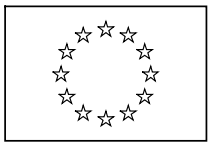

EUROPEAN COMMISSION
Directorate-General XII, III, XIII, XVII

European Commission

Copernicus 1998

Funded joint research projects, concerted actions and accompanying measures

Environmental protection
Environmental and health consequences of ionising radiation
Health
Non-nuclear energy (demonstration projects)
Non-nuclear energy (research projects)
Advanced communications and telematic applications
Information technologies
Industrial technologies and material research
Agro-food
Social sciences

Edited by J.L. Blanc, C. Deschamps
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Preface

After the historic changes in the Eastern part of Europe, the European Union initiated a comprehensive programme of scientific and technological cooperation with the countries of Central and Eastern Europe.

This cooperation started in 1992. In order to have a positive impact on the economy of these countries, an effort has been made to focus on a limited number of key areas. In particular, attention has been paid to the research activities related to industry and especially those activities involving SMEs.

This publication covers the second call for proposals (1998) issued under the Fourth Framework Programme. The scientific areas were chosen following a broad consultation of scientists through the Internet and other channels. More than 2000 scientists reacted to this consultation.

Since 1992, the Central European countries have witnessed radical changes in the economy, the organization of society and the research environment. The cooperation under the Copernicus Programme has significantly contributed to enhance research in Central Europe and has paved the way for future cooperation on an equal footing with Western European scientists. Ten Central European countries are now ready to be fully associated to the Fifth Framework Programme. That is why these countries' problems are not anymore separately addressed under the international cooperation activity of the Fifth Framework Programme.

The NIS (New Independent States of the former Soviet Union) have been included in the Copernicus Programme since 1994. The Copernicus Programme will continue under the Fifth Framework Programme in specific areas of mutual interest such as environment, health...

This publication provides a summary of the COPERNICUS projects selected and financed in 1998. From among 1931 proposals, involving 10 236 proposing teams, 235 projects were selected (1574 teams funded), for which an amount of ECU 53 million was allocated.

J. Gabolde

TABLE OF CONTENT

INTRODUCTION

COPERNICUS 1998

History

Actions undertaken in parallel of the Third Framework Programme for Community activities in the field of research and technological development

1989 : The Eastern Block breaks down. Following the request of the G7[1] at the Summit of the Arch, the European Commission launches a series of initiatives to help the Countries of Central and Eastern Europe (CCEE) to restructure their economy :

-1990: PHARE[2] which includes some activities related to the research but of which the contribution to the restructuration of the research in the CCEE is necessarily limited.

-1991: eight specific cooperation projects in science and technology to supplement PHARE. These projects, which cover the main CCEE, are launched with strong support of the Parliament, who conciders that scientific and technological cooperation is of major importance to the integration process.

-1992 : PECO[3]-Copernicus[4]. This very large call open to the Central European Countries (CEC) allows them to take part in the Third Framework Programme (FP3). This call includes five types of actions : fellowship, support for conferences, for scientific network[5], for joint projects and for participation in COST projects. It received 12398 proposals of which 3 200 were funded for a total budjet of 93 MECU.

-1993 : Funding of large number of proposals of the Copernicus call 92. These very good proposals hadn't been funded in 92 because of a lack of money.

-1993-94 : Participation in the FP3 is again the subject of special PECO actions. In 1994, the action also includes the New Independant States of the Former Soviet Union (NIS) (a "team" can contain a NIS country in addition to the obligatory two CCEE and the european one).

-1994 : PECO-Copernicus' support for scientific network[4] and joint projects continues under the name Copernicus 1994 and becomes open to the NIS. By the side of these actions, PECO 1994 takes care of the further support for participation in the 3rd FP open programmes.

The 1994 Copernicus call for proposals, more focused in order to better achieve the general objectives of cooperation with Central Europe and mutual benefit, received nearly 1700 proposals. 220 of these proposals were selected for funding for a total amount of 63 MECU. The proposals concerned Information Technologies, Communication Technologies, Materials, Measurement & Testing, Agro-food and Biotechnology.

Cooperation with the CCE and NIS included in the Fourth Framework Programme

26 April 1994 : the FP4 is adopted. It has a duration of five years (1994-98) and a budjet of ECU 12.3 billion. The second action line of this programme is INCO (International Cooperation). The CCE/NIS part is called INCO-Copernicus.

October 1995 : INCO-Copernicus' first call under the Fourth Framework Programme is launched (closing date on 29 February 1996). This is the first action to be open on an equal footing to the CCE and NIS. The main aim of Copernicus 1995-96 was to enable them to be associated with the generation of knowledge and innovative technologies needed to solve their specific problems and to achieve sustainable economic development. Three types of actions (joint research project, concerted actions and accompanying measures) were used to minimize the tendency of brain-drain from Central and Eastern countries and give them a maximum of chances to maintain and improve their S&T know-how.

This cooperation with CCE/NIS was divided in twelve sectors covering three targeted research sectors : stabilization of the R&D potential, environmental protection and health and RDT targeted industry.
The call was followed by 1931 proposals. After evaluation, 299 of them were funded for a total of 77,5 MECU.

[1] 7 more industrialised countries
[2] Poland and Hungary: Aid for the Reconstruction of the Economy
[3] Pays d'Europe Centrale et Orientale, Countries of Central and Eastern Europe
[4] Community of Pan-European Research Network of Interdisciplinary Centres and Universities in Sciences
[5] Support also called concerted actions

OBJECTIVES OF COPERNICUS 1998

Being complementary to Inco-copernicus first call (1995/96), Copernicus 1998 main objectives remain, through the funding of RDT projects, to help CCE[6] and NIS [7]to solve problems of social, economic and ecological importance. The second call of the Fourth Framework Programme aims at the intensification of the cooperation in the fields of RDT where these countries are in the first line on a world level. The stabilization of RTD potential, or safeguarding of highly qualified human resources in the countries concerned and in fields of mutual interest, forms an integral part of this cooperation.

In order to focus on the objectives defined, 10 sectors were chosen which are complementary to those already covered by the specific programmes of the Fourth Framework Programme which are open to CCE and European NIS.

Three types of actions have been used :

JOINT RESEARCH PROJECTS
CONCERTED ACTIONS
ACCOMPANYING MEASURES

These actions have different but complementary roles in minimizing the tendency of brain-drain from Central and Eastern Countries and in giving a maximum of chances to maintain and improve the S&T know-how of these countries.

Joint Research Projects (RDT projects carried out by entities, research centers, universities…) aim to bring together a multinational team to carry out precompetitive research and development and achieve collaborative results on a specific research topic. They are focused on transferring and developing knowledge and technologies likely to contribute to the rehabilitation of the economy via an efficient transfer of research results and their application in the productive systems. The strengthening of the relation between university research and industry in the countries concerned has been an important consideration.

Concerted Actions (coordination of RDT projects already funded by public authorities or private bodies) are groupings/networks of research teams sharing common long-term technological goals that closely coordinate their activities. They aim to coordinate, across borders, research and development activities which are already under way within the individual countries and to promote circulation of scientific and technical information, re-establish contact among scientists and engineers of Central and Eastern Europe and of the European Union and to stimulate the innovation process. A further objective is to support prenormative activities by disseminating the scientific know-/how and technical requirements necessary to establish norms, standards and codes of good practice, so as to facilitate the transfer of new technologies to manufacturing and other industries.

Accompanying Measures (concern RTD indirect actions provided they are in the interest of the Community)
Applicable to :
-studies in support of the programme
-support for exchange of information
-conferences
-workshops and seminars
-scientific publications, including dissemination, promotion and utilisation of results
-training activities related to research covered by this programme

[6] Albania, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia
[7] Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgystan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

The targeted research sectors

The scientific and technical cooperation with CCE/NIS is divided into four principal sectors : stabilization of RDT potential, environmental protection and health, RDT targeted on industry, and « other ».

Stabilization of RTD potential:

As indicated above, stabilization of RTD potential is one of the objectives of this cooperation with the CCE/NIS. The stated objective is to safeguard highly qualified human resources in the countries concerned and in fields of mutual interest. Since safeguarding RTD potential is a subject of general interest, it forms in the COPERNICUS Programme an integral part of the sectors Environmental Protection and Health, and RTD targeted on industry.

Environmental Protection and Health

1) Environmental Protection
2) Environmental Consequences of Ionising Radiation
3) Health Research Activities
4) Non-Nuclear Energy (demonstration projects)
5) Non-Nuclear Energy (research projects)

RTD targeted on industry

6) Advanced Communications and Telematic Applications
7) Information Technologies
8) Industrial Technologies and Material Research
9) Agro-Food

Other

10) Social Sciences

COPERNICUS 1998 : OVERVIEW OF THE CALL FOR PROPOSALS AND ITS RESULTS

The 1998 call is the second call under the Fourth Framework Programme, it complements the first call (1996) in view to cover most of the work programme concerning cooperation with Eastern Countries.

Participation was open to all legal entities, i.e. to natural persons, legal persons and national or regional organizations established in the Members States of the European Union and in the CCE/NIS (industrial firms-both large companies and SMEs-Universities, higher education institutes, research organizations, etc.) and to the Joint Research Centre.

The minimum requirements for consortium was 2 Members States and 1 CCE/NIS country for joint research projects and 2 participants from the East for concerted actions. Preference was given to a bigger consortium, the average is 5 participants in a consortium for a joint research project.

COPERNICUS is contributing to the familiarization of East European scientists with the EU-programmes (research of partners, forms to be filled out, ...) and helps for participation to the specific programmes.
The second call was published the 15th April 1997. A total of 1300 proposals were submitted to the commission service, involving more than 7600 participants with a total funding request of 398 MECU.
After evaluation, 235 propositions were accepted for funding for an amount of 53,37 MECU.

The distribution over the different sectors was as follows :

SECTOR	***RECEIVED PROPOSALS***	***FUNDED PROJECTS***
1. Environmental protection	316	52
2. Environmental & health consequences of ionising radiation	134	21
3. Health research activities	201	41
4. Non-nuclear energy (Demonstration projects)	86	10
5. Non-nuclear energy (Research projects, CA & AM)	113	16
6. Advanced communications and telematics applications	20	7
7. Information technologies	137	34
8. Industrial technologies & material research	119	24
9. Agro-food	118	16
10. Social sciences	56	14
TOTAL	***1300***	***235***

The synopses provide information on all the activities (projects) being launched as a result of the call. Summarized information by sector is given below.

SECTOR 1 : ENVIRONMENTAL PROTECTION

Its principal objective is the conservation and utilisation of natural ressources with a view to balance environmentally sustainable long-term economic development. Sustainable management of basic natural resources such as soils, water and biotic resources and on the restoration and/or mitigation of the damage already caused by the growth of urban, industrial and agricultural structures.

The priority areas covered are :

Sustainable management of forestry resources
Sustainable water management
Sustainable soil management

The dynamics of these resources should be examined in depth, putting the accent on the interdependence between land, water and biological resources and the potential regional and global implications of the dynamics of the ecosystems involved (forests, wetlands, drylands, etc) with a view to their long-term management. Special attention should be given to the analysis of the potential for alternative forms of economic use and the search for general or sectoral policy options, which could promote the sustainable use of natural resources.

SECTOR 1	***RECEIVED PROPOSALS***	***FUNDED PROJECTS***
Sustainable management of forestry resources	69	15
Sustainable water management	178	27
Sustainable soil management	69	10
TOTAL	***316***	***52***

SECTOR 2 : ENVIRONMENTAL & HEALTH CONSEQUENCES OF IONISING RADIATION

Operations of nuclear facilities and nuclear accidents have led in the past to severe contamination of territories and ecosystems with radioactive materials and to exposure of certain groups of people to substantial chronic doses of ionising radiation in Central European Countries, in particular in the former Soviet Union.
Research proposals should address these main objectives:

- Study of the interaction mechanisms for radionuclides in different ecosystems using up-to-date methods in soil and vegetation science, land use assessment and Geographical Information Systems for vulnerability assessment. The knowledge gained should be applied in environmental restoration scenarios.

- Determination of health effects arising in, and radiation doses received by, groups of exposed people, such as Chernobyl accident liquidators, residents along the Techa river and Mayak nuclear workers (Southern Urals).

This sector comprises two priority areas :

Environment

Radioactive contamination of catchments and groundwater:
Analysis of soil vulnerability to radionuclides:
Further development of rehabilitation approaches after environmental radioactive contamination:

Health

Biosample databank for radiation exposed populations:
Late effects in over-exposed accident victims:
Validation of data and methods for epidemiological studies of chronically radiation exposed populations:

SECTOR 2	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Environment	85	12
Health	49	9
TOTAL	***134***	***21***

SECTOR 3 : HEALTH RESEARCH ACTIVITIES

Principal objectives :

- Research activities addressing to the solution of health problems inherited from the past and related to the political and economic reform process in the CCE/NIS.

- Analysis, comparison and assessment of the situation, whereby priority should be given to research leading to more efficient health care systems including management and financing aspects.

- Improvement of public health by supporting the epidemiological research potential, and by prevention and early diagnosis of diseases. In addition, the research on infectious diseases should be limited to those that are of proven relevance to CCE/NIS such as: diphtheria, tuberculosis, toxic coliform, salmonelleses, staphylococci carrying toxin genes, lyme, chlamydiosis, papilloma viruses, hepatitis viruses B and C.

The priority areas covered are :

Research in health care systems
Advanced diagnostics and prognostic in epidemiology
Forum on Health Services Research (Accompanying Measures)

Organization of a Forum on the theme of the reform process of health care systems in economies in transition.
This Forum should bring together public health experts, consultants, policy makers, health care institutes and users of health care and should give an opportunity for exchanging views and experience between western European countries and countries from CCE/NIS.

SECTOR 3	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Research in health care systems	80	16
Advanced diagnostics and prognostic in epidemiology	117	24
Forum on Health Services Research	4	1
TOTAL	***201***	***41***

SECTOR 4 : NON-NUCLEAR ENERGY (Demonstration projects)

The provision of clean and efficient energy technologies aims at ensuring durable and reliable energy services at affordable costs and conditions. At the same time, it helps to reduce the impact of both the production and use of energy on the environment in CCE/NIS countries, and thereby contributes to a sustainable development of these countries both on economic and social grounds.

For instance, in the industry sector, the use of efficient and environmentally-friendly technologies is the way to stabilize and modernize local RTD structures while reducing energy intensity which proves to be between two and seven times higher than the average in Western European countries. Demonstration of new technologies in areas indicated below is therefore an objective which meets the mutual political, industrial and environmental interests both of the EU and of the CCE/NIS countries.

The priority areas covered are :
Renewable energies (RES)

Solar energy: thermal applications, photovoltaics.
Wind energy
Geothermal : use of low temperature resources.
Biomass and waste : biomass and waste production used as fuel for decentralised heat an power.

SECTOR 4	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Solar energy	44	4
Wind energy	13	3
Geothermal	13	2
Biomass and waste	16	1
TOTAL	***86***	***10***

SECTOR 5 : NON-NUCLEAR ENERGY (Research projects, CA & AM)[8]

The objectives are:

- To reduce the impact of the production and use of energy, in particular the emissions of CO_2;
- To strengthen the technological basis of the energy industry with benefits for the economy, employment and export potential, improving social and economic cohesion;
- The exploration and assessment of new concepts and policy instruments to foster clean and efficient energy technologies.

The priority areas covered are :

Clean use of fossil fuels : Rational Use of Energy (R.U.E) in buildings, transport and industry

- RUE in buildings : Research should contribute to the integration of innovative technologies and best practice. Preference will be given to approaches which will have potential for use in the retrofit of existing buildings as well as in new buildings.
- RUE in industry : Consortia should include both developers and the potential users of technologies being researched together with a commitment to exploit a successful outcome. Research should focus on those technologies which have the potential for substantial energy savings, normally at least 20% beyond the best available technology and a reduction in environmental pollution.
- RUE in public transport : Development of implementation support strategies and the associated vehicle and infrastructure technologies to guide the phased introduction of more cost-effective cleaner technologies for transport.

Coal and lignites : optimisation of combustion and gasification processes including

- The combined combustion of coal blends and coal with biomass, residues and/or wastes.
- The development of basic technologies needed for clean and efficient combustion processes.

Concerted Actions are encouraged in the field of coal based integrated gasification combined cycle.

*Energy-environment-economic Forum (*Accompanying Measures*)*

SECTOR 5	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Clean use of fossil fuels	67	7
Coal and lignites	38	9
Energy-environment-economic Forum	8	0
TOTAL	***113***	***16***

8 Joint Research Projects, Concerted Actions & Accompanying Measures

SECTOR 6 : ADVANCED COMMUNICATIONS AND TELEMATICS APPLICATIONS

Accompanying Measures which contribute to the creation of the Global Information Society in the CCE/NIS related to successful projects and actions which have recently ended or end in the near future in the framework of INCO-Copernicus, ACTS or Telematics applications programmes.

SECTOR 6	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Advanced communications and telematics applications	20	7
TOTAL	***20***	***7***

SECTOR 7 : INFORMATION TECHNOLOGIES

Information Technology related to the Information Society with emphasis on research oriented actions as defined in the Action Plan of the '1996 CEEC/EU FORUM' on the Information Society.

The priority areas covered are

Multi Media Systems
Multi linguistic tools
Geographical Information Systems
Research Networks

Proposals may also be submitted for Keep In Touch (KIT) actions for successful projects under international cooperation activity which have recently ended or which will end before 30.06.1998.

Proposals have strong regional aspects in the CCE/NIS and contribute to the involvement of CCE/NIS in the Global Information Society and should be related to activities as specified in the Action Plan resulting from the second CEEC/EU FORUM held in Prague in September 1996.

SECTOR 7	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Multi Media Systems	42	7
Multi linguistic tools	17	3
Geographical Information System	20	4
Research Networks	47	14
KIT	11	6
TOTAL	***137***	***34***

SECTOR 8 : INDUSTRIAL TECHNOLOGIES & MATERIAL RESEARCH [9]

The networks which will be launched in this fields should focus on the particular needs and weaknesses of industrial technologies and material research in many CCE and NIS. They will be targeted at achieving three important tasks at the same time:

- to develop sustainable, clean technologies which from the environmental point of view are an improvement to previous forms of productions and/or products,
- to improve cooperation between science and industry, in particular with small and medium size enterprises (SMEs),
- to develop strategies on how to achieve a future industrial application of the scientific results.

The proposers should clearly explain what particular weaknesses the network wishes to overcome by the actions, the originality of their proposal and which means are foreseen. A thorough analysis of the necessity for change, the present technology and the industrial situation is required.

SECTOR 8	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Industrial technologies & material research	119	24
TOTAL	***119***	***24***

9 Limited to Concerted Actions

SECTOR 9 : AGRO-FOOD

The Objectives

- Development of new technologies and optimizing existing food processes leading to safe, high-quality and environment-friendly food products.
- Use of natural products and systems for food preservation, including natural food additives.

The priority areas covered are :

Process optimisation

- Improvement of traditional processing and storage techniques.
- Development of rapid methods for assessing the quality of raw materials and food products.
- Modelling and simulation of unit operations, processes and plants.
- Reduction of damage to the environment from food processing.
- Improvement of packaging materials and packaging processes.
- Use of natural food additives (e.g. bacteriocins, spices...) to extend the shelflife of products.

Food safety

- Effects of processing and preservation techniques on pathogens including viruses.
- Microbial ecology, particularly the competition between microflora in complex food systems.
- Predictive microbiology with emphasis to the validation of models on real food systems.
- Chronic influence of potential residues in foods and interaction of compounds which have a positive or negative health effect.
- Rapid on-line sensor technology for assessing safety-related factors (toxins, pathogens,...).

SECTOR 9	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Process optimisation	88	12
Food safety	30	4
TOTAL	***118***	***16***

SECTOR 10 : SOCIAL SCIENCES

Research in this field is targeted towards two particular policy questions of CCE and NIS. The themes of research are narrowly defined and should deliver original information to policy makers.

It is expected that new and comparative empirical data will be generated.

Research

The priority areas covered are :

One of the most important themes in the transition towards competitive market economies in the CCE and NIS is the modernisation of traditional industries and the generation of innovative technologies. The analysis of success stories and their conditions or the factors hindering the process should contribute to improve future strategies and improve conditions for innovation and modernisation of industries.

Illicit drug trafficking has become a major issue in the CCE and the NIS. Patterns and factors should be investigated to contribute to policy making in this area. Proposals should investigate the particular situation in the CCE and NIS in relation to the EU:

- Supply and distribution systems
- Economic conditions and mechanisms
- Social conditions and mechanisms

SECTOR 10	**RECEIVED PROPOSALS**	**FUNDED PROJECTS**
Condition for innovation and modernisation of industries	51	11
Illicit drug trafficking	5	3
TOTAL	***56***	***14***

FOURTH FRAMEWORK PROGRAMME (1994-1998)

The political objective of bringing together the two parts of Europe separated since the end of the Second World War is leading to the progressive integration of R&D in the countries of Eastern Europe and that of the West. In this spirit, the cooperation with those countries which, until now, has been considered to be a preparatory measure and has been financed on the basis of annual decisions, will hence'forth be fully integrated in the Fourth Framework Programme of Research and Technological Development (RTD).

It has been decided to open all the specific programmes to European third countries, notably the Central and East European countries.

The main goals for RTD cooperation with CCE and NIS countries are :

- to help to safeguard the RTD potential;
- to help to solve RTD problems of social, economic and ecological importance;
- to intensify cooperation in the regions of RTD where these countries are in the first line of a world level.

THE SYNOPSES

The main section of this volume gives the synopses of the selected projects of COPERNICUS 1998, grouped in 10 parts by research sectors.

To be found are : the abstracts of the projects (with the objectives and the foreseen results)
the names of the coordinators
the partnerships
the keywords

The projects cover fields belonging to the competence of different Directorates General of the European Commission. For each part, the name, office address and fax number of the scientific officer is indicated below (mailing address for all is : Rue de la Loi, 200, B-1049 Bruxelles) :

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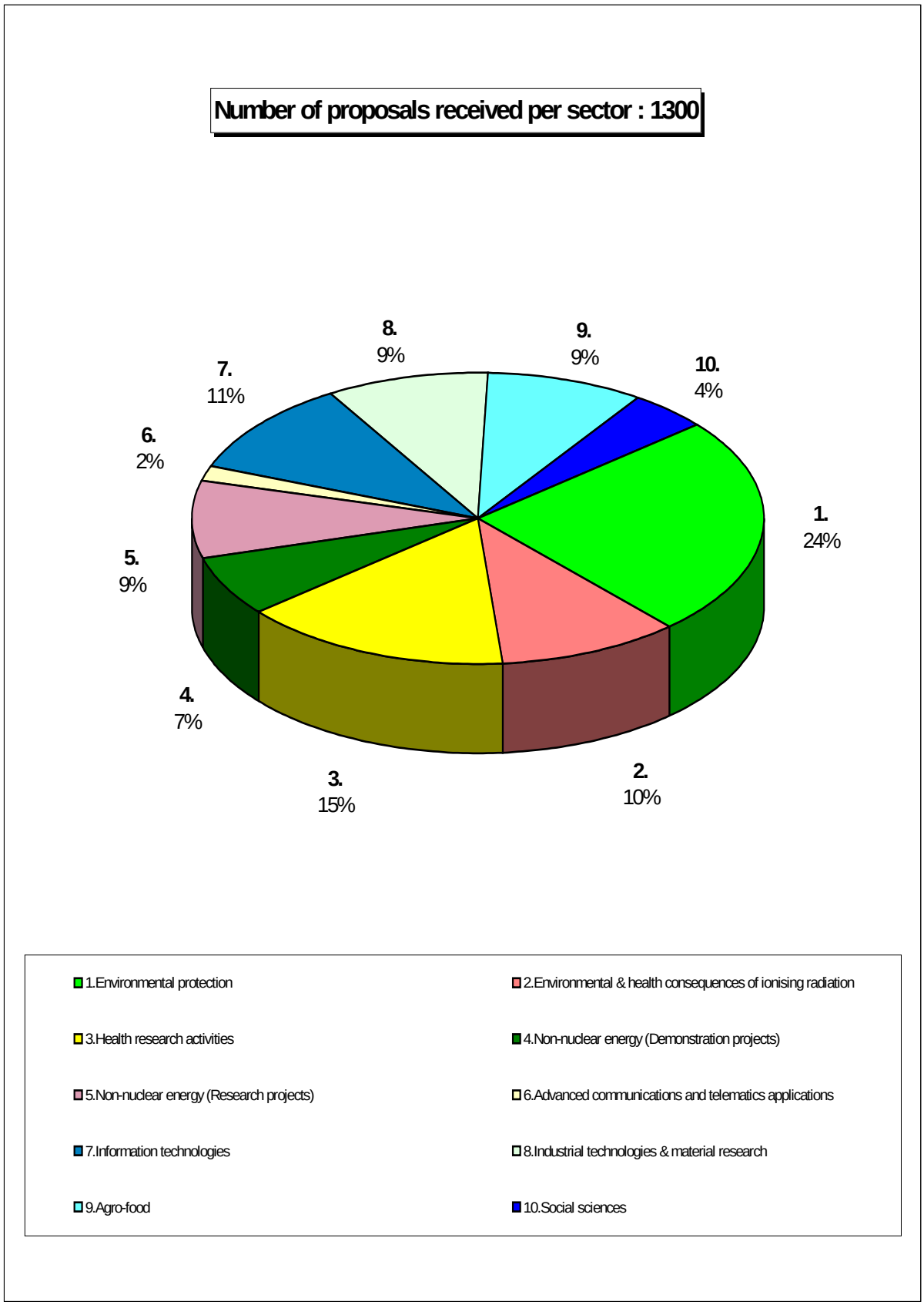
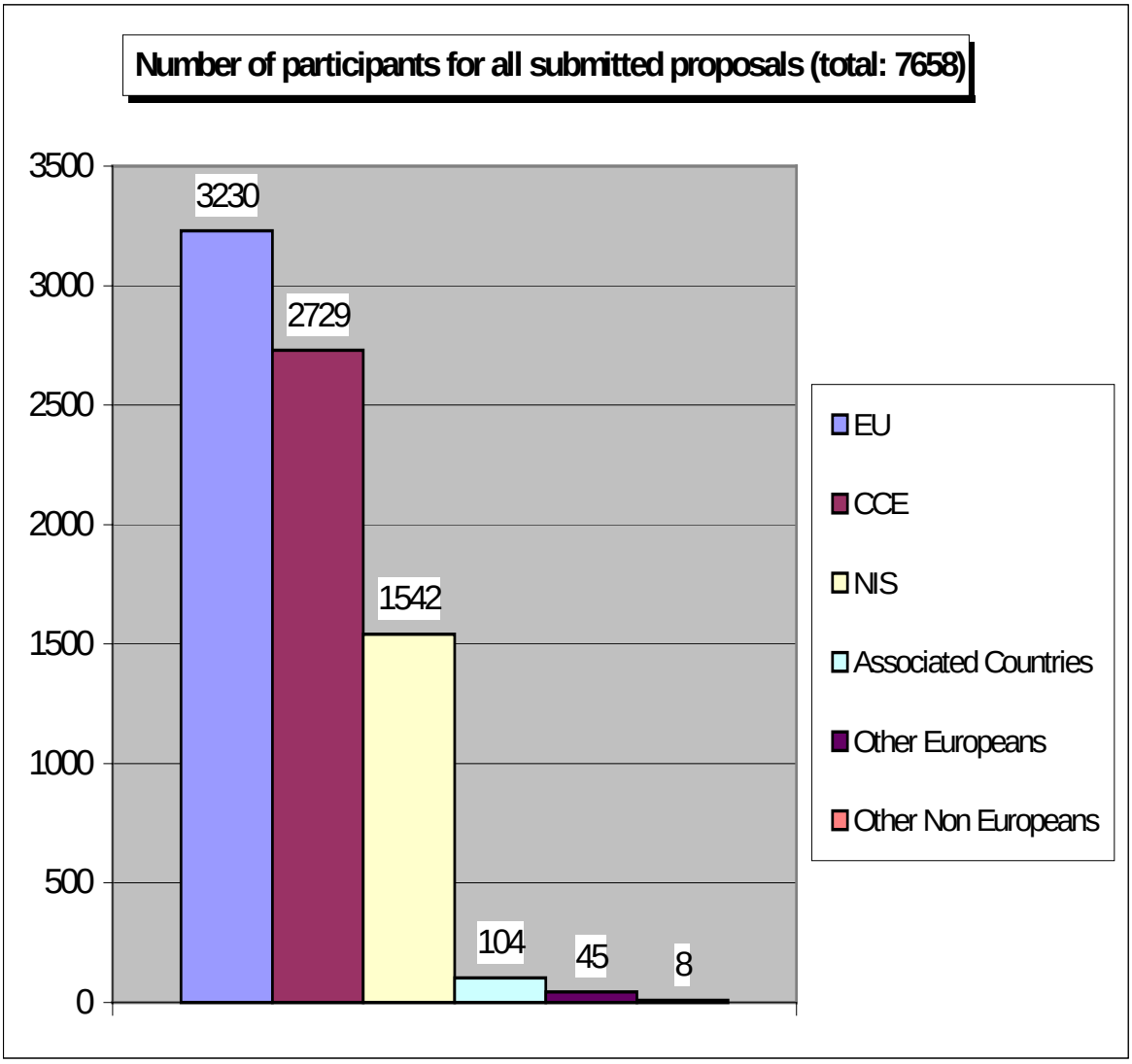

Number of proposals received per sector : 1300
8.
9%
9.
9%
10.
4%
7.
11%
6.
2%
1.
24%
5.
9%
4.
7%
3.
15%
2.
10%
1.Environmental protection
2.Environmental & health consequences of ionising radiation
3.Health research activities
4.Non-nuclear energy (Demonstration projects)
5.Non-nuclear energy (Research projects)
6.Advanced communications and telematics applications
7.Information technologies
8.Industrial technologies & material research
9.Agro-food
10.Social sciences

Distribution of 7658 participants for all submitted proposals

Country/sector		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
EU	Austria	48	16	26	10	14	3	24	6	10	6	163
	Belgium	35	26	17	4	9	2	11	15	20	7	146
	Denmark	17	8	19	6	10	1	7	6	5	5	84
	Finland	39	8	24	5	18	1	7	6	3	6	117
	France	69	52	57	22	31	16	43	61	29	11	391
	Germany	137	59	85	48	57	15	69	64	49	25	608
	Greece	45	18	20	26	17	8	35	21	21	5	216
	Ireland	15	4	8	3	5	1	4	5	11	5	61
	Italy	87	25	56	19	25	7	37	49	25	4	334
	Luxembourg	1	4	0	0	0	0	5	0	0	0	10
	Netherlands	52	20	44	5	16	6	31	17	19	12	222
	Portugal	19	2	3	8	8	0	7	17	10	0	74
	Spain	49	10	18	7	18	5	22	22	28	8	187
	Sweden	42	15	29	3	15	2	6	12	12	2	138
	United Kingdom	91	51	80	15	47	12	58	56	47	22	479
Total EU		***746***	***318***	***486***	***181***	***290***	***79***	***366***	***357***	***289***	***118***	***3230***
CCE	Albania	3	1	4	1	1	2	2	2	1	0	17
	Bosnia-Herzegovina	8	1	2	0	1	1	1	2	0	0	16
	Bulgaria	72	28	46	13	31	24	64	33	56	15	382
	Czech Republic	83	35	57	21	50	9	56	63	45	9	428
	Estonia	22	4	27	4	6	1	5	7	2	2	80
	FYROM	3	0	7	2	4	3	3	1	0	4	27
	Hungary	92	20	50	11	36	6	47	39	56	28	385
	Latvia	5	6	29	3	5	4	12	8	5	2	79
	Lithuania	11	4	28	9	2	4	10	9	15	15	107
	Poland	106	12	57	18	48	4	38	78	48	21	430
	Romania	76	8	43	26	29	10	45	78	30	18	363
	Slovak Republic	62	16	43	7	18	4	28	32	35	15	260
	Slovenia	30	7	17	6	20	6	23	30	12	4	155
Total CCE		***573***	***142***	***410***	***121***	***251***	***78***	***334***	***382***	***305***	***133***	***2729***

Country/sector		1	2	3	4	5	6	7	8	9	10	Total
NIS	Armenia	3	2	6	4	2	2	8	0	0	1	28
	Azerbaijan	0	1	3	0	0	0	2	0	0	1	7
	Belarus	14	34	11	2	13	4	14	21	8	2	123
	Georgia	13	1	7	3	1	1	2	0	2	1	31
	Kazakhstan	20	19	16	10	3	2	14	11	7	3	105
	Kyrgyzstan	5	5	4	1	1	0	3	0	0	0	19
	Moldova	17	0	8	4	2	2	3	6	2	4	48
	Russia	162	109	114	31	71	13	76	105	51	34	766
	Tajikistan	1	0	2	2	0	0	2	0	0	0	7
	Turkmenistan	4	1	2	3	0	0	3	0	0	0	13
	Ukraine	67	80	39	19	26	6	22	55	20	8	342
	Uzbekistan	20	0	6	9	2	1	4	2	3	6	53
Total NIS		***326***	***252***	***218***	***88***	***121***	***31***	***153***	***200***	***93***	***60***	***1542***
Associated	Iceland	2	0	1	2	0	0	1	0	0	0	6
	Israel	17	4	6	1	5	0	2	5	11	4	55
	Liechtenstein	0	2	1	0	0	0	1	0	0	0	4
	Norway	11	9	8	0	2	0	1	2	6	0	39
Total associated		***30***	***15***	***16***	***4***	***7***	***0***	***5***	***7***	***17***	***4***	***104***
Other europeans	Croatia	1	0	4	0	0	0	1	0	3	0	9
	Cyprus	0	0	0	0	0	0	1	0	0	0	1
	Malta	0	0	0	0	0	1	0	0	0	0	1
	Switzerland	7	6	2	2	2	0	7	1	3	0	30
	Turkey	0	0	0	0	0	1	0	0	1	0	2
	Yugoslavia	1	0	0	0	0	0	1	0	0	0	2
Total other europeans		***9***	***6***	***6***	***2***	***2***	***2***	***10***	***1***	***7***	***0***	***45***
Other non europeans	Australia	1	0	2	0	0	0	0	0	0	0	3
	Canada	0	0	0	0	1	1	1	0	0	1	4
	South Africa	0	0	0	0	0	0	0	1	0	0	1
Total other non-europeans		***1***	***0***	***2***	***0***	***1***	***1***	***1***	***1***	***0***	***1***	***8***
Total by sector		***1685***	***733***	***1138***	***395***	***672***	***191***	***869***	***950***	***711***	***316***	***7658***

Sector 1: Environmental protection
Sector 2 : Environmental and health consequences of ionising radiation
Sector 3 : Health research activities
Sector 4 : Non-nuclear energy (demonstration projects)
Sector 5 : Non-nuclear energy (research projects)
Sector 6 : Advanced communications and telematic applications
Sector 7 : Information technologies
Sector 8 : Industrial technologies and material research
Sector 9 : Agro-food
Sector 10 :Social sciences

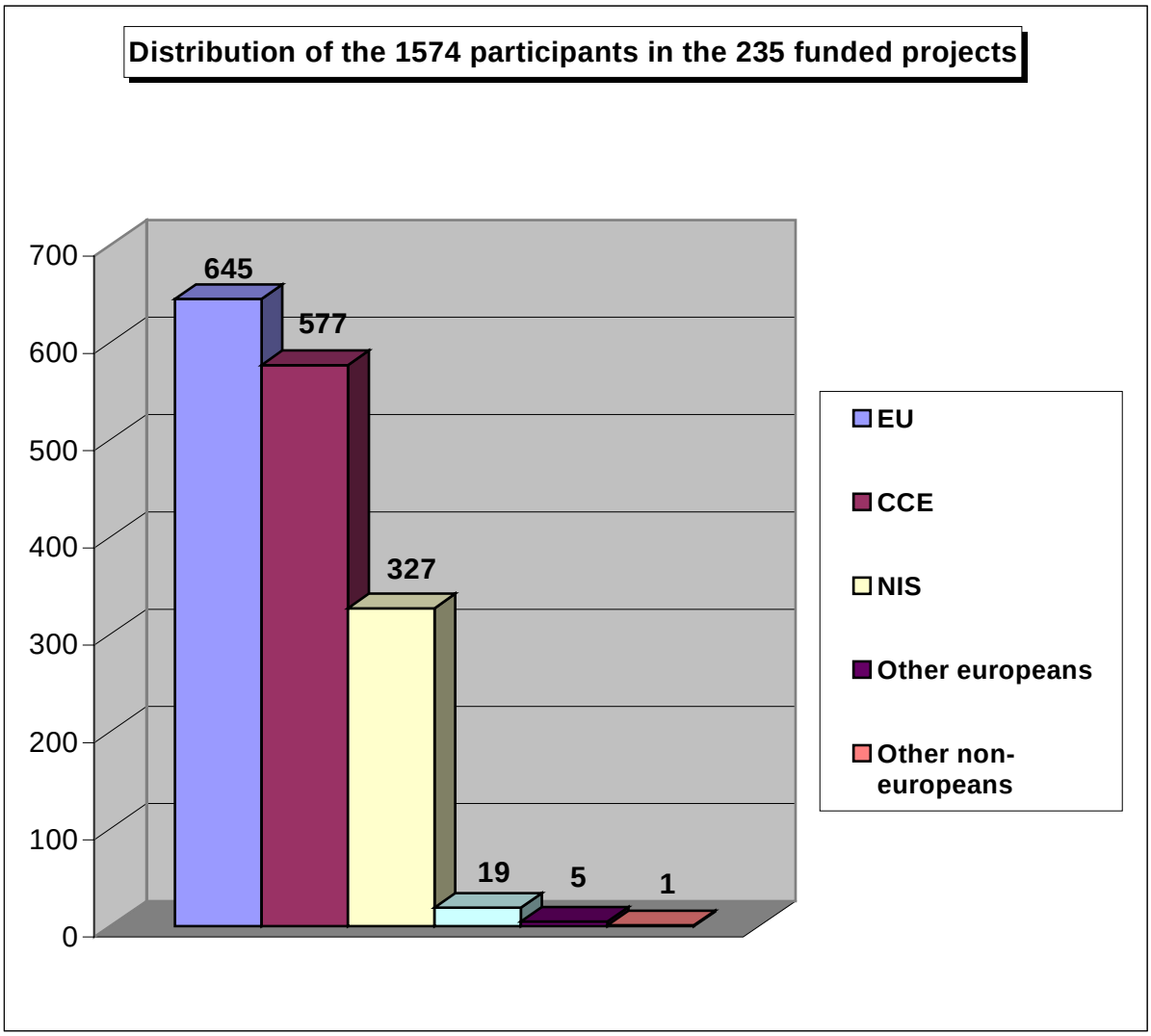

Number of participants for all submitted proposals (total: 7658)
3500
3000
2500
2000
1500
1000
500
0
3230
2729
1542
104
45
8
EU
CCE
NIS
Associated Countries
Other Europeans
Other Non Europeans

Distribution of the 1574 participants for all funded proposals

Country/Sector		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
EU	Austria	2	0	2	4	0	2	5	0	2	2	19
	Belgium	3	1	5	0	2	1	4	3	5	4	30
	Denmark	3	2	7	0	2	0	3	3	0	2	21
	Finland	6	2	8	1	0	0	3	3	0	1	25
	France	15	6	5	2	7	4	14	14	2	5	74
	Germany	22	8	19	5	8	3	24	19	5	6	119
	Greece	4	1	2	5	2	2	10	3	2	1	32
	Ireland	2	1	2	0	1	1	1	2	3	1	14
	Italy	15	2	10	0	3	2	15	15	4	1	67
	Luxembourg	0	0	0	0	0	0	1	0	0	0	1
	Netherlands	13	5	13	0	1	1	11	6	0	2	52
	Portugal	3	1	1	2	0	0	4	4	2	0	17
	Spain	13	2	3	0	0	2	1	5	2	3	31
	Sweden	11	4	9	1	1	1	6	3	4	0	40
	United Kingdom	17	14	17	1	7	2	21	9	9	6	103
Total EU		***129***	***49***	***103***	***21***	***34***	***21***	***123***	***89***	***40***	***36***	***645***
CCE	Albania	0	0	0	0	0	1	0	0	0	0	1
	Bosnia-Herzegovina	1	0	0	0	0	0	0	0	0	0	1
	Bulgaria	11	2	14	1	5	3	23	7	6	1	73
	Czech Republic	15	5	11	1	8	4	23	22	6	3	98
	Estonia	4	0	13	2	0	1	3	1	0	1	25
	FYROM	1	0	0	0	0	0	2	0	0	1	4
	Hungary	19	2	10	2	5	1	22	11	4	3	79
	Latvia	1	0	13	0	0	3	3	0	0	2	22
	Lithuania	0	1	8	0	0	1	4	3	2	3	22
	Poland	21	1	18	1	6	2	16	17	4	3	89
	Romania	11	0	12	5	8	2	15	10	2	4	69
	Slovak republic	12	3	11	1	1	2	13	6	7	1	57
	Slovenia	6	0	3	4	2	3	7	8	2	2	37
Total CCE		***102***	***14***	***113***	***17***	***35***	***23***	***131***	***85***	***33***	***24***	***577***

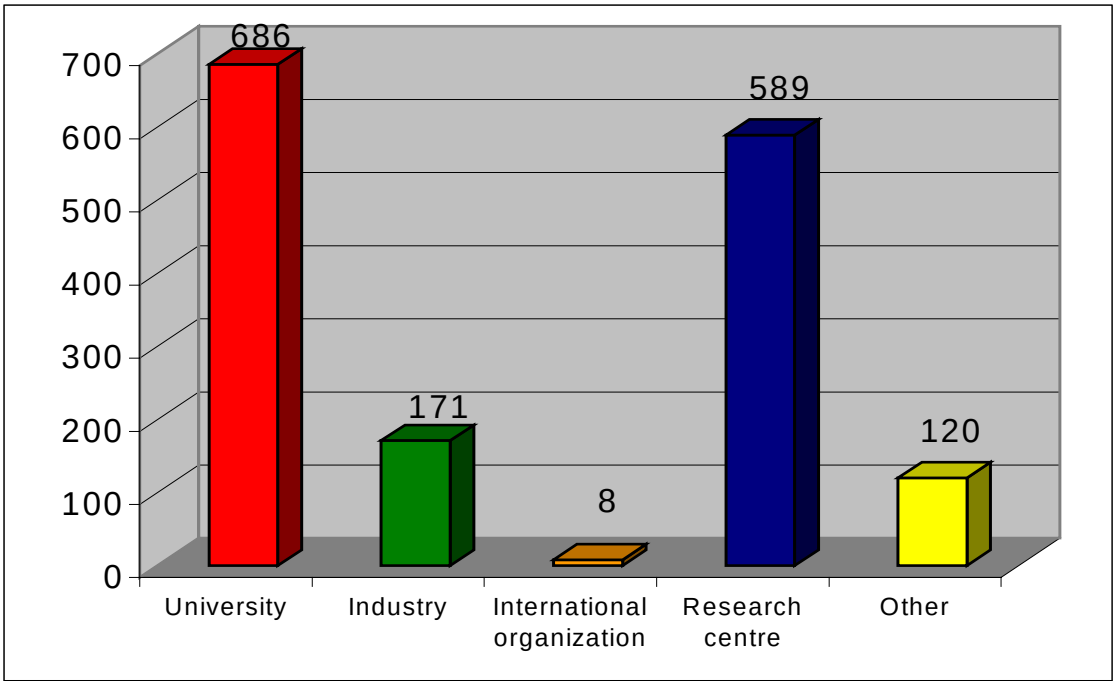
Country/sector		1	2	3	4	5	6	7	8	9	10	Total
NIS	Armenia	0	0	1	2	0	0	1	0	0	1	5
	Azerbaijan	0	0	0	0	0	0	1	0	0	0	1
	Belarus	3	4	5	0	1	1	8	8	0	1	31
	Georgia	1	0	0	0	0	0	1	0	0	1	3
	Kazakhstan	8	4	3	1	1	0	3	0	1	0	21
	Kyrgyzstan	0	0	0	0	1	0	2	0	0	0	3
	Moldova	4	0	1	0	0	0	1	2	0	1	9
	Russia	36	23	26	2	10	3	19	29	10	13	171
	Tajikistan	1	0	0	0	0	0	1	0	0	0	2
	Turkmenistan	2	0	0	0	0	0	1	0	0	0	3
	Ukraine	13	12	5	1	7	2	9	9	3	3	64
	Uzbekistan	5	0	1	3	1	1	2	0	1	0	14
Total NIS		***73***	***43***	***42***	***9***	***21***	***7***	***49***	***48***	***15***	***20***	***327***
Associated	Iceland	0	0	0	1	0	0	1	0	0	0	2
	Israel	4	0	0	0	0	0	0	1	1	0	6
	Norway	2	5	4	0	0	0	0	0	0	0	11
Total associated		***6***	***5***	***4***	***1***	***0***	***0***	***1***	***1***	***1***	***0***	***19***
Other Europeans	Cyprus	0	0	0	0	0	0	1	0	0	0	1
	Switzerland	2	0	0	0	0	0	1	0	0	0	3
	Turkey	0	0	0	0	0	1	0	0	0	0	1
Total other europeans		***2***	***0***	***0***	***0***	***0***	***1***	***2***	***0***	***0***	***0***	***5***
Other non-europeans	Australia	0	0	1	0	0	0	0	0	0	0	1
Total other non-europeans		***0***	***0***	***1***	***0***	***0***	***1***	***0***	***1***	***0***	***0***	***3***
Total by sector		***312***	***111***	***263***	***48***	***90***	***52***	***306***	***223***	***89***	***80***	***1574***

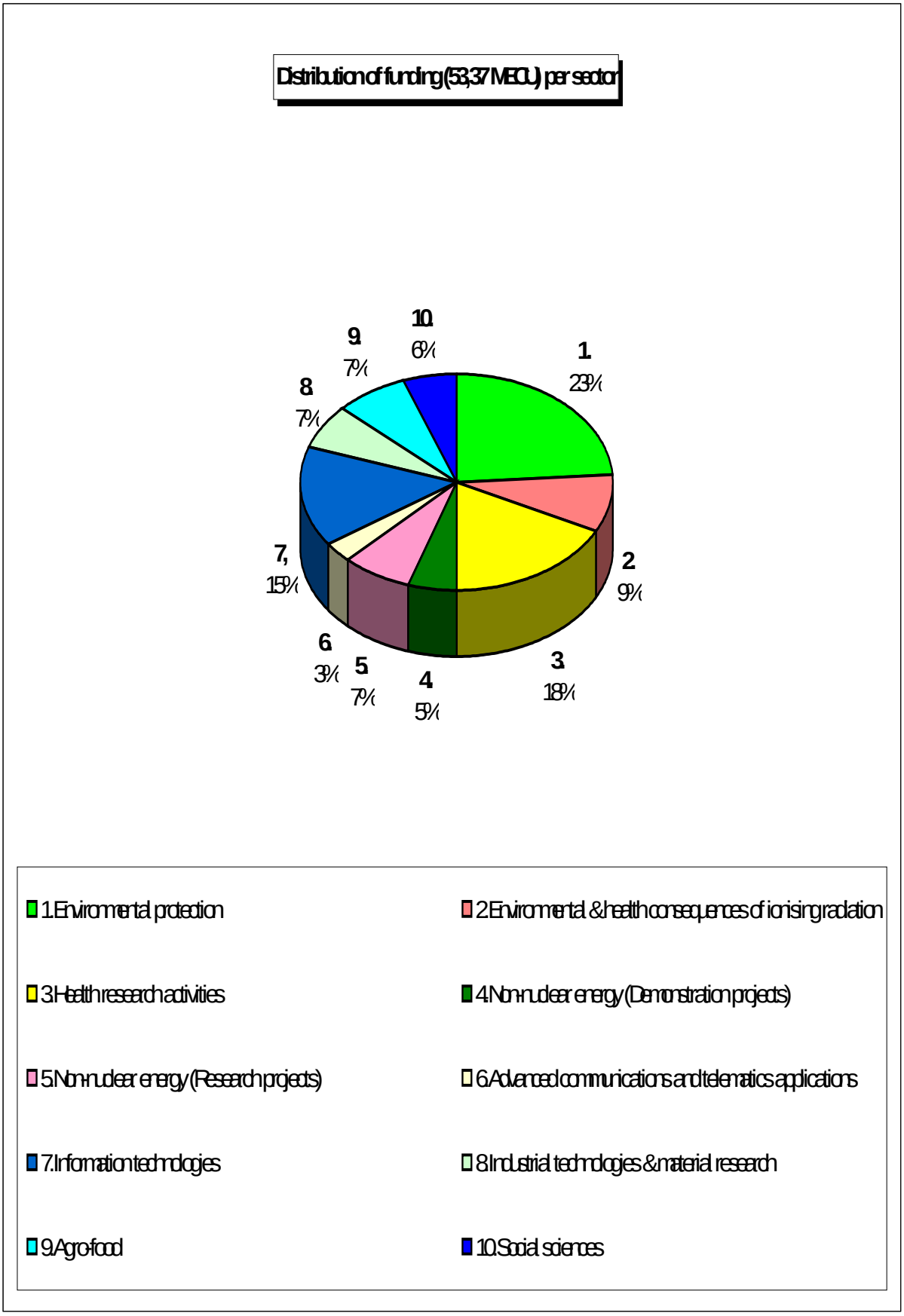
Sector 1: Environmental protection
Sector 2 : Environmental and health consequences of ionising radiation
Sector 3 : Health research activities
Sector 4 : Non-nuclear energy (demonstration projects)
Sector 5 : Non-nuclear energy (research projects)
Sector 6 : Advanced communications and telematic applications
Sector 7 : Information technologies
Sector 8 : Industrial technologies and material research
Sector 9 : Agro-food
Sector 10 :Social sciences


Distribution of the 1574 participants in the 235 funded projects
700
600
500
400
300
200
100
0
645
577
327
19
5
1
EU
CCE
NIS
Other europeans
Other non-europeans

Distribution of the 1574 participants by categories of partners for 235 funded projects

Sector		University	Industry	International organisation	Research center	Other
1	Environmental protection	139	24	2	137	10
2	Environmental and health consequences of ionising radiation	25	3	1	74	8
3	Health research activities	122	8	2	103	28
4	Non-nuclear energy (demonstration projects)	6	22	1	10	9
5	Non-nuclear energy (research projects)	37	16	0	36	1
6	Advanced communication and telematic applications	29	5	2	11	5
7	Information technologies	135	46	0	85	40
8	Industrial technologies and material research	97	34	0	85	7
9	Agro-food	56	10	0	23	0
10	Social sciences	44	3	0	25	12
Total		***686***	***171***	***8***	***589***	***120***




Distribution of funding (533,37 MECU) per sector
10.
6%
9.
7%
1.
23%
8.
7%
2
9%
7,
15%
6.
3%
5.
7%
4.
5%
3.
18%
1. Environmental protection
2. Environmental & health consequences of ionising radiation
3. Health research activities
4. Non-nuclear energy (Demonstration projects)
5. Non-nuclear energy (Research projects)
6. Advanced communications and telematics applications
7. Information technologies
8. Industrial technologies & material research
9. Agro-food
10. Social sciences

ENVIRONMENTAL PROTECTION

LOW-INPUT AGRICULTURE AND SOIL SUSTAINABILITY IN EASTERN EUROPE

Contract ref. :	***ERBIC15CT980101***	***EC Scientific Officer***
Proposal ref. :	***PL971006***	Mr Michele GENOVESE
Type :	*J oint Research Proj ect*	Fax : +32 2 2963308
Duration :	***36 Months***	E-mail michele.genovese@dg12.cec.be
Start date :	01/09/1998	
End date :	31/08/2001	
EC contribution :	*2 0 5 .0 0 0 ECU*	

Project coordinator
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CCE Partners

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NIS Partners

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1006

Project

Low-input Agriculture and Soil Sustainability in Eastern Europe (LASSEE)

Keywords

Soil sustainability, low-input agriculture, Eastern Europe, modelling, long-term experiments, GIS

Objectives and Contents

Since the political changes in eastern Europe in the early 1990s, state subsidies to agriculture have greatly decreased or ceased, meaning that in many eastern European countries, the application of inorganic fertilizers to agricultural land has greatly decreased. These changes have led to widespread decreases in yield. In terms of environmental impacts this may have positive and negative effects. On the positive side, the amounts of N leached have probably decreased but on the negative side, there has probably been a decrease in the residues (roots, stubble etc.) being returned annually to the soil. Such large-scale changes may have implications for future soil sustainability since both attainable yields and soil organic matter levels may decrease, thus compromising the soil's ability to continue to supply adequate nutrients for plant (crop) growth.
In the former Soviet Union there are a large number of long-term agronomic experiments at which, in recent years due to financial difficulties, treatments (e.g. inorganic fertilizer application) have ceased (L. Schevtsova, pers. comm.). This situation parallels the cesation of inorganic fertilizer use on the majority of agricultural land in eastern Europe since the early 1990s and provides a unique opportunity to monitor changes in soil sustainability as measured by chnages in SOM, soil N pools and N leaching after the cesation of long-term application of inorganic fertilizers.
Through the use this data, in combination with state-of-the-art dynamic simulation models (SUNDIAL) and GIS databases, this project provides an opportunity to a) examine the likely effects of low-input fertilizer regimes at the regional level, and b) suggest alternative sustainable management practices to preserve future soil fertility and minimise leaching.

Forseen results

- Define the likely effects of the new low-input fertilizer regimes in eastern Europe on soil sustainability and fertility (as measured by changes in soil organic matter (SOM) status, changes in pools of soil N, and changes in N leaching)
- Provide a methodology for assessing these impacts at the regional scale (with a regional application in Hungary)
- Suggest alternative, sustainable management practices to preserve soil fertility and examine the impact of these practices at the regional level
-From (c) above, suggest policy options for long-term, environmentally-sustainable agricultural development, with particular emphasis on eastern Europe.

GROWTH OF SILVER BIRCH AT ELEVATED LEVELS OF CARBON DIOXIDE AND OZONE: ACCLIMATIONS IN PHOTOSYNTESIS, INJURIES AND PROTECTION BY ASCORBATE AND TERPENES

Contract ref. : ***ERBIC15CT980102***
Proposal ref. : ***PL971019***
Type : *J oint Research Proj ect*
Duration : ***36 Months***
Start date : 01/09/1998
End date : 31/08/2001
EC contribution : *3 7 5 .0 0 0 ECU*

EC Scientific Officer
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Consiglio Nazionale delle Ricerche. Istituto di Biochimica ed Ecofisiologia Vegetali	185 Roma	Italy

CCE Partners

Institute of Ecology - Estonian Academy of Sciences.	1 Tallinn	Estonia

NIS Partners

Institute of Plant Physiology and Genetics - Tajik Academy of Science. Laboratory of Physiology and Biochemistry	734063 Dushanbe	Tajikistan

1019

Project

Groth of silver birch at elevated levels of carbon dioxide and ozone: acclimations in photosynthesis, injuries and protection by ascorbate and terpenes

Keywords

Birch, carbon dioxide, ozone, photosynthesis

Objectives and Contents

According to the predictions from recent growth models climate change will alter the species distribution in boreal forest: Growth of the conifers will benefit from the climate change only slightly or even decline, while deciduous trees and particularly birch are predicted to benefit from climate change. The predictions are complicated with the fact that air pollutants, like ozone, will ultimately interfere with processes of climate change. At present we have no information about effects of climate change and ozone on silver birch under field conditions, and therefore this project will focus on these issues. This work will produce detailed information about the effects of elevated levels of O_3 and CO_2, separately and in combination, on cell integrity, ascorbate levels, terpene emission and characteristics of photosynthetic machinery in leaves of silver birch. The innovations of the project are a complex approach and nondestructive methods used for the measurements of photosynthetic characteristics.
Saplings of two previously selected fast-growing clones of silver birch, one ozone sensitive and one ozone tolerant are exposed to: 1) outside control; 2) chamber control; 3) O_3 -treatment (2 $*$ background O_3); 4) CO_2 -treatment (720 ppm) and 5) O_3 + CO_2 -treatment (2 * background O_3 + 720 ppm CO_2). During three consecutive growing seasons the following measurements will be carried out: 1) electron micrographs of cells to detect injuries; 2) the concentrations of ascorbate in mesophyll cells and cell walls; 3) emission of isoprene from leaves; 4) nondestructive *in vivo* measurements of various photosynthetic parameters describing light harvesting, photosynthetic electron transport and CO_2 fixation.

Foreseen Results

The obtained information will be available for the modelling of growth of birch trees. Mathematical models of tree growth that are able to consider the presence of elevated levels of O_3 and CO_2 will be used for the prediction of the responses of boreal forests to climate changes, thus helping for sustainable management of these forests in future.

REUSE OF BIOMASS OF AGRO-INDUSTRIAL ORIGIN FOR SOILS FERTILISATION AND SUSTAINABLE AGRICULTURE

Contract ref. :	***ERBIC15CT980103***	***EC Scientific Officer***
Proposal ref. :	***PL971021***	Mr Michele GENOVESE
Type :	*J oint Research Proj ect*	Fax : +32 2 2963308
Duration :	***36 Months***	E-mail michele.genovese@dg12.cec.be
Start date :	01/12/1998	
End date :	30/11/2001	
EC contribution :	*3 3 0 .0 0 0 ECU*	

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CCE Partners

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NIS Partners

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National Scientific Centre for Medical and Biotechnical Research. Laboratory of Environmental Biotechnology	252601 Kiev	Ukraine
Small Enterprise CORUND"".	327038 Ukraine	Ukraine

1021

Project

Reuse of biomass of agro-industrial origin for soil fertilisation and sustainable agriculture

Keywords

Agriculture, Biomass, Environment, Fertilisation, Soil

Objectives and Contents

Objectives of the research consist in the study and evaluation of the aspects concerning the reuse and recycling of different biosolids (biomasses) in agriculture, paying particular attention to the soil-plant ecosystem and to those aspects which reduce environmental impact and pollution. The organic waste materials to be studied within the project will be raw and stabilised industrial wastes, municipal sewage sludges, and agricultural organic by-products composts produced in the countries of this network. Unproper use of biomasses in agriculture can produce several risk of pollution. The proposed research is aimed to support a more appropriate management of the waste materials in order i) to close the natural cycling of the elements (micro and macronutrients), ii) to improve soil fertility and iii) to decrease the environmental impact of the wastes and the costs of landfills disposal. The research has an European dimension , since the problem of the reuse of biosolids in agriculture is very important for all the countries from both the West or the Est.
The raw materials can not be directly used in agriculture as organic fertilisers, but they must be subjected to a composting process to obtain stabilised final products having an high amount of humic substances. Such substances constitute the fraction of organic matter particularly important for soil fertility and for environmental protection.
Therefore microbiological, biochemical, chemical and biotechnological aspects involved in the stabilisation of the organic matter during the composting processes of biomasses will be studied. At the same time the agronomical and environmental effects of the biomass distribution to the soil and the technological aspects of know how transfer to industrial level on European countries will be take in consideration.
The proposed activities will include: 1) the activation of two pilot composting treatment plants (“Caviro”, Italy and “Corund”, Ukraine); 2) the monitoring of important factors influencing the composting processes (microbial biomass, temperature, pH, etc.); 3) the study of microbiological and enzymatic aspects of the composting processes, 4) the study of important enzymes, such as laccase, involved in the composting processes; 5) the chemical and biochemical characterisation of the organic fractions during different period of stabilisation; 6) the monitoring the agronomical and environmental behaviour of the raw and stabilised organic wastes in long-term field plot trials; 7) the monitoring of the mobility of pollutants (i.e. heavy metals) in amended soils with biomasses; 8) the behaviour and effect of biomasses on phosphate (P) short- and long-term sorption in soils amended with biomasses; 9) the chemical characterisation of the organic fractions extracted and fractionated from the amended soils.

Foreseen Results

The expected results are: 1) increase of knowledge in the stabilisation (humification) processes of the organic matter of organic wastes; 2) individuation and evaluation of specific enzymes which the key role play in humification process; 3) identification of the best agronomic practices to be used when soils are fertilised with raw and stabilised organic wastes; 4) evaluation of the impact of the use of biomasses as organic fertilisers on soil pollution by heavy metals in long-term field experiments; 5) behaviour (sorption, desorption, precipitation, insolubilisation) of phosphorus in different type of soils amended with biomasses related to plant growth and risk assessment of eutrophication; 6) bio-technological information on the composting processes of biomasses; 7) transferring of experience concerning treatment of organic wastes within the partners; 8) resolution of specific scientific and bio-technical points under collaboration within the research teams; 9) stabilisation of RTD potential in the participating Eastern teams; 10) industrial trials of composting processes using pilot-plants of the industrial partners which take part in the project.
The results will be disseminated through publications in the prestigious international journals and through data presentation on relevant scientific meetings.

FOREST SUCCESSIONS IN THE CENTRAL AND EASTERN EUROPE: MARKOV-CHAIN MODELS AS A TOOL FOR LONG-TERM PREDICTIONS AND MANAGEMENTS

Contract ref. : ***ERBIC15CT980104***
Proposal ref. : ***PL971022***
Type : *J oint Research Proj ect*
Duration : ***42 Months***
Start date : 01/11/1998
End date : 30/04/2002
EC contribution : *1 9 0 .0 0 0 ECU*

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State Nature Reserve 'Bryanskii Les'. Research Department Sizemskii Region	242180 Bryanskaya Oblast,	Russia

1022

Project

Forest successions in the Central and Eastern Europe: Markov-chain models as a tool for long-term predictions and management

Keywords

Case studies, mountain forest, broad-leaved forest, successions, climax states, subclimax states, modelling, Markov chains, long-term prediction, management strategies, risk assessment

Objectives and Contents

The Project is aimed at further development of scientific bases for sustainable management of forestry resources through studying the current trends and predicting the future states in successional dynamics of particular forests typical for the Central and Eastern Europe.
Specific objectives are:
- To determine the natural (potential) course and the outcome of successions under the (hypothetical) lack of pressure and disturbances;
- To find the actual (plausible) course and the outcome of succession under the current and future pressures and disturbances;
- To quantify the above knowledge in terms of area distributions among particular forest types and average time it takes to reach those distributions;
- To define the events of ecological risk related to ecosystem degradation and to determine the path of succession vulnerable to those events;
- To study long-term consequences of alternative management or/and rehabilitation scenarios and to calculate the profiles of ecological risk conjugated to each scenario.
The methodology is based upon a new kind of Markov-chain models which are applicable also under changing environmental conditions.

The models shall be developed for and applied to 3 typical situations represented by 3 case studies in the 3 corresponding regions:

1. A mountain forest degrading under the current air-pollution and other anthropogenic pressures, („Erzgebirge", south-east Germany);
2. A broad-leaved-coniferous forest under controllable cutting and renewal strategies (Russkii Les Forestry, Moscow Region, Russia);
3. A broad-leafed forest under reserve conditions (Bryanskii Les Reserve, Bryansk Region, Russia).

Foreseen Results

New methods for long-term predictions of forest dynamics under different conditions and recommendations on practical measures to facilitate and accelerate the course of rehabilitation successions.

ADAPTATION OF EFFICIENT WATER CRITERIA IN MARGINAL REGIONS OF EUROPE AND MEDDLE ASIA WITH SCARCE SOURCES SUBJECT TO ENVIRONMENTAL CONTROL, CLIMATE CHANGES AND SOCIO-ECONOMIC DEVELOPMENT

Contract ref. :	***ERBIC15CT980105***	***EC Scientific Officer***
Proposal ref. :	***PL971046***	Mr Michele GENOVESE
Type :	*J oint Research Proj ect*	Fax : +32 2 2963308
Duration :	***42 Months***	E-mail michele.genovese@dg12.cec.be
Start date :	01/11/1998	
End date :	30/04/2002	
EC contribution :	*1 9 0 .0 0 0 ECU*	

Project coordinator
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1046

Project

Adaptation of efficient water use criteria in Marginal Regions of Europe and Middle Asia with scarce sources subject to environmental control, climate changes and socio-economic development

Keywords

Water quality and management, irrigation efficiency, environmental control, climatic changes, crop water eequirements, heat and water regimes modelling.

Objectives and Contents

Resent scarcity of water in arid and semi-arid regions has promoted the search for extra sources currently not intensively exploited. Additionally, natural fluctuations of climatic parameters and their changes provoke environmental changes, in consequence of global warming conformably to the various scenarios of socio-economic regions. This research is to increase the efficiency of regional water use and improve the environmental control for areas of interest regarding to climate and socio-economic changes. It can be achieved by developing and implementing of the recommendation for substitution of the conventional resources (e.g. fresh surface water and groundwater) for satisfying water present and expected requirements in agriculture (mainly for irrigation) by unconventional water resource, like municipal wastewater, water shortage, deterioration of water quality and environmental constrains, have to lead to an increase interest in reuse of treated wastewater in many parts of the world. The international research group of this project are scientists with a large experience on Water Management in Marginal Irrigated Regions: 1) East Europe - North Caucasus economic region of Russia Federation (basicaly Kabardin - Bakarian region) and some Bulgaria irrigated regions; 2) West Europe - Arid and semi-arid Mediterranean regions (Faro / Algarve and Barcelona regions); 3) Midle Asia - Uzbekistan region, and additionally Israel (wich is also an arid region, located in the Mediterranean Basin). These regions have limited water resources and specially the reuse of treated wastewater for agriculture will be appropriate solution for efficient water management and environment protection.
The overall objectives of this research are:
- Estimation of regional climate changes due to global warming and growth of greenhouse gases retained in the atmosphere.
- Evaluation of crop water requirements and total water demand for irrigation regarding to present weather-plant-soil conditions and estimation of irrigation parameters sensitivity to the regional climate changes corresponding to various levels of global warming.
- The estimation of opportunities for the development of irrigation with wastewater in the study regions (quality and quantity) and development of recommendations on rational collection and treatment of wastewater.
- Selection of the most appropriate for watewater use in regions of interest irrigation technologies and determination together with avoiding any hazard for environment and human health.

Foreseen Results

The main result of the proposed research will be the development of the criteria for the efficient strategy in water managemet. The efficient strategy will be a trigger for further economic development, together with environmental protection, specially in conditions of expected global warming. In the examined regions, methods will be developed of water management, in the Former Soviet Region, in centralized planned management of economy. Advanced methods should guarantee the opportunity of the choice from the wide spectrum of alternate water use variants. The decision wich give the possibility to realize the reasonably sustainable economic projects and to develop the flexible system of indicators for substantiation of rational water use in conditions of free market economy. According to the obtained results, a manuscrit will be prepared for publication which contain the issues and recommendations on methods of the analyses and alternative forecasting of optimal regional water use, based on the complex examination of natural economic regions or separate national and sub-national administrative units chosen.

SIDASS - A SPATIALLY DISTRIBUTED SIMULATION MODEL PREDICTING THE DYNAMICS OF AGROPHYSICAL SOIL STATE WITHIN EASTERN AND WESTERN EUROPE COUNTRIES FOR THE SELECTION OF MANAGEMENT PRACTICES TO PREVENT SOIL EROSION BASED ON SUSTAINABLE SOIL-WATER INTERACTIONS.

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1051

Project

SIDASS - a spatially distributed Simulation model predicting the Dynamics of Agrophysical Soil State within Eastern and Western Europe countries for the selection of management practices to prevent soil erosion based on sustainable soil-water interactions.

Keywords

Soil erosion, agrophysical soil state; soil-water interactions

Objectives and Contents

The general objectives of the proposed research are :

- To link under the same conceptual and predicting tool of the developments in various fields of soil physics (soil-machine interaction, pedotransfer functions, soil structure as influenced by various management systems, elc.), agriculture management (ti lage systems, crop rotations, risk analysis), mathematical simulation (site specific and spatially distributed simulation models for crop yield, water dynamics in soil-crop-atmosphere continuum) with soil erosion induced by changing the soil physical properties in the topsoil

- To develop using available field experimental data of modules characterising soilmachine interaction effects on soil parameters used as input in the simulation models for soil erosion, crop yield7 water dynamics in soil-crop-atmosphere continuum;

- To developing algorithms predicting changes in soil erosion produced by the modification of the soil-water interactions in the topsoil as a consequence of soil compaction and soil tillage;

- To Use the simulation models for space and time extrapolations of the field experimental data OQ the effects of various tillage systems on soil physical properties, soil erosion and croo yield allowing a site-specifik risk analysis. This also implies possible change of tillage systems (e.g. excessive conventional up to conservative tillage practices);

-To defining soil erosion sustainable soil-water and soil mechanics interactions using the pedotransfer functions;

- The evaluation of alternative management practices using various target Functions: diminishing so:! erosion, environment protection, economic efficiency, food security, etc.;

- The optimisation of strategies to be used to have a maximum-economic-benefit and an environment-friendly-agriculture preventing soil erosion based on sustainable soil-water interactions;

-To create the framework of an European-wide database of **machinery and tillage** parameters related to soil physical properties;' estimation of the potential effects induced by the degradation of the soil physical state by soil erosion on natural neighbouring resources (ground~vater and fresh surface waters);

- To develop small software modules to be utilised by local individual farmers as decision support systems regarding management practices scenarios on short and long term.

- The pointing of the gaps in the specific research to be filled in the future.

Foreseen Results

The project will provide sub-programs linking the available (site-specific and regional) simulation models for water dynamics, soil erosion and crop **yield formation, with management** and machinery induced problems on soil-water interactions related to soil erosion problems.

There is not the object of the project developing special simulation models for crop yield and/or mass transport in soil-crop-atmosphere system. Such models developed previously have a more or less site specific or sub-regional character. The proposed project will focus on the overlaps between various models related mainly to soil input parameters which are affected by soil-machine interactions.

SYSTEM FOR WATER MONITORING AND SUSTAINABLE MANAGEMENT BASED ON GROUND STATIONS AND SATELLITE IMAGES

Contract ref. :	***ERBIC15CT980107***	***EC Scientific Officer***
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1053

Project

Large System for Water Monitoring and Sustainable Management Based on Ground Stations and Satellite Images

Keywords

Water monitoring, radio-computer system, satellite image filtration, mathematical modelling, numerical methods, data processing

Objectives and Contents

A monitoring system in water management of the transborder rivers in the southern part of the Balkans will be developed. The rivers in this region have become extremely polluted as a result of industrial growth. This fact set the pattern for the need of their permanent monitoring. Therefore this project concerns the analysis of water quality, sources of pollution as well as forecasts and recommendations about future industrial productions.

There are a great number of cascades and of dammed lakes in this region, and these areas are highly important in the following aspects:
- reservoir for drinking water and irrigation
- protection of the purity of the water in the Mediterranean
- avoiding disasters

Therefore another aim of the proposed research is to forecast and to support control of balance and quantity of the water by observation of the snow cover in the catchment areas and of meteorological conditions. The main objective of the project is to create a research laboratory for water monitoring.
Research activity will be directed to create a selfacting radio-computer system for the ground stations, and further, to develop mathematical models of the river systems. The data from the ground stations together with the satellite information will be collected. Hence, another research topic is how to organize and process these data for effective use by modern information technologies and knowledge based decision support systems.

Foreseen Results

Selfacting radio-computer system for collecting, control and management of the water resources; algorithms for satellite image filtration, edge and regional detection, and methods for multispectral classification of water and snow cover; mathematical modelling of the river systems, which can be refined, improved and applied to other problems; numerical techniques and software; perspectives to further observation of other types of objects as wood, soil, agricultural crops and plants; preserving the scientific potential through the inclusion of research workers, lectures, post-graduate students and students in the treatment of the project; dissemination of results through seminars and publications; information directed to the state institution and the governing body of the enterprises.

MANAGING INPUTS OF NUTRIENTS TO AVOID INSUFFICIENT OR EXCESS (MAINTAINE)

Contract ref. :	***ERBIC15CT980108***	***EC Scientific Officer***
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1055

Project

Managing Inputs of Nutrients To Avoid Insufficient or Excess (MAINTAINE)

Keywords

Manure, slurry, nutrients, fertilizer recommendations, soil tests, nutrient balance

Objectives and Contents

Sustainable farming requires maintaining soil fertility (nutrients and organic matter): fertility should not be too low that crop productivity and soil structure are affected, nor should it be too high that there is the risk of excessive nutrient loss to the environment. This latter point is particularly important for nitrogen (nitrate to water, ammonia to the atmosphere) and phosphorus (surface run-off to waters).

To optimise this management, the aim must be to develop a fertilizer recommendation scheme (RS) that balances inputs and outputs of nutrients, thus fulfilling the concept of sustainable farming practices. The main inputs are available nutrients in the soil and the nutrients and organic matter from animal manures. The main productive output is plant nutrient uptake. The system is balanced by the necessary amounts of mineral fertilizer. The control measures for the scheme validity are soil fertility tests and the concentration of nutrients in soil water.

The overall objective of the project is therefore to assess the current nutrient status of CEC farming systems and to utilize fully the nutrients and organic matter from animal manures and mineral fertilizers to avoid nutrient depletion or excess in soils. This will be achieved through the following:

Exchange and agreement of analytical, experimental and informational techniques to be used within the project.
Quantification of current manure and nutrient loadings to soils
Quantification of current soil nutrient status on farms
Calculation of nutrient balances on ‘typical’ farms
Refining current fertilizer recommendations
Assessment of the recommendation system in small-plot experiments
Transfer of results to the end-user

Foreseen Results

The project will provide:
- A measure, under ‘typical’ farming systems, of current soil nutrient status and current farm nutrient balances. This is important to assess the medium and long-term effects on soil sustainability (and the environment). We see that this information will be useful to farmers, advisors and policy makers, and will be particularly relevant as agricultural production increases and, perhaps, farm structures begin to change.
- Practical, farm oriented advice on nutrient management, with the emphasis very much on providing useful, usable information. Again, we see this targeted at farmers and their advisors, but it will be of use to policy makers in formulating environmental protection policies.

SOLID WATER MANAGEMENT IN AGRICULTURAL PRODUCTION IN URBAN AREAS OF CCE/NIS COUNTRIES (SWAPUA)

Contract ref. :	***ERBIC15CT980109***	***EC Scientific Officer***
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1067

Project

Soil and water management in agricultural production in urban areas of CCE/NIS countries (SWAPUA)

Keywords

Soil and water management, urban agriculture, urban environment (depending on used listings of EU)

Objectives and Contents

Urban agricultural activities have played an important role for food production, income and employment, and recreation in CEE/NIS countries for a long time and the scarce data available indicate that the importance of urban agriculture has increased under the economic pressure of the transformation process.

1. The assessment of the status, potential and problems of agricultural activities in urban areas in CEE/NIS-countries, with special emphasis on soil and water management, and documentation of best practices. Five institutions in CEE/NIS countries will carry out country and city surveys.
2. In cooperation with local organisations, the formulation of local policies and innovative action-research programmes on urban agriculture in at least one city in each of the five CEE/NIS countries participating in the project.
3. The establishment of a network of researchers, policy makers, city administrations, urban planners and other stakeholders.
4. The development and dissemination of a policy framework for the integration of urban agriculture in urban planning and administration.

The research is innovative and makes considerable steps forward in the development of sustainable resource management in urban areas in Central and Eastern Europe, since:
- The environmental effects of urban agriculture and especially its role in sustainable soil and water management in urban areas is analysed.
- City administrators and urban planners are made aware of the potentials of urban agriculture as an important component of urban development policies and resource management strategies.
- Local stakeholders are incorporated in the research process and research, local policy development, and action planning are directly linked
- Western experience and knowledge is used to strengthen research and development in CEE/NIS countries
- The research results are disseminated to a large number of cities in Central and Eastern Europe

Foreseen results

- Resource directory and a bibliographic database are compiled
- Homepage, interactive bulletin, and networking among research partners are established.
- Country and city surveys with harmonised research methodologies are carried out in at least two cities in each of five Central and Eastern European countries and reports on the country and city surveys with photographic and cartographic materials are prepared.
- “Best Practices” of soil and water management in urban agriculture are identified and decriptive documents and video films on “Best Practices” are produced.
- Local policy recommendations are formulated in cooperation with local organisations and city administrators in five cities/countries.
- Local action programmes are formulated in cooperation with active participation of local stakeholders.
- Experience in urban agriculture, participatory research and planning approaches, and soil and water management of Western European institutions is used to develop capacities in CCE/NIS countries.
- Policy framework for the integration of urban agriculture in urban policies and administration and its role in sustainable resource management (especially soil and water) CCE/NIS cisties is drafted and revised with participation of administrators and planners of European cities at dissemination workshop.
-Specific presentations of results for implementation are prepared and results are disseminated among urban administrators, urban planners, scientists, local stakeholders including small and medium scale industries.

DEVELOPMENT OF NEW GENERATION OF ULTRASONIC EQUIPMENT AND PROCESSES OF PHYSICAL AND CHEMICAL ACTION ON WATER TREATMENT, SET UP THE PILOT INSTALATION AND TECHNOLOGIES (ULTRAWAT)

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1069

Project

Development of new generation of ultrasonic equipment for physical and chemical processes in water treatment, the set up of the technologies and pilot installations

Keywords

Ultrasound, photolysis, particle separation, water decontamination

Objectives and Contents

- Design of a complete apparatus for the ultrasonic treatment of water.
- Development of ultrasonically assisted advanced oxidation processes for the clean up of waste water resulting from chemical and industrial processes.
- Enhancement of chlorine and ozone treatment of drinking water by ultrasonic action.
- Development of a technology for the activation of ion-exchange resin used in water treatment.
- Development of innovative economically favourable ultrasonically assisted technologies for coagulation and flocculation.

The purification of water by the removal of chemical contaminants such as pesticides (organofluorine and nitroaromatic compounds) and biological hazards (bacteria and viruses) which are dangerous to both human health and to the environment is an important and urgent requirement. In some cases the concentrations of these pollutants are so low that the conventional and widely used adsorption methods are no longer effective. One of the most promising routes to water purification is based on the oxidation of chemical impurities by atmospheric oxygen or other oxidizing agents. The low reactivity of some dangerous impurities require enhanced oxidation and disinfection methodologies using extreme conditions involving acoustic cavitation, or irradiation with ultraviolet light. Under these conditions, a greater concentration of radicals are generated to provide efficient remediation.

In the framework of this project it is intended to develop a new generation of ultrasonic equipment for water treatment to be used in enhanced oxidation technologies. Ultraviolet light is already used on a large scale although the process does have some drawbacks. The combined use of ultrasound with ultraviolet radiation will combat these drawbacks and result in major improvements including shorter processing times, reduced energy requirements and a better quality of the resulting water. Ultrasound alone has been used on an industrial scale for the clean up of potable and waste water for the reduction in quantity of coagulating particles required and the dispersion of materials used in water treatment. It has also been used to improve disinfection by chlorine and ozone.

Applications of ultrasound for water treatment has been a subject of research for several of the participants: Coventry University (U.K.), Institute Nationale Polytechnique (Toulouse, France) and the Institute of Ultrasonic Systems (Moscow). The Institute of Water Purification and Irrigation (Uzbekistan) and Hydrotechnologia (Slovakia) are involved in commercial large scale water purification and will contribute that expertise to the group. Sensor devices and control system information will be the domain of the Technical University of Moldova (Moldova) and the University of Ljubljana (Slovenia). It is intended that the Institute of Ultrasonic Systems (Moscow) will start commercial production of the ultrasonic equipment for the treatment of waste water as a result of this project. Ultrasonic equipment will also be designed for use in established processes for drinking water preparation. Specialist lectures and personal training courses in the technology will be provided by members of the consortium for companies and scientists who intend to adopt the technologies developed.

SUSTAINABLE BIO-TECHNOLOGIES AGAINST FOREST REGENERATION DECLINE AND SOIL EROSION IN NORTH-EASTERN BOHEMIA ACRONYM : SUSBIOFOR

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1076

Project

Sustainable biotechnologies against forest regeneration decline and soil erosion in North-Eastern Bohemia.

Keywords

Forest decline, pollution, heavy metals, soil erosion, Bohemia, Giant Mountains, soil chemical, pedology, biotechnology, ectomycorrhizas, helper bacteria, rhyzosphere fungi, phytopathology.

Objectives and contents

In the North-Eastern part of Bohemia (CZ), "Giant Mountains National Park", stress and physiological disorders of higher plants are consistent and related to a strong forest decline. Total deforestation in some localities is connected with an increasing danger of soil erosion, causing additional problems in reforestation.
Aim of the project are: 1) to assess the bio-technological knowledge required to understand the restriction to novel forest; 2) to propose sustainable strategies to overcome the stress conditions of the higher plants that inhibit the natural renovation of degraded forests; 3) to confirm the benefit of new bio-pedo-technologies in avoiding soil erosion. Particularly will be evaluated: i) the pedo-environmental restriction to forest renovation in terms of soil chemical, physical and mineralogical constraints; ii) the climatic change effect on the forest health; iii) the microbiological changes into the soil between healthy and declining seedlings; iv) the efficacy of useful micro-organisms in exploiting soil resources and surviving in harsh conditions; v) the topsoil aggregate breakdown using a simple model and the potential enhancement of soil structure stability generated by mycorrhized plants.

Foreseen Results

- Improving of the global management of locally available resources, such as novel trees, mycorrhizas and soils
- a scientific improvement of knowledge on wild plants, mycorrhizas and soils and on their relationship
- An evaluation on the effectiveness of the wild plants and of the bio-technologies used for enhance their renovation capabilities
- A lowering of soil degradation.

BIO-TECHNOLOGICAL CONVERSION OF SLUDGE INTO ORGANIC FERTILIZERS-SLUDGE, BIOCONVERSION

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1086

Project

Bio-technological conversion of sludge into organic fertilizers

Keywords

sludge cleaning, heavy metals reduction, bio-conversion, electrokinetic leaching, combined composting

Objectives and Contents

As sludge may constitute some hazardous to the environment, it has not been approved to be directly used in agriculture or disposal by agricultural means; it must be efficiently treated. One such possibility being the combined composting of sludge and solid agricultural waste. The most significant condition of the efficient implementation of combined composting is reduction of an excessive heavy metal in sludge**.** After that sludge can be used as a safe component of the organic fertilizers.

The aim of the proposed research work shall be elaboration of innovative and effective technological treatment process of sewage sludge mainly by reduction of the metal content in a sludge to standards that can meet EU regulations required the use its in agriculture during the final disposal**.** The treatment process shall be based on using environmentally sound and newly developed biological and physical methods:

- Biotransformation of heavy metal compounds contained in a digested sludge in their insoluble (sulphide) form into the soluble (sulphate) form by means of sulphurophilic bacteria (Thiobacillus ferrooxidans as well as Th.thiooxidans and Th. acidofilus),
- Alt.chemical transformation of heavy metal compounds contained in sludge in the sulphide form into the sulphate form by means of oxidising agents (O_2, O_3 or H_2O_2),
- Electrokinetic precipitation/leaching of the metal ions from sludge liquor in a form of concentrated eluat that shall be treated further on biosorption, brown coal filter (an electrokinetic process applied by Ukleja enables as more as 200-fold increase the leaching of certain heavy metals ions from the liquid sludge),
- Combined composting of treated sludge.

The research has to focus on the biotransformation and the electrokinesis of the treatment process.
The proposed Joint Research Project carried out common with foreign partners (FAL, Germany; TNO, The Netherlands; NIVA and SINTEF, Norway; UHFI, Hungary; POLTEGOR and BIOTESANIT, Poland) would be of practical nature. It shall concern 3 selected new existing sewage treatment plants in Poland of different sludge characteristic and output, as well as other components of combined composting. The research shall be accomplished in three phases : laboratory (I and II) and III pilot scale in the experimental composting plant.

Foreseen Results

It is expected first of all that the proposed innovative method of the biotransformation of sludge into organic fertilizer will obtain full technological and economic justification as a result of the implementation of the proposed research programme at existing sewage treatment plants. Preliminary laboratory-scale studies carried out so far indicate that there exist definite possibilities of developing this technology and introducing it on an industrial scale. The common join of an international team of experts from renowned European research centres significantly enhances the chances of accomplishing positive results. If the correctness of the adopted assumptions is borne out by the research, the project will enable the development of reliable criteria for the design, construction, and operation of sludge treatment and disposal facilities, which will also create possibilities for the comprehensive supplementation of existing incomplete technological systems. It is expected that the positive results of the research will enable the development of new quality standards – conforming to EU requirements for the production of biocompost from material containing sewage sludge. Such biocompost, purified in a controlled way of excessive levels of specified heavy metals, will be more widely accepted as safe material for recultivation and fertilization. This will open new prospects for sewage treatment. Positive results of the research, with regard to all aspects of the new technology, will also be disseminated in the form of publications and conference papers in the countries and languages of the project team partners. It is further expected that the initiated collaboration among the project team partners will be an inspiration for solving other problems and undertaking further research projects.

SUSTAINABLE MANAGEMENT OF GROUDWATER IN KARSTIC ENVIRONMENTS (STALAGMITE)

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1091

Project

Sustainable management of groundwater in karstic environments (STALAGMITE)

Keywords

Karst; sustainable management; groundwater, SHETRAN, hydrological modelling; hydrogeological modelling; decision support systems

Objectives and Contents

Karstic areas are commonly distinguished for their ability to store and supply important quantities of the good quality groundwater essential for sustained economic development. However, excessive exploitation of the groundwater resource damages the karst environment leading to erosion, degradation of biodiversity, and shortages of good quality water for potable supply. The karst environment is also particularly vulnerable to the effects of pollution at the surface due to urban, agricultural and industrial activities, and to the effects of quarrying and soil erosion. There is a need for a holistic approach to ensure the sustainable management of groundwater resources. The complexity of the tasks calls for the application of innovative decision support tools and administrative procedures to aid the development and implementation of effective management solutions.

This project focuses on the need for sustainable groundwater management policies that meet the specific requirements of many CCE Countries, in particular, Slovenia, Slovakia and Bulgaria. The aim of STALAGMITE is to set up a methodology and decision-planning tool, based upon the unit of the groundwater catchment, for ranking areas to be protected or developed with a view to sustainable utilisation of karstic groundwater. The project will amalgamate state-of-the-art data acquisition and processing technology with innovative hydrological modelling and economic analysis into a decision support tool, the application of which will be used to develop an effective sustainable management strategy for karstic groundwater protection.

The overall methodology can be divided into two parts : an assessment of the physical environment, groundwater vulnerability and protection capacity and the determination of policy indicators; and the development and application of a methodological tool for selecting sustainable development policies. The project outcomes will be achieved through a series of workpackages including: the construction of an inventory of water and environmental resources and impacts; the construction of land use databases for selected study areas; the augmentation of the integrated hydrological modelling system, SHETRAN, to simulate flow in karstic aquifers; the formulation of a decision support methodology for sustainable groundwater management; the training of scientists in the use of the decision support tool; the construction of calibrated SHETRAN models of the study regions; the application of test methodologies to study areas; and the production of atlases of environmental impacts.

Foreseen Results

It is expected that the project will increase the knowledge and understanding of karst water flow systems and groundwater recharge; improve the management of karst water resources in terms of assessing the available resources, establishing sustainable groundwater extraction levels, and the delineation of protection zones against pollution; improve the management of forest zones and soil conservation policies; identify pollution problems (existing and future); help control of loss of habitat for endangered flora and fauna; and assist urban planners in policy formulation.

CHARACTERIZATION OF FRESH AND DEPOSITED SLUDGES OF THE MOSCOW REGION AND DEVELOPMENT OF STRATEGIES OF A UTILIZATION IN COMPOSTING PROCESSES, AGRICULTURE OR HORTICULTURE (COMPOSTING)

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1104

Project

Characterization of fresh and deposited sludges of the Moscow region and development of strategies of a utilization in composting processes, agriculture or horticulture (Acronym: Composting)

Keywords

Environmental analysis, soils, sludges, composting, agriculture, horticulture,heavy metals, phytoremediation

Objectives and Contents

In Moscow there are working today two bigger central waster wate treatment units, one at Lyubertsi and the other at Kouryanowo. For nine further plants the planning phase is unning now. About 600,000 to 800,000 m3 of sludge are available in the two working plants. Today a part of the sludges were pressed and dehydrated to 25% of dry mass. This material were deposited on special as well as usual deposits. A firing is refused today because the costs are to high. A composting at the moment is not applied and on this basis here is no utilization in horticulture or agriculture possible. On the other hand reports in Russian studies were published describing that there are big deficiencies on the nutrient concentration in the agricultural and horticultural used soils because the fertilization took place only with mineral fertilizers and no enrichment of the soils using dung or compost was carried out.
The aims of the poject are:
-To analyse the composition of the deposited sludges and of the sludges direct after the separation from the waste water treatment plants
- To characterize the microbial, parasitological and virological status
- To analyse the soils of selected areas used for agriculture and horticulture of the Moscow region and to develop application strategies of the different kinds of sludges and/or composts from such sludges for increasing the quality of the soils and the yields in agriculture and/or horticulture
- Putting up a map of interesting areas in the Moscow region for agriculture and horticulture at the actual situation and following the effect of treatment with composts and/or sludges on the soil quality and the yields on agriculture or horticulture
- Comparison of the effects of soil treating with composts produced with the classical technology and/or after prepration of such composts partially with sludges in the composting process
- Investigation on the possibilities of a reduction of organic waste compounds using microbial techniques or the possibilities of phytoremediation
- Comparison of composting methods applied with sludges, organic compounds, e.g. polymers used in the horticulture, and normal composting materials
- Investigations for a reduction of the heavy metal concentration by phytoremediation and/or microbiological techniques

Foreseen Results

To achieved a detailed analysis of the load of the sludges with organic waste compounds in the same way as the microbial, parasitological and virological status, in view of a development of applications for the sludges and the composts produced on their basis.

RE-USE AND RECYCLING OF WATER IN PULPING PLANTS. REWAPULP

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1108

Project

Re-use and recycling of water in pulping plants rewapulp

Keywords

Water re-use, pulping plants, black liquors, bleaching, liquors, water treatments

Objectives and Contents

One of the main concerns of the pulp and paper industry in our days is to reach an environmental sustainable economic development. However, at this moment there is not an available technology that can be directly applied to reach this aim. It is necessary to develop and/or to apply an adequated technology economically viable.

Thus, the aim of this project is to reach the environmentally sustainable economic development of pulp mills by means of closing up the water and chemicals cycles. In order to reach this general aim the following sub-objectives have been stablished:

- The development of alternative methods to recover black liquors when the traditional systems can not be applied.
- The removal of non-process elements to recover alkaline bleaching liquors in close-loops.
- The removal of clhoride compounds and metals from bleaching effluents.
- The development of a computer model for process simulation.

Foreseen Results

The implementation of an new processes will present the following benefits:

- Sustainable water management.
- 80-90 % less emissions.
- Reduction of water consumption.
- Saving of pulping and bleaching chemicals.
- Reduction of organic clhoride compounds emissions.

This project is focus on the study of combination of novel and existing technologies, and includes the following aspects : pulping black liquors, alkaline and acids bleaching liquors treatments.

LEGUME ASSOCIATIONS WITH SOIL MICROBES : BIOLOGICAL SOLUTIONS FOR RESTORING FERTILITY OF HEAVY METAL POLLUTED SOILS IN SUSTAINABLE AGROECOSYSTEMS (PABSHM)

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1112

Project

Legume associations with soil microbes : biological solutions for restoring fertility of heavy metal polluted soils in sustainable agroecosystems (PABSHM)

Keywords

Pea, heavy metals, cadmium, fragilized agroecosystems, soil fertility restoration, root symbioses, rhizobia, glomalean fungi, tolerance/resistance mechanisms

Objectives and Contents

Heavy metal (HM) polluted soils can be considered one of the most important problems presently facing sustainable soil management in European countries. Metal-rich mine tailings, smelting, intensive agriculture and sludge dumping, for example, contaminate soils with large quantities of HMs. Growth and mineral nutrition of various agricultural crops are reduced in agroecosystems fragilized by the accumulation of HMs. Pea (*Pisum sativum* L.), which is one of the most important legume crops in european agriculture, is an ideal candidate for restoring and maintaining soil fertility in HM polluted agroecosystems because of its great genetic diversity and ability to establish symbiotic root associations with nodulating N_2-fixing rhizobial bacteria and P-scavenging arbuscular endomycorrhizal fungi. This tripartite symbiosis will be important for the exploitation of agroecosystems fragilized by HMs since lower N and P levels are frequently observed in soils where heavy metals accumulate, and increased concentrations of HMs in plants can lead to decreases in nutrient uptake by roots. Although nodule formation, N_2-fixation and endomycorrhizal colonization can be significantly reduced by HMs, tolerant/resistant isolates of the microsymbionts can be found.
The general objectives of the proposed research are (1) to restore fertility of HM polluted soils through selection of adapted plant material and exploitation of biotic interactions with beneficial soil microorganisms, and (2) to understand the mechanisms underlying plant tolerance/resistance to HMs and how these affect, or are affected by, symbiotic plant-microbe interactions. Particular attention is given to problems of cadmium pollution because this element is one of the most toxic and frequent soil pollutants in Europe. Major research activities in the project are therefore focussed on (i) the genetic potential and variability of pea for Cd tolerance/resistance and accumulation of HMs (Cd, Zn, Cu, Pb, Hg), (ii) isolation of Cd-tolerant/resistant beneficial root associated soil microorganisms (PGPR, rhizobia, endomycorrhizal fungi), (iii) interactions between HMs, development and efficiency of root-microbe associations and plant tolerance/resistance, (iv) changes in plant gene expression and biochemical pathways related to Cd tolerance/resistance and symbiotic efficiency, (v) structural modifications induced by HMs and sites of sequestration in pea tissues and microsymbionts, (vi) selection of efficient pea-microbe associations for field production. The eight partners who are involved in the project (INRA-FR, ARRIAM-RU, UNIJAG-PL, SUAS-SE, UNIVUPS-SE, SW-SE, UNIBI-DE, UNIAN-IT) have extensive experience in their particular area and provide complementary expertise essential to efficient and productive cooperation.

Foreseen Results

Significant expected outputs are selection of Cd-resistant pea genotypes, isolation of Cd-tolerant/resistant beneficial soil microorganisms, cellular and molecular markers for Cd tolerance/resistance in pea lines and root symbioses, and pea-soil microbe consortia for plant production in the polluted soils.

IMPACT OF OPEN PIT MINING ON GROUNDWATER AND SURFACE WATERS IN POLAND

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1114

Project

Impact of open pit mining on grounwater and surface waters in Poland

Keywords

Decision support system, groundwater protection, open pit mining

Objectives and Contents

The project's main objective is "to build a prototype of the Decision Support System (DSS) which can be used by Environmental Protection Authority and the management of Open Pit Mines for assessing impact of dewatering on groundwater and surface waters and for testing potential measures (scenarios) of protecting water resources in the mining stricken areas".
The prototype will consist of four components :
1) Water Monitoring Data Base
2) System of Spatial Geographical and Geological Data of the mining region (GEO-DATA-SET of GIS)
3) 3D-Groundwater Flow Model (DEDALE-3D based) modified for moving boundary situations and interactions with surface waters
4) Interactive Post-Processor, allowing for graphical and text representation of the state of water resources in the open-pit-mining region under actual, or assumed stresses imposed by different mining operations, or resulting from the implementation of water protection measures.

Contents of the project (tasks) :
- Defining criteria for water management in mining regions
- Designing information structure of the DSS
- Harmonising assumptions, uncertainties and limitations of the DSS components 1 - 4 and designing interfaces between components
- Constructing the DSS components 1 - 4
- Testing components 1 - 4
- Integration of the DSS
- Practical testing of the DSS

Foreseen Results

1) A prototype of the Decision Support System designed to aid water resources management in the mining affected regions

2) Well defined and clearly described strategy for developing a water monitoring system in the vicinity of operating open pit mines. The monitoring strategy is to be harmonised with the long-term water management and environment protection criteria.

3) Numerically tested measures for protecting surface waters and groundwater in the vicinity of brown coal open pit mines in the Konin region in Poland. Measures will be of an universal nature and can be repeated in any mining affected region in Europe.

GENES IN BASIC PROCESSES OF CONSERVATIONAL TREE BIOTECHNOLOGY FOR: CELL ELONGATION, CELL DIVISION, AND POLARITY

Contract ref. : ***ERBIC15CT980118***
Proposal ref. : ***PL971117***
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1117

Project

Genes in Basis Processes of Conservational Tree Biotechnology for: Cell Elongation, Cell Divison and Polarity.

Keywords

somatic embryogenesis,Quercus robur, Nicotiana tabacum, polarity, auxin, cytokinin

Objectives and Contents

Biotechnology of plants has received a great deal of attention due to the expected added value and its industrial impact. In populations of long-living plants such as forest trees genetic variability and the genes of valuable individuals - having proven their ability to cope with the various stresses in plant life - need to be preserved and propagated, the latter by vegetative processes. Propagation of plants if genetic engineering is to be included at any one step, always involves micropropagation and/or somatic embryogenesis. The problems with biotechnology are most acute with long-living plants, such as trees, which are mostly among the recalcitrant species in biotechnology. One Czech partner in the project (FGMRI) has lond-standing experience in micropropagation methods for oak and other broad-leaved and coniferous species, in the conservation and clonal reproduction of valuable or old individuals of limited reproduction capacity, and of managing gene sources as long-term stored explants or in more than 270 plots in selected forest areas. Knowledge about the function of genes and of their gene products in somatic embryogenesis is central to all aspects of biotechnology. It is clear that the actions of the plant hormone auxin and cytokinin are central for regeneration and, therefore, one important aspect for the project is to elucidate the input of signal transduction steps into regeneration. Expertise for this area of the project is provided by the second Czech group (Pra), the Russian group (Pet), Hannover and Wellesbourne (Han Wel). The interaction of the work done will allow to address specific parameters in the oak system: (1) the hormonal balance favorable for the initiation of polarity in oak, (2) the improvement in identification of tissue(s) suitable for the initiation of embryogenic development of oak (3) the determination of parameters for improved percentage of conversion of oak embryogenic tissue into complete oak plants (4) improvement of the number of oak transformants selected for specific traits such as resistance to stress. Major part of the work will be done with a unique tobacco cell culture (VB-0) provided by one Czech partner (Pra) which exhibits the elements essential for generating plant shape: cell division, cell elongation and polarity and which is more accessible to modern techniques.

Foreseen Results

Our approach to expand our knowledge on regeneration of plants is to use a number of genes known to have key functions in the action of auxin and cytokinin and the VBI-0 culture as a unique test system where cell division, cell elongation and polarity can be influenced separately in a systematic manner. The genes code for the ABP1 (=auxin binding protein), the AUX1 gene coding for an influx transporter functioning in polar auxin transport, the gene for phospholipase A and a gene coding for the biosynthesis of cytokinin, the IPT (=adenosine-isopentenyl-transferase) gene from *Agrobacterium rhizogenes*.
We will introduce these genes to overexpress them in the cells of the VBI-0 cell culture, exhibiting cell division, cell elongation and polarity so that these experiments provide a screen to check and highlight the influence of the above-mentioned genes in regeneration. To collect and to study such genes will advance our knowledge on basic processes for biotechnology of plants, providing a platform from which to improve regeneration success and the biotechnology of trees.

FLOW INJECTION METHODS OF ANALYSIS FOR IMPROVEMENT THE QUALITY CONTROL OF DRINKING WATERS

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1118

Project

Flow Injection Methods of Analysis for improving the quality control of drinking waters

Keywords

Flow analysis, drinking water, water control

Objectives and Contents

The main goal is to find new analytical methods or to improve some of the published for monitoring the quality control of drinking waters. All those goals will be reached inside the continuous flow methodoly known as FIA, as a cheap and quick source for upgrading the quality control. The task to be performed to reach the reported objectives are the following:
1) New biosensors based on immunological reactions for the determination of phenols; different FIA immunoassay configurations will be employed were the sample will be incubated with; a) excess of labelled antibodies and separation of the labelled fractions; or, b) with unlabelled antibodies and separation of labelled antigens. Depending of the labelled compound different detector will be proposed.
2) Methods for residual chlorine, phenols and nitrite ions. The nitrite determination will be studied by biamperometric detector with iodine/iodide as intermediate couple. This determination will be also proposed by proflavin as spectrophotometric reagent. The residual chlorine will be performed by chemiluminescence (strongoxidants) and spectrophotometrically with o-dianisidine. The phenols determination will be proposed with the aid of 4-aminoantipydirine.
3) The inhibition of acetylcholinesterase is the suitable way for the determination of organophosphoric and carbamate insecticides. Also to asses the global toxicity of any water sample.
4) Preconcentration and enrichment of Pb, Cd, and Hg by solid-phase extraction with the aid of different complexes ligands as dithizone, oxine or diethylditiocarbamate. The task will be also performed with the aid of ion-exchanger resins. The solid-phase extraction will be also used for the preconcentration of phenols, organophosphoric and carbamate pesticides.
5) As a result of the reported tasks, the last part of the proposal is the development of new multipurpuse FIA injection analysis equipment with the required characteristics and robustness for the continuous use. The equipment will be prepared from commercially available parts.

Foreseen Results

Technical reproduction of the built-up FIA equipment realised during the joint research proposal can be an interesting source for obtaining cheap equipments for quick and reproducible analysis of the control quality monitoring of drinking waters for laboratories in Roumania and Poland in a first step. Then all results will be extended to other countries.

INTEGRATED STUDY OF FACTORS INVOLVED IN DEGRADED CHESTNUT FOREST IN CENTRAL AND MEDITERRANEAN EUROPE. BIOLOGICAL CRITERIA FOR A SUSTAINABLE DEVELOPMENT. (CHESUD)

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1123

Project

Integrated study of factors involved in degraded chestnut forests in central and mediterranean Europe. Biological criteria for a sustainable development (CHESUD).

Keywords

Chestnut forests, ecological factors, chestnut blight, silvicultural treatment, sustainable management.

Objectives and Contents

Biological criteria for a sustainable management and development are often underestimated and their importance have to be considered especially in the European forests submitted to an intense anthropic influence until a few decades ago.
The general goal of the project is to define, for chestnut coppice stands, management proposals on the basis of eco-biological processes evaluated by means of experimental surveys. In particularly the study emphasises the vegetative dynamics, with particular reference to the biodiversity; the ecological factors involved in different management situations, the effect of the diseases as constraint factors able to influence the resilience of the system and the consequences of different silvicultural treatment on productivity and stand structure.
The research activity, carried out in five european countries - France, Italy, Slovene, Slovak, Hungary -, is arranged in three tasks: i) ecological aspects of vegetation dynamics; ii) phythosanitary aspects; iii) silvicultural and management aspects. In order to evaluate the sustainability of management and the impact of the abandonment, some ecological parameters (litterfall, LAI, light conditions) and the main environmental factors affecting the vegetation dynamics (natural regeneration, competition with other species, floristic richness) will be investigated. Two groups of pathogens will be considered, those infecting roots (*Phytophthora cambivora* and *P. cinnammoni*) and those infecting stems and branches (*Cryphonectria parasitica*). Concerning blight disease, the parasite population will be characterised in order to determine the *C. parasitica* vegetative compatibility groups, spread in the stands under examination. Experimental trials about the effects of different silvicultural treatment on stand structure and productivity and the characterisation of all experimental sites will be carried out. In added the influence and the changes determined by the different management system at landscape level will be investigated.

Foreseen Results

From an integrated study will allow to define some bio-ecological criteria to plan an alternative silvicultural system able to differentiate the wood production and to provide ecological and pathological stability of chestnut stands.

THE RESPONSE OF THE WATER FLOWS OF THE BOREAL FOREST REGION AT THE VOLGA' S SOURCE AREA TO CLIMATIC AND LAND-USE CHANGES (VOLGAFOREST)

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1125

Project

The response of the water flows of the boreal forest region at the Volga's source area to climatic and land-use changes.

Keywords

Boreal forest, climatic changes, water budget

Objectives and Contents

The project will investigate the water budget of a swampy boreal forest area and impacts of its changes on forest conditions at the very sensitive boundary of boreal and nemoral forest communities in Russia. This area (ca. 250 km^2) in Russia (Twer region) (56°N, 33°E) is at the same time the source area of Volga (flows into the Caspian Sea), a very important feature for Russia. It is located close to sources of other large European rivers: Dnepr (into the Black Sea) and Daugava (into the Baltic Sea) and it is typical for the European boreal forests. This site was therefore included in the GCTE-IGBP "Tver land-surface experiment" (IGBP Report, 27, p.52).
The water budget components will be investigated in a long-term perspective using different experimental techniques (eddy-correlation flux measurements, runoff, snow accumulation and precipitation measurements, porometry, sap flow technique), modelling (hydrological and "Soil-Vegetation-Atmosphere-Transfer" (SVAT) schemes and methods of remote sensing).
The objectives are
(*i*) to describe the variability of the forest structure, of climatological and hydrological conditions on the regional scale at the Volga's source area for the last 100-150 years; (*ii*) to establish the experimental site and to quantify in long-term perspective the principal components of water-budgets of the forested catchment area at the Volga's source using different experimental and modelling approaches in order to specify the dynamics and response of these hydrological and forest systems on climatic and anthropogenic impacts; (*iii*) to produce the data (precipitation, snow melting, runoff, surface evapotranspiration, soil moisture, groundwater recharge) needed to improve and validate climate models and to find out what are the important processes controlling the energy- and water exchanges on an ecosystem scale; (*iv*) to describe the interaction processes between boreal forest ecosystems, climate conditions and the hydrological conditions of the Volga's source area using different modelling approaches (GIS based SVAT models, conditioned precipitation models, catchment and water balance models); (*v*) to obtain background information on tree behaviour under natural conditions, to quantify real water consumption of individual trees and forest stands and to characterise their responses to a limiting water supply and to overwatering; (*vi*) to assess and predict the impact of climatic changes on boreal forest ecosystems and on water resources in the Volga's source area; (*vii*) to estimate the possible degradation risk and to predict the afforestation impact on the hydrological regime (water balance components, soil moisture, droughts, floods) of Volga.

Foreseen Results

The product of the research activity will be maps for the watersheds of the upper source area of the Volga, GIS based models for water fluxes in this area together with GIS-compatible databases. The hydrological regime of Volga's source area will be characterised in space and in time. This regional scale information is necessary for the development and validation of a realistic model of the hydrological cycle on a regional scale. It will also predict the response of boreal forest ecosystems and the response of different components of the hydrological system on changes of environmental conditions using different experimental and modelling approaches. The succession and afforestation trend will be estimated, its response to the water regime of this area will be quantified and practical recommendations for the preservation of this unique forest area will be developed.

COPRECIPITATION AND ELECTROFLOTATION FOR THE TREATMENT OF WASTE WATERS CONTAMINATED BY COLLOID PARTICLES AND HEAVY METAL IONS.

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1127

Project

Coprecipitation and Electroflotation for the Treatment of Waste Waters Contaminated by Colloid Particles and Heavy Metal Ions. (COPELFLOW)

Keywords

Environment, Electroflotation,Waste Water Management, Heavy Metal Ions, Colloidal Particles

Objectives and Contents

The project addresses the purification of waste waters contaminated by both colloids and heavy metal ions. A combination of precipitation and flotation techniques will be developped, including:
- Coprecipitation of contaminants (Metal ions and colloids) with hydrolyzable cations (Fe3+).
Production of the gas bubbles and possibly the precipitating ions by electrolysis using steel electrodes.
Investigations will be made to improve the knowledge in interaction forces between particles, bubbles and surfaces in order to control the aggregation and adhesion phenomena.
- The effects of lateral interactions, hydrodynamic factors, electric polarisation and surface chemistry will be investigated specifically.
- A theoritical model will be elaborated for the treatment of waste waters in the case of mixed contamination by colloid and metal ions.

Most industrial procedures produce waste waters that contain a mixture of colloidal substances and heavy metal ions (Cu, Co, Cr, Ni, etc...); this is the case as an example with the contamination created by electrolytic composite plating and surface finishing. The project aims i) to improve the efficiency of industrial water treatment in accordance with contemporary ecological rules; ii) to reduce (suppress) the use of organic additives in order to simplify the process and make it more attractive for small and medium sized enterprises; iii) to produce purified waters for re-use and recycling in the plant.

Foreseen Results

The project brings together complementary techniques and expertise in the fields of colloids and water treatment. Experimental results are expected in the analysis of particle-particle interactions, bubble-particle interactions and particle-electrode interactions. Fundamental and theoritical achievements will be produced concerning hydration and hydrophobic forces in adhesion and agregation phenomena. transfer of results from the basic research to industrial applications will be facilitated by the use of pilot units at two industrial plants. Improvements in cell design, adjustment of operational parameters and hydrodynamics will thus be obtained.

SCENARIO ANALYSIS FOR SUSTAINABLE WOOD PRODUCTION UNDER DIFFERENT MANAGEMENT REGIMES (SCEFORMA)

Contract ref. :	***ERBIC15CT980122***	***EC Scientific Officer***
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1147

Project

Scenario analysis of sustainable wood production under different forest management regimes (SCEFORMA)

Keywords

Natural resource management, scenario studies, forest decline, global change impacts, sustainable forest management

Objectives and Contents

The overall objective of the project is to provide a quantitative assessment of future wood production in Czech Republic, Poland, Hungary and Ukraine, its degree of sustainability under various scenarios of forest growth and timber harvest, and the overall consequences of forest decline and climate change on future wood supply. These national assessments will be placed in a European perspective by including them in the frame of an ongoing project on large scale European forest scenario analysis that is being carried out by the European Forest Institute (EFI, Finland) and the DLO-Institute for Forestry and Nature Research (IBN-DLO, The Netherlands).
Specific objectives of the proposed project consist of the following:

I. Assessment of the forest resource by combining forest inventory data with a large-scale scenario model to predict future wood supply
II. Analysis of potential effects of forest decline and climate change on future wood supply
III. Assessment of different options for forest policy, accounting for national timber trends, environmental change, and forest management options

Activities:
1. Compilation of data-base based on national forest inventory data, including observed forest decline for the countries in the project.
2. Calibration of the growth rates in the scenario model, using national data and models.
3. Extension of the scenario model to include general aspects of forest damage, notably growth reduction in relation to degree of defoliation.
4. Extension of the scenario model to include overall effects of climate change on forest growth using results from ongoing EU-Environment and Climate projects.
5. Scenario analyses of wood supply in relation to growth rates and forest management, and under changing environmental conditions.
6. Assessment of forest policy options based on the scenario analyses, accounting for local and/or national conditions, possibilities for sustainable forest management and international (European) timber trends.

Foreseen Results

The project will enable the quantitative assessment of the potential for sustainable use of the forest resource, accounting for different management options, and accounting for overall aspects of forest decline and climate change impacts, using locally or nationally available information on forest growth. This implies the integration of information from various sources (forest management systems, forest inventory, growth and yield levels, forest decline, and climate change impacts) in an overall scheme for decision support. In doing so, historical data are used in combination with new information, to contribute to forest policies aiming at restoration and sustainable use of damaged forest ecosystems in Central and Eastern Europe. The scenario results, comprising of scientifically up-to-date information on future forest resource development under different management regimes and environmental changes, will serve as the basis for the identification of sustainable forest policies in the countries involved.

EXTERNAL FACTORS FORCING GROWTH VARIABILITY AT DIFFERENT FREQUENCIES DURING THE HOLOCENE IN NORTHERN EUROPE AND APPLICATIONS TO ENSURE SUSTAINABLE FOREST MANAGEMENT

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1150

Project

External factors forcing conifer growth variability at different frequencies during the holocene in northern Europe and applications to ensure sustainable forest management (EXTRATERRESTRIAL)

Keywords

Sustainable forest management, environmental conditions, dendroecology, growth variability

Objectives and Contents

The main aim is to study the forest dynamics and sustainable forestry in the future depending on estimates of critical environmental conditions and local anthropogeneous action in the boreal forest zone in northern Europe. This main aim can be divided into the following subgoals:
Studies of long-term growth variability in conifers as well as in the forcing factors at different frequencies.
Modelling of forest dynamics and sustainable wood supply in the future with respect to environmental factors.
Development of sustainable management practices of forestry resouces in context of the dynamics of these boreal ecosystems.

The project proposes a multidisciplinar approach to the problem which will involve six workpackages of research activity:
WP1: Assessment of data quality, reliability and confidence
WP2: Periodicity in conifer growth variability and external factors
WP3: Determining growth responses in conifers to external forcings, natural and man-made
WP4: Interregional comparisons and transect studies
WP5: Solar-terrestrial forcings
WP6: Prognosis of wood supply and boreal forest sustainability
WP7: Dissemination

Foreseen Results

We envisage producing interregional comparisons of growth responses and growth variability of various conifer species (in natural, managed and polluted stands) using long tree-ring chronologies. These comparisons will include determination of possible long-term variation, fluctuation and periodicity, in tree growth as well as in the environmental factors forcing growth. The above enables the search for the underlying principles in the geo- and astrophysical forcing mechanisms, including the solar _ terrestrial relationships between global and regional climates, variations of solar and cosmic rays, changes in ionospheric and geomagnetic disturbances, and variability in volcanic action and stratospheric ozone.

Ultimately, we wish to deliver long-term prognoses of sustainable wood supply depending on critical environmental conditions. 49 % of the forests in Europe are in the Russian territory. The forestry and forest industry are playing an increasingly important role in Russian economy. It is obvious that Russia will also benefit a lot of the development of the basis of the sustainable forestry.

CYCLING TRACE METALS IN SUSTAINABLE MANAGEMENT OF AGRICULTURAL SOILS. FERTILITY REQUIRES THE INVENTORY OF INPUT METALS. (FERTILIA)

Contract ref. : ***ERBIC15CT980124***
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1161

Project

Cycling trace metals in sustainable management of agricultural soils. Fertility requires the inventory of input metals (FERTILIA).

Keywords

Trace metals, agricultural soils, ecotoxicology, genotoxicology, GIS, phytotoxicity, organic fertilisation

Objectives and Contents

Maintenance of soil fertility in the modern, intensive agricultures of European countries rests on inorganic and organic fertilisation. However,the supply of mineral elements through chemical fertilisers is not sufficient, as compared with the application of organic fertilisers. Indeed, a considerable amount of nutrients can be carried to the soils through manure and slurries from animal farming or from compost obtained in processing sewage sludges. One possible consequence of this type of fertilisation, which is a limit to its application, is the presence of toxic and phytotoxic compounds, especially heavy metals. According to this, the objectives of the project are: (i) the analysis of the cycling of trace metals into the inorganic, organic, and biological matrices of agricultural soils considered as ecosystems, and (ii) the evaluation of the effects exerted at physico-chemical, organismal and ecosystemical levels. The analysis of the entrance and partitioning of some heavy metals into the soil ecosystem components will be performed through the integration of:
1. physico-chemical analysis of metal concentration in agricultural soils from different European regions
2. chemical and biological analysis of metals in soil organisms representative of the different trophic levels
3. application of biomarkers (model microorganisms, invertebrates and plants) for biological monitoring of trace metals
4. ecotoxicological analysis with biomarkers (bacteria, microflora, plants) and application of new transgenic biosensors
5. ecogenetic analysis of the genotoxic effects at the level of the soil organisms (short-range and long-range)
6. description of spatial modelling of soil ecosystems. Sampling will be performed on agricultural soils with different pedological characteristics, which have been subjected in the past to different fertilisation regimens. For each sampling point a whole set of data : physical, chemical, agronomical, microbiological, biological, toxicological and genotoxicological, will be obtained.

Foreseen Results

The data will be analysed and archived using Geographic Information System and other relevant softwares to obtain a spatial model of the cycling of trace metals in soils and soil components for application in the management of agricultural soils. Data and models will be made available possibly to EU and scientific community through a Web page. Other expected results include new protocols for heavy metal analysis, ecotoxicological and genotoxicological tests, new biosensors and biomarkers, scientific publications, and products for the transfer of the results to public administrations and agricultural managers.

INTEGRATED RISK ASSESMENT AND NEW PEST MANAGEMENT TECHNOLOGY IN ECOSYSTEMS AFFECTED BY FOREST DECLINE AND BARK BEETLE OUTBREAKS. (TATRY)

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1163

Project

Integrated risk assessment and new pest management technology in ecosystems affected by forest decline and bark beetle outbreaks. (TATRY)

Keywords

Pest management technology, forest decline, bark beetle

Objectives and Contents

- To find relationships between incidence of spruce bark beetle outbreaks in Central Europe and site, host, environmental condition (air pollution), bark beetle populations and pest management and the integration of this knowledge by GIS.
- To develop improved bark beetle population management systems (including monitoring, risk assessment, effective salvage cutting, mass trapping by pheromone traps or trap trees, and use of repellents) according to site, host, environmental condition, bark beetle populations and level of natural conservation.

The project is the first integrated attempt to solve complex scientific problems connected with bark beetle outbreaks in forests affected by forest decline in Central-Europe.
Work will be concerned on risk assessment and on new improved pest management technology. Risk assessment will be based on integrated results from research on tree/stand levels and from historical remote sensing GIS analysis. Risk assessment should be basis for decision for optimal pest management technology. All results will be integrated in GIS system. Risk assessment will also be integrated part of new improved pest management technology. Based on results from laboratory, field test and risk assessment studies new technology of forest protection will be tested. Technology will be based on effective use of attractant and attractant-antiattractant systems (also known as "Push'n-Pull" strategy). In commercial forests, pest management based on use of attractant (pheromone) and attractant/anti- attractant systems (pheromone/inhibitory semiochemicals) will be tested, in combination with effective salvage cutting and rational use of trap trees. In protected areas, pest management will use only pheromone and semiochemical based systems.

Foreseen results

Pest management by semiochemicals is relatively expensive. The use of attractants and antiattractants according to risk of bark beetle damage could considerably decrease the costs and increase the effectivety of pest management.
Research will be focused on neighboring forest areas with different methods of pest management in Tatra Mountains (Slovakia, Poland) and on areas where the improved methods of pest management are tested.

EXPERIENCE WITH THE IMPACT OF SUBSOIL COMPACTION ON SOIL NUTRITION CROP GROWTH AND ENVIRONMENT AND WAYS TO PREVENT SUBSOIL COMPACTION

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1165

Project

Experiences with the impact of subsoil compaction on soil nutrition, crop growth and environment and ways to prevent subsoil compaction

Keywords

subsoil, compaction, degradation, nutrients, crop growth, environment, soil quality, soil strength, database, modeling, soil physical properties, soil mechanical properties

Objectives and Contents

Objectives: To promote sustainable environment friendly agriculture and to preserve existing knowledge and experiences in Countries of Central Europe and New Independent States by:
- Setting down and disseminating this knowledge and experiences in international publications and proceedings;
- Creation of databases with information and data of effects of subsoil compaction on soil nutrients behavior, plant nutrition, crop growth, erosion and environmental impact;
- Identification of farming systems with a risk of subsoil compaction and determination of effective ways to prevent subsoil compaction;
- Promotion of mutual research projects.

The concerted action includes 3 institutes from EU member states and 15 institutes from Countries of Central Europe and New Independent States. The concerted action will be correlated to a comparable one involving most EU countries, in the FAIR Programme.
Three Workshops are planned. The first workshop is joined to a European Conference on subsoil compaction organized by the FAIR-CA on subsoil compaction and the ISSS working group Soil Physics, in March 1999, Kiel. The concluding Workshop will be joined to an International Conference. Working groups on specific subjects will be established.
Tasks working groups and aim workshops:
- Presentation and inventory of experiences, methods, experiments, data available and harmonization of data delivery;
- Inventory of gaps in knowledge and data, measurement methods and design of field experiments;
- Harmonization and recommendation of analytical methods and design of field experiments;
- Recommendation of ways and guidelines for the farmers how to prevent subsoil compaction;
- Dissemination of results in proceedings, joint publications and presentations in local, European and international conferences;
- Formulation and initiation of required future mutual research.

Three databases will be constructed and data analyzed: (1) "Literature on subsoil compaction and its causes, factors, effects, prevention and alleviation, including an inventory of existing field experiments and of analytical methods"; (2) "Impact of subsoil compaction on soil nutrients and water regimes, soil physical properties, crop production and environment" and (3) "Soil mechanical properties implied in subsoil compaction processes". The participants will collect and deliver the specific data in a harmonized way. The constructed databases will be compatible with other important soil orientated databases in the European Soils Bureau.

Foreseen Results

Proceedings of workshops, reports and national and international papers that will provide insight in: (1) impact of subsoil compaction in Eastern Europe, correlated with similar data from Western Europe; (2) guidelines and ways to prevent subsoil compaction; (3) recommended measurement methods and recommended design of field experiments; (4) gaps in knowledge and recommended future research.
Databases on (1) literature on subsoil compaction; (2) impact of subsoil compaction on soil nutrients, physical properties, crop production and environment and (3) on soil mechanical properties.

A NEW PROTOCOL FOR SUSTAINABLE ENVIRONMENTAL MANAGEMENT (PROSEM)

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1175

Project

A new Protocol for Sustainable Environmental Management (PROSEM)

Objectives and Contents

Conventional management of insect pests in silviculture, agriculture and horticulture in recent years has involved the extensive use of synthetic chemicals which are often not selective to a particular pest, which often have to be applied at relatively high levels and which are often persistent long term toxins to both man and a range of other species. They are released into the atmosphere by evaporation and into watercourses leaching. In countries with less advanced industrial systems and less rigorous health and safety controls, -the chemicals themselves are often produced under conditions which lead to impurities, such as dioxins, which are highly toxic even at very low levels.

It is well known that many naturally occurring organic molecules show potent effects in controlling key biological functions such as plant growth, plant-insect and insect-insect interactions. This is exemplified by the wide range of sex pheromones, natural signalling chemicals, which are produced naturally at extremely low levels and dramatically control the interactions ea., between male and female insects. Isolation of sufficient quantities of these compounds from natural sources for use in agriculture is generally not viable; however, considerable development has occurrred in the use of chemically synthesised material in controlling pest populations, ea., in the control of certain species of bark beetle in Scandinavia. However, the proportion of world agriculture treated in this way, or by using any types of synthetic nature identical material, is still very small and very little large scale work has been carried out in the countries of the CCE or NIS. The project will seek to bring the knowledge and technology in these countries to a level such that such treatment 1S seen as a viable alternative to conventional methods.

The overall aim of this project is to use nature identical organic compounds, and particularly those contaiing cyclopropane rings, either from natural sources or synthesised by 'clean' chemical processes, and their close structural analogues, to develop a new system of pest control for application in silviculture, horticulture and agriculture. It will also examine the use of big-degradable delivery systems in the case of insect control through the use of pheromones. This system will reduce the need to apply large quantities of chemicals to the environment and at the same time develop the scientific and technological base of the CCE or NIS so that they are equipped to introduce and monitor the new system.

This may be divided into a number of sub-targets:

- The development of an efficient route to the natural antibiotic mychorrhizin A, which is a potent inhibitor of root rot fungus. It is hoped that this route will also allow a number of related compounds to be prepared in a manner which is sufficiently simple for them to become a commercially viable means of controlling damaging fungi without damage to the environment.
- The development of more efficient routes to a range of insect sex pheromones and analogues and of biodegradable systems which would allow them to be used in the environment (at extremely low levels) to control the populations of key pests.
- The development of new and efficient approaches to a range of natural compounds which control plant growth and ripening or act as plant defence agents.
- The development of new compounds for application in agriculture, horticulture and silviculture based on modification of readily available natural materials.

The project will be carried out by six groups who have considerable experience in the areas of cyclopropane and pheromone chemistry in collaboration with Institutes with expertise in the laboratory and field testing of biologically active molecules.The groups have shown that they can collaborate extremely effectively in an earlier INTAS programme.

Foreseen Results

It is hoped that the outcome will be a series of cost effective routes to compounds which may provide a future generation of agrochemicals which will directly protect the sustainability of silviculture and agriculture and at the same time reduce levels of toxic materials in watercourses and in soil. The programme will build on the skills of the scientists in the CCE and NIS and also put them in the position to use and develop the technology which is established.

MOLECULAR MECHANISMS FOR TOLERANCE TO STRESS FACTORS AFFECTING PHOTOSYNTHETIC EFFICIENCY OF STRESS. TREMOLSTRESS

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1176

Project

Molecular mechanisms for tolerance to stress factors affecting photosynthetic efficiency of trees

Keywords

Forest trees, environmental sress, photosynthesis, UV-B radiation

Objectives and Contents

Plants typically respond to several factors acting in concert and the effectiveness of a factor can be greatly modified by other simultaneously existing stress factors. So far very little information exists on the responses of trees despite the fact that over two third of global terrestrial productivity occurs in forest ecosystems. The existing data suggest that long-lived trees are likely endangered by future climate changes at much higher degree than herbaceous plants, because the effects may be accumulative and even small changes in the environment will have a detrimental influence over the life time of trees. The study of the impact of combined environmental stresses on forest trees is today a major challenge for a sustainable management of forestry resources.
The primary objective of our research is to provide a better understanding of the stress tolerance and protective mechanisms of woody plants in context to multiple stress effects by applying an interdisciplinary approach. In order to achieve this goal we utilize the combined efforts of ten research groups specialized on molecular mechanisms, physiological studies as well as on monitoring physiological responses of trees and forest ecosystems. Besides their scientific diversity, the participating groups cover far away areas of Europe - from Finland to Italy and from Spain to Hungary - which ensures that forest species of ecological and economic significance in different climatic regions of Europe can be studied. The reseach will concentrate on:
1, Mechanisms of light energy collection and the role chlorophyll-protein complexes in the photosynthetic antenna systems.
2, Photoprotection by light energy dissipation and antioxidant enzymes.
3, Molecular mechanisms and physiological consequences of photoinbition of tree photosynthesis induced by visible light under conditions of iron deficiency and heavy metal pollution as well as enhanced UV-B radiation.
4, Interactions of elevated UV-B radiation with visible light, drought, low and high temperatures on woody plants at the molecular and physiology level.
5, Molecular background and physiological importance of protein repair mechanisms restoring the structural and functional integrity of stress-damaged photosynthetic apparatus.
6, The mechanisms of Cd, Pb and Cu toxicity in context to the distribution of these metal ions in different plant compartments.

Foreseen Results

The molecular mechanisms and physiological consequences of multiple stress effects will be studied in experimental systems ranging from isolated photosynthetic complexes, through genetically well characterized model plants to tree seedlings, hydroponically cultivated whole trees, and natural forest ecosystems. The knowledge obtained for the mechanisms involved in multiple-stress induced damage, photoprotection, energy dissipation and control of photosynthesis, will be of great practical importance for sustainable forestry management through selecting breeding strategies and possible genetic manipulations aimed at creating more stress tolerant species.

ECONOMIC AND ECOLOGIC SUSTAINABLE MANAGEMENT OF THE WOOD AREA IN NORTH-WEST OF RUSSIA

Contract ref. : ***ERBIC15CT980127***
Proposal ref. : ***PL971180***
Type : *J oint Research Proj ect*
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1180

Project

Economic and ecologic sustainable management of the wood area in North-West of Russia

Keywords

Sustainability, sustainable, sustainable forest management, wood, timber, certification, forest, forestry, Russia

Objectives and Contents

- Testing of the criteria and indicators for sustainable forest management discussed in the Helsinki-and Montreal process, and of the requirements set by environment protection organizations, for their applicability under the special conditions of the transformation process of the Russian Federation.
- Finding of other criteria and indicators, in order to take the regional peculiarities and the aspects of nature conservation into consideration.
- Analysis of the actual conditions of the management of the forests and their repercussions on biodiversity to ascertain the difference existing between the actual situation and the intended sustainability of the management of the forests in North-West Russia.
- To elaborate a catalogue of hints for the transition to sustainable management of the forests stocking in North-West Russia. Thus, a contribution is rendered to the solution of the current contradiction between the conservation of the boreal forest intended by ecological criteria and the economic constraints before the background of the present economic crisis.
- Regarding the expected forest development this project forms the basis for the wood-processing industry to adapt to the changed tree species composition and age structure.

Foreseen Results

Guidelines for sustainable forest management in North-West Russia are to be elaborated as a result of the research project. They are oriented both by the international endeavors of the Helsinki process and the ideas of national and international environmental organizations.
Significant criteria will be the considerations about ecological, socioeconomic and mainly economic skeleton conditions. The recommendations are to assist the Russian forestry, mainly before the background of economic difficulties, to nevertheless achieve a high degree of ecological compatibility in forest management.

MULTIPLE OBJECTIVE FOREST MANAGEMENT OF PROTECTED AREAS (NATURE RESERVES) IN CENTRAL AND EASTERN EUROPE FOR THE PREVENTION OF OIL EROSION. MOFM 2000

Contract ref. :	***ERBIC15CT980128***	***EC Scientific Officer***
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1181

Project

Multiple objective Forest Management of protected areas (nature reserves) in Central and Eastern Europe for the prevention of soil erosion.

Keyword

Soil erosion, forest management

Objectives and Contents

To determine the extent to which, within nature reserves in C.E.E. countries, the following factors are a function of grazing pressure and to generate guidelines for managing protected areas.

1. The extent and degree of soil erosion.
2. To determine the nature of the relationship between grazing pressure and soil erosion.

This transnational project will also provide comparative results into Western European countries.
It is also intended to produce a set of guidelines that actively encourages and promotes sustainable partnerships between all the groups involved for the prevention of soil erosion generated by grazing.

Foreseen Results

It is envisaged that the project will result in long term co-operation between the participants and an understanding of multiple interactions between environmental factors and human activity, which will lead to a reduction in soil erosion, together with improved management guidelines which will provide a higher level of protection for the environment.

BIOTECHNOLOGICAL PROCEDURES FOR SUSTAINABLE WATER MANAGEMENT

Contract ref. :	***ERBIC15CT980129***	***EC Scientific Officer***
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1185

Project

Biotechnological procedures for sustainable water management (Acronym: Aquabiotec)

Keywords

Pollution; Water; Enhanced biological phosphorus removal; Polyphosphates; DNA damage; Genotoxicity

Objectives and Contents

Urban, industrial, and agricultural pollution of natural water resources and low quality of drinking water are currently major problems for human and animal health, especially in the countries of CCE/NIS. This multidisciplinary project concerns the application of modern biotechnological and molecular biological approaches, which will help to solve these problems and are based on existing knowledge in the participating countries of EU/CCE/NIS, thereby contributing to stabilization of RTD potential in the respective CCE/NIS. The topics of this project are: (A) Determination of phosphate pollution of wastewaters and the development of methods for phosphate removal with its consequent reuse (enhanced biological phosphorus removal); (B) Determination of genotoxicity of by-products of water oxidation/disinfection and development of methods for its routine assessment.
The measurable, specific objectives of this project are:
1. Application of molecular biological and gene technological approaches to understand the molecular basis and to increase the efficiency of the process of enhanced biological phosphorus removal [removal of phosphate from wastewaters by formation of inorganic polyphosphate (polyP) in bacteria]
2. Application of biotechnological approaches to increase the efficiency of the process of enhanced biological phosphorus removal.
3. Investigation of the potential for reuse of phosphorus from wastewater, by using biological phosphorus removal in combination with polishing chemical precipitation.
4. Investigation of the effect on biological wastewater treatment on future changes in wastewater composition.
5. Studies of genotoxic potential/effects of by-products in drinking water in relation to water-treatment/water quality.
6. Determination of genotoxicity (DNA damage) of natural and man-made pollutants in wastewater and drinking water.

Foreseen Results

- Isolation of the organism(s) responsible for phosphate removal in sludge.
- Genes coding for polyP-dependent enzymes.
- Use of polyP in complexing heavy metal ions.
- Clarification of activated sludge settling and separation properties.
- Verification of the phenomenon of anoxic phosphate uptake with simultaneous denitrification.
- Optimisation of full scale nutrient activated sludge plants.
- Verification of activated sludge models IAWQ No. 2.
- Survey of filamentous microorganisms in full-scale activated sludge plants.
- Estimates for the realistic degree of reuse of phosphorus in wastewater.
- Estimates of future wastewater composition under assumed changes in the society.
- Design information for bio-P processes in changed wastewater.
- Information on genotoxic by-products in drinking water.
- A kit for routine monitoring of DNA damage.

LEAD ISOTOPES AND HEAVY METAL POLLUTION - AN INTEGRATED STUDY OF THE THREAT TO GROUNDWATER RESOURCES (LIMPIT)

Contract ref. : ***ERBIC15CT980130***
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1195

Project

Lead Isotopes and heavy Metal Pollution - an Integrated study of the Threat to groundwater resources (LIMPIT)

Keywords

Heavy metals, lead isotope geochemistry, contaminant transport, critical load, water resource management

Objectives and Contents

Heavy metal contamination of groundwaters is of wide concern, and is an especially serious problem in some CCE/NIS countries. The extent to which groundwater may become polluted from surficially deposited heavy metals depends, *inter alia*, on the rates at which the chemical species are transported through the soil, and the influence of any retardation mechanisms, such as sorption onto solid phases and uptake by organisms. These transfer rates and retardation mechanisms are only poorly understood. This study will develop and demonstrate a methodology for assessing the contamination of groundwater resources from heavy metals deposited to soil. The study will initally examine in detail the behaviour of lead (Pb) at several carefully selected sites, and extend the study to other heavy metals (e.g., Cd, Cr, Cu).

The main objective of the project is to document and quantify the mobility of anthropogenic and natural Pb in soils and groundwaters, to extend this understanding to other toxic heavy metals, and to make recommendations regarding mitigation of heavy metal pollution. The study will focus on sites in four countries having differing climates, differing types of pollution and differing levels of pollution. The detailed objectives of the project are:

- To determine the sources of anthropogenic and natural heavy metals delivered to soils above strategic groundwater catchments in the Czech Republic, Israel, Moldova and Russia. To measure the anthropogenic Pb isotopic composition.
- To use Pb isotope and Pb concentration measurements to determine mass balances between anthropogenic and rock-derived Pb to soils and groundwaters at the different sites. Soil petrology and water geochemistry (including O, H and S isotope measurements and trace element analysis) will be used to extend the analysis to other chalcophile elements and to test conclusions drawn on the basis of the Pb data.
- Use modelling to develop a quantitative understanding of the processes that control the transport of Pb, and other metals, through saturated and unsaturated soils.
- To use the modelling results to establish the critical (safe) limits to the various input fluxes of anthropogenic Pb and other heavy metals at each site, and to assess the future threat to groundwater aquifers and water quality.
- To identify microbial parameters for assessing heavy metal pollution levels in soils.
- To make recommendations regarding strategies for sustainable water management and protection of groundwater and soil resources from heavy metal pollution.

Foreseen Results

The critical load concept has previously been used to set limits on acid emissions to European forest ecosystems. In our project it will be extended to make recommendations as to the maximum safe input flux of toxic metals to soils at the different sites studied. Furthermore, because our project will look at polluted and unpolluted sites in four widely separated geographic areas having contrasting climatic regimes, ecosystems and pollution problems, our results will be more easily extrapolated and be of more general relevance to other areas, within the EU and elsewhere. The lessons learned from this project, in particular the multidisciplinary approach for studying heavy metal pollution of groundwaters and soils, will be of widespread benefit to the management of water resources in boreal, temperate and semi-arid climatic zones, and to environmental restoration strategies.

DEVOLPMENT OF TOOLS NEEDED FOR AN IMPACT ANALYSIS TO GROUNDWATER QUALITY DUE TO CHANGING OF AGRICULTURAL SOIL USE

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1196

Project

Development of tools needed for an impact analysis for groundwater quality due to changing of agricultural soil use

Keywords

Groundwater, modeling, agricultural soil use, water quality management, nutrients metabolism, leaching property

Objectives and Contents

The intention of this research is to prove existing software instruments which describes the water fluxes and the nutrient metabolism in groundwater. These tools shall enable the user to simulate scenarios of variations in agricultural soil use and their effects on groundwater for small catchment areas, of a size of less than 10 km^2. The specific organization of the market in the EU has led to an increase in the intensity of all sectors of agriculture during the last few decades. This was accompanied by an increase of nutrients in plant production and stock farming which lead to an increase of diffuse inflow of nutrients to the water body. Nowadays emissions from agricultural soil use into water resources in countries like Bulgaria and Poland are quite low. As a result of the planned accession of the CEEC to the EU, an increase in the intensity of agricultural soil use due to the conditions of the market is expected. Therefore, it can be expected that the usability of groundwater, e.g. for drinking water, will be affected.
It is necessary to develop tools to enable the user to make scenario analysis and predict the reactions of the system before the agricultural soil use is changed.

In order to do this the work is generally divided into three tasks:
- Exchange of experiences and harmonization of suitable measurement equipment for saturated and unsaturated zone, for the methods of chemical analysis, comparison, test and selection of the partners models as part in the developing tool.
- Process studies on investigation fields, recording of nutrient fluxes through the compartments soil and groundwater, especially of nitrogen. The kinetics of nitrate turnover beneath the root zone will be analyzed in situ and studied in the laboratory. The results will be input-parameters in the transport-model.
- Calibration and verification of flow- and transport-models at the scale of a few hectares and of catchment areas.

Foreseen Results

- Better scientific understanding will be obtained concerning the processes of nutrient metabolism in groundwater under different European climatic and geological conditions.
- The technique for measurements for saturated and unsaturated zones, especially on an electronic basis is highly developed in western European countries. Therefore, also the transfer to middle-eastern European partners will be important for this research project.
- The eastern European partners have much experience in modeling. The investigation allows the comparison and estimation several known model tools from eastern and western Europe with the help of measured data from three locations. Furthermore, it means an increase in experience for all partners and allows finding out a suitable combination of tools for calibration and application at the test areas of the partners.
- It can be expected that an increase in the intensity of agricultural soil use will restrict the use of water resources like groundwater for water supply, for example. Therefore, for regional planning foresight is necessary. In groundwater catchment areas of delivery wells it may be necessary to change the soil use in a manner that the emission of plant nutrients to water will be minimized. The tools developed in this project will be helpful as a means of planning.

PROTECTION OF THERMAL GROUND WATER RESOURCES IN SEISMIC AREAS (WATSEISA)

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1198

Project

Protection of Termal Groundwater Resources in Seismic Areas

Keywords

Aquifer properties, borehole measurements, microtemperature, thermal groundwater resources, water pressure

Objectives and Contents

The Ponticaspian region is a seismic active area with recent tectonic movements. This active geology not only allows thermal groundwater to move to the surface but also it closes effective pathways. A Transcaucasian as well as an area at the Kopet-Dagh front fault in Turkmenistan are selected where a thermal groundwater resource is explored, in order to determine their depth and extent of the recharge area for a sustainable exploitation. The protection and management of the resources, which are located in health-resorts with tradition since centuries, is necessary for two reasons:
1. The discharge of wells is naturally affected, so that variations happen suddenly.
2. The depth, extent and recharge area of the resources are unknown in detail, so that drilling activities for gas or oil, which are increasing, might be harmful for the thermal water resources.
If more details of the resources are known, the problems might be overcome with drilling into the resource when a well deceases. In the case of man-made actvities, the authorities will get arguements to keep gas/oil drilling out of the recharge or resource area.
The objectives may be reached with long-term temperature and pressure measurements in boreholes. Seismic events and the earth tides generate jerks or long-term variations in these physical parameters which are used to elaborate the properties of the groundwater resources. Correlations of the records between boreholes allow to determine the extent of the geologic unit in which the aquifer is embedded. Multisensor probes of temperature measurements yield the depth of the aquifer in every borehole.
The method which is applied to explore the properties of groundwater resources may be used in any other seismic active region.

Foreseen Results

The main goal is to yield informations to the extent and depth as well as to hydraulic parameters of the aquifers which are under exploitation, in order to establish a sustainable thermal water protection and management. Besides of this applied research, the case studies will demonstrate that microtemperature and pressure survey are able to obtain these parameters in contextural computer simulation studies.

LONG-TERM RISKS OFINADEQUATE MANAGEMENT PRACTICES ON THE SUSTAINABILITY OF AGRICULTURAL SOILS.

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1207

Project

Long-term risks of inadequate management practices on the sustainability of agricultural soils.

Keywords

Soil acidification, heavy metals, plant uptake, modelling, management practices

Objectives and Contents

The objective of the proposed activity is to assess the long-term risk of soil acidification on plant uptake of potentially toxic heavy metals (i.e. cadmium, copper, lead and zinc) from agricultural soils in Slovakia and Hungary with different crops and management practices. Inadequate management of soils may result in soil acidification. Acidification of soils increases the mobility and bio-availability of heavy metals in the soil. These results in decreased soil fertility as an increased bio-availability may cause agricultural products with unacceptable levels of heavy metals and even reduced crop production. Furthermore soil fertility may be hampered as a result of a decreased (micro) biological activity in the soil. The project will result in a methodology to evaluate management practices with respect to acidification, metal mobilisation and plant uptake of heavy metals. To arrive at such a methodology four research activities will be undertaken which are focussed on well-drained agricultural soils in Slovakia and Hungary :
1. Determination of the impact of changes in pH due to soil acidification on the sorption of heavy metals by soil and complexation of heavy metals with dissolved organic carbon on the basis of literature reviews, laboratory experiments and field studies.
2. Assessment of the impact of mobilisation of potentially toxic heavy metals on plant uptake. This includes the determination of the relation between soluble heavy metal concentrations and the development /calibration of a plant uptake model for major crops in agricultural soils in Slovakia and Hungary.
3. Elaboration of available models on soil acidification and heavy metal behaviour and calibration on field measurements.
4. Modelling the long-term environmental impacts of acidification on plant uptake (wheat and maize) in Hungary and Slovakia for various land use management (liming and fertiliser application) scenarios.

Foreseen Results

- Pedo-transfer functions which relate the total content of heavy metals to the bioavailable metal concentration in solution as a function of general soil properties for a broad range in pH
- Relations which describe the pH dependancy of heavy metal complexation with DOC.
- Calibrated models for the evaluation of long-term environmental risks of soil acidification on the crop uptake and leaching of potentially toxic heavy metals.
- A methodology to evaluate the risk of management practices on soil acidification, metal mobilisation and uptake by crops.
- Model applications for several regions of Slovakia and Hungary indicating the impacts of various land use management (fertiliser and liming) scenarios on soil acidity and heavy metal mobilisation and uptake by agricultural crops.

These results represent great practical significance as they contribute to the proper management of polluted regions, such that threatening trends in a long-term perspective will be avoided.

RISK ASSESSMENT OF GROUNDWATER POLLUTION BY INTERACTION WITH SURFACE WATERS AFFECTED BY PULP AND PAPER MILLS

Contract ref. :	***ERBIC15CT980134***	***EC Scientific Officer***
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1209

Project

Risk assessment of groundwater pollution by interaction with surface waters affected by pulp and paper mills

Keywords

Risk assessment, groundwater, Lake Ladoga, Lake Onega, pulp and paper mills

Objectives and Contents

The serious surface and groundwater pollution in the north-western region of Russia (Lake Ladoga and Lake Onega region) is mainly caused by pulp and paper mill effluents. The River Neva, the outlet of Lake Ladoga, is the main raw water source for drinking water production for more than 6 million people most of them living in St. Petersburg. Whereas former and recent investigations concentrated on river and lake water quality, there is a serious lack of knowledge about groundwater pollution and the various effects of interaction of groundwater and surface water. Until now evaluations of surface water pollution only considered direct waste water inflow. An important long-term contribution of highly polluted groundwater is expected but has not been investigated and quantified. A higher rate of iIlness and mortality of the population living near to the industrial sites is known, but not the effects of consuming untreated water derived from groundwater by domestic wells in the villages.
Therefore, the main objective is a complex risk assessment of groundwater pollution by direct inputs from pulp and paper mills and indirect inputs by interaction with surface waters from lakes and artificial ponds used for waste water storage and infiltration. Because of the much higher level of pollution, risk assessment tools used in Europe are not applicable without adaption to the specific problems of the region. In Russia, developed scientific risk assessment approaches are different from European methods and can contribute to further developments in this field. The following objectives will be undertaken in the working parts:
i) Evaluation of different risk assessment methods and their adaption for contributing to the development of new methods (e.g. the Russian method EXERGIA) applicable under the specific conditions, ii) case studies at three representative sites of the region including field investigations and laboratory experiments to obtain additional data necessary for risk assessment and modelling, iii) investigation of groundwater and surface water interactions resulting in groundwater pollution by organics and salts, in increasing groundwater levels due to thick siltation layers in lakes and rivers, and in changing groundwater flow regimes, iv) modelling groundwater flow, mass transport and biogeochemical processes, v) development of a risk assessment method for application under the specific conditions in the region, vi) generalization of results.

Foreseen Results

The main scientific results will be the comparison and further development of risk assessment methods applicable on sites with very high pollution level and the improvement of scientific knowledge about groundwater and surface water interaction. Based on the results a prognosis will be made for the future impact of polluted groundwater inflow on surface water ressources and on drinking water quality in the villages around the pulp and paper mills. The presentation of the applied risk assessment tools and the results at the yearly international conference in St. Petersburg and at the final conference of the project will give important informations, especially about the ranking of necessary measures and site sanitations, for the local and state authorities and EC policies. The effective research network between 4 NIS partners and 3 EC partners will support the active scientists and their research activities in Russia.

BLACK LOCUST (ROBINA PSEUDOACACIA L.) RESOURCES INVESTIGATIONS FOR DEGRADED AREAS REHABILITATION

Contract ref. : ***ERBIC15CT980135***
Proposal ref. : ***PL971222***
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1222

Project

Black Locust (*Robinia pseudoacacia* L.) Resources Investigations for Degrated Areas Rehabilitation (B.Lo.R.I.D.A.R.)

Keywords

Robinia pseudoacacia; Variability; Environment rehabilitation Degraded Areas; Reforestation; Wood quality; Improvement in wood utilisation

Objectives and Contents

Aim of this project is to detect and characterize *Robinia pseudoacacia* L. trees suitable to reforestation of degraded lands in unfavourable environments. This objective will be pursued by integrated researches at genetical, biochemical, eco-physiological level, completed by technological studies on wood characteristics as influenced by genotype and different environmental conditions. All these elements will allow to evaluate the possibility to spread Robinia stands in unfavourable environments in such a way to combine protective and landscaping functions together with an increase of high quality wood production.
Three different tasks have been identified to manage the project which will be carried out by complementary teams from 2 Eastern European Countries (Hungary and Bulgaria) and 2 EU Countries (Greece and Italy). The first task deals with the eco-physiological characterization of black locust trees growing in unfavourable environmental conditions both through field and laboratory investigations. The two others are devoted to genetic aspects and wood quality characteristics analyses

Present complementary approaches are:

- Field analyses aimed to assess growth ability and morpho-phenological characteristics of black locust clones and plus individuals from populations will be carried out and will be integrated with climatic parameters records, pedological analyses and data on the water cycle processes in Robinia stands to evaluate the effects on environmental protection.
- Plants exhibiting the best growth aptitudes will undergo to propagation and laboratory analyses. Physiological studies will be carried out in controlled environment (greenhouse and growth chambers) using portable instruments and Infra Red Gas Analyser (IRGA) to test responses in growth, photosynthesis and traspiration rate according to different water availability and temperature.
- Genetic characterization of all the drought tolerant material will be performed by isozymes and RAPD markers analyses.
- Wood quality characteristics as influenced by genotype and environmental conditions will be determined measuring tree qualitative parameters (shrinkages and density).
- Multivariate statistical techniques will be used to study the degree of correlation among molecular markers, tolerance to drought environments and wood quality, thus detecting a set of biochemical and molecular markers able to discriminate between tolerant and not tolerant plants.

Foreseen Results

Identification of black locust genotypes adaptable to live under limiting environmental conditions and providing good quality wood for economical advantageous utilization; identification of markers for assisted selection to use in future tree improvement programmes; realization of a clonal bank of the selected clones in each of the participating Countries; a wider knowledge of *Robinia pseudoacacia* L. biology and basic technological properties; development of an experimental methodology useful for the early evaluation of wood quality; scientific papers pubblication. Final outcome will be a clonal bank of *Robinia pseudoacacia* L., which will be established at the end of the project including all the clones selected through the different scientific competences involved and it will be available for each Participant and for other European Countries interested to this material.

BIOTECHNOLOGY FOR THE IMPROVED ADAPTATION OF LEGUMINOUS TREES TO STRESS CONDITIONS

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1223

Project

Biotechnology for the improved adaptation of leguminous trees tostress conditions.

Keywords

Salt tolerance/ drought tolerance/ nitrogen fixation/ plant symbiosis/ Azorhizobium.

Objectives and content

The overall aim is to increase stress (salinityand drought) tolerance of leguminous shrubs and trees to ecosystems in areas affected by salinity, drought and low pH, as means of preserving life in semiarid ecological areas suffering progressive desertification processes, as well as reclaiming areas lost through desertification. This will be achieved through the isolation, selection and exploitation of stress tolerant soil microorganisms forming nitrogen fixing symbiotic nodules with the vegetation. Stress tolerant nitrogen fixing symbiotic associations will be identified and initially characterized. Those showing highest tolerance will be further analyzed with regards to the efficiency of nitrogen fixation and ammonium provision to the plant, the mechanisms by which symbiotic organisms enhance mineral nutrition and growth of plants in poor soils and the effects of symbiotic organisms on the adaptation processes of plants to salinity and drought. The possibility of improving the efficiency of the natural association and to create new microorganism/plant associations will also be tested.

Foreseen Results

A collection of native strains establishing nitrogen fixing symbiosis with trees and brushwoods will be isolated from the Aral Sea region an also from Israel. A number of isolates will be selected, which could eventually be used for establishing symbiosis in other desertic areas. Efficiency of selected symbiotic associations in relation to establishment of the symbiosis and nitrogen fixation will be thoroughly estimated and potential bottlenecks will be identified. The effect of the symbiotic associations on the plant will be assessed with regards to increase of mineral nutrition and other beneficial effects for the plant adaptation to salinity and drought. Guidelines will be suggested in order to establish appropriate symbiotic associations in areas affected by salinity and drought, which may be of use for future plans of reforestation in affected areas.

BIOREMEDIATION TECHNIQUES FOR DETOXICATION OF HAZARDOUS POLLUTANTS IN INDUSTRIAL WATERS AND SLUDGES

Contract ref. :	***ERBIC15CT980137***	***EC Scientific Officer***
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1226

Project

Bioremediation techniques for detoxication of hazardous pollutants in industrial waters and sludges

Keywords

Bioremediation techniques, hazardous pollutants, xenobiotics, detoxication, indusrtial waters, activated sludges and sludges, specialised biological systems

Objectives and Contents

This project is an attempt for elaboration of general least cost technique for detoxication of industrial effluents and sludges, containing hazardous substances.
The general purpose of the project is to make a comparative and comprehensive analysis of the biodetoxicational (bioremediational) activity of the natural and artificially created biosystems against the key, priority hazardous pollutants by a large set of biotechnological approaches. The project includes laboratory experiments and decoding of the biochemical detoxicational mechanisms, lab scale experiments with different type of bioreactors and processes, pilot studies and in situ investigations.

Foreseen Results

1. Proposal and creation of combined techniques for increasing the rate of the detoxicational processes. Special attentions given to highly specialized and manageable biological systems: microbial cultures and stabilised biocenoses (sludges and activated sludges), including plants, protozoa, consuments from third level, etc.;
2. Development and verification of new bioindicative systems and indicators serving as a critical control points (CCPs) in the assessment and management of hazard wastes;
3. Engineering evaluation of the most suitable type of bioreactors: comparative study of the performance of plug-flow reactor and two kinds of upflow biological filters (fixed-bed and expanded bed);
4. Elaboration of a model for wastewater treatment in the presence of hazardous xenobiotics: the model will be useful both for bioreactors design and for prediction of their performance.

BIOLOGICAL TOOLS FOR A SUSTAINABLE WATER MANAGEMENT

Contract ref. :	***ERBIC15CT980138***	***EC Scientific Officer***
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1233

Project

Biological Tools for a Sustainable Water Management (BIOTOOLS)

Keywords

Surfactants, microbial biosensor, prototype, flow immunoassays, polarisation fluoro immunoassay, ELISA, supported liquid membrane extraction (SLM), biological waste treatment

Objectives and Contents

The intensive growth of the world population, urbanisation and industrial development have lead to extensive contamination of our common water resources by a number of toxic chemicals. Among these are the surfactants (or surface active compounds, SAC), which are considered as an extremely dangerous group of water pollutants. Although legislators prescribe SAC biodegradability, these cannot be completely mineralised in biological waste treatment plants, thus they arrive together with their metabolites in rivers where some even are found in drinking water. Due to the extreme amounts of SAC emitted into sewage plants and the persistence of some of the known metabolites, it is the group of environmental pollutants with the highest priority (Council Directives 73/404, 76/464 and its six daughters). Today, the standardised methods for SACs are mainly performed by sum parameter analysis using spectrometric and titrimetric methods. These methods are laborious, unsensitive and unreliable in that they lack the ability to distinguish specific target analytes from a whole group of related compounds and also from other interferences. The initial screening of toxic compounds should in general be specific for the compound(s) in question, technically simple, inexpensive, useful for routine analysis of a large number of samples, and should potentially be carried out directly at the sampling site. Thus, there is a great gap between the demand for express assay of SACs in aqueous solutions and the available analytical methods.

The objectives of BIOTOOLS is to solve some of these problems by developing various complementary methods based on specific biological recognition techniques, i.e., immuno chemical detection (ICD) in flow analysis, polarisation fluoro immunoassay (PFIA), microtitre plate ELISA, and a portable microbial biosensor prototype of disposable nature. All techniques will be designed for simple on- or off-line connection to a stand alone in-field sampling unit based on supported liquid membrane (SLM) extraction. The work is aimed at being complementary in nature to the recently started Waste Water Cluster (WWC) within the *Environmental technologies* and to extend the geographic reach of the WWC beyond the EC, by connecting partners from areas where pollution is significantly more serious and where the need for cheap and more simple solutions are urgent.

Foreseen Results

The expected results will greatly expand contemporary knowledge about biological detection of SACs in the environment. Due to the co-ordinated efforts of different specialists - microbiologists, biochemists, immunologists, analytical chemists - SAC analysis by biological methods will be studied from various angles and viewpoints. The potential industrial application areas of BIOTOOLS are as follows: 1) the optimisation and development of waste treatment processes, 2) as alarm system for industrial waste treatment plants, 3) for measurement in ground water at waste dumping sites, and 4) for water quality control and treatment. The investigations may help to reduce the ecological risk of water pollution by SACs and contribute to a more rational use of the water resources in the EC and NIS and CCE.

ASSESSMENT OF RENEWABLE GROUND AND SURFACE WATER RESOURCES AND THE IMPACT OF ECONOMIC ACTIVITY ON RUNOFF IN THE BASIN OF THE LLI RIVER, REPUBLIC OF KAZAKSTAN

Contract ref. : ***ERBIC15CT980152***
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1235

Project

Assessment of renewable ground and surface water resources and the impact of economic activity on runoff in the basin of the Ili River, Republic of Kazakstan.

Keywords

Renewable ground&surface waters; climatic&anthropogenic changes; runoff formation of Ili river

Objectives and Contents

The Ili-Balkhash basin presently accounts for almost 20% of Kazakstan's total population, more than 20% of its industrial activity and 30% of the country's gross agricultural output; over the past three decades this development has resulted in a growing deficiency of fresh water resources and there are now concerns that the region is facing an environmental crisis that mirrors other regions of arid Central Asia, not least that of Kazakstan's Aral Sea (refs----).

In order to improve the present management of water resources, and to ensure their long-term sustainable development, it is proposed to undertake an assessment of current renewable ground and surface water resources in the Ili-Balkhash basin, to determine the impact of climatic and anthropogenic changes on water resources over the past 200-300 years, and to model potential water resource changes under differing future climate change scenarios. The primary focus of this study is the mountain territory of the basin of the Ili River which constitutes the zone of runoff formation; water sourced from melting of snow and glacier ice in this part of the catchment amounts to at least 70% of the basin's water budget.

The main goals of the project are as follows:

- To assess the primary components of the water budget (precipitation, snow-ice resources, evaporation, surface and ground runoff) and their distribution in the Ili basin
- To assess ground and surface water runoff from the source areas in the mountain basins, including regions where little or data are available (notably the Chinese part of the Ili watershed);
- To assess the impact of economic development upon hydrological regimes of the region;
- To assess the influence of climate change on ice and water resources in the basin over the past 200-300 years;
- To model potential changes in regional water budgets under future climate change scenarios
- To evaluate renewable resources of ground and surface water and ecologically sustainable levels of use.

Foreseen results

- A thematic GIS databank for water resources in the Ili-Balkhash basin;
-. A new method of calculating depth of snow cover in the mountains and its water equivalent;
-. New and improved methods of calculating the budgets of surface and ground water and estimates of renewable water resources;
- Models of snow-ice cover and surface and ground water resources, including unexplored regions (from the Chinese part of Ili basin);
- Data on the dynamics of firn lines (on typical glaciers) and climatic snow line (within typical basins) as a basis for reconstruction of climatic changes over the past 200-300 years;
- Models of possible changes in glaciation, air temperature, annual precipitation, snow cover parameters and total basin water resources for future climate change scenarios;
- Data on the impact of economic activity on river runoff in the 11i basin;

These results will provide the basis for water and land management frameworks that are ecologically safe and sustainable for the present and future years.

The project personnel comprises 5 Full Professors, 5 persons with Ph.D. sci. (Candidate of science), 3 Junior Researchers, 2 students.

WATER QUALITY IMPROVEMENT THROUGH FLUORIDE REDUCTION IN GROUNDWATER OF CENTRAL EUROPE

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1239

Project

Water Quality Improvement through Fluoride Reduction in Groundwater of Central Europe

Keywords

Environment, water treatment, de-fluoridation, GIS, zeolites, health

Objectives and Contents

Currently more than 80 million people world wide suffer from fluorosis caused by a high fluoride contents (above 2 mg/l) in the water they drink. Rural populations in parts of Moldova and Ukraine currently have no alternative but to drink water with fluoride contents of up to 20 mg/l.

The main aim of the project is to develop a low cost, working water treatment system based on innovative fluoride adsorption by modified zeolites, which can be tested and installed at a number of sites in Central and Eastern Europe where high F is a known problem. This will lead to more efficient water use through quality improvements by the treatment process. At the same time a better understanding of the relationship of fluoride in groundwater to the rocks and sediments which form the host aquifers will be achieved. This will lead to a better management of water resources. The problem is of a cross border nature, affecting Moldova, Ukraine and Hungary. The development of a GIS vulnerability map covering the cross border regions of Ukraine, Moldova and Hungary for fluoride, in which health data and population are included is also highly innovative, and is possible because of the partnership in this project. The quantifiable aims of the project are:

- The optimising and scaling up of a system developed on the laboratory scale, with a maximum reduction of fluoride in the treated water.
- Reduction of fluoride to below the WHO and EU norms
- Production of pilot units capable of producing several m^3 per hour
- Maintenance of low cost both in construction, installation and running
- testing at a number of locations in CEE lands where fluorosis is a known problem, to demonstrate its flexibility under different field conditions
- Development of GIS-based risk maps for regions of Central and Eastern Europe with high F

Forseen results

- Optimisation of zeolites based de-fluoridation technology
- Desing, commissioning and testing of a low cost, pilot unit in Ukraine, Moldova and Hungary
- Production of risk maps for high fluoride in groundwater,
- Development of GIS based Management support system to select most effective methods
- Evaluation and dissemination of the results, including a workshop.

NEW MEMBRANES AND INTEGRATED HYDRID MEMBRANE SYSTEMS FOR VOCS REMOVAL INDUSTRIAL CONTAMINATED WATER (NISIW)

Contract ref. :	***ERBIC15CT980140***	***EC Scientific Officer***
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1245

Project

New membranes and Integrated hybrid membrane Systems for VOCs removal from Industrialcontaminated Water (NISIW)

Keywords

Organophilic membranes, Vapor permeation, VOCs removal, Clean technology

Objectives and Contents

This project involves a progressive research proposal encompassing all spects of modern membrane technology needed for the sustainable management of industrial water, in order to reduce considerably the needs and waste of water due to industrial uses. The selective removal of hazardous volatiles from water will be achieved through gas phase treatment under low energy consumption.

Based on the accumulated advanced scientific experience of West and East countries, this NISIW project corresponds to mutual interests in the field of new vapour separation membranes and clean processes. The skills of five academic EU and NIS partners and one industrial NIS partner will be joined and shared to achieve this research project (EU: France #1, Greece #3 ; NIS: Russia #2 and #4, Ukraine #5) ; this international group has been constructed to harness expertise not available in one country alone. The industrial partner (Russia #6) will take an active part to the technological feasibility of the on-going development of membrane systems of the project. NISIW project will proceed through three primary objectives: (1) new selective polymeric membranes for VOCs recovery based on known polar inorganic P-N and/or Si-O backbone chains, and on new trimethylsilyl containing polymers (olefin or acetylene's), combining controlled hydrophilic/hydrophobic balance with high permeability and selectivity in relation either to water vapour/air or to VOCs/air separation ; (2) new membrane systems based on best promising materials and related composite membranes, providing an effective separation of ternary mixtures: (water vapour)/(organic vapour)/air; such systems will enable gas phase and water recycling under continuous VOCs recovery, leading to null pollutant release ; (3) study of integrated hybrid processes combining low compressing air stripper for vapourization and transportation of VOCs and membrane treatment of the gas phase allowing continuous conditions. Several operating schemes will be investigated and their industrial feasibility will be taken into account. The successful end products for effective VOCs removal from water will be provided by reduced cost-effective clean technologies.

Foreseen Results

Allowing the emergence of new processes aiming at the conservation and better utilization of natural water resources, the project will provide waste water purification under environmentally safe conditions with the development of new organophilic polymers and clean integrated technologies. Result exploitation will include technical-economic feasibility studies for the production and assessment of commercialization. Hence, the NISIW project output should lead Europe to a competitive position in a potentially world-wide market.

CAVITATION PHENOMENA IN WASTE WATER TREATMENT BY ULTRASOUND

Contract ref. :	***ERBIC15CT980141***	***EC Scientific Officer***
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1257

Project

Cavitation phenomena in waste water treatment by ultrasound

Keywords

Ultrasound, bubble-bubble-interaction, coalescence, bubble-populations, pattern-formation, waste-water-treatment

Objectives and Contents

The use of ultrasound in water treatment has gained increasing interest recently, as a method of high efficiency that avoids the use of chemical additives. Ultrasound can be used in conjunction with, or even as an alternative to, standard chemical processes in wastewater or drinking water treatment. Acoustic irradiation of water can influence cleaning processes in different ways, depending on the type of the pollutant. Indeed, it has been shown that in the presence of strong enough acoustic fields cavitation takes place, i.e. bubbles emerge, grow, and oscillate intensely. Under such conditions they are responsible for the following mechanisms of pollutant removal:
- Degassing of water from pollutants through rectified diffusion, bubble coagulation and bubble drift, as a means of odor and corrosion control.
- Separation of solid pollutants dispersed in a liquid by accumulation at bubble surfaces and agglomeration due to bubble drift.
- Neutralization of chemical pollutants as they react with free radicals, at high temperatures, which are produced during bubble collapses (sonochemistry).
- Deactivation of living microorganisms as a result of the dynamics of bubble collapse and the subsequent shock wave formation, or through the additional corrosion due to generated free radicals.
Ultrasound can also be used in cases where bubbles are not involved:
- Separation of hydrocarbon droplets from water in preliminary oil separation processes
- Removal of fine dust particles from a gas stream through ultrasonic agglomeration.
The recent advances in the field of cavitation, whether dealing with bubble-bubble interaction, or pattern formation in bubble fields, constitute a solid basis for an investigative effort.

The objectives of the proposed research effort are:

- Investigation of interaction forces for arbitrary bubble radii, bubble separation, and sound wavelength.
- Introduction of dissipation mechanisms, such as, viscous dissipation, heat conduction, and compressibility in the gas and/or liquid phases.
- Effect of nonlinear dynamics on bubble coalescence, resonance and break-up.
- Modeling of the collective behavior of bubble populations in acoustic fields.
- Numerical simulation of pattern formation in bubble fields.
- Experimental observations and high-speed video recording of bubble dynamics.
- Streamlining of numerical simulations with industrial applications.
- Improvement and optimization of existing and/or planned cleaning technologies.
In summary, the research effort will be twofold. Partners 1 and 2 will focus on the microscale aspects of the problem (bubble-bubble interaction level), whereas Partners 3 and 4 will concentrate on the macroscale aspects (pattern formation in large bubble populations). Finally, all the Partners in close collaboration with the industrial subcontractor (a German SME specializing in ultrasound applications) will incorporate the findings of the proposed investigation in industrial applications.

ASSESSMENT OF THE AGRICULTURAL POTENTIAL OF AN INDIGENOUS WATER HARVESTING SYSTEM IN THE CENTRAL ASIAN DESERTS (AWACAD)

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1269

Project

Assessement of the agricultural potential of an indigenous water harvesting system in the central asian deserts (AWACAD)

Keywords

indigenous system, water shortage, runoff, catchments, takyr

Objectives and Contents

The main subject of the proposed research is the evaluation of takyrs in the Central Asian deserts as natural catchment areas for runoff harvesting and agricultural production. Takyrs are plain or slightly sloping dense clay surfaces distributed in closed drainage areas of accumulative landscapes on alluvial, proluvial and deluvial deposits, and in areas of ancient irrigation in the arid zones of Central Asia. They are characterized by polygonally cracked surface crusts with little or no vegetation. The crust is compact and has a vesicular structure passing into a laminated horizon 3-7 cm thick. Takyrs occur mainly in local depressions, and have clay loam textures (20% to 70% clay), which are slowly permeable (Lobova, 1960). In many cases they are covered on the edges by aeolian sandy deposits with sparse vegetation. According to a preliminary estimation, the total area of takyrs in Central Asia varies from 13 mln.to 16 mln. hectares (Prasolov, 1933; Rosanov, 1986). During rainfall events, runoff is generated on the takyrs. The runoff could be channelled into plots and used for agricultural purposes. Thus, takyrs potentially form water resources in desert areas of Central Asia. Non-conventional water resources, such as runoff water harvesting, have not been developed in Central Asia. Even though there is sufficient precipitation (95-150 mm) and evidence of runoff, data on rainfall/runoff relationship, potential volume of runoff, and potential cultivated area supplied by runoff are lacking. Takyrs produce runoff under natural conditions and do not require any surface treatment.
From historical times the local population has used takyr catchments as the only source of water supply. There are a lot of well preserved simple engineering structures for storing runoff water along the caravan routes of the Middle Ages. For instance, *khaks*, small open pits about 2 m deep; *chirle*, artificial wells; and *sardobs*, large covered storages lined with brick-clay for fresh water. So, takyrs potentially are ideal catchment areas with high runoff coefficients. Runoff from takyrs - unique natural surfaces distributed in all Central Asian deserts - could be important water source for the water-supply to distant settlements, afforestation and development of micro-oasis agriculture in the Central Asian region of the former Soviet Union. In the proposed research the total area of takyrs and the potential catchment areas will be estimated, and their dynamics during the last 30 - 40 years will be studied by means of remote sensing.

Foreseen Results

The rainfall-runoff model will be adapted for takyr surfaces. The quantity of potential runoff from takyr surfaces will be calculated. The area of cultivated lands under runoff irrigation will be estimated. The optimal model of plant-growing reclamation and agrotechniques on takyr will be elaborated during the three years of experiment in Central Asia. The runoff farming technique, developed in the Runoff Agriculture Laboratory of the J.Blaustein Institute for Desert Research, which has been successfully applied and validated in Israel, Kenya, and other developing countries, will be implemented in Turkmenistan and Uzbekistan.
The final report will be disseminated in the interested organizations of the Central Asian States by the Regional Research Information Center on Aral Problems.
Young scientists from Turkmenistan and Uzbekistan will get the opportunity to have training in runoff agriculture, remote sensing and rainfall-runoff modeling.

SCIENTIFIC COOPERATION ON SUBSTAINABLE WATER EQUIPMENT IN AGRICULTURAL AREAS AROUND ST. PETERSBURG (SCOPE)

Contract ref. :	***ERBIC15CT980143***	***EC Scientific Officer***
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1277

Project

Scientific cooperation on sustainable water management in agricultural areas around St. Petersburg (SCOPE)

Keywords

Hydrogeology, on-line water monitoring systems, geoelectrical mapping.

Objectives and Contents

The agriculture is one of the main sources of surface and ground waterpollution in the St. Petersburg region. Many of the Russian and EU scientists behind this proposal have already for some time been cooperating in the development of methods for on-line measurement of water quality. The cooperation project will consist of tree main parts:
1. A study project of the water quality and hydrogeology in the Detskoselsky farm area.
2. Development and tests of on-line water monitoring systems based on Ion-selective Chalcogenide Glass-electrodes.
3. Combined test of Russian, Czech and EU universities geophysical equipment and interpretation methods in the area. For the developing of the best geophysical methods in this type of areas, for mapping groundwater aquifers, especially to forecast water quality problems in the aquifers.

Foreseen Results

The projects are integrated. But the aim of the project is mainly to secure that western expertise on the problems is transferred to the Russian institutions, where as the aim of the development project is to secure that the new methods based on Russian basic research will be general available to help future waste management in farming areas.

DEVELOPMENT OF LOW-COST METHODS FOR TREATMENT AND REUSE OF DRAINAGE AND URBAN WASTEWATER BY ADAPTATION OF WASTE STABILIZATION PONDS FOR EXTREME CONTINENTAL CLIMATES (COLD WSPS)

Contract ref. :	***ERBIC15CT980144***	***EC Scientific Officer***
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1278

Project

Development of low cost methods for treatment and reuse of drainage and urban wastewater by adaptation of waste stabilization ponds for extreme continental climates

Keywords

Wastewater, water reuse, pathogen removal, kinetic modeling, algae, stabilization ponds

Objectives and Contents

The project has several objectives, which will be achieved by reference to both laboratory and pilot scale work. To meet these objectives will require a more fundamental understanding of the factors that influence and impact upon the microbial populations within a waste stabilization pond system subjected to extreme climatic conditions and ice cover during the winter months. Techniques will be used to measure the population growth rate and productivity of algal species in relation to temperature changes and the degree of insolation; the data will be used to test and derive kinetic models that can relate this to the rate of waste stabilization in the system. Interpretation of the results will, where possible, relate to engineering factors used in the design of such systems, these will include: determination of the minimum holding period of the wastewater; the ideal pond depth; optimum water take off heights and the sizing of holding ponds during periods of sub-optimal BOD removal. The suitability of pond effluent, with respect to its pathogenic quality, for restricted re-use in agriculture and crop irrigation, will be established using conventional micro-biological techniques. The project will also monitor an extensive man made lake and canal system that has been constructed to convey the treated effluent form Almaty, Kazakhstan to its natural receiving water course some 30 miles away. The system is behaving like an algal pond system with high levels of primary productivity; data from this system will be used as a guide in the design of a pilot scale waste stabilization pond treatment system, which will then be further, evaluated.

Foreseen Results

It is expected that the results will be useful in testing the conventional empirical equations used in waste stabilization pond design and provide the necessary data for modification of these to take into account extreme continental climates. The results from both laboratory studies and field measurements will give a clearer picture as to the factors that affect pathogen destruction in pond systems and should allow more definitive judgments to be made on the reuse potential of pond effluents in agriculture. A better understanding of the kinetics of the system, especially under conditions of transient temperature changes, should allow pond loading to be optimised so as to prevent the odour nuisance commonly encountered in existing empirically designed systems. Optimisation of the system based on a fundamental understanding of the process kinetics should enable more precise design of the systems, so reducing overall costs and land usage requirements.

SUSTAINABLE AGRICULTURE IN THE ARAL BASIN; OPTIMISATION OF SOIL WATER. MANAGEMENT BASED ON SUSTAINABLE SOIL, WATER AND BIOTIC INTERACTIONS

Contract ref. :	***ERBIC15CT980148***	***EC Scientific Officer***
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1281

Project

Sustainable Agriculture in the Aral Basin: Optimisation of soil water management to minimise the soil salinisation and water logging and reduce wastage of water. ("CROPSAL")

Keywords

Agriculture, Water use, Aral Sea basin

Objectives and Contents

Since the construction of the irrigation projects on the Amu and Syr Rivers of the Aral Basin, waterlogging and salinity buildup in the soils have had a major impact on the sustainability of agricultural production. Irrigation consumes an ever-growing proportion of the limited water supplying the Aral Sea. Also, soil degradation and poor understanding of water use for agriculture has resulted in the reduction of crop yields over vast tracts of land, much of which is being abandoned. There is a need to improve water use efficiency of the irrigated agriculture within the Aral Basin. The overall inefficiency of water distribution and use is resulting in an environmental collapse with loss of soil fertility, declining yields, loss of aquatic life and biodiversity of the lands.

The project is a collaborative approach to investigate water management practises in the Aral Basin. It will involve field research to improve knowledge of the contribution of capillary rise to crops, the determination of regional climatic and crop factors for use with the UN FAO irrigation methodology, and a survey of the impact of improved water management practises on the soil and water resource of the region. The partners in the programme include research centres in Uzbekistan, Kyrgystan and Khazakstan together with support from research specialists in the United Kingdom, The Netherlands and FAO in Rome. FAO will provide additional technical inputs and will run a parallel training programme on modern irrigation practises at five sites in the region during the project period.

Foreseen Results

-Derivation of appropriate crop-soil parameters for irrigation in the Aral Sea region.
-Development of regional standards for estimating water use.
-Transfer of knowledge on crop-soil-water interactions to the NIS partners.
-Implementation of a regional climatic database for use with CROPWAT.
-Development of alternate water use scenarios.
-Dissemination of knowledge through training and reports.

SUSTAINABLE WATER MANAGMENT: APPLICATION OF THE ADVANCED BIOREMEDIATION TECHNIQUES FOR EFFICIENT TREATMENT OF INDUSTRIAL WASTE WATERS

Contract ref. : ***ERBIC15CT980145***
Proposal ref. : ***PL971284***
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1284

Project

Sustainable water management: application of the advanced bioremediation techniques for an efficient treatment of industrial waste waters.

Keywords

Bioremediation, microorganisms, environment, monitoring, waste waters treatment

Objectives and Contents

This multidisciplinary project concerns the application of bioremediation approaches for the decontamination of industrial waste waters, thus allowing their further recycling. The project represents a close cooperation between a scientific and an industrial team: the different aspects of the bioremediation treatment of the waste waters will be thoroughly studied by the participating research teams and then the most appropriate microorganisms will be applied for the decontamination of the waste waters of the industrial unit. Therefore, one of the most important objective of the project is to promote the collaboration among the scientific and the industrial group, that should result in the improvement of the existing water treatment technologies. The proposed research will deal with: i) systematic monitoring of organic pollutants in the waste waters of the industrial enterprise which takes part in the project, as well as in the natural water resources which are connected with the plant; ii) estimation of the environmental impact of the industrial unit on the ecological situation in this region; iii) development and application in situ of the most appropriate bioremediation technologies targeted to the improvement of the decontamination of the waste waters of the involved industrial enterprise.

Foreseen Results

As this project is industrially oriented, the main expected achievement of the project is the improvement of the waste water treatment system in the industrial enterprise participating in the project through the implementation of novel biotechnological techniques developed by the scientific participants of the project. Such profitable collaboration between the scientific and the industrial team, besides its scientific output, will also serve as an example of the involvement of scientific groups resolving specific industrial problems.

TECHNOLOGIES FOR THE RECLAMATION OF METALLURGICAL PROCESS WATERS (TREWAT)

Contract ref. : ***ERBIC15CT980146***
Proposal ref. : ***PL971293***
Type : *J oint Research Proj ect*
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1293

Project

Technologies for the Reclamation of Metallurgical Proces Waters (TREWAT)

Keywords

Separation processes; effluent treatment; liquid-liquid extraction; ion exchange; water recycle; hydrometallurgy; copper; cadmium; lead, zinc.

Objectives and Contents

- To provide a data-base of current practice for effluent treatment in the extractive metallurgical industries of Poland and Romania
- To provide training and expertise in the use of liquid-liquid extraction and resin ion exchange for the treatment of process waters and effluents
- To develop hydrometallurgical flowsheets for thexernoval of impurities from process waters associated with lead/zinc smelting and the refining of copper
- To introduce suc technology into relevant industries in Poland and Romania

This project will investigate the reclamation and recycling of process waters in the extractive metallurgical industry of Poland and Romania, using as a basis the following processes:

- Reclamation and recycling of waste waters containing cadmium arising from the wet cleaning of gases from the ISP lead/zinc smelter,
- A water management in copper producing plants, in particular the treatment of electrolytic tank house liquors.

Initially the project will evaluate the processes used to treat metallurgical waste waters in Poland and Romania and thuas provide a working data-base of current practice in these countries.

The overall aim of this project is to introduce young scientists witt knowledge of the latest separation technologies and to encourage research in these areas for the benefit of the. industry and environment. Separation technologies which will be included are: liquid-liquid extraction; ion exchange using both resins and membranes; impregnated. solid adsorbents; and liquid -membranes, technologies which currently are not used in Romania and Poland in these industries. Initial studies will be centred on the expertise of the two University partners who will provide training for Romanian and Polish Research Institute staff in their own Universities and in the Research Institutes.

Following these laboratory studies the Research Institute in close collaboration with the Industrial partners will determine the most appropriate process(es) for the treatment of the Industrial partners' effluents and develop flowsheets for the treatment of the real process effluents. Such flow sheets will take into consideration the presence and concentration of impurity elements. Volumes and local situations. The intended outcome of this phase is the development of flowsheets, which will be able to provide a commercial, economic and environmental acceptable solution to. the treatment of these industrial effluents.

Foreseen Results

- Data-base of current effluent treatment practice in Poland and Romania,
- Technical reports on the metal recovery using selected separation techniques, tested flowsheets for the treatment of effluents.

RECYCLING HEAVY METAL IONS AND ORGANICS OF BIOLOGICAL INTEREST BY INNOVATIVE SEPARATION MEMBRANES

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Proposal ref. : ***PL971301***
Type : *J oint Research Proj ect*
Duration : ***36 Months***
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1301

Project

Recycling heavy metal ions and organics of biological interest by innovative separation membranes

Keywords

Separation membranes, heavy metal ions, organics

Objectives and Contents

The objective of the project is both to strengthen the scientific collaboration and to stimulate the exchange of scientists between research groups of Bucharest (1, 2), Bratislava (3), Warsaw (4), Barcelona (5) and Montpellier (6). This common research purpose will be achieved through a joint research project dealing with new environmentally friendly separation technologies for the selective recovery of organics of biological interest and of heavy metal ions from waste waters. The scientific originality of the project is to develop a new generation of membranes such as Bulk Liquid Membranes (BLM) in hollow-fiber contactors and Fixed Site Complexant Membranes (FSCM) made of selective complexants chemically linked to a solid matrix. The separation is based on the recognition, binding and release of specific molecules which create the facilitated transport membranes. These recycling techniques require low energy consumption and low operating costs and are highly efficient. Because no chemicals are needed, membrane separation is a clean technology.

Five discrete activities are involved along this project connected to scientific domains of specific interest for the CCE partners :
- Synthesis of selective sequestering/transporting ligands and macrocycles (teams 1, 2 and 5)
- Liquid extraction (teams 3 and 4)
- Development of supported liquid membranes (in ion-exchange support) and bulk liquid membranes (teams 1, 2 and 3)
- Elaboration of fixed-site complexant membranes (team 6)
- Development and testing of new hollow fiber contactors for solvent extraction and pertraction (team 3).

This project brings together research teams with high expertise in molecular chemistry, material and membrane science as well as process engineering. It offers to young scientists and post-doctoral fellows a broad and high quality research and training and provides a useful formation on environmental problems and separation techniques.

Foreseen Results

- To prove that facilitated transport membranes are potential processes for the ion decontamination from industrial waste streams according to the industrial requirements by solving in particular their instability.
- To prove that such membranes are competitive at a commercial level
- To demonstrate that fixed site complexant membranes and bulk liquid membranes allow the amino acids to be efficiently separated
- To identify suitable membrane systems for removal of heavy metal ions and organic contaminants
- To determine membrane characteristics and operating limitations.

This project could bring some contribution to understand
- The ion-complexant interaction
- The transport of an entity through a dense solid. Thus it will broaden the knowledge of the concepts of recognition, the concepts of facilitated transport through liquid and solid medium and of the transport mechanisms ion cell membranes in specific interactions from biological media.

ENVIRONMENTAL AND HEALTH CONSEQUENCES OF IONISING RADIATION

ARCTIC VULNERABILITY TO RADIOACTIVE CONTAMINATION (AVAIL)

Contract ref. :	***ERBIC15CT980201***
Proposal ref. :	***PL971282***
Type :	*J oint Research Proj ect*
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1282

Project

Arctic Vulnerability to Radioactive Contamination (AVAIL)

Keywords

Arctic environment, fluxes of radionuclides, environmental transfer, Cs-137 and Sr-90, dietary habits, indigenous populations, vulnerability, spatial variability, internal and external doses, modelling

Objectives and contents

The objectives of this project are to study the long-term consequences of contamination areas due to nuclear weapons testing after the Chernobyl accident, and to identify vulnerable areas. This will require the study of transfer of radionuclides through the foodchain, to develop a spatially variable biophysical model to calculate doses, and to develop a method of quantifying vulnerability (i.e. defining a vulnerability index). Spatial variation in factors such as transfer rates, population levels and foodstuff production rates in conjunction with new dietary information will be integrated into a Geographical Information System to improve the spatial resolution of prediction of doses

Foreseen results

The collation and use of existing data, combined with directed acquisition of new information will enhance the knowledge about transfer processes of radionuclides in Arctic Russian environments and subsequently will improve the assessment of dose to man associated with previous releases in the Arctic. Better estimates of both individual and collective doses which would arise from a possible nuclear release will allow for the long term contribution recognized now as an important item. The research will provide also an important input to consequence analysis (emergency preparedness), where potential radiation doses to man and biota can be compared to quantify the effectiveness of different risk reduction measures in order to identify the most appropriate countermeasure for effective dose reduction. The output from this project will be in the form of critical load maps, vulnerability index maps, and a comprehensive dose assessment for inhabitants of the Arctic.

HIGHLY VERSATILE BUT SUSTAINABLE PROCESSES FOR THE REMOVAL OF RADIONUCLIDES FROM RADIOACTIVE WASTE (SUSRAD)

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2001

Project

Highly Versatile but Sustainable Processes for the Removal of Radionuclides from Radioactive Waste

Keywords

Environment, decontamination, removal of radionuclides from contaminated water

Objectives and Contents

The project concerns highly versatile but sustainable processes for the removal of the radionuclides. The versatility arises from the selection of the appropriate process for the particular catchment or groundwater in question. The processes chosen include Selective Solvent Extraction (SX); Membrane Extraction (MEM); Selective Sorbents (SORB); Photocatalytic Oxidation (PHOX); Electrochemical Removal (ELEC) and Cross-Flow Membrane Filtration (CFMF). Each partner to this programme has well defined tasks related to the removal of the radionuclides. The University of Reading will prepare selective solvent extraction reagents, selective inorganic adsorbents and will study SX and SORB. The University of Prague will study PHOX and SORB and will prepare composite granular absorbers from absorbents prepared by Reading. The Institute of Radioecology in Minsk will study SORB and CFMF; Chalmers University in Gothenburg will study SX and MEM; the SME, AllDeco, will study ELEC and a selection of other techniques for treating the waste for their processes. This selection will be made during the research project. The ELEC process used by the SME, AllDeco, is one of the processes used for the decontamination of metallic parts released from the controlled zones in decontamination and decommissioning of nuclear installations. The process generates a concentrated radioactive solution which needs a further treatment such as those suggested above. Radionuclides may also be removed by the chemical treatment of this solution and aqueous streams using the above techniques.

The proposers have already identified polluted streams, which represent hazards for catchments and ground waters, and for which the additional versatile but sustainable processes are required. These streams are principally in the CCE region but are also representative of other streams which occur in other nuclear power generating countries including France, United Kingdom and Sweden. The radionuclides are principally those of caesium, strontium, radium, technetium and transuranium elements. In some of these streams, the levels of pollution by radionuclides are well above the minimum, and urgent action is required at the research level in order to understand how such aqueous streams, which may be quite complex in chemical composition, may be treated.

Foreseen Results

The expected results of the project are new data on properties of novel solvent extraction reagents; ‘membrane extraction’ (supported solvent extractants) mechanisms and reagents preparation; novel highly selective sorbents properties; speciation of radionuclides in complex solutions; photocatalytic degradation of organic complexants and the correlation between the structure and properties of the photocatalysts used and their photocatalytic activity.

The outputs of this project would yield a basis for practical implementation of a new effective highly versatile but sustainable process for treatment of liquid waste contaminated by radionuclides. Application of this process might result in significant decrease of the volume of radioactive waste (in excess of 10^6). Removal of the organic complexants from the liquid waste would at the same time result in significant decrease of the leachability of final waste solidificates (more than 200%). Thus, the safety of their storage and final disposal would be significantly increased.

SELECTIVE SEPARATION OF M(1+), M(2+) AND M(3+) RADIONUCLIDES, NAMELY OF CS, SR AND ACTINIDES FROM NUCLEAR WASTE BY MEANS OF CHELATING HYDROPHOBIC CLUSTER ANIONS, FOCUSED ON THE PRACTICAL DECONTAMINATION OF " MAYAK" (CHELYABINSK-65) AREA

Contract ref. : ***ERBIC15CT980221***
Proposal ref. : ***PL972004***
Type : *J oint Research Proj ect*
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2004

Project

Selective separation of M(2+) and M(3+) radio-nuclides, namely of Sr and actinides, from nuclear waste by means of chelating hydrophobic cluster anions.

Keywords

Environment, decontamination, removal of long-lived radio-nuclides

Objectives and Contents

The Mayak plutonium fabrication plant in Ozersk (alias Chelyabinsk-40 or -65) produced in the past a large quantity of nuclear wastes. They originated from the PUREX process in which U was recovered and, followingly, Pu, Np and technetium were isolated. The resulting solutions, containing the most radioactive elements Cs and Sr (over 95% of the total radioactivity) and further radio-nuclides, have been stored in large stainless steel tanks (about 190 tanks) of hundreds cubic meters volume. At present, Cs and Sr are systematically extracted from the solutions stored in tanks by means of chlorinated COSAN (bis-dicarbollide cobaltate(-) anion) using a Czechoslovak patent. Re-extracted Cs and Sr are converted to phosphate glass and stored for cooling in stainless steel cylinders in a well guarded building. Up to now, practically one third of the tanks have been cleaned in this way. The extraction solvent used in this process is, however, very expensive and less available and, therefore, each improvement of the extraction system will be strongly appreciated.

The objectives of this project are: (i) to modify the above type of extractants, i.e. the hydrophobic anions, in such a way that the new derivatives can selectively separate Sr^{2+} and actinides from liquid medium and high level radioactive waste and (ii) to test the new extractants on simulated and/or real waste.

This project has three work packages: (i) Synthesis of new extracting agents; (ii) Development and production of basic borane cluster materials, and (iii) Extraction and transport experiments.

The partners of this project are the Autonomous University in Barcelona, Katchem Ltd. in Prague, CEA Cadarache, the Institute of Inorganic Chemistry in Rez, The University Claude Bernard in Lyon and the Nuclear Research Institute in Rez.

Foreseen Results

A solvent extraction process specific for the removal of trivalent and tretravalent cations, mainly actinides, from liquid radioactive waste will be elaborated. The proposed program is focused on the preparation of new reactants – the hydrophobic boron cluster anions – which will allow to extract in an industrial scale strontium and actinides from nitric acid solutions. The cooperation and back-feeding between teams working in synthesis and extraction and an SME preparing the required new extractants in a larger scale are expected to produce good results in a relatively short time.

The results obtained in this project will be disseminated either in the form of papers published in international scientific journals or presented at international conferences.

IMPLEMENTING COMPUTERISED METHODOLOGIES TO EVALUATE THE EFFECTIVENESS OF COUNTERMEASURES FOR RESTORING RADIOBUCLIDE CONTAMINED FRESH WATER ECOSYSTEMS COMETES

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2018

Project

Implementing Computerized Methodologies to Evaluate the Effectiveness of Countermeasures for Restoring Radionulcide Contaminated Fresh Water Ecosystems (COMETES)

Keywords

Environmental models, validation, countermeasure effectiveness, restoration, fresh water, lakes, rivers, Chernobyl, Techa river, flood plains, radionuclide migration, Cs-137, Sr-90

Objectives and Contents

The main aim of the project is the implementation of computerized methodologies in order to evaluate, in practical circumstances and by accounting for the benefits of dose reductions and economics, the social and the ecological costs of the remedial actions, the global effectiveness of countermeasures for restoring freshwater systems contaminated by radionuclides. The project has the following aims:

- validation and improvement of the environmental models for predicting the migration of radionuclides in freshwater systems and the effects of the countermeasures
- testing and customization of the Multi-Attribute Analysis procedures for the evaluation of the countermeasure effectiveness when the social, the economic and the ecological impacts are accounted for
- improvement of the flexibility of the developed computerized methodologies to assure their applicability to a wide range of different real circumstances

Foreseen Results

Critical analysis of the effectiveness of countermeasure strategies for restoring freshwater systems contaminated by radioactive substances based on the evaluation of social, economic and ecological costs using also experiences obtained in the past. Methodologies for selecting the most effective countermeasure and restoration strategies in relation to specific environmental scenarios of contamination in fresh water systems will be improved.
Based on the developed computerized methodologies a suitable architecture of decision making procedure will be developed which will serve as flexible tool applicable to the varying environmental, social, and economic conditions.
General recommendations concerning the selection and application of optimal strategies and technologies for remedial actions in the aquatic environment will be elaborated also on the basis of practical experiences and critical analysis of their effectiveness.

CAUSE OF DEATH REGISTERS IN AREAS OF CHRONICALLY EXPOSED POPULATIONS IN THE RUSSIAN FEDERATION (CDR-RU)

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2024

Project

Cause of Death Registers in Areas of Chronically Exposed Populations in the Russian Federation

Keywords

Epidemiology, chronic exposure, death registry

Objectives and Contents

Most of our knowledge on radiation induced cancer derives from the A-bomb survivors and from patients exposed to external radiotherapy. In both situations the studied subjects were exposed to high doses and dose rates. Very little is known about the carcinogenic hazard after chronic low-dose exposure, and extrapolations from high dose, high dose-rate situations, are presently used in radiation protection. The accidents in the former Soviet Union give us the opportunity to learn how protracted exposure influences man. This could be the last opportunity to study such large cohorts with reliable data and it is of great importance that the studies are carried out.

Foreseen Results

Creation of database for future epidemiological studies.

AQUIFERS AND SURFACE WATERS IN THE CHERNOBYL AREA - OBSERVATIONS AND PREDICTIVE EVALUATION (AQUASCOPE)

Contract ref. :	***ERBIC15CT980205***
Proposal ref. :	***PL972029***
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2029

Project

Aquifers and Surface-waters in the Chernobyl Area - Observations and Predictive Evaluation (AQUASCOPE).

Keywords

Surface waters, ground waters, Caesium fallout, Chernobyl, soil/sediments characteristics, soil solution, remobilization, vulnerability, Cs-137, Sr-90

Objectives and Contents

Much work has been done during the years after Chernobyl to identify, quantify and model the key processes which determine radio-caesium (Cs-137) activity concentrations in different components of the aquatic ecosystem. The purpose of this project is to test these models for a number of lakes rivers and aquifers in the Chernobyl area, and to extend them to make predictions of Cs-137 contamination over very long time periods (decades) after an accident. A similar, but limited study will be carried out for Sr-90. Criteria will be determined for the identification of aquatic systems, which are particularly vulnerable to long-term radionuclide contamination in the event of a future accident. Studies on aquifers will quantify contamination of a key component of the hydrological system in this region - most lakes and rivers are groundwater fed. It has been shown that water bodies in the regions around Chernobyl can contribute significantly to the intake of radioactivity by local populations. In many lakes and small rivers around Chernobyl, Cs-137 activity concentrations in fish are still significantly (up to two orders of magnitude) greater than maximum permissible consumption limits of ca. 1000 Bq/kg. To our knowledge, there is, at present, little information on the radiological impact of Chernobyl on ground waters. Recent evidence suggests that, at the present time, Cs-137 and Sr-90 activity concentrations in water and fish have stabilised. Thus, the present rate of decline in activity concentrations in rivers and lakes is tending towards the physical decay rate of the particular radionucIide. In practical terms, this implies that those lakes and rivers (& their fish) which are presently significantly contaminated, may remain so for many decades. These results warrant further analysis, and development of models for very long time scale predictions. Field studies to measure key water, sediment and catchment soil characteristics will be carried out at a number of lake, river and groundwater sites in the Chernobyl area. By continuing the sampling of rivers and lakes studied under previous CEC programmes, we have a unique opportunity to study these systems over the very long time period (10 years and more) required for long-term assessments. Modelling of these data will be carried out in two stages: firstly, the testing of the accuracy and general applicability of runoff, sediment remobilization, and soil migration models developed under previous CEC programmes, and secondly, the development of these models to make predictions in the very long-term. An important condition of the models, which will be used in this study, is that they are simple and general enough to be used over wide geographic areas.

Foreseen results

First reliable predictions of the future contamination of aquatic systems around Chernobyl in the long term (decades) after the accident will be produced. A general test of the accuracy and general applicability of aquatic models developed under previous CEC programmes will be performed. Criteria will be determined for the identification of aquatic systems, which are particularly vulnerable to long-term radionuclide contamination in the event of a future accident in Western Europe or the former Soviet Union. New understanding will be gained of the migration of surface radioactivity to ground waters (aquifers).

SPATIAL ANALYSIS OF VULNERABLE AREAS IN CENTRAL EUROPE (SAVEC)

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2033

Project

Spatial Analysis Of Vulnerable Areas In Central Europe (SAVEC)

Keywords

Radiocaesium (Cs-137), soils, land use, environmental behaviour, fluxes, foodstuff, diet, models

Objectives and Contents

Considerable recent progress has been made in applying radio-ecological expertise to radiation protection by integrating into predictive models our fundamental understanding of the environmental behaviour of radionuclides and the variation in operative parameters. Spatial and temporal analysis of these factors can be implemented by combining dynamic models of radionuclide behaviour with spatial databases of the input parameters within the Geographical Information Systems (GIS). This approach is being used in the EC-funded SAVE project (Spatial Analysis of Vulnerable Areas in Europe), as well as in several Inco-Copernicus projects (e.g. STRESS, RECLAIM); a spatially based model, SAVE IT, has been developed. Currently, there is no similar, radio-ecologically based work in the Countries of Central Europe (CCE). These countries are expected to have ecological, agricultural and cultural similarities and differences to both Western Europe and the CIS. Therefore, it is proposed to implement the SAVE approach to three of the largest Central European countries, Poland, the Czech Republic, and Hungary, with the following objectives:
- To collate information on parameters important in influencing the flux/transfer of radiocaesium to man, e.g. soil type, land use, climate and crop type;
- To collate dietary information at national and regional levels;
- To identify areas of uncertainty or lack of coverage in the existing data sets and supplement with field studies as required;
- To integrate the existing and newly acquired data into GIS for subsequent manipulation in the SAVE IT system, allowing presentation of output data in the form of maps and time-series graphs and tables;
- To improve the predictions made by the SAVE IT system;
- To identify areas most vulnerable to radiocaesium contamination; and
- To produce a PC-based model, which can provide contamination maps for user-specified areas and food products after a deposition event, under different scenarios.
The study will be invaluable in broadening the perspective of the SAVE approach, highlighting operative parameters that are inadequately described and providing the potential to improve the generic design within the models.

Foreseen Results

A central aspect of the work is the identification of vulnerable areas, namely those areas which, by virtue of the processes governing the transfer of radionuclides through foodchains, deliver high radionuclide fluxes to man. Identification of vulnerable areas is essential in establishing where intervention levels are likely to be exceeded in the event of a nuclear accident.
Successful implementation of the SAVE IT-approach should allow not only the identification of vulnerable areas but also an evaluation of countermeasure strategies, which might be expected to vary spatially. The project integrates information on the variation in radionuclide transfer to foodstuffs with spatial data (e.g. soil characteristics, climate, and land use) into predictive models for specific locations or areas, thus bringing together a large body of radioecological knowledge that is not currently available in a readily useable form. The project will also provide potentially useful input to other European-scale funded projects on risk assessment within radiation protection, such as RODOS.
Overall, this project will assist in reducing the economic and social impact of radionuclide contamination by providing user-friendly guidance, both in the form of computer-based systems and accompanying handbooks, for decision-makers. Specifically, the outputs of this project will help decision-makers to identify the most vulnerable geographical areas and food production systems and enable them to make better-informed decisions. It will also provide advice on optimum methods of controlling radiocaesium levels in food products.

CANCER RISK FOLLOWING CHRONIC RADIATION EXPOSURE IN THE NUCLEAR INDUSTRY IN THE RUSSIAN FEDERATION, HUNGARY, THE SLOVAK REPUBLIC AND LITHUANIA (CANUC)

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2035

Project

Cancer Risk Following Chronic Radiation Exposure in the Nuclear Industry in the Russian Federation, Hungary, the Slovak Republic and Lithuania (CANUC)

Keywords

Epidemiology, occupational exposure, nuclear workers

Objectives and Contents

An International Collaborative Study of Cancer Risk among Radiation Workers in the Nuclear Industry is currently underway in 12 countries (including 8 in Europe: 7 from the European Union). The current proposal is for the extension of this study to the Russian Federation, Hungary, the Slovak Republic and Lithuania. This will increase the power of the International Study and the informativeness of its findings. It will also provide valuable information concerning populations who have been little studied in the past: this information will be directly comparable with results derived from other studies in the European Union and elsewhere.

Foreseen Results

Contribution to the estimation of radiation risk at low doses

DEVELOPMENT OF TECHNOLOGIES ON EFFICIENT DECONTAMINATION OF RADIOACTIVE WASTES BASED ON NEW ORGANOPHOSPHOROUS IONOPHORES

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2037

Project

Development of Technologies on Efficient Decontamination of Radioactive Wastes Based on New Organophosphorus Ionophores.

Keywords

Environment, decontamination, removal of long-lived radionuclides

Objectives and Contents

This project is devoted to the development of technologies and processes of decontamination of radioactive wastes based on new generation of chemically and radiochemically stable and relatively inexpensive organophosphorus ionophores possessing high complexation selectivity and high binding affinity for radioisotopes. The proposed studies consist of *(i)* synthesis of new organophosphorus ionophores (functionalised crown-ethers and calixarenes) and preparation of related polymeric sorbents and solid extractants on their basis; *(ii)* development and semi-industrial tests of new technologies of extraction and safe storage of toxic radionuclides (caesium, strontium, actinide, rare earth and platinum elements) from radioactive wastes of different nature; and *(iii)* physico-chemical (thermodynamics of extraction; IR, NMR, EXAFS, XPS, XANES spectroscopy measurements on metal complexes) and molecular modelling studies, aiming to find relationships between structure and binding affinities of new ionophores and to guide the design of efficient extractants of metals.

The partners of this project are the Université Louis Pasteur in Strasbourg, ENEA Saluggia, the Institute of Inorganic Chemistry in Novosibirsk, the Institute of Organic Chemistry in Kiev and the Chlopin Radium Institute in St-Petersburg.

Foreseen Results

1. New ionophores (trialkylphosphinoxides and dialkylphosphino acids, phosphoryl-containing crown-ethers, phosphoryl- and thiophosphoryl-containing calixarenes) and materials based on them (solid extractants and sorbents) for extraction and separation of toxic radioisotopes of caesium, strontium, actinide and rare earth elements from radioactive wastes will be elaborated. Technologies of manufacturing of the promising compounds in industrial scale will be developed.
2. Technologies of decontamination of industrial and natural radioactive wastes and methods of long term safe storage of the toxic radioisotopes of caesium, strontium, actinide and rare earth elements will be developed.
3. Spectroscopy, thermodynamics and modelling studies will allow to develop strategy of the design of new ionophores possessing high binding affinity for metal cations.
4. The developed technologies will have potentially direct application at radiochemical plants of Russia, Ukraine and France for reprocessing of nuclear fuel of atomic power stations. Another possible application is the decontamination of the toxic radioactive wastes in the Chernobyl region (Ukraine) and in the MAYAK plant area (Russia).

RADIOECOLOGICAL ASSESSMENT OF CONSEQUENCES FROM RADIOACTIVE CONTAMINATION OF ARCTIC MARINE AREAS

Contract ref. :	***ERBIC15CT980209***	***EC Scientific Officer***
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2047

Project

Radio-ecological Assessment of Consequences from Radioactive Contamination of Arctic Marine Areas (ARCTIMAR)

Keywords

Arctic seas, modelling, estuaries, land/sea transport, rivers, sea-ice, biogeochemical cycling, food chain transfer, actinides, Cs-137, Sr-90, dose assessment

Objectives and Contents

The objectives of this project are to assess the scope of the contemporary Arctic database. This investigation will be based on available samples and design field studies/experiments covering themes, which are most suitable for the parameterisation of marine compartment models and the understanding of behaviour and fate of radionuclides in estuarine/marine environments.
Further development of present marine compartment models will gain in modelling the transfer of radionuclides to biota using information obtained in the on-going field studies. The behaviour of radionuclides in the transition from fresh to saline waters (estuaries) will be investigated considering the physico-chemical processes of radionuclide cycling at the sediment/water interface. The role of sea-ice in transporting sediments and associated radionuclides to the Arctic shelf areas and seas will be studied. A study of the diagenetic behaviour of radionuclides will lead to better understanding of their potential release in future years.
Food chain studies will cover a great range of biota (algae, molluscs, crustaceans, fish, and mammals) in order to get better insight in the transfer of radionuclides to man in an extreme environment.
From a general knowledge of the biogeochemical behaviour of radionuclides in the Arctic environment in conjunction with detailed habit and dietary information for indigenous peoples, critical groups may be identified and doses assessed (contemporary and predicted).

Foreseen Results

The collocation and use of existing data, combined with directed acquisition of new information will greatly improve the knowledge about transfer processes in the Arctic marine environments as well as modelling and validation of models for the assessment of dose to man. The influence of fluxes from rivers and estuaries as well as ice transport of radionuclides will also be considered for dose estimates arising from future nuclear releases into the Arctic. The output of results from the project will be in form of maps showing concentrations of relevant radionuclides in sediments, water and biota with accompanying comprehensive dose assessments thus forming a user-friendly guidance including reports and computer-based systems for decision-makers.

IMPROVEMENT OF A MODEL FOR FORECASTING MARINE RADIOACTIVITY CAUSED BY ACCIDENTAL RELEASES FROM COASTAL AREAS AND ITS IMPLEMENTATION INTO THE EU DECISION SUPPORT SYSTEM RODOS.

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2062

Project

ImProvement of a model for fOrecasting marine radioactivity cauSed by accidental relEases from coastal areas and its implementation into the EU decisiON support system RODOS (POSEIDON)

Keywords

Decision support, off-site emergency management, RODOS, radiological consequences, coastal waters, radioactive material, environmental modelling.

Objectives and Contents

The objectives are to develop an improved model (and related software) for assessing the radiological consequences of radioactive material accidentally released into coastal waters and to incorporate this model/software into the RODOS decision support system for off-site nuclear emergency management.

The existing model/software, POSEIDON, will be used as the basis of further developments/improvements, the more important of which are: conversion of software from a Windows to Unix platform; full integration within the current RODOS hydrological model chain; better description of the short term biological processes and exchange rates between the major model compartments, in particular taking account of seasonal variations; better modelling of transfer to aquatic foodstuffs; validation using Chernobyl data.

The project will last for 24 months and the effort involved is 156 man months. The project partners are:

- KEMA, Netherlands
- Institute of Mathematical Machines & System Problems, Ukraine
- CEPN, France
- NCRS “Demokritos”, Greece
- SPA “Typhoon”, Russia

Foreseen Results

- improvement of the POSEIDON model, in particular the inclusion of land-sea transfer by run-off
- validation of the improved POSEIDON model using Chernobyl data for the transfer into the Black Sea
- integration of POSEIDON into the hydrological module of the RODOS decision support system.

VALIDATION OF PARAMETERS OF 90SR BIOKINETICS IN HUMANS

Contract ref. :	***ERBIC15CT980211***
Proposal ref. :	***PL972071***
Type :	*J oint Research Proj ect*
Duration :	***30 Months***
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2071

Project

Validation of parameters of 90Sr-biokinetics in humans

Keywords

Incorporation of 90Sr, dose reconstruction, biokinetic parameters, tracer kinetic studies, organ and effective dose

Objectives and contents

The overall objective is a validation of biokinetic parameters used for reconstruction of individual internal doses due to 90 Sr incorporation in the Urals region.

The biokinetic parameters will be derived from tracer kinetic studies on human volunteers applying stable isotopes of strontium as tracers, i.e. no additional radiation exposure will be imposed on these subjects. Thermal ionization mass spectrometry will be applied to measure the stable isotope concentrations in blood and urine samples taken at various times after oral and intravenous administration. Investigations will include the assessment of fractional intestinal absorption of Sr from contaminated foodstuffs, Sr blood clearance, and urinary excretion of Sr. Volunteers include children, adolescents and adults in order to determine age-dependent and gender specific biokinetic parameters for the Urals region and Western Europe. Data obtained will also be compared with current values as recommended by ICRP. Combining these data with data available on 90 Sr content in foodstuffs in the Urals region as well as on the history of working at Mayak and on 90 Sr content of bone samples, the intake and the uptake functions will be evaluated.

The observed variation of the biokinetic data allows the identification of parameters of the greatest significance with regard to dose reconstruction. The measurements on volunteers of different ages will contribute validated data on the age-dependence of organ and effective doses.

Foreseen Results

A set of validated biokinetic parameters will be derived for age-dependent and gender-specific uptake and internal turnover of 90 Sr. Individual internal doses due to 90 Sr incorporation for workers of Mayak and for members of the general population of the Ozersk region will be reconstructed. The validated data of doses due to 90 Sr incorporation in individuals from the Ozersk region will provide an improved basis for risk assessment with respect to malignancies.

FURTHER DEVELOPMENT OF EPICURE TO SERVE AS A COMMON SOFTWARE TOOL

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2091

Project

Further Development of EPICURE to Serve as a Common Software Tool

Keywords

Epidemiology, software development, statistics

Objectives and contents

The software package EPICURE is a collection of command-driven interactive programs for personal computers. These are tools for working with general risk models arising in analyses of epidemiological or experimental studies. The objective is to make EPICURE more accessible and to provide enhancements that facilitate its use in a broad range of chronic exposure studies, especially studies of the cohorts of exposed populations in the former Soviet Union. The general aim is to support the trend that the same software be used in radioepidemiological studies, to facilitate these studies, but - more importantly - to make them transparent and readily comparable, which could clarify or resolve various issues in the controversies on radiation risk.

Foreseen Results

Improved computer programme for the analysis of epidemiological studies.

DOSES TO THE BELARUS AND UKRAINE POPULATIONS RESULTING FROM THE CHERNOBYL ACCIDENT (CHERNOBYL DOSES)

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2096

Project

Doses to the Belarus and Ukraine Populations Resulting from the Chernobyl Accident

Keywords

Biological Dosimetry, FISH, chromosome painting, translocations, retrospective dosimetry,chernobyl doses.

Objectives and Contents

Doses to people living close to the reactor at the the time of the accident have been estimated on the basis of cesium deposition, whole body measurements and dose rate measurements, These doses are generally thought to be less than 100mSv. Recently, cytological measurements have been revealed which indicate that some villagers in Belarus and Ukraine received doses of 500mSv, considerable greater than has been assumed. The aim is to use FISH biological dosimetry to measure chromosomal translocations, considered to be stable in time, to reassess these higher doses to confirm or reject their validity. If confirmed the higher doses imply a greater risk to the exposed population than has been assumed till now.

Methods : FISH, or chromosome painting, is a recently developed technique which permits the more stable chromosomal translocations to be scored in peripheral blood lymphocytes as a form of retrospective biological dosimetry. This method will be used to reasses and compare the doses in individuals measured at the time of the accident in 1986 using dicentric biological dosimetry who showed a considerably higher dose than has been assumed till now.

Foreseen Results

The results should allow a comparison to be made between cytological dose measurements made using dicentric aberrations in peripheral blood lymphocytes soon after the Chernobyl reactor accident in people living near to the reactor and measurements made using reputably stable translocation aberrations in peripheral blood lymphocytes of the same people. In view of the fact that the dicentric measurements indicate considerably higher doses than have been officially ascribed to these people the results, if confirmed could have important consequences for both their health and epidemiological follow-up. The results might also lead to a reassessment of the doses of larger numbers of people who were living in the neighbourhood of the reactor at the time of the accident.

PHYTOR: EVALUATION OF WILLOW PLANTATIONS FOR THE PHYTOREHABILITATION OF CONTAMINATED ARABLE LAND AND FLOOD PLAIN AREAS

Contract ref. :	***ERBIC15CT980213***	***EC Scientific Officer***
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2100

Project

Evaluation of Willow Plantations for the Phyto-Rehabilitations of Contaminated Arable Land and Flood Plain Areas (PHYTOR)

Keywords

Short rotation coppice, willow plants, reclamation, Chernobyl, river flood plains, arable lands, Cs-137, Sr-90, vertical migration, soil-plant transfer, exchangeable fraction, fluxes

Objectives and Contents

Following the Chernobyl accident large agricultural areas and forests have been severely contaminated in Ukraine, Belarus and Russia including the fresh water Dnjeper cascade, which represents the major source for drinking water of the local population. When common agricultural perspectives must be abandoned in case of severe contamination of agricultural land, alternative practices can offer a solution for land recovery. In this context the Short Rotation Forestry (SRF) concept for energy production was proposed in a former project (RECOVER) evaluating its potential for the remediation of contaminated land with restricted use, on a radiological and economical basis.
The main objective of the proposed project is the evaluation of willow plantations for the phyto-rehabilitation of contaminated arable land and flood plain areas by using willow coppice for energy production (alternative crop) and for migration and erosion control (border stabilisation) and pond reclamation. The overall objectives will be procured by elaborating in following areas:
1. Fluxes of Cs-137, Cs-134 and Sr-90 in coppice test sites (RECOVER project in Belarus) and in Belgium (Lysimeter study Cs-134) as well as in newly established sites in the Ukraine.
2. Feasibility study on willow growth under Belarussian climatic conditions and of transfer of Cs-137 and Sr-90 to crops common for Belarus, by comparing different land use on a radiological and economical basis.
3. Use of willows for attenuation of vertical radionuclide migration and the contamination of the Pripyat river.
4. Effectiveness of willow plants to reclaim shallow ponds and preventing the bottom sediments from resuspending.
5. Investigation of the effectiveness of willow plantations in abating the water erosion of contaminated material from the inundated flood plains back to the river Pripyat.
6.Test of stabilising Pripyart river borders by willow plants.
7. Use of an environmental model (based on detailed soil classification and land use maps, *GIS* and results from the RECOVER project*)* for defining and selecting radioactively contaminated areas (Chernobyl) suitable for willow coppice culturing for energy production as a valuable restoration option.

Foreseen Results

The multi-disciplinary impact analysis of the radiological, technological, and economical features of the Short Rotation Forestry concept will allow to target its remedial potential among other land valorisation and/or reclamation options. The GIS coupled with the information acquired during the project and with already existing data will give a visualised output (maps) displaying areas suitable for willow plantations for energy production representing thus a valuable tool for decision-makers in remediation management. The evaluation of data and modelling will result in:
- ranking of different land-use options on a radiological and economical basis
- use of the data-base for radio-ecological modelling (for SRF) at a 1:100.000 to 1:200.000 scale
- description of the concepts behind the spatial and temporal modelling
- PCRaster script of the spatial-temporal model
- maps delineating areas for willow growth

The use of willow plants as potential for decontamination of flood plain areas will be evaluated together with their general phyto-remediation (decontamination) aspects.

RADIATION OVER-EXPOSED ACCIDENT VICTIMS: EVALUATION OF HEALTH CONSEQUENCES

Contract ref. :	***ERBIC15CT980214***
Proposal ref. :	***PL972105***
Type :	*J oint Research Proj ect*
Duration :	***24 Months***
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2105

Project

Radiation Over-Exposed Accident Victims: Evaluation of Health Consequences

Keywords

Radiation injury, treatment of over-exposed, health effects

Objectives and Contents

The project is designed as a prospective follow-up study. The overall objective is to evaluate the health sequels of the 97 survivors diagnosed as having acute radiation sickness following the reactor accident and now suffering from radiation damage of the skin and other organ systems . The aim is to improve diagnosis and treatment and thereby reduce manifestation of the mid- and long-term health consequences of past and future radiation accidents. New concepts can be developed to improve the care for the victims and their quality of life.

Foreseen Results

Compendium of late arising effects in over exposed individuals.

SOURCE DEVELOPMENT AND TRANSPORT OF RADIOACTIVE CONTAMINATION IN THE ENVIRONMENT TROUGH THE USE OF SATELLITE IMAGERY (STREAM)

Contract ref. :	***ERBIC15CT980219***	***EC Scientific Officer***
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2111

Project

Source Development and Transport of Radioactive Contamination in the Environment through the Use of Satellite Imagery (STREAM)

Keywords

Satellite images, radionuclide distribution, river transport, sediment deposits, final sinks, central Russian sites, environmental damage, field gamma radiometric survey, long-term fate, Cs-137, Sr-90

Objectives and Contents

The level and distribution of radioactive contamination originating from nuclear sites and installations in the territory of the former Soviet Union have come under close scrutiny in recent years. In particular the nuclear fuel reprocessing plants Mayak P.A., Tomsk-7 and Krasnoyarsk –26 and the nuclear test sites at Semipalatinsk and Novaya Zemlya have received special attention. Satellite images now available for civil use have the great potential of providing detailed information on features of radioecological interest in areas of the NIS where standard maps are difficult to acquire or poor in quality. A long time-series of images/photographs now available can be used to track the historical development of contamination sources e.g. Mayak P.A.
The aim of the project is to study the development of contamination and impact (damage to the environment) of selected sources using satellite images/photographs. Finally distribution and fate of radionuclides arising from these sources will be considered, investigating transport of river's suspended load and the distribution of radioactivity in riverine/estuarine sediment deposits. This will be achieved via the following objectives:

- To study satellite photographs and standard maps of (a) selected sites contributing to radioactive contamination of central Russia and (b) the major river systems of central Russia (Ob and Yenisey ,tributaries);
- To describe (a) the development and (b) the impact in terms of environmental damage caused by routine operations and accidents at sites of interest and to produce maps on evolution of the river channels at specific sites over time;
- To produce maps of river/estuarine sediment facies showing areas acting as sources or sinks for contaminated sediment. Integration of data into Geographical Information Systems (GIS);
- To assess the contamination at selected sites using field gamma radiometric surveys and core collection and to create inventory maps (GIS) i.e. integration of sediment facies maps, landscape core data, radiometric and field mapping of the areas of interest;
- To use satellite imagery to qualitatively study the processes leading to sediment dispersion (sediment-bound radionuclides) carried by river systems and to study the role of suspended sediments in dispersing radioactivity in these river systems, implementing field studies and modeling;
- To predict the long-term fate of radionuclides (Cs-137, Pu-239/240, Sr-90) in the catchment/river floodplains of the major river systems entering the Kara and Barents seas.

Foreseen results

The study of satellite photography in conjunction with sampling, analysis and modeling will provide data on radioactive contamination in environments surrounding nuclear installations including data on inventories in sediments (field gamma spectrometry) which can then easily be extrapolated over larger areas. In addition environmental processes may be studied such as transport of contaminated sediments carried as suspended particle load in rivers and their deposition on floodplains. A more precise determination of the distribution and fate of radioactive contamination from Russian nuclear facilities can thus be achieved within the fluvial system of the rivers Ob and Yenesei and their contribution to the contamination of Arctic waters. Results from this work will also form an important input to other projects such SUCON (South Ural Contamination) and AMAP (Arctic Monitoring and Assessment Programme) through which results may be disseminated.

SPATIAL REDISTRIBUTION OF RADIONUCLIDES WITHIN CATCHMENTS DEVELOPMENT OF GIS-BASED MODELS FOR DECISION SUPPORT SYSTEMS (SPARTACUS)

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2116

Project

Spatial Redistribution of Radionuclides within Catchments: Development of GIS-based Models for Decision Support Systems (SPARTACUS)

Keywords

Spatial modelling, catchment areas, radionuclides, redistribution, wash-off, soil erosion transport (run-off) , agricultural lands, river/ground water transfer, vertical migration, lysimeter experiments, effect of countermeasures, Cs-137, Sr-90

Objectives and Contents

Redistribution of radionucides within catchments may occur through transport of soil particles, to which radionuclides are readily adsorbed, or through leaching to deeper horizons or groundwater. Knowledge about these processes is particularly essential for assessment of secondary contamination of groundwater, surface water or floodplains after environmental radioactive contamination. Current models of radionuclide redistribution are based on soluble transport. Soil erosion models are not widely used for the evaluation of radionuclide transport within and from river catchment areas. The integration of soil erosion models into radionuclide transport models enables the improvement of evaluation of radionuclide transport within or from catchments.
The main objective of the proposed research project is to improve the methodology for spatial modelling of radionuclide redistribution within catchments by incorporation and evaluation of existing spatial databases of experimental catchments into GIS. To this end the following intermediate steps will be pursued:
- Incorporation and evaluation of existing spatial databases of experimental catchments in GIS (soil type, land use, surface contamination)
- Improvement of experimental techniques for determining radionuclide wash-off parameters (solid and soluble phase)
- Experimental evaluation of the effect of countermeasures on radionuclide wash-off under different environmental conditions
- Improvement of existing models for radionuclide wash-off processes by incorporation of complementary sub-models of transport of radionuclides associated with eroded soil particles, and physical-chemical transformation of radionuclides
- Development of a GIS-based model for evaluation of the spatial redistribution of radionuclides in natural and agricultural catchments under the influence of hydrological processes
- Quantification of radionuclide transport to river water and groundwater in selected catchments

Foreseen Results

The main result of the project will be a better scientific understanding of radionuclide redistribution in catchments, resulting in the production of a prototype software package and consisting of integrated, improved models of surface run-off, soil erosion, soluble and solid radionuclide wash-off, and vertical radionuclide migration. Including a software manual. The ultimate aim of the project is to provide a spatial modelling tool for evaluation of rehabilitation practices of radioactively contaminated land with regard to soil erosion and radionuclide transport that could be easily incorporated into existing decision support systems.

RETROSPECTIVE DOSIMETRY FOR POPULATION IN AREAS AFFECTED BY FALLOUT FROM THE SEMIPALATINSK NUCLEAR TEST SITE (RDSNTS)

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2120

Project

Retrospective dosimetry for populations in areas affected by fall-out from the Semipalatinsk Nuclear Test Site

Keywords

Retrospective dosimetry, luminescence dosimetry, Semipalatinsk Nuclear Test Site, fallout, training facility, standardization.

Objectives and Contents

The primary objectives of this project are twofold: (1) to survey, assess and test the potential of the application of retrospective luminescence dosimetry with ceramics for subsequent dose reconstruction work in populated areas affected by fallout from the Semipalatinsk Nuclear Test Site (SNTS); (2) to establish the basis of a CIS training facility at MRRC RAMS, Obninsk for the application of solid-state retrospective dosimetry methods.

1) A small scale dose evaluation will be made within one or more settlements, enabling a comparison of retrospective dosimetry estimates and the official published values obtained by calculation. Such quantitative data are urgently needed in the long term assessment of the health of potentially affected populations The study will be performed in settlements within the areas of Altay, Russia and Semipalatinsk, Kazakhstan.
Work will include:
-The survey of potential settlements and identification of those suitable for study and the sampling locations therein; the sampling of brick and porcelain as appropriate.
-The evaluation of absorbed dose in ceramics, and conversion of absorbed dose in brick to dose in air a reference locations; synthesis of dose evaluations for whole or parts of settlements.
- Development of recommendations for procedures to be used for dose evaluations in settlements where dose reconstruction methods may be used in the future.

2) The foundations of a training facility based at MRRC, Obninsk, will be laid down that will undertake to provide training and facilities for scientists wishing to apply retrospective dosimetry methods within the CIS and to promote and sustain active research work in the CIS.
Work will include:
- The provision of operational laboratory facilities that will enable luminescence work to proceed with sufficient throughput using semi-automated apparatus that will provide the capacity for ceramic testing and in training of CIS dosimetry researchers who wish to gain hands-on experience in the laboratory procedures employed with ceramics.
- Providing initial fieldwork training for novices from the EU and from the CIS.

Foreseen Results

Standardization of sampling and experimental strategies for work in regions affected by fallout. Documentation in English and Russian, for training purposes, of the recommended procedures for sample preparation of ceramic and environmental samples. Comparison of dose evaluations obtained by luminescence with those published data and obtained by computational modeling in selected settlements.

MINISATELLITE MUTATIONS AND BIODOSIMETRY OF POPULATION AROUND THE SEMIPALATINSK NUCLEAR TEST SITE

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2121

Project

Minisatellite Mutations and Biodosimetry of Population Around the Semipalatinsk Nuclear Test Site

Keywords

Biodosimetry, heritable mutations

Objectives and Contents

The study aims at the collection and long-term storage of a biosample database of a unique population of people exposed to ionizing radiation from nuclear weapon tests during former decades. It concerns people exposed to chronic radiation at the Semipalatinsk nuclear test site in Kazakhstan. The biosamples will be used to assess the radiation exposure of the population and to determine the rate of heritable mutations in their germline. The study will include three generations of people in fifty families from the Semipalatinsk nuclear test area and thirty families from clean areas as controls. The biosample database will be available to future studies addressing genetic effects of ionizing radiation using novel molecular biological methods.

Foreseen Results

Information on the utility of this innovative mutational technique.
Information on the inheritability of mutations.

HEALTH EFFECTS OF NUCLEAR WEAPONS TESTING ON SEMIPALATINSK TEST SITE, KAZAKHSTAN, ONTHE POPULATION IN SEMIPALATINSK OBLAST (SEMIPALATINSK FOLLOW-UP)

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2129

Project

Health Effects of Nuclear Weapons Testing on Semipalatinsk Test Site, Kazakhstan, on the Population in Semipalatinsk Oblast

Keywords

Epidemiology, death registry, cancer incidence

Objectives and contents

The objectives are threefold: A cohort study should be established and conducted both on persons being directly exposed by the fall-out from the nuclear weapons testing on the Semipalatinsk Test Site and on their progenies, i.e children and grandchildren. The inclusion of children and grandchildren is due to first results reporting a two-peaked increase on cancer incidence in the exposed areas on the basis of cross-sectional studies. Secondly, it is aimed to develop a death registry for the exposed population in Semipalatinsk Oblast. Thirdly, a link of the research activities in Kazakhstan will be established to those in the Russian Federation, i.e. effects on chronic radiation exposure among the populations living in the Altai (who were affected by the fall-out from the atomic weapons testing on Semipalatinsk Test Site, too), on the River Techa, and in the closed city of Ozersk.

Foreseen Results

Feasibility of conducting epidemiological studies in these contaminated areas.

HEALTH
RESEARCH ACTIVITIES

STANDARDS OF CARE FOR CLEFT LIP AND PALATE IN EUROPE (EUROCLEFT)

Contract ref. :	***ERBIC15CT980301***
Proposal ref. :	***PL973021***
Type :	*J oint Research Proj ect*
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3021

Project

Standards of care for cleft lip and palate in Europe

Keywords

Cleft palate, standards, quality assurance

Objectives and Contents

The ultimate goal of the project is to improve the effectiveness and efficiency of care for European children with clefts of the lip and/or palate by extending the current BIOMED II "Eurocleft" network to the CCE. Cleft professionals from the following states will join the network: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Slovak Republic, and Slovenia.

Clefts of the lip and/or palate are birth defects affecting 1 per 700 live births. Successful rehabilitation requires a complex multidisciplinary mix of services. The organisation of care across Europe differs dramatically from highly centralised national teams, to poorly co-ordinated local services. Clinical protocols of care also vary widely and are seldom evidence based. There is no commonly agreed method of quality assurance and resources for research on treatment and prevention are fragmented.

This project will be lead by the Steering Group of the established BIOMED II project who are representatives of 5 cleft teams from Denmark, Netherlands, Norway, Sweden and UK. They will work in partnership with a Polish team leader acting as Scientific Co-ordinator for the CCE. A survey of CCE states will be undertaken to identify the personnel involved in care and followed by a networking process that will include interaction with principal contacts, the preparation of fact sheets and short exchange visits between colleagues in the east and west of Europe. Local pilot studies of treatment outcome will also be encouraged. This co-operation will help to establish the assessment of cleft care systems in the CCE in order that the organisation of services might begin to be analysed and compared with those in the EU in the hope of improving the effectiveness and efficiency of treatment for patients. Two workshops will be held to enable CCE cleft specialists to have an exchange of views with western European colleagues in order to reach agreement on a common approach to quality assurance.

Foreseen Results

Register of services, clinical protocols, and research resources
Systematic reviews of clinical trials in the CCE literature
Common practice guidelines
Common methodology for outcome assessment

MICROBIOLOGICAL SURVEILLANCE OF DIPHTERIA IN EASTERN EUROPE (DIPHTERIA IN EASTERN EUROPE)

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3027

Project

Microbiological surveillance of diphtheria in eastern Europe

Keywords

Diphtheria; Microbiology; Disease surveillance

Objectives and Contents

The project focuses upon research activities concerning the standardisation and harmonisation of, methodologies for the microbiological diagnosis of diphtheria and the molecular epidemiology of the causative organism, Corynebacterium diphtheriae. In addition, the project aims to strengthen international collaboration and laboratory based research and surveillance within and between newly established and existing diphtheria reference centres particularly those in Eastern Europe. This will also encourage the transfer and monitoring of new and existing methodologies within all these countries. These activities should contribute greatly to the improvement of public health laboratory based research and surveillance of this re-emerging infectious disease. This will essentially be achieved by:
The formation of a defined network of Diphtheria Reference Centres within both Western and Eastern Europe.
The establishment of laboratory based research and surveillance and information exchange to bring any potential 'clusters' of disease within a particular area to the attention of the participants and relevant public health officials; and to identify any potentially pathogenic 'clones' that may be circulating.
The standardisation and dissemination of public health methodologies and protocols for microbiological surveillance in order to improve the effectiveness of EU wide prevention of this disease
The introduction of novel and simple methodologies for laboratory diagnosis of diphtheria to key centres within Eastern Europe by training of key personnel from these laboratories.
Introduction of a European international quality assurance scheme for laboratory performance in diagnostic and research typing methodologies.
The establishment of a core set of clinical and epidemiological data items ('passport') to accompany, where possible each laboratory confirmed case of diphtheria in Europe and the creation of an international database of genotyping patterns as determined by molecular methods and the monitoring of the distribution of these genotypes within Europe as a major research collaborative study between all participants within Western and Eastern Europe.
To create a common European database for identification and verification of new and existing genetically defined clones of the causative organism that have the potential to cause epidemics.

Foreseen Results

The project complies with the objectives of the INCO-COPERNICUS work programme in that international collaboration with Eastern Europe is essential to monitor the spread and the pathogenesis of this re-emerging disease and to promote the necessary research and developmental work within this field. The participating laboratories are situated in 'key' areas within Eastern Europe and the creation of a research network linking either directly or indirectly Diphtheria Reference Centres within Europe represents a new initiative and is a good example of coordinated activities leading to joint research collaborations focused upon improvements in diagnosis and prevention of this disease. Exploitation at the public health level should lead to improvements in microbiological surveillance and diagnosis.

ASSESSMENT OF HEALTH RISKS RELATED TO OCCUPATIONAL AND ENVIRONMENTAL EXPOSURE TO RADIOFREQUENCY AND MICROWAVE ELECTROMAGNETIC FIELDS (RADIORISKS)

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3038

Project

Assessment of health risks related to occupational and environmental exposure to radiofrequency and microwave electromagnetic fields (radiorisks).

Keywords

Health risks, radiofrequencies, electromagnetic fields.

Objectives and Contents

Epidemiological studies on health risks related to occupational or residential exposure to radiofrequency (RF) and microwave (MW) electromagnetic fields (EMF) are scarce, fragmentary and give controversial results. Experimental investigations indicate that, under certain schedules of exposure, cellular systems or small animals may respond to low-level RF/MW EMFs with pronounced shifts of certain physiologic parameters. One of the main factors which limits epidemiological studies of subjects exposed to RF/MW appears to be a relatively small size of cohorts of exposed workers or residents at the national level.
The project is based on coordination of five epidemiological studies, sponsored from national sources, currently on-going in Poland, Latvia and Croatia. These studies cover, among others, analysis of cancer morbidity in Polish military personnel exposed to MWs, autonomic regulation of cardiac function and shift of diurnal rhythms in workers of radio broadcasting stations and personnel of radio communication centres, assessment of health, immune and cytogenetic status in personnel servicing radar stations and finally, evaluation of psychomotoric functions and general development parameters in residents living close to powerful radar stations in Skrunda, Latvia.
The consortium composed of 5 partners (coordinator in Poland, contractor in Austria, associate contractors in Sweden and Latvia, external cooperator in Croatia) was organised with the aim to coordinate and improve the final outcome of the above five on-going epidemiological/medical studies of workers and/or residents exposed to low-level RF/MW radiation in Poland, Latvia and Croatia. The international coordination of the projects will include exchange of data between the partners, collection and critical selection of data, improvement and verification of methods for measurement of exposure and finally, preparation of reports and publications. A close cooperation with the COST-244 bis Project "Biomedical Aspects of Electromagnetic Fields" and the International WHO EMF Project will be continued. This would provide a direct access to other on-going projects in European centres and a possibility for reliable supplementation of database with entries relevant to health risks.

Foreseen Results

Results of the project may considerably contribute to better assessment of health consequences of long-term exposure in RF/MW fields, providing that both the evaluation of exposure levels and relations of bioeffects/medical findings with the exposure in the investigated populations will be properly established.
Results of all on-going epidemiological/medical studies, including effects of their coordination, will be published by partners of the consortium in peer-reviewed journals and presented during scientific meetings.

IMPROVMENT OF SURVEILLANCE AND PREVENTION OF HEPATITIS C VIRUS INFECTION

Contract ref. :	***ERBIC15CT980304***
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3040

Project

C virus improvement of surveillance and prevention of hepatitis infection

Keywords

HCV, diagnosis, vaccination

Objectives and Contents

Hepatitis C virus (HCV) is an enveloped, positive strand RNA virus recognised as a major etiologic agent of blood-borne and sporadic non-A non-B hepatitis. HCV infection represents a world health problem due to the high seroprevalence and high propensity of evolution towards a chronic carrier state, which can lead, to liver cirrhosis and hepatic cell carcinoma. The objectives of the proposed research project concern the improvement of diagnosis, surveillance of virus transmission and prevention of HCV infection.

Diagnosis: the polypeptide composition, antigenic structure as well as the number of possible viral serotypes remain unknown. Current diagnostic tests fail to detect viral structural proteins .Therefore the first objective will be development of novel tools for analysis of the antigenic structure of the HCV virion and for immunological diagnosis of HCV infection. HCV virions will be purified from sera of different HCV genotypes. Monoclonal and polyclonal antibodies will be produced by immunisation with virions and recombinant HCV structural proteins isolated from different expression systems. Physicochemical properties and the antigenic structure of HCV viral particles will be determined. Epitope mapping will include analysis of continuous and discontinuous epitopes using native virions, recombinant proteins and synthetic peptides encompassing important regions of the structural HCV proteins. Determination of the antigenic structure of the virion, identification of the conserved epitopes and development of the immunological detection methods for HCV in sera and human tissues, would provide important information for the improvement of the diagnosis of HCV infection.
Epidemiology: the variability of HCV genome and identification of genetic recombinants might have important implications for understanding the epidemiology of HCV infection. Natural HCV variability and polymorphism will be investigated including the distribution of HCV genotypes and of the possible viral serotypes in countries participating in the project. Patients from different clinical groups (recently infected, chronic carriers, resistant or sensitive to interferon treatment) will be screened for major HCV genotypes. Polymorphic genomic segments will be determined and patient's sera will be analysed for the presence of recombinant strains. This epidemiological study will help to understand the role of natural genetic variability in the evolution of HCV and in the development of chronic HCV infection.
Prevention*:* the absence of an efficient tissue culture system to propagate HCV is a major impediment for the identification of neutralising and potentially protective antibodies. Therefore we shall investigate the host immune response against viral components to identify antibodies essential for the resolution and prevention of HCV infection. This study will include the analysis of immunogenicity of viral components (complete virus, as well as recombinant envelope and capsid proteins) and search for virus neutralising and protective antibody response. Tissue culture systems will be investigated for their capacity to replicate HCV.

Foreseen Results

Assays will be developed to select polyclonal or monoclonal antibodies capable to prevent viral attachment and/or replication. Identification of antibodies essential for viral neutralisation and/or protection and understanding the reasons of the chronic evolution of the disease may be helpful for the future development of an HCV vaccine.

MULTICENTER PROJEKT ON GENOTYPE - PHENOTYPE-CORRELATION IN MEN I AND HNPCC

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3046

Project

Multicenter project on genotype-phenotype-correlation in MEN I and HNPCC

Keywords

HNPCC, MEN I, Genotype-Phenotype-Correlation

Objectives and Contents

Identification, recruitment and phenotype documentation of MEN/HNPCC families in the proposed countries
Sample collection of 1 proband per family, molecular analysis (DANN sequencing), predictive diagnosis in at-risk family members
Population based incidence analysis of MEN I and HNPCC in 4 of the participating countries
Evaluation of results and statistical analysis of genotype-phenotype correlation
The expected results will comprise research on one hand and on the other hand allow the immediate benefit of predictive testing in-patients with the hereditary predispositions MEN and HNPCC.

Foreseen Results

In regard to the expected scientific results, this project will render a significant contribution to the analysis of a genotype-ohenotype correlation in the two syndromes. In order to study these correlations most accurate clinical data will be required and correlated with quality-controlled laboratory results. Individual centres will not be able to achieve an adequate number to allow a significant analysis, but the accumulation of data from several already established, specialised centres with increasing potential for patient recruitment promises relevant results. Although the main focus will be the establishment of a genotype-phenotype correlation, this project will also allow the identification of population-based analysis and the possible identification of founder mutations or even environmental influences, that are increasingly being discussed for HNPCC. For this syndrome as yet there is only a mutation database, that is internationally being coordinated by P. Peltomäki in Helsinki. Unfortunately this is merely a mutation database, that does not include clinical data. Therefore especially for this syndrome innovative clues may be expected.

On the clinical level obviously the main benefit will be cancer prevention by predictive genetic testing for at-risk family members and the coordination of screening examinations. The experience that will be gained in the course of this project may become the basis for mutation-based screening guidelines. The cost benefit in screening of predisposed families according to their mutation is another aspect that should be considered apart from the improved effectivity of cancer prevention.

EXCHANGE OF RESEARCH METHODOLOGY BETWEEN EUROPEAN UNION COUNTRIES-NIS AND CCE TO DEFINE ESSENTIALS OF EUROPEAN COMMUNITY ACTIONS SUPPORTING PRIMARY HEALTH CARE ACTION AGAINST TOBACCO CONSUMPTION AND HAZARDOUS DRINKING. (E.C.A.TO.D.)

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3051

Project

Exchange of research methodology between European Union Countries-NIS and CCE to define essentials of European Community Actions to support primary health care action against TObacco consumption and hazardous Drinking (ECATOD).

Keywords

Alcohol, Tobacco, Community-research

Objectives and Contents

Epidemiological overview of alcohol issues: The lowest mortality risk for population is at 2 litres per capita per year. Recorded and estimates of unrecorded consumption extend the range from 5 or less litres to 20 and upper levels with wide regional spread of countries over 10 litres/capita. Even though alcohol consumption decreased by about 18% (between 1980 and 1993) to 9,65 litres/capita in the 15 EU countries, this downward trend masks the fact that many EU countries have an annual consumption of 10 litres and more. Standardized death rates for chronic liver disease and cirrhosis per 100.000 population is particularly high in Hungary (78%), Slovenia (35%) and Italy (22%).
Epidemiological overview of tobacco issues: One third of the adult EU population smokes. In the CCE/NIS the prevalence varies considerably from Estonia, Latvia, Russian Federation, Hungary (> 50%) to Slovenia (25%). Smoking prevalence among adults is increasing especially in the CCE/NIS and in women. In the EU countries the number of deaths attributed to smoking in men of all ages has been decreasing since 1985, but more slowly in those aged 35-69 yrs. On the other hand, an increasing trend was noticed for smoking-related deaths in women. In 1995 over a quarter of a million people in the EU aged 35-69 yrs (over half a million of 35+ yrs) died from smoking.
Objectives: The efficacy and effectiveness of health care services, in particular Primary Care, can benefit from well implemented community actions especially regarding prevention and risk reduction programmes. Since no theoretical data exist on how to perform such kind of actions and when important lifestyle issues like tobacco smoking and hazardous drinking are treated, a study on the essential aspects of community involvement can also have a positive impact on the economical and social development of the European countries. Comparison among Eastern and Western nations with different economies and cultures seems also important. The principal objective of this 24 months-JRP is to create a basic "common and structured approach" for implementing standardised community actions in different cultural economical and health service settings in order to increase the effectiveness of local primary health care services in respect to hazardous alcohol drinking and tobacco consumption programmes. A thorough analysis of the existing primary health care services will be performed in order to understand each participant's health services situation. Focus groups and Delphi methodology are the two standardised procedures utilised to obtain common data. A network of representative Institutions of seven Countries (Italy, Belgium, Slovenia, Hungary, Bulgaria, Latvia and Russian Federation) will work in close co-operation. Qualitative, quantitative analysis and dissemination strategies are the three major parts of this project. Data from health services, road accidents, retailing consumption will be retrieved. Different aspects of the same problems will be part of a "photograph" of tobacco and hazardous drinking and will contribute to uniform outcome measures and easy screening instruments.

Foreseen Results

- Improved comparability of community action research in the field of alcohol and tobacco
- Support and improved efficacy and effectiveness of the PHC services
- Two easy tools for the early diagnosis of hazardous drinkers and smokers will be validated
- A common methodological basis will be established for future co-operative European intervention projects on this issue.
- Lifestyle improvement through joint primary health care and community action.

RECOMBINANT VACCINES AGAINST TUBERCULOSIS CHALLENGE IN NORMAL AS WELL AS TRANSGENIC, HLADR-EXPRESSING, IA-DEFICIENT MICE.

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Proposal ref. : ***PL973061***
Type : *J oint Research Proj ect*
Duration : ***36 Months***
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End date : 31/10/2001
EC contribution : *2 5 0 .0 0 0 ECU*

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3061

Project

Recombinant vaccines against tuberculosis challenge in normal as well as transgenic, HLA-DR-expressing, IA-deficient mice

Keywords

Tuberculosis, vaccines, mycobacterial antigens

Objectives and Contents

The incidence of tuberculosis is growing rapidly worldwide, and over the last 5-7 years this has become a major public health problem in the Russian Federation. The need of a new anti-tuberculosis vaccine is generally recognised because of the variable efficacy of Mycobacterium bovis BCG, the only available vaccine, and its potential danger for immunocompromised recipients. We are interested in developing new subunit vaccines for control of tuberculosis and testing them in animal models. We have investigated a set of recombinant vaccines containing a major 19 kDa lipoprotein antigen from *M. tuberculosis*. We found that this antigen, which is highly immunogenic during the natural infection, interfered with the protective response provided by the mycobacterial vector in which it was expressed. Here we propose to elucidate the mechanisms of this deleterious effect. Availability of a new set of transgenic inbred mice expressing human *MHC* Class II products as the only antigen presenting structure provides a unique opportunity to experimentally study this issue under conditions of human-type T cell recognition.

First, we intend to assess the influence of *HLA-DRA* and *HLA-DRB1*0301* genes on susceptibility of mice to tuberculosis infection and on vaccine-induced protection by comparing two congenic strains: DR3.Ab° and C57BL/10. Second, we will investigate if the presence of the 19 kDa antigen in the vaccine preparation interferes with protection provided by the BCG vaccine. Finally, we will address the possible contribution of the 19 kDa antigen to pathogenesis by deleting the gene from *M. tuberculosis*.

The proposed experimental approaches combine the expertise available at the Central Institute for Tuberculosis in Moscow, with that available at Imperial College in London and at University Hospital in Leiden. Mycobacterial molecular genetic tools will be used in London to construct mycobacterial vaccine strains differing in their expression of the 19 kDa protein. HLA-DR3-expressing mice bred in Leiden will be used in mouse models of tuberculosis developed in Moscow to assess the vaccine efficacy of these constructs and to evaluate immunological correlates of protection as predictors of resistance/susceptibility, based on measurement of antigen-specific antibody production, T cell proliferation, DTH development and cytokine synthesis.

Foreseen Results

This application will help to strengthen our mutual effort in the development and testing of anti-TB vaccines and for better understanding of interaction of mycobacterial antigens with the lost immune system.

EUROPEAN SURVEILLANCE OF ANTIBIOTIC RESISTANCE

Contract ref. :	***ERBIC15CT980308***	***EC Scientific Officer***
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3066

Project

European Surveillance of Antibiotic Resistance (ESAR)

Keywords

European Surveillance, antibiotic, resistance

Objectives and Contents

Concern at antimicrobial resistance levels is at its greatest yet there are no good European data available. Surveillance of antimicrobial resistance is essential for good healthcare resource utilisation. It helps ensure best use of antimicrobials and infection control practices, optimum clinical outcomes and help in new anti-infective strategies. A study is proposed to set up a European wide programme of surveillance on incidence and mechanims of resistance using sentinel laboratories and standardised methodology. The chosen organism for illustrative purposes is H. influenzae the single most important agent in respiratory infections and one which causes much morbidity and economic loss. Other organisms to be studied are included in the lists of Alert and Target organisms (Appendices 1 & 2). The benefits of a successful surveillance system are improved nationwide cooperation, better prescribing and reduced levels of resistance.

Foreseen Results

- To establish a representative network of sentinel diagnostic laboratories across Europe which will enable antibiotic resistance monitoring according to standardised methods.

- To identify new resistance mechanisms at an early stage and prevent their dissemination.

- Early detection and prevention of outbreaks.

- In the longer term it is envisaged that a sentinel scheme would provide an informed basis for antibiotic prescribing in Europe and help control its escalation when linked in with prescribing data obtained from hospitals through the ESBiC and other programmes such as the ESCMID and Harmony scheme.

MOLECULAR GENETIC TESTING IN PHENYLKETONURIA: A MODEL TO ASSESS THE QUALITY CONTROL SYSTEM FOR MONOGENIC DISEASE

Contract ref. :	***ERBIC15CT980337***	***EC Scientific Officer***
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3070

Project

MOLECULAR GENETIC TESTING IN PHENYLKETONURIA: A MODEL TO ASSESS THE QUALITY CONTROL SYSTEM FOR MONOGENIC DISEASE

Objectives and Contents

Reliability and reproducibility of molecular genetics testing in various laboratories is still an important problem due to the differences in the techniques used in various laboratories and different level of experience of the investigators in the interpreting of experimental results. To overcome such problems, a relevant quality control system is necessary. The basis of such system should be standardization of existing laboratory techniques. On the other -hand, a comprehensive molecular genetic database and a bank of control samples is essential. Such system of the quality -control for molecular genetics testing can be created using monogenic disease as a model. A model disease should be-frequent enough to collect adequate experimental databases and well characterized both on phenotypical and molecular -genetics aspects. Phenylketonuria (PKU) could be such a model disease. However, it must be stressed that present knowledge of genotype-phenotype correlation in different mutant phenylalaninehydroxylase (PAM) locus genotypes causing PKU is insufficient, especially in the cases of rare PAH gene mutations. Data on PAH mutations collected in Italy, Germany and Lithuania (Dianzani et al. 1995, Kucinskas et al 1994, Giannattasio et al. 1997), together with a well established experimental basis for molecular genetic investigations in Italy and Germany, is a good starting point for the project.

The objectives of this proposed three-year project are: (1) to completely genotype PAH locus of PKU patients registered in human molecular genetics centers of Lithuania, Latvia, Italy and Germany, (2) to create a mutual computerized database of clinical, genealogical and molecular genetic data of PKU patients, (3) to create a bank of control DNA samples carrying PAH gene mutations, (4) to estimate the relationship between PAI-I locus genotype and ~phenotypic parameters in PKU patients, (5) to create a mutual laboratory for most complicated molecular genetic analyses (such as DGGE, DNA sequencing**)** on the basis of the Human Genetics Centre of Vilnius [University for Latvia and Lithuania, (6) to create and implement an up-to-date standardized quality control system for mutation identification in molecular genetic laboratories.

The scientific network (Lithuania, Latvia, Italy and Germany) that is proposed in this collaborative research project will give the opportunity for a multidisciplinary approach to the molecular genetic analysis of PKU J. It is expected that the exchange of information will allow for the assessment of a quality control system aimed at the optimization of molecular genetic testing in the diagnosis and treatment of diseases such as YKII. It is noteworthy that the strict interrelation among the four partners of this scientific network with their own peculiar scientific expertise, will significantly improve the reliability, reproducibility and comparability of diagnostic and scientific laboratory analyses. Such system might be further extended to standardize other molecular genetic analyses and implemented in other East European human genetic laboratories. Eventually, one of the most important goals of this proposal is to coordinate the activities of well-established centres (Germany, Italy) performing molecular genetic analysis with centres that will benefit from know-how, logistics, quality control (Lithuania, Latvia). Financial support from international organizations, particularly under the INCO-COPERNICUS program, would be of vital importance in staff training and updating laboratories of the human genetics centers of CCE countries such as Lithuania and Latvia.

Foreseen Results

Creation of a computer database of PKIl patients' clinical, genealogical and molecular genetic data; identification of new PAH gene mutations; estimation of spectum and frequency of PAH gene mutations in Lithuania and Latvia; correlation between PAH locus genotype and phenotype; functioning standardized system for quality control of PAH gene mutation identification and a more reliable PKIJ diagnosis and treatment in Lithuania and Latvia.

On the whole, coordinated activities of well-established molecular genetic centres in Germany and Italy with human genetics centres in Lithuania and Latvia started on the basis of the investigation of molecular genetic basis of PKIJ and quality control of corresponding analyses will be one of important chains in the regional program of drawing closer of West and Eastern European scientific centres thus increasing the level of molecular genetic rcscarch in the latter region.

UNEVERSAL DNA-CHIP FOR DIAGNOSIS OF GENETICALLY INHERITED DISEASES

Contract ref. :	***ERBIC15CT980309***	***EC Scientific Officer***
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3083

Project

Universal dna chip for diagnosis of genetically inherited diseases

Keywords

DNA chip; molecular diagnostics; genotyping

Objectives and Contents

Human genome sequencing is progressing fast and will be completed at least by year 2005. DNA sequencing and analysis of human genes will not be over by this fundamental achievement, but rather begins. Most of the human diseases are caused by changes in our genes and genetic testing will help medical doctors very much. It will be possible to diagnose more precisely - and to do it long before the symptoms of the disease will develop. Therefore it is very important to have a technology for genetic testing - which is universal, robust, precise and cheap enough for mass analysis. DNA chip based technology seems to fulfil all these criteria and we are presenting here idea, which combines the fundamental DNA complementarity rule with very specific molecular recognition in DNA enzyme complex to get maximum genetic information. This method is based on enzymatic single nucleotide primer extension from two-dimensional oligonucleotide array with fluorescently labelled terminators.

Foreseen Results

This technology, while fully developed and automated, can be implemented in clinical, research and industrial laboratories for parallel and high throughput analysis of gene structure and function. At the first stage this technology may facilitate human phenotype - genotype correlation in order to isolate new human disease genes. Further on, when all human genes are known, DNA testing and gene expression analysis will expand tremendously. We are approaching to the point, where gene technology is advancing so quickly and many things we could not dream about 10-20 years ago, will be possible. This may cause a problem for people and more attention should be devoted for explanation what molecular gene medicine is all about and how this can improve everybody's life.

HEALTH AND WELLBEING IN TRANSITION SOCIETIES, A STUDY OF HEALTH, NEED FOR HEALTH AND SOCIAL SERVICES AND HEALTH-RELATED LIVING CONDITIONS

Contract ref. :	***ERBIC15CT980338***	***EC Scientific Officer***
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3093

Project

Health and well-being in transition societies. A study of health, need for health and social services and health-related living conditions

Objectives and Contents

The aim of the study is to produce information about the health situation, needs and health service utilisation of population groups, not only for research purposes but also to facilitate the planning and implementation of services, working methods and concepts for health and social services that correspond to the social situation, stratification and the dynamics of the social system and are affordable from the public sector's point of view. The research process also aims at transferring the health and social welfare research tradition to Republic of Karelia, Russia, and the Ukraine.

The specific aims of the research project are:

1) To produce with a representative population sample an interview-based study about health status, health services needs and utilisation in the Karelian Republic and in the Ukraine. This part of the study will include: a) a description of the health and functional capacity of the population; b) a description of utilisation of health and social care services; c) identification of the population groups in the worst situation and in need of extensive health and social care services; and d) a description of the accumulation of poverty and ill-health due to social exclusion, all in quantitative terms.

2) To produce with a small sample of families an in-depth-interview study (with same themes as the larger data) about the social situation of the families and the changes in this situation during the transition period, to complement the larger interview data with qualitative data.

3) The interview data will be complemented by the study of document, register and other secondary data in order to describe the health and social care systems and services, evaluate the changing system of welfare provision (location, allocation of services and economics of the provision), and analyse the service structure, working methods and concepts of health and social policy.

4) To develop a study methodology of poverty and living conditions for transition societies on the basis of health and social care research methodology. The last component of the study includes educational goals - a number of post-graduate researchers will be trained in the project to experts on living conditions and health and social care research from different aspects in the Ukraine and in Karelia.

The present social situation in the transition societies is characterised by difficult transformation processes both in the health and social situation of the population and in service provision. The changes can be classified in two categories: Firstly, the increases in poverty and income differences among the population and the financial crisis of the public sector; and secondly, the dramatic changes in the dynamics of the social system as a whole. Because of the income and financial crises the need for health and social services has increased, but the capacity of public health and social services to provide appropriate services has collapsed. Due to changes in the social dynamics, the nature of the social problems has also changed (e.g. those connected with unemployment) and the existing service structures, working methods and service provision concepts need critical evaluation and re-adjustment to be able to respond to new large-scale health and social problems.

Foreseen Results

This research project aims at production of information for solution of these problems. The duration of the research project is 3 years, starting in 1999. The research project contains four partners from four countries, Portugal, Russia, Ukraine and Finland.

EVALUATION OF EFFICACY AND COST OF SCHIZOPHRENIA TREATMENT IN FOUR EUROPEAN COUNTRIES/ACRONYM/SCH-4-EUR/

Contract ref. :	***ERBIC15CT980340***	***EC Scientific Officer***
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3097

Project

Evaluation of efficacy and costs of schizophrenia – treatment in four European countries

Objectives and Contents

The pattern of health care provision within countries of Europe, both Western and Eastern is changing. Economical restrictions, innovative treatment practices and the increasing role of the individual (patient) are all forcing the implementation of extensive changes within the health care system. In this context cost-effectiveness and quality of care will be of central importance in order to plan the treatment for each individual patient starting with the first symptoms until optimal therapeutic benefit is achieved and *maintained*. This is especially important for the patients of schizophrenia, a mental disease that produces considerable morbidity and disability, and has no curative treatment available. Schizophrenia is considered to be the most costly illness that psychiatrists treat, as it begins early in life, very few patients recover totally after the first episode, and the majority experience relapses despite the treatment received.

The general aim of the present project is to evaluate the efficacy of treatment, and to quantify the utilization of healthcare resources in the treatment of schizophrenia in different healthcare systems and regions (Estonia, Hungary, Spain and Sweden). Additional data about the epidemiology of the disease will also be studied.

The study will be prospective, including two-year recruitment and at least one-year follow-up period for all patients diagnosed. The study population will consist of all new cases of schizophrenia appearing in the study regions. Evaluation of efficacy and safety of schizophrenia treatment and the cost-effectiveness of treatment will be carried out.

Foreseen Results

This open study is planned to evaluate long-term efficacy, safety and cost effectiveness of modern treatment of schizophrenic patients. The international co-operation will make it possible to increase the number of patients in the study, and thus the power of the conclusions drawn. The research will assess the economic efficiency of the health systems in providing medical care for the psychiatric patients in four countries. The comparison will reveal the actual costs of in- and out-patient treatment of schizophrenic patients in the health systems studied and thus possibilities for improving management and financial planning in this sector.

ASSESSMENT OF REGULATORY POLICIES AND DRUG AVAILABILITY IN THE CENTRAL AND EASTERN EUROPE COUNTRIES IN THE LIGHT OF THEIR ACCESSION TO THE EUROPEAN UNION

Contract ref. :	***ERBIC15CT980310***
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Start date :	01/02/1999
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3103

Project

Assessment of Regulatory Policies and Drug Availability in the Central and Eastern Europe Countries in the Light of their Accession to the European Union
Acronym: CEE – Medicines

Keywords

Health policy, drug-related problems, and health expenditure

Objectives and results

The switch to a market economy in Central and Eastern Europe (CEE) has implied a larger and faster than ever before change in all the economic and social aspects of life including health care. A restructuring is under way also in the field of medicinal products. Since 1989 the privatisation of the old State-owned system of manufacturing and distribution of medicinal products has determined: a dramatic increase in the number of approvals of new drugs (> 4,000 in Slovakia in 1996), the merging of new importers and wholesalers (600 in Bulgaria and 250 in Czech Republic in 1994) and a great rise in the import billing (ECU) of medicinal products (+108% in Bulgaria in the period 1989/1993 and +216% in Poland in the period 1989/1992). On the other hand the increase in health billing is a major problem for the Governments around the world apart from their economic, geographic or political situation. Spending on drug is regarded as a major target for saving in health care costs because there is evidence that drug budget is currently not being used to best advantage.

This project is the first attempt to individuate the mean and the higher levels of performance by a descriptive study and a comparative analysis (Benchmarking) of the global Central and Eastern Europe drug market and the national drug policies.
The aims of this Concerted Action are to study and compare the availability and quality of the medicinal products marketed in the countries of the Central and Eastern Europe (CEE) and to compare these results with the availability and quality of the medicinal products marketed in the Member States of the European Union
These objectives are aimed to realise a better European harmonisation and accomplishes with the objectives of the - Accession Strategy - defined by the European Councils. Our objectives are also consistent with the objectives of the EU Task Force (Pharmaceutical Unit) aimed to look at the economic situation, legislation and market conditions in each applicant country in view of the starting of access negotiations.

The first result of this Concerted Action will be a better knowledge of the CEE Health Systems. This result can be the basis of new national decisions constructed in the best interest of the patients and permits to upgrade at higher standards the countries where the comparative analysis will demonstrate there is a higher probability of exposing patients to needless risks through taking drugs that are either ineffective or unsafe or both.

Foreseen Results

The data available from this study will also overcome a lack of reliable data and information on the CEE pharmaceutical sector. This lack and the need of information channels was one of the major issue discussed by the Meeting of the CEE Regulatory Authorities held in Sofia in June 1997.
The results can also have an economic relevance because drug-related morbidity and mortality are one of the leading diseases in terms of resources consumed.
Thus the results of this research can be the basis of a substantial cost reduction, or at least an improvement in efficiency, of the health expenditures. Moreover an understanding of the principles of a safer and more effective drug therapy can limit the need for rationing of therapy by reducing the waste of public money.

REDUCING THE RISK OF HEPATITIS AND HIV CROSS-INFECTION OF PATIENTS IN EASTERN EUROPE

Contract ref. :	***ERBIC15CT980335***	***EC Scientific Officer***
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3106

Project

Reducing the risk of hepatitis and HIV cross-infection of patients in Eastern Europe.

Objectives and Contents

This project has been developed in response to the identification of a major health problem in Romania, The Republic of Moldova and the Slovak Republic, and a request for Western European help in developing a solution to the problem. Starkly presented, the problem is that hepatitis B virus (HBV), hepatitis C virus (HCV) and HIV infections are spreading rapidly in the three CCE/NIS countries. A major cause of bloodborne infections in the populations is the transmission to patients by surgeons and related health care workers (HCW).

The project is focused on the transmission of these infections by the group which has proved to be most infected, and most at risk of infection - dental surgeons/dentists (stomatologists). They in turn have the highest number of interactions with patients involving contact with blood and oral fluids. No other category of HCW has transmitted more cases of HBV infection to their patients (cross-infection) than oral surgeons/dentists. HCV infection is an problem and percutaneous exposure to blood is likely to transfer HIV infection.

Eastern European pilot studies conducted by researchers associated with this proposal have discovered that dental health care workers (DHCW) have high levels of HBV infection, are usually asymptomatic but highly infectious, have not recognised the extent and seriousness of the problem, and take unsufficient steps to control the spread of bloodborne infections using preventative means.

The project aims to clarify the precise nature and extent of the problem in the three CCE/NIS states, determine the principle causative factors of bloodborne pathogen transmission, identify how the problem might best be tackled, and determine what simple, effective and affordable steps need to be taken by whom to prevent widespread epidemics being caused by stomatologists.

The tools to be used in the study are: (i) serological screening, (ii) sterilizer monitoring, (iii) assessment of the dentists' infection control practices,(iv) recording of sharps injuries, and (v) evaluation of the dentists attitude towards treating patients who have said they are infected.

After a 18 month interval the steps (i)-(v) will be repeated and the effect of our information to the dentists will be assessed.

Dental Associations in several CCE states have confirmed that similar problems are likely to exist in their states, and have indicated their interest in participating in a programme of dissemination of the conclusions of the proposed research.

Expected Results

As Ministries of Health from the three CCE/NIS states involved in the project are integral partners in the project, it is expected that recommendations may be speedily implemented, and lessons for other health care workers (and their patients) identified. It is expected that the CCE/NIS researchers will (i) transfer their findings/project recommendations to other dental DHCW in their states, (ii) transfer them to other DHCW in other CEE/NIS states, (iii) identify other research needed in their CEE/NIS states and develop it with colleagues in other health care fields using the methodologies and practices utilised in this project.

A small company specialised in the provision of rapid ELIZA immunoassay diagnostic testing kits and methodologies for developing countries will be involved in this project to help identify (a) ways for local laboratories to provide effective screening/testing services and (b) whether it will be possible to provide cheap, locally produced, diagnostic kits to aid the disease control and prevention measures identified as being potentially most effective, and (c) how to develop a cost-effective and non-invasive saliva-based sampling device.

COMPARATIVE ANALYSIS OF OCCUPATIONAL HEALTH SYSTEM AND PRACTICES AS PART OF PREVENTIVE HEALTH CARE SYSTEMS IN SEVEN EUROPEAN COUNTRIES

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3108

Project

Comparative analysis of occupational health system and practices as part of preventive health care systems in seven European countries risk perception, system analysis, quality of service

Keywords

Occupational health, riskperception, quality

Objectives and Contents

This project aims at conducting a comparative analysis of the occupational health and related policies in four CCE countries (Latvia, Lithuania, Estonia, Czech Republic) and three EU countries (Finland, Belgium, Italy) in view of improving health and social protection of the working population in compliance with the related EU Directives and as part of preventive health care systems by describing the approaches the health risks has been dealt with for selected risk factors and groups of workers at increased risk; identifying the most relevant determinants affecting risk perception and the attitude towards controlling and dealing with the risk factors; describing the policy, activities and performance of the OH system and occupational health professionals related to the exposures and risk levels prevailing in the selected work places; and making a comparative analysis of the above, especially in identifying the extent to which practices in the participating countries are in compliance with the European Union regulations related to health and safety at work, and to identify the respective needs.

The study will comprise in CCE countries a document based survey of the OH system, regulations and activities in occupational health services, and their role in preventive health care systems, a structured interview of stakeholders' views and aspirations on occupational health and safety, and health and safety surveys and audits at workplaces in selected industries (lead in battery and ceramic industry, asbestos in asbestos industry and demolition works, benzene in petrochemical industry, and noise in textile industry) with a specific reference to a vulnerable group of workers, i.e. pregnant women. Participating EU countries will serve as reference points. Special interest will be on how the OH systems respect the societal values of respect for human dignity, social justice, solidarity and democratic participation.

Foreseen Results

The analysis of different approaches to address occupational health wish to compare their functionality and effectiveness and to design appropriate methods and measures for further actions. This will also improve national capacity to focus resources correctly and may be a tool for social partners involved.

EUROCOMMUNICATION-II. A COMPARATIVE STUDY BETWEEN COUNTRIES IN CENTRAL EUROPE AND WESTERN EUROPE ON DOCTOR-PATIENT COMMUNICATION. EUROCOM-II

Contract ref. : ***ERBIC15CT980312***
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3109

Project

A comparative study between countries in Central Europe and Western Europe on doctor-patient communication

Keywords

Doctor-patient communication; patient satisfaction; vocational training; health care systems

Objectives and Contents

Communication is crucial in modern medicine. Discovering the true nature of the patient's problem, translating it into a diagnosis, and communicating this to the patient is largely dependent on successful communication between doctor and patient. Patient satisfaction and compliance and outcomes of medical treatment also rely on the quality of this interaction. As the technology to patient-centred life-style changes, the need for good communication skills will only increase in the future.

The aim of the proposed study is to investigate the consequences of health care system factors on doctor-patient communication. Good communication skills, adequate consultation time and knowledge of the patient's history appear to be positive correlates of successful doctor-patient-interaction. In addition to these doctor related factors it may be assumed that structural factors related to the health care system play a role. A remuneration system, for instance, which is based on medical interventions may imply a disincentive to talking to patients. If patients are not registered with a GP and if secondary care is accessible without referral by a GP, it will generally be more difficult for a GP to kwo the patient's history. So it is assumed that structural conditions related to national regulations and other characteristics of the health care system (especially the presence of a fixed list of patients, GP's gatekeeping function, the remuneration system and GP's employment status) also contribute to the style of communication between GPs and patients.

Foreseen Results

Results of the combination of a running EC-study and the study which is now proposed has implications for policy as well as for education. The identification of possible obstacles to doctor-patient-communication could result in two types of recommendations: recommendations with respect to structure, to be effected by policy measurements, and recommendations with respect to content, to be followed up by educational efforts. Comparison of communication styles of GPs between countries could be an impetus to changes in medical education programmes. It is especially of interest for the countries of Central Europe, where GP vocational training has been started only a number of years ago.

There will also be important scientific benefits. A general description of doctor-patient communication under different working conditions will enable us to generalise earlier findings for more restricted populations. In addition, scientific and educational expertise on doctor-patient communication can be exchanged among the participants. Partners from Central Europe will get the opportunity to get acquainted with advanced with advanced ways of data collection and analysis.

As doctor-patient communication could have important effects on the cost-effectiveness of medical treatments, the recommendations and resulting policy measures will have beneficial consequences on preventive medicine, prevention of medicalisation and compliance of patients.

DNA VACCINATION AGAINST HEPATITIS C VIRUS INFECTION (JRP)

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3110

Project

DNA-Vaccination against Infection with Hepatitis C Virus

Keywords

Hepatitis C virus, DNA-immunisation, vaccine

Objectives and Contents

Hepatitis C virus (HCV) infection presents a major health problem in Northern Eurasia. Acute HCV infection runs a chronic course in up to 80% of cases and with the development of chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma is a significant cause for morbidity and mortality. Prevalence of HCV antibody in healthy people living in Russia varies between 0,7 and 3,8%. Very important is the high predominance in these countries including Baltic States of HCV type linked to a more aggressive clinical course of the disease (type 1b). Treatment with interferon-alfa has a limited efficacy (<20% of patients), considerable side effects, and high costs. The development of a broadly reactive vaccine is a high priority task for the control of HCV infection. However, the genetic and serological heterogeneity of HCV, occurring reinfections, absence of *in vitro* (sensitive cell culture system) and *in vivo* (small animal) models of HCV infection make the task difficult. Extremely attractive potential for resoluting the major task is offered by the most advanced branch of vaccinology - DNA-immunisation, the direct introduction of genes encoding microbial antigens. DNA-immunogens induce broad and effective immune response, are easily developed, produced, and distributed.

The project aims at: (1) design of DNA-immunogens encoding major HCV antigens of types/subtypes prevalent in the countries of former USSR; (2) evaluation of individual and concert immunogenicity and safety of DNA-immunogens; (3) assessing protective potential of proposed vaccine preparations by establishing models for HCV infection *in vitro* and in small animals; (4) identifying components of immune response obligatory for protection. The techniques necessary to achieve these goals have been elaborated by the applicants in their previous research.

Foreseen Results

Representative longitudinal serum/tissue panels of HCV patients from European part of Russia and Baltic States will be collected and viral sequences characterised. Eukaryotic vectors will be designed expressing major HCV proteins (core, E1, E2, NS3) of regionally predominant HCV isolates; efficacy and safety of protein expression will be characterised *in vitro* and *in vivo*. DNA-immunisation will be carried out and HCV specific immune responses induced in laboratory animals (mice, rabbits) will be surveyed including neutralising activity of induced antibodies in HCV culture assays. (4) A small animal (primarily, mouse) model of HCV infection will be developed as a challenge system to assess the protective potential of DNA-immunisation. (5) The interdependence will be revealed between fine specificity of immune response induced by DNA-immunisation and its protective potential. Mutual effort would contribute to resolution/prevention of hepatitis C infection as one of the major health care problems in East and West Europe.

SCREENING PROGRAM FOR THE ASSESMENT OF THE PREVALENCE OF CLINICAL AND SUB-CLINICAL THYROID AUROIMMUNITY AND INSULIN-DEPENDENT DIABETES MELLITUS (IDDM) IN CONTAMINATED TERRITORIES OF CIS COUNTRIES AND WESTERN EUROPE

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3117

Project

Screening program for the assessment of the prevalence of clinical and sub-clinical thyroid autoimmunity and insulin-dependent diabetes mellitus (iddm) in contaminated and non-contaminated territories of NIS countries and Western Europe.

Keywords

Autoimmunity; thyroiditis; diabetes mellitus; Chernobyl**.**

Objectives and Contents

The etiology of autoimmune thyroid diseases and of IDDM is still largely unknown, but the most widely accepted hypothesis is that the diseases are multifactorial in nature, involving a complex interaction between genetic determinants and environmental factors, resulting in the autoimmune destruction of the target organs. After the Chernobyl accident, preliminary evidence has been provided of an increased prevalence (nearly 20%) of anti-thyroid autoantibodies and of IDDM in Belarus children living in contaminated areas, with respect to not contaminated areas. The validation of these findings requires further studies aimed to take into account any contributing variable (environmental, genetic and immunoligical) and to understand the etiologic mechanisms of this health effect.

Aim of the proposal is to develop epidemiological, clinical and basic studies to reach the following objectives:
a) Prevalence of autoimmune diseases in children exposed to post-Chernobyl fallout. The first step is to assess whether thyroid and b-cell autoimmunity has taken place in subjects exposed to the Chernobyl accident.
b) Comparison with uncontaminated Western European regions with or without a spontaneous high incidence of thyroid autoimmunity and IDDM. In the last three decades the incidence of IDDM in Sardinia and Scandinavian countries has definitively increased and environmental changes have been implicated in this phenomenon. The epidemiological, humoral and clinical features of selected villages will be compared with the CIS counterpart to pinpoint the putative etiologic agents.
c) Correlation of the autoimmune prevalence data with immunological and environmental factors. The prevalence of thyroid and b-cells autoimmunity will be correlated with measurements of islet-related autoantibodies (GADA and IE-2), levels of radioactive contamination, and environmental factors such as iodine intake.

Foreseen Results

From this project we expect clinical, social, and scientific achievements. The mapping of the prevalence of autoimmunity against the thyroid and the pancreatic b-cells in young subjects exposed to the post-Chernobyl radioactive fallout, as compared to uncontaminated ethnical groups known to be, or not to be, at high risk of autoimmune diseases in Western European countries, will enable the identification of groups “at risk” for later development of autoimmune diseases (i.e. thyroid autoimmunity and IDDM). This definition has an important impact in terms of prevention, since will allow the early diagnosis of autoimmune diseases and the institution of early treatment whenever feasible. Mapping of iodine deficiency in relation to the prevalence of autoimmune thyroid dysfunction will reinforce the need for the use of iodine prophylaxis as primary prevention of iodine deficiency related thyroid disorders and as a tool for the eradication of iodine deficiency. In addition, the study we propose will certainly spread light in the controversial issue of whether iodine deficiency is a contributing factor to the development of thyroid autoimmunity, with the important addition, in this particular case, of the potential impact of the radioactive fallout which has occurred in that particular region.

From the scientific point of view, the project might allow a better definition of genetic and environmental factors triggering or contributing to the development of autoimmune diseases, and, eventually, in the development of new diagnostic methods for early diagnosis.

MEDICAL GUIDELINE TECHNOLOGY: REPRESENTING, INTERPRETING AND SHARING COST-EFFECTIVE STANDARDS. (MGT)

Contract ref. :	***ERBIC15CT980315***
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3121

Project

Medical Guideline Technology: representing, interpreting and sharing cost-effective standards (MGT)

Keywords

Medical guidelines, cost-effectivity, standards

Objectives and Contents

The proposed joint research project aims to develop methodology and software support for creating, representing and applying medical guidelines.
a) Design and implementation of techniques for computer representation of medical guidelines (MGL) which integrate generic recommendations for specific medical circumstances (generic medical guidelines) with site-specific conditions (site ontology) and an applicable cost model.
b) Design of a computational model for applying MGL to uncertain or incomplete patient data and implementation of reasoning algorithms for calculating optimal decision with respect to the given MGL, cost model and a selected criterion.
c) Analysis and design of methods for critiquing MGL by induction from patient databases and implementation of corresponding algorithms.
d) Three pilot applications in the same medical domain of hypertension and cardiology but in countries with significant differences in the health care system, available resources and organisational structure (both from EU and CCE). The methodology and tools will be also used for the health care of first contact (general practitioners). Evaluation and comparison of benefits for the different health care conditions will be undertaken.

Foreseen Results

Organising a workshop with the aim of presenting our results and discussing the future potential of MGL technology, and disseminating results as a part of the course material for medical educational projects.

ENTEROVIRUS INFECTIONS IN NIS/CCE COUNTRIES AND IN EU - IMPORTANCE FOR POPULATION HEALTH AND PATHOGENESIS IF INSULIN-DEPENDENT DIABETES MELLITUS (ENTEROVIRUS AND DIABETES)

Contract ref. :	***ERBIC15CT980316***	***EC Scientific Officer***
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3129

Project

Enterovirus Infections in NIS/CCE Countries and in EU – Importance for population health and pathogenesis of insulin-dependent diabetes mellitus

Keywords

Enterovirus infection, insulin, diabetes mellitus

Objectives and Contents

The present study deals with two important medical problems, enterovirus infections and insulin-dependent diabetes mellitus (IDDM), evaluating their possible causal relation. The main aim is to find out, whether enterovirus infections can explain the marked international variation in the incidence of IDDM. The epidemiology of enterovirus is infections studied in four CCE/NIS countries and compared to that in three EU countries. The hypotheses are: 1) The frequency of enterovirus infections differs markedly between these countries; 2) The frequency of enterovirus infections correlates with the incidence of IDDM in these countries; 3) The rapid increase in the incidence of IDDM is related to changing epidemiology of enterovirus infections.
Enterovirus infections are of great importance in NIS/CCE countries but also in EU. They cause life-threatening infections in neonates and are one of the most common causes of aseptic meningitis, myocarditis and chronic cardiomyopathy. They are also important in the pathogenesis of IDDM. Enteroviruses spread through the faecal-oral route. Their transmission depends on socio-economic, hygienic and climatic factors which vary from country-to-country and from time-to-time.
IDDM, in turn, is a chronic disease with immense medical and economical impact. It is caused by an autoimmune process, which selectively destroys insulin-producing beta cells in the pancreas. Both genetic and environmental factors play role in the pathogenesis. Genetic susceptibility is determined mainly by HLA-DQ genes, while environmental risk factors include virus infections, especially coxsackievirus B and certain other enterovirus infections. We have recently confirmed the important role of enteroviruses in unique prospective studies: Enterovirus infections in childhood and also in utero increased the risk of IDDM with a time-lag of several years. The proposed research will give further information about the possible causal relation between these diseases. The epidemiology of enterovirus infections is studied in all participating countries and compared to that of IDDM. These countries have more than six-fold differences in IDDM incidence and marked differences in the geographic location, climate, socio-economic and hygienic conditions. Two of these populations are of special interest since they have the same genetic background and the same climate but they live in different socio-economic and hygienic conditions (the neighbouring Karelian Republic of Russia and Finland).

Foreseen Results

The present consortium has a long experience from studies concerning the pathogenesis of viral and autoimmune diseases, and especially IDDM. This study will give valuable new information on the role of enterovirus infections in the pathogenesis of IDDM and their transmission from country to country. It will help to establish standardised virological, immunological, genetic and epidemiological methods in NIS/CCE countries and to design strategies for the prevention of severe enterovirus diseases. The results may also be beneficial for the planning of community activities (e.g. day-care) in a manner that reduces the spread of these infections.

GENETIC DISSECTION OF MULTIGENIC PREDISPOSITION TO DISEASE IN THE MOUSE MODEL

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3131

Project

Genetic Dissection of Multigenic Predisposition to Disease in the Mouse Model

Keywords

Genetic dissection, Multigenic predisposition, Mouse model

Objectives and Contents

In addition to the considerable number of hereditary disease syndromes, where the disease development is determined by a single major gene, there is evidence that also those diseases, which are not obviously hereditary, tend to occur in genetically predisposed individuals. This is strongly supported by studies in experimental animals, where predisposition has been demonstrated in almost any disease model sufficiently tested. Whereas the hereditary diseases affect only a small fraction of the human population, the genetic predisposition is shown to affect also the most common diseases, like the sporadic cancer, infectious, autoimmune and metabolic diseases. The high frequency of these diseases determines also their large impact on the well being of the population, as well as on the financing of the health care. The detection of the genes predisposing to such diseases and the understanding of their action might contribute to a better preventive care for persons predisposed to a specific disease, as well as to better understanding of the mechanism of the disease and the ways towards its therapy.

The main obstacle in resolving the genetics of these diseases is the multiplicity of the genes involved. The present project proposes to apply a powerful tool for dissection of complex genetic traits in the mouse, the Recombinant Congenic Strains (RCS) developed in the coordinator's laboratory. The genetic difference between these strains is reduced, and hence the individual genes participating in the multigenic control can be more readily mapped. This approach has led to mapping of a large number of loci affecting several types of cancer, as well as loci for different components of immune response, resistance to infection, apoptosis, lipid metabolism, and others.

We propose to use the RC strains to analyse the genetic control of susceptibility to intestinal cancer, as well as the genetic control of inflammation in response to quartz-injection (the etiologic agent of the silicosis in humans) and the genetics and mechanisms of susceptibility to infection by Leishmania major. The intestinal (colonic) cancer is one of the major causes of cancer-related death, and several hundreds of millions of people, many of them in the newly independent states from the former Soviet Union, are exposed to the danger of leishmaniasis. The project is based on extensive pilot studies of all participants, who have used the RC strains produced in the coordinator's laboratory and established that they are suitable for the dissection of the trait they propose to study. In the course of the project, the individual loci controlling the susceptibility to the stated diseases will be mapped to specific chromosomes and subsequently their position established with a precision which enables to search for their human counterparts.

Foreseen Results

The genetic information obtained in the course of this project will be used to initiate the positional cloning of the detected susceptibility genes. In addition, the functional effects of the different susceptibility loci will be compared, in order to obtain a better insight into a correlation between the genotype and the prevailing pathogenic mechanisms. The combination of the diseases studied in the present proposal can also contribute to the elucidation of the possible role of genes controlling inflammation or immune response on cancer susceptibility, as the recent data suggest that these processes may affect cancer development. Therefore, the same RC strains are being used in tumour susceptibility studies and in studies of inflammation and immune responsiveness. The loci found to affect one of the tested diseases can therefore be easily tested for their effect on the other diseases.

EPIDEMIOLOGY AND GENETICS OF URINARY TRACT TUMORS IN PATIENTS WITH BALKAN ENDEMIC NEPHROPATHY

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3132

Project

Epidemiology and genetics of the urinary tract tumors in patients with Balkan endemic nephropathy

Keywords

Epidemiology, tumors, endemic nephropathy

Objectives and Contents

The aim of the project is to identify the genetic background, predisposition and progression of the familial urinary tract tumors (FUTT) in patients with Balkan endemic nephropathy (BEN).
FUTT/BEN are of great clinical importance in some restricted areas of Bulgaria, Romania, Croatia, Serbia, Slovenia, Bosnia and Herzegovina. The distinctive FUTT/BEN characteristics (familial syndrome, multiple localisation and bilateral development of the tumors, a female predominance and chromosome aberrations) are suggestive of a multifactorial etiology of the disease (polygenic disease). Limited studies on the etiological factors for tumorogenesis in FUTT/BEN patients have not so far discovered any single exogenous causative agent or genetic bases of this puzzling disease.
The role of genetic factors for the development of the FUTT/BEN disease will be studied by: investigation of the significance of 3q25 marker, determination of the type and the frequency of chromosomal aberrations in tumor cells and analysis of the breakpoints that generate structural chromosomal abnormalities and disturb the function of the refuge genes; studies for mutations in tumor suppressor genes (p53, VHL) and oncogenes (NRAS, KRAS, RAF1), their incidence and possible biological implications; studies on genetic heterogeneity of possible predisposing factors (CYP 450 1A1, 2D6, 2E1, GSTGST, NAT2) and biotransformation of nephrotoxins; investigation for defects in the host's immune system, virological studies of material from BEN patients for isolation of viral agents.

Foreseen Results

New information about the genetic changes that can be correlated with the initiation or progression of FUTT/BEN or with clinical outcome may derive from the modern epidemiological studies of populations at risk by cytogenetic, molecular-cytogenetic, molecular-genetic and virological and immunological methods. In theoretical aspect we expect that the results of this study will allow identification of susceptible individuals and might raise the possibility to screen patients at increased risk for FUTT/BEN.
This new research will make possible the future impact of molecular biology on diagnosis, prognosis and treatment of FUTT/BEN as a model of tubulo-interstitial kidney lesions.

MOLECULAR MONITORING AND PATHOLOGICAL ROLE OF HCV, HGV AND ALTERED HBV GENOMES IN BALTIC REGION

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Proposal ref. : ***PL973133***
Type : *J oint Research Proj ect*
Duration : ***36 Months***
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3133

Project

Molecular monitoring and pathological role of HCV, HGV and altered HBV genomes in Baltic region

Keywords

Hepatitis viruses, liver disease, virus mutants

Objectives and Contents

The role of hepatitis B virus (HBV) and hepatitis C virus (HCV) as a major cause of chronic liver disease is now accepted world-wide, whereas the relationship between hepatitis G virus (HGV) infection and liver dysfunction requires further clarification. Recent investigations on hepatitis B show the particular clinical importance of altered HBV genomes with mutated core (C), surface (S), and X genes in pathogenesis of chronic hepatitis (especially under immunosuppression in transplantation patients), in serologically negative infections, infections of postvaccinees with immunological escape mutants, infection of liver grafts in patients undergoing immunotherapy, etc. The objectives of the proposed project are to describe HCV, HGV and mutated HBV genomes occurring in the new Baltic countries and to discover the pathological role of mutated HBV proteins.

In HBV, this project is aimed at epidemiological evaluating of occurrence, frequency and significance of altered viral genomes in the course of chronic single and double (with HCV) infection, especially under the long-term immunosuppression, in countries of Central and North-Eastern Europe, including the new Baltic countries. HBV genes S, C, X will be monitored for the emergence of mutations by PCR sequencing. Mutated HBV genes will be cloned and expressed in order to understand their role in the occurrence of complications of chronic infection. In HCV, the virus geno/subtypes occurring in the new Baltic countries will be established by PCR and PCR/ELISA typing, direct sequencing and analysis of fragments of core, env and NS3-NS5 genes. In HGV, the data for the Baltic countries on incidence, genetic structure and clinical impact of infection of this newly described virus and its possible interference with HCV infections will be collected.

Foreseen Results

The results will allow new insights into the pathogenesis of hepatitis B infections. The role of specifically altered HBV genomes in liver destruction and the advantage of their diagnostic identification as a prognostic marker for the patient will be evaluated.
Data on distribution and epidemiological importance of HCV, HGV and altered HBV genomes will be employed for further precautions in diagnosis and prevention of viral hepatitis in three new independent Baltic countries.

EPIDEMIOLOGICAL STUDY OF SPATIAL AND TEMPORAL VARIATIONS IN OUTDOOR AIR POLLUTION AND CHILDREN' S RESPIRATORY DISEASE IN CENTRAL EUROPE

Contract ref. :	***ERBIC15CT980320***	***EC Scientific Officer***
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3142

Project

Epidemiological study of spatial and temporal variations in outdoor air pollution and children's respiratory disease in Central Europe

Keywords

Air pollution epidemiology, respiratory disease, and exposure assessment

Objectives and Contents

The objectives of the study are: to assess the relationship between respiratory health and ambient air pollution, in particular to particulate matter, among primary school children living in 25 areas in Central Europe; to compare the impact of current and historical indicators for the outdoor exposure to air pollution; to evaluate the use of novel statistical approaches in the field of air pollution epidemiology; to strengthen the research capacity in the field of environmental epidemiology and risk assessment in Central Europe.
The project addresses two important methodological issues in air pollution epidemiology. First, the project sets out to develop improved exposure indicators, taken spatial and temporal information into account. Second, statistical techniques will be applied to account for inherently hierarchical data structure.
Both approaches will be employed on a data set that was recently assembled for 25 study areas in six Central European countries in the earlier CESAR project. The CESAR (Central European Study on Air pollution and Respiratory health) project collected in 1994-1997 baseline information on childhood respiratory health and potential risk factors, including outdoor air pollution in several areas in Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovak Republic.
PM_{10}, $PM_{2.5}$, SO_2 and NO_2 were measured at a background sampling site in all 25 areas during 12 months in a standardised way; additional measurements were carried out to assess the spatial variation in air pollution concentrations. Time-series of concentrations for air pollutants from existing monitoring networks and historical data on emissions and meteorological conditions were collected to estimate life-time exposure for each subject.

Foreseen Results

The scientific output will be published in four papers describing: current concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NO_2 in 25 areas in Central Europe; methodology for the improvement of current and historical exposure indicators, and its results; the impact of air pollution on respiratory symptoms and disorders; the impact of air pollution on pulmonary function. It is very likely that, in addition, results of the project will also be published in local languages in Central European journals.

A conference to disseminate the methodology and results among Central European stakeholders will be organised after finalisation of the project.

ASSESSMENT OF GENITAL HUMAN PAPILLOMAVIRUS (HPV) INFECTIONS AS A HEALTH PROBLEM IN RUSSIA, BELARUS AND LATVIA MEASURES NECESSARY FOR THEIR EARLY DETECTION, TREATMENT AND CONTROL OF CERVICAL CANCER AND ITS PRECURSOR (CIN) LESIONS (HPV AND CERVICAL CANCER IN NIS/CCE)

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3143

Project

Assessment of genital human papillomavirus (hpv) infections as a health problem in Russia, Belarus and Latvia. Measures Necessary for Their Early Detection, Treatment and Control of Cervical Cancer and Its Precursor (CIN) Lesions.

Keywords

HPV infections, Cervical cancer, Detection of precancers

Objectives and Contents

In the present proposal, an approach is made 1) to assess the magnitude of genital HPV infections, CIN and cervical cancer as a health problem in the participating NIS/CCE countries, 2) to disclose the risk groups for this disease within these countries, 3) to elucidate the optimal (and the minimum) requirements for an appropriate detection of these risk groups by taking into account the local (and limited) resources, and finally 4) by combining the research and development component of this project, to create an effective health care system in the participating NIS/CCE centres, capable of independently diagnosing and treating genital HPV and CIN, with the decreased disease burden due to cervical cancer as the main long-term objective. A potential European dimension will be provided by the future implementation of such a system in other European countries with cervical cancer as a major health problem.

Foreseen Results

This study design permits an extensive analysis of a number of important issues, necessary while completing the objective 4 of this project. Such key issues include the following: 1) How many cases of significant lesions are missed by ARM I (conventional cytology) protocol? 2) How many unnecessary colposcopies are caused a) by AMR I protocol, and b) by ARM II (PCR) protocol? 3) What is the optimal diagnostic set-up to result in the highest specificity, sensitivity and positive predictive value of HPV/CIN diagnosis? The results to these key questions will then be carefully weighted while developing the most appropriate health care system for the NIS.

With the prospective follow-up of low-grade lesions (HPV-NCIN & HPV-CIN I) without treatment permits the analysis of a wide variety of prognostic factors with potential impact on disease progression. The 24-month period allocated for this follow-up (after the 12 months of recruitment period) is optimal for this purpose, and based on the unequivocal data from the Kuopio Cohort Study, indicating that practically all lesions predestined to progression do so during the first two years from the diagnosis. These data should also permit the detection of the low-risk patients to be allocated for follow-up only, and thus avoiding the waste of the limited resources for unnecessary treatment. This should have a major impact on the health economy issues in the NIS/CCE countries with existing limited resources.

Through the research component of the project, the answers to following key questions should be obtained:
- The magnitude of genital HPV infections, CIN and cervical cancer as a health problem in these countries
- Which is the risk groups for this disease within the NIS/CCE countries?
- The optimal (and the minimum) requirements for an appropriate detection of these risk groups by taking into account the local (limited) resources
- By combining the research and development component of this project, an effective health care system could be created to the participating NIS/CCE centres, capable of independently diagnosing and treating genital HPV and CIN, with the decreased disease burden due to cervical cancer as the main long-term (ultimate) objective and benefit of this project.

AUTOMATED IMMUNOASSAY SYSTEM FOR CONTINUOUS AIR SAFETY CONTROL (AISAC) AND ITS APPLICATION TO AIR POLLUTION AND AERO-ALLERGEN MONITORING.

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3145

Project

Automated Immunoassay System for continuous Air safety Control (AISAC) and its application to air pollution and aero-allergen monitoring.

Keywords

Aero-allergens, pollen, immunoassay, air-pollutants, automated monitoring, air safety control

Objectives and Contents

The air quality in urban areas is of great importance. Many sources of pollution are threatening the quality of life and the public health.
Present state of knowledge: gaseous pollutants are now well detected and quantified by automated equipment but aerosols of dust or pollen particles are not easily analysed currently. Allergenic pollens are responsible of a great part of the respiratory tract diseases. Their effect is frequently amplified by the air pollution mainly its particulate load. Pollen traps are available throughout Europe but they need a well trained expert to count under the microscope intact captured pollen grains. Their data are available only one or two weeks after the pollen capture. Diesel car exhaust gas particles are the major source of small particles (less than 2.5 μm) in the air of our cities. Their detection and quantification is not yet easy to perform. However their level in the air should be known accurately and rapidly in order first to confirm their direct responsibility on pulmonary functions in conjunction with aero-allergens and second to allow documented regulatory measures of the car traffic in polluted cities if needed.
Joint research project partners: our project involves four truly complementary partners specialised respectively in immunoallergy (F), in chemistry of air pollutants (D), in analytical and preparative electroseparation techniques (CZ), in analytical biochemistry (HU), in collaboration with one French SME, expert in integrated automated immunoassays, and one Czech SME (CZ'), as associated contractor, very successful in producing monoclonal antibodies and biological tests.
The aim is to contribute to build an automated air trap which will collect the air dust and at regular intervals, once or twice daily, will extract allergens and organic compounds representing mainly the Diesel car soot and quantitate them rapidly by an ELISA type of immunoassay. Such a versatile device should be able to detect any compound that could induce the production of antibodies, as an antigen or as a small haptenic molecule. For example it could also allow, if needed, to detect quickly and automatically any pathogenic agent present in the air, such as bacteria or viruses, provided that specific antibodies can detect them.
Our work program includes: the collection of dust samples at different times and locations in Paris, Munich, Prague and Pecs (F,D,CZ,HU); the extraction of organic compounds and aero-allergens (F, D, CZ, HU); the physico-chemical characterisation and purification of some major organic compounds using HPLC and capillary electrophoretic methods (D, CZ, HU); in vitro and in vivo testing of toxicity or adjuvanticity for aero-allergens of these compounds (F, CZ, HU); purification of organic compounds by preparative free-flow electrophoresis and HPLC (CZ, D); the physico-chemical characterisation and purification of major aero-allergens, mainly from pollen of grasses and trees and also from latex due to their presence in aerosols originating from the wear and tear of truck tyres (F, HU, CZ); the preparation of polyclonal and monoclonal antibodies to the molecules that will be selected, analysed and purified or synthesised (F, D, CZ, HU); the integration of these developments into a new air trap to be built.

Foreseen Results

Optimisation of the immunodetection of allergens and toxic air pollutants on the basis of newly developed procedures for their extraction, qualitative and quantitative analysis by high-performance analytical techniques with the final aim to develop an automated air control equipment which will make possible precise preventive actions and treatments for a better air quality and safety in urban areas.

STUDY OF NOVEL MOLECULAR-GENETIC FACTORS UNDERLYING ALZHEIMER' S DISEASE IN VITRO AND IN VIVO

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3146

Project

Study of novel molecular-genetic factors underlying Alzheimer’s disease in vitro and in vivo

Keywords

Alzheimer disease, tau, presenilin, amyloid

Objectives and Contents

Alzheimer's disease (AD) is a major cause of memory loss and mental impairment in adult life. AD, in a significant proportion of early-onset AD families (50-70%), is associated with two homologous genes: presenilins (PS-1 and PS-2) and e4 isoform of Apolipoprotein E gene, a major genetic risk factor for AD known to date. On the other hand, the epidemiological distribution and prevalence of PS-1/PS-2 mutations among different familial and non-familial dementia forms and ethnic groups is not yet elucidated. The association of ApoE genotype with AD has been established in several ethnic populations of Western Europe origin. However, the ApoE genotyping of Eastern/Central Europe and Russian populations remains to be conducted. The accomplishment of this goal will help to determine the specificity and significance of these genetic factors and their interactions with genetic or environmental factors modulating AD disease risk. Previous studies also demonstrated that at least one other not yet identified major susceptibility gene for common late forms of AD exists and that more than 30-50% of early-onset familial AD cases have no mutations in known AD genes. These observations imply that the search for other genes should be continued by linkage analysis and positional cloning and/or by association analysis of DNA polymorphisms in candidate-genes in families and AD groups of different ethnic descent. The long term goal of this proposal is to elucidate the pathogenic role of recently discovered genes for Alzheimer s Disease in European human populations and to identify novel molecular-genetic factors involved in central nervous dysfunction in Alzheimer s disease.

The project is focused on presenilins and tau-proteins and, particularly, their mutated and truncated forms originally discovered by authors of this proposal. The scientific aims of this proposal are :
- To evaluate the prevalence of mutations and polymorphisms in PS1/PS2 gene and ApoE genotyping in patients with different subtypes of familial and sporadic AD and vascular dementia, from ethnically and geographically distinct populations
- To search for novel genes and mutations, which may promote an Alzheimer's disease, by linkage and DNA polymorphism association analysis of candidate- genes
- To study the interactions of mutant and truncated presenilins with tau protein, Notch signalling and neurotransmitter system elements; to identify novel genes and their products that are regulated by expression of normal and mutant isoforms of presenilins. It is anticipated, that the accomplishment of tasks outlined in this proposal will help to elucidate the molecular mechanisms involved in cell death leading to AD and contribute to the development of criteria for diagnostic genetic markers for AD in human populations.

Foreseen Results

Identification of novel genes and mutations underlying Alzheimer's disease and elucidation of their role in AD pathway. Collection of DNA samples of families and cohort of patients with dementias of Alzheimer's type. Total sample of 500 patients from AD families and 1000 patients with no familial history who meet INCDS/ADRDA criteria for probable or definite AD will be assembled from 4 centres in Russia, Slovakia, US and Australia (European descent). Evaluation of the most common risks factor (ApoE genotype) for different clinical subtypes of AD in the Russian, Slovak, US and Australia populations (of European descent). Evaluation of mutations and polymorphisms in PS1 and PS2 in familial and non-familial AD in subjects from ethnically and geographically distinct European populations. Elucidation of the molecular mechanisms involved in cell death leading to AD and contribution to the development of criteria for early diagnostic genetic markers for AD in human populations.

PREVENTION AND CONTROL OF HEPATITIS B IN SELECTED COUNTRIES OF CCE AND NIS : ECONOMIC EVALUATION OF UNIVERSAL INFANT IMMUNISATION PROGRAMME

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3151

Project

Prevention and Control of Hepatitis B in Selected Countries of CCE and NIS: Economic Evaluation of Universal Infant Immunisation Programmes

Keywords

Hepatitis B, prevention, vaccination

Objectives and Contents

Hepatitis B has been documented to be a serious threat to the health of populations in the European region: more than a million people are infected with HBV each year, of whom about 90.000 become chronic HBV carriers. Despite the availability of safe and effective hepatitis B vaccines, only a limited number of CCE/NIS countries have yet included HB vaccine into their national immunisation programme. The other countries have failed to do so mainly because of economic constraints. This project aims to: address issues related to implementation of HB vaccination in Bulgaria and Russia; to speed up the progress of these countries towards the implementation of universal immunisation against hepatitis B; to focus on the economic evaluation of this preventive intervention; to generate epidemiological and sauce-demographic data related to HB infection to be used as input data for disease burden and economic modelling; and to support efforts to improve resource use within the health sectors and to make resource use more clinically effective, cost-effective and efficient.

Foreseen Results

Specific expected results of the project are: the transfer of the health economics technology to the partners in eastern Europe; the sharing of expertise in epidemiological, social policy-oriented research and economic evaluation techniques in the area of control of vaccine preventable infections; the assistance in the development and promotion of cost-effective, evidence-based policy in hepatitis B control; the support of a significant network of collaboration in the field of prevention of infectious diseases between EU countries and CCE/NIS; the use of existing epidemiological and socio-demographic data as input data for an economic evaluation; the use of economic evaluation as a tool to prioritise a preventative intervention; reports of the findings and documents which translate these findings into public policy recommendations for control and prevention of hepatitis B will be published. These publications will be disseminated to the target public;
Documents will be published in English and CCE/NIS languages by all the partners, and will be presented at scientific meetings including within CCE/NIS meetings.

The breakdown of communicable disease prevention systems in Eastern Europe in general, coupled with high prevalence of viral hepatitis in particular, has called for a growing need for European-wide collaboration in this field. A successful implementation of a universal HB immunisation strategy, based on hard scientific evidence generated by a cost-effectiveness analysis, can work as a role model and catalyst for other CCE/NIS countries with a similar level of endemicity of hepatitis B infection. The results of the economic evaluation could be used to convince the health authorities in other countries of the public health importance of hepatitis B prevention and that financial arguments no longer can be used to delay the implementation of universal hepatitis B immunisation.

EXPOSURE TO ARSENIC AND CANCER RISK IN CENTRAL AND EAST EUROPE

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3158

Project

Exposure to arsenic and cancer risk in central and east Europe

Keywords

Arsenic, epidemiology, risk assessment

Objectives and Contents

To determine if there is a relation between arsenic emissions by the coal burning power plants and the non-ferrous metal smelting and processing industry in CEE countries, and high rates of cancer of the skin, lung and bladder. Two main case studies will focus on the epidemiological studies in the Nitra Valley, Slovakia and the risk assessment study in NW Romania. This will provide risk estimates for exposed European populations.
To determine if there are other populations at risk in Central and East Europe, and to identify possible sources of arsenic pollution.
Background: The presence of elevated concentrations of arsenic in the environment has over the past 20 years given rise to increasing concern due to mounting evidence of adverse human health effects. Arsenic exposure has been associated with the development of cancer, in particular skin, lung and bladder cancer, but also prostate, kidney and liver cancer, based mainly on studies from Taiwan. High levels of arsenic in soils have been found in natural arsenic rich geological strata in the South West and North East of Taiwan, West Bengal, the South East and North West of Argentina, Finland, Hungary and Romania, in mining and smelting areas in the South West of England, Thailand, Chile, parts of the United States, Greece and Romania, and in areas with coal burning power stations in China, India and Slovakia. Two of the main sources of the arsenic emission in the environment are associated with coal powered power plants and non-ferrous metals processing industry.

The scientific and social significance of the proposed programme is that it will provide a comprehensive approach to an important health risk in certain parts of Europe, and in particular Central and Eastern areas. The joint research project will provide risk estimates to quantify the potential risk in European populations. Further, it will use its strong industrial links to establish recommendations for the best industrial practice in line with EU directives and form the basis for future EU legislation.

Foreseen Results

Multidisciplinary research project brings together experts and expertise in geochemistry, environmental chemistry, air pollution, exposure assessment, epidemiology, toxicology and environmental management and control. The co-operation involves a variety of types of institutions, including academia, medical research institutes, industrial companies from the energy producing sector and non-ferrous metals processing industry, local authorities and environmental protection agencies from the EU countries, UK, Germany and Austria and from CEE countries, Slovakia, the Czech Republic, Romania and Hungary. The assembled team will constitute one of the largest European and international consortium concerned with environmental and epidemiological risk assessment to arsenic exposure. The project will lead to new methodologies in the field of epidemiology and risk assessment, and it will validate existing techniques. The research will lead to a better understanding of the relationship between arsenic exposure and the development of cancer, which will inform health practitioners and local authorities responsible for the reduction of health risks. It will identify and make recommendations for best industrial practice for the industrial partners in the energy producing sector and non-ferrous processing industry.

BLOOD STERILIZATION USING THE PHOTODYNAMIC EFFECT WITH IMMOBILIZED PHOTOSENSITISERS

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3160

Project

Blood sterilisation using the photodynamic effect with immobilised photosensitizers (Blood PDT)

Keywords

Blood sterilisation, photodynamic effect, photosentizers

Objectives and Contents

Although the transmission of pathogenic viruses by blood transfusion has been largely reduced, absolute safety has not been achieved. There is a considerable documentation on the ability of photosensitisers to destroy enveloped viruses, either in whole blood, blood components or cell-free, when they are treated with light of the appropriate wavelength in the presence of oxygen, however, in the existing protocols the photosensitiser one used, remains in solution in the blood sample, which if given to a patient could render him photosensitised for several weeks. The objective of the present proposal is to examine new methods for the sterilisation of blood using the photodynamic effect, that is photosensitiser + light + oxygen. The novelty of this proposal is that the photosensitiser is immobilised on a polymeric surface, and cannot itself contaminate the blood for transfusion.
This task requires:
- The preparation of suitable porphyrin photosensitisers.
- The anchoring of them to pre-formed polymeric matrices, or their copolymerization with monomeric olefins to form new photosensitising copolymers.
- The evaluation of the immobilised photosensitisers in the destruction of viruses found in human blood transfusion samples.
This project requires of interdisciplinary collaboration, which moreover is proposed to be intereuropean due to its novelty.
Three groups specialised in organic chemistry (University of Barcelona [Spain], University of London [U.K.] and Ivanovo Chemical Technology Institute [Russia]) are going to develop insoluble polymer bound porphyrins, in the form of films, beads and tissues, and a biochemical group (University of Barcelona [Spain]) is going to prepare immobilised-porphyrin-liposomes also as beads, to cover in this way the main possibilities of achieving easily separable photosensitisers. The immobilized photosensitisers will then be tested on enveloped viruses (cell-free and in blood) in Barcelona to study the virucidal potential, and subsequently in Wroclaw (Poland) under the same experimental conditions to assess their toxicity on the blood components.The photosensitisers here proposed will also be assaied on non-enveloped viruses to check if these new structures are able to break their protein capsid.

Foreseen Results

The project is expected to have important beneficial results in the health area, that may offer economic advantages with respect to the present sterilisation process.

DEVELOPMENT OF A SIMPLE, RAPID AND HIGHLY SENSITIVE METHOD FOR THE QUANTITATIVE DETECTION OF NUCLEOTIDE SEQUENCES AND ITS APPLICATION FOR THE DIAGNOSIS OF SOME VIRAL INFECTIONS

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3163

Project

Development of a simple, rapid and highly sensitive method for the quantitative detection of nucleotide sequences and its application for the diagnosis of some viral infections

Keywords

DNA minor groove specific ligand; single-chain Fv antibody; hybridisation

Objectives and Contents

A collaborative project has been organised between two laboratories in Russia (Novosibirsk and Koltsovo), a laboratory in Germany (Heidelberg), a laboratory in Kazakhstan (Almati) and Affitech AS (Oslo, Norway). The objectives are to design a method for the quantitative detection of target nucleic acids in a microplate well, which will be as sensitive and specific as a nested-PCR or RT-PCR but which will be more easy to perform, less time-consuming, inexpensive and suitable for large-scale diagnostic assays in clinical laboratories.

The proposed method is based on a combination of PCR or RT-PCR amplification of the target nucleic acid, hybridisation of the amplicon with conjugates of an oligodeoxynucleotide with a minor groove binding ligand and detection of the resultant hybrid by a recombinant antibody.

This procedure will combine the specificity of the hybridisation event with the ease and speed of an ELISA. The use of the same equipment as for ELISA and the complete automation of the procedure will permit the rapid processing of a large number of samples in a clinical laboratory. The unique hybridisation properties of oligonucleotide conjugates with minor groove binders provide a higher specificity and sensitivity than other well-known tests. An additional advantage of this method is that it provides numerical data and thus does not depend on subjective interpretation.

Foreseen Results

The developments of amplification DNA test is very important for Russia because no standard commercial test system exist. These test will combine the specificity of the hybridization event with the speed of an ELISA procedure. The method provides numerical data and does not depend on subjective interpretations . The test will be applied I Russian and Kazakh clinics.

DETECTION, IDENTIFICATION AND TYPING OF THE MYCOBACTERIUM TUBERCULOSIS IN THE BALTIC COUNTRIES

Contract ref. : ***ERBIC15CT980328***
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3169

Project

Detection, identification and typing of mycobacterium tuberculosis in the Baltic countries.

Keywords

Tuberculosis, Drug resistance, Baltic countries

Objectives and Contents

The tuberculosis situation in the Baltic States is alarming. The objectives of this project are to developed efficient diagnostic systems based mainly on recombinant DNA technologies, and to use these for further characterisation of the development and spread of (multi) drug resistant strains of Mycobacterium tuberculosis. We are also aiming at studying the virulence of the infecting agent and to improve the methods for fighting drug-resistant tuberculosis.

Specific aims are - to develop, evaluate and introduce PCR-based diagnostic systems for detection and identification of M. tuberculosis - to identify and characterise patterns of mutations causing drug resistance in M.tuberculosis isolates from patients in the Baltic countries, especially rpoB gene leading to rifampicin resistance, katG, inhA and aphC genes associated with isoniazed resistance, 16S RNA and ribosomal protein S12 genes leading to streptomycin resistance, emboperon leading to ethambutol resistance, identification of yet unidentified mutations associated with drug resistance - genotyping of M.tuberculosis isolated from patients in the Baltic countries using a highly standardised RFLP with IS6110 as an epidemiological marker, additional methods for epidemiological fingerprinting for further characterisation of the isolates, specific PCR-based fingerprinting using conserved repetitive motifs with the aim of identifying the rearrangements in the mycobacterial genome, identification the operons potentially involved in increased virulence.

Foreseen Results

The introduction of the most recent molecular genetic techniques in mycobacterial diagnostics and research in the Baltic countries will make possible a broad genetic characterisation of drug-resistant M tuberculosis in a geographical area which is a international hot spot for spread of multidrug-resistant TB. Genotyping of M tuberculosis, drug resistant and susceptible isolates, provides a basis for an increased understanding of the mechanisms leading to antibiotic resistance. The identification of the mutations leading to the increase of the virulence would make it possible to design new methods for identification of the virulent, antibiotic resistant strains.

This project will provide useful information for the identification of more effective tools in the fight against tuberculosis in the Baltic countries and elsewhere.

EUROPEAN PROJECT ON GENES IN HYPERTENSION

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3172

Project

European Project on Genes in Hypertension – EPOGH

Keywords

Genes, hypertension

Objectives and Contents

Background: hypertension (HT) comes about through interaction between genetic, environmental and life-style factors. However, the literature on the presumed associations between genetic variability and HT is conflicting and difficult to interpret because of unstandardised definitions, divergent epidemiological methods and insufficient sample size.

Objective: EPOGH sets out to measure the genetic determination of blood pressure (BP) and HT and its cardiovascular complications; to identify polymorphism's significantly associated with HT or cardiovascular risk; (3) to produce a database, which describes the genetic background and cardiovascular phenotypes of 4 Eastern and 2 Western European populations; (4) and to establish a permanent pool of genetic material, which is immediately accessible to address emerging issues in genetic research.

Methodology: via random population sampling and enrolment at specialised HT clinics, EPOGH will recruit 600 nuclear families (nearly 2400 subjects) in 6 European countries (Belgium, Bulgaria, Italy, Poland, Romania and Russia). In subjects aged 18-59 years, the relationship between BP, HT and genetic variation in the renin sytem will be investigated using linkage analysis. Strictly standardised epidemiological methods, subjected to rigorous quality control, will be used to determine complex phenotypes consisting of BP in combination with other traits. The conventional BP will be measured at 2 separate home visits (2 x 5 readings). Modern methods to define complex phenotypes will include 24-h ambulatory BP monitoring, power spectral analysis of heart rate variability as index of the autonomic nervous modulation of the cardiovascular system, and measurement of the endogenous lithium clearance as index of sodium sensitivity. A validated questionnaire will inquire into personal and familial medical history important life-style factors. In addition to usual measurements, blood biochemistry will also include plasma renin activity, angiotensinogen concentration and angiotensin converting-enzyme activity. The electrolyte and aldosterone excretion will be measured in timed 24-h urine samples.

Foreseen Results

HT affects 15% of the adult European population. Beyond age 65, its complications explain over 50% of total mortality. This project will enable the pharmaceutical industry to develop, produce and commercialise simple diagnostic tests to determine genetic predisposition and responsiveness to drug treatment. This, in turn, will lead to the more rational prevention and treatment of HT and its incapacitating complications and will help to curb the epidemic of cardiovascular disease in Eastern Europe. This project will promote genetic and cardiovascular research in 4 Eastern European countries and define new goals and markets for the European pharmaceutical industry.

FORUM ON HEALTH SERVICES RESEARCH IN PRIMARY HEALTH CARE IN CCE AND NIS (ACCOMPANYING MEASURES)

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3181

Project

FORUM on Health Services Research in the Primary Health Sector in the CCE/NIS

Keywords

Forum, health services research, primary healthcare

Objectives and Contents

To create an active network of outstanding Public Health Care experts from the CCE and NIS who start an ongoing consultation relation with the relevant experts in the EU countries.
To collect the most up-to date knowledge on the most problematic issues of the health services in the target countries.
To facilitate the elaboration and development of Public Health Care strategies and plans in the target countries highlighting on the importance of finding solutions to health care problems through evidence based research.
To enable the CEC and the NIS to found / develop / strengthen solid PHC research policies, and teams with the help of the experience and major findings of the EU countries.
To contribute to the hamornisation of the standards of PHC activities and services in the target countries with those in the EU.

With the aim of realising the main objectives of the FORUM, we aim to plan, organise and realise three conferences between 1998-2000, each lasting for 5 days in Budapest, Hungary, alternatively, one in Slovenia and one Poland. The participant (beneficiary) CCE and NIS are the followings: Estonia, Hungary, Latvia, Poland, Romania, Slovak Republic, Slovenia (3-5 persons from each country at each conference).

Before and between conferences, the major actions of the FORUM are planned as follows:
Organise, manage and control consultation, correspondence and all kinds of exchange of information mainly through the internet home page of the Scientific Coordinator, the National Institute of Family Medicine (www.ohi.hu) where a special FORUM section shall be designed for this purpose exclusively for the beneficiary countries of this proposal. These consultations would serve for the analysis of the health care situation of each target country at the onset of the project and then, in between each conference, for monitoring and quality controlling the proper direction of the development projects in the target countries, consultations.

In the conference periods:
Starting the conferences with reports on the results of research and development activities stimulated or facilitated by the FORUM. This exercise could also serve as the control of the implementation of the FORUM's activity. Discussion of the best findings, studies selected previously by the EU partners for the purpose of proposing and setting up PHC development priorities and strategies for the most problematic health service issues in the specific countries for the next 8-10 months based on the practical experience of the EU countries.
Proposal for research methods and the structuring of the activities in relation to the previously selected topics taking into consideration also the application of quality assurance methods advised by the EU partners.

Foreseen Results

Collection of the most up-to date knowledge and data on the latest situation of the health services in the target countries.
Harmonisation of Public Health Care development strategies and plans in the target countries.
Developed PHC activities/services with the help of findings of the EU countries and/or those of the CCE/NIS.

DIAGNOSIS AND PROGNOSIS OF VIRAL HEPATITIS B AND C BASED ON NOVEL SERUM ASSAYS

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3182

Project

Diagnosis and Prognosis of Viral Hepatitis B and C based on novel serum assays.

Keywords

Hepatitis, xanthine oxidase

Objectives and Contents

The incidence of hepatitis B and C in the New Independent States (NIS) is very much higher than that in Western Europe. Despite this fact, screening for these diseases in the NIS is woefully inadequate, commonly being based on the use of homemade immunoassay kits that are incapable of detecting early stages of infection. Diagnosis and prognosis of hepatitis B and C are also major problems, not only in the NIS, but also in Western Europe. Thus, verification of the stage of disease, estimation of liver damage and prognosis of acute disease is all uncertain.

The objectives of the proposed research are to establish optimised diagnostic and prognostic laboratory criteria in acute and chronic viral hepatitis B and C, that are based on the use of novel standardised ELISAs (Enzyme-Linked Immunosorbent Assays) suitable for use in clinical diagnostic laboratories in the NIS.
The ELISAs will be for serum levels of the liver enzyme, Xanthine Oxidoreductase (XOR), of anti-XOR antibodies and of XOR-containing Immune Complexes (XORIC). Levels of XOR in serum are known to be greatly elevated in cases of infectious hepatitis, more so than levels of alanine aminotransferase, the present marker of choice. All previous assays for serum XOR have been for enzymic activity, determination of which is both difficult and expensive. The concept of using ELISA for XOR is totally novel and is based on a procedure developed in the laboratories of the Project Coordinator. Previous work in the latter laboratories has also led to the development of assays for anti-XOR antibodies and XORIC, both of which are elevated in the serum of patients with liver disease and represent an amplification of the primary increase in XOR levels. ELISAs for all three parameters are straightforward and potentially adaptable for use in regional clinical laboratories. Cases and controls will be selected from designated hospitals in three NIS (Russia, Uzbekistan and Kazakhstan) by each of the relevant partners and under the supervision of the Scientific Coordinator, Dr. I Bondarenko, St. Petersburg Therapeutic Institute, Russia.

Levels of serum XOR, anti-XOR antibodies and XORIC will be compared between cases and controls, between cases of hepatitis B and Cand during the course of progression from acute to chronic disease. Correlation of the XOR-based data will be sought with the results of liver biopsies and other parameters of liver function.

Foreseen Results

It is anticipated that the above information will provide more convenient and sensitive screening procedures for hepatitis B and C and aid diagnosis in allowing better evaluation of liver damage and the stages of disease. Prognosic value will derive from improved prediction of chronicity as an outcome of acute disease. Information concerning the novel concept of beneficial autoimmunity will make an important contribution to basic science.

GENETIC, INFECTIOUS AND LIFESTYLE RISL FACTORS BEHIND TWO INCREASING CANCERS IN CENTRAL EUROPE

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3184

Project

Genetic, infectious and lifestyle risk factors behind two increasing cancers in Central Europe

Keywords

Oral cancer, larynx cancer, HPV, genes, lifestyle

Objectives and Contents

The objectives of this project are to evaluate the role of infectious, genetic and lifestyle factors for both oral and larynx cancer in the CCE and to quantify the extent of interaction between these three groups of causes. High-risk groups will be identified and information relevant for prevention programmes will be made available.

The project will consist of an epidemiological case-control study and will be conducted in five areas from CCE: Bucharest (Romania), Banska Bystrika (Slovakia), Lodz (Poland), Budapest (Hungary), and Warsaw (Poland). In each centre approximately 70 incident cases of each cancer type will be recruited and will be asked to undergo a detailed personal interview during which they will provide information on tobacco and alcohol consumption, occupational history, dietary and other lifestyle habits. Evaluation of occupational history will involve a team of experts in each centre (typically an industrial hygienist and chemist) who will classify an a priori group of suspected carcinogens according to the level, probability and duration of exposure. An oral mucosa sample will also be obtained and will be analysed for the presence of high-risk HPV types, especially HPV 16 and 18. A 10ml blood sample will also be collected and analysed for genetic polymorphisms of carcinogen metabolising enzymes.

An efficient aspect of this study is that a separate control group will not have to be recruited in each centre. This is because they are all currently participating in a similar multicentre case-control study of lung cancer investigating lifestyle, occupational and genetic risk factors. This study is also funded by the INCO Copernicus programme (Contract ERBIC15-CT96-0313). These control groups are being recruited from hospital patients with other diseases and will be suitable for the present proposed study as the questionnaire and interview approach will be identical to that of the two case groups. The only extra information, which will be required from the controls, will be oral mucosa samples for HPV detection.

Foreseen Results

The results will consist of estimates for both oral and larynx cancer for HPV infection, lifestyle practices and genetic susceptibility.

NEEDS ASSESSMENT FOR CHRONIC RENAL FAILURE AND END STAGE RENAL DISEASE IN EASTERN EUROPE (NACE)

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3186

Project

Needs assessment for chronic renal failure and end-stage renal disease in Eastern Europe (NACE)

Objectives and Contents

Most patients with chronic renal failure (CRF) progress to end-stage renal disease (ESRD) in which life can only be sustained by renal replacement therapy (RRT) which comprises dialysis and kidney transplantation. In western European countries it is estimated that around 80-100 new patients per million of the population require RRT each year. The incidence of CRF (serum creatinine concentration $\geq$ 300 umol/ 1) in these countries is as high as 450 per million per year. There are limited data on the incidence of ESRD in eastern European countries and even less information on the incidence and prevalence of CRF. Studies carried out by us and colleagues in St Petersburg, Russia and Tirana, Albania suggest that the provision of facilities for RRT are limited and that many patients who might benefit from treatment are dying from ESRD.

In order to determine the resources required to provide the best management for patients with chronic renal failure and ESRD it is vital to establish the incidence and prevalence of these conditions and to assess existing resources available for its management.

The detailed objectives of our study are therefore twofold. Firstly to study, prospectively, the incidence, prevalence and outcome of chronic renal failure and ESRD in 11 renal centres in north-west Russia and in communities in neighboring Estonia, Lithuania, Latvia and Poland, and secondly to assess the existing resources and their variability in these centres. We will base this study on collaboration established under the auspices of the PECO-93, 94 and BIOMED 2 initiatives of the EC with colleagues in Rotterdam and St Petersburg. Specifically we plan to undertake a prospective study in a population base of 12 million with serum creatinine concentrations $\geq$ 300 umol/ l which remains persistently elevated. These patients and their progress will be followed for a further 12 month period after the end of recruitment in the first year of the study. We shall also study, using the resources of the health economics facilities at Renine (The Dutch Renal Registry) in the Erasmus University Rotterdarm the extent of the resources available (both manpower and material) for the investigation and management of CRF and ESRD in the study centres.

Foreeen Results

We shall establish the incidence, prevalence and resource use for CRF and ESRD in the above areas of Eastern Europe. Using these data and the methodology established in Aberdeen and Rotterdam, we shall develop policy protocols for resource provision and utilization in eastern European states for the management of these conditions. The co-operation in the project will enable the transfer of the skills for needs assessment and economic analysis to places where these are not currently easily available. This sharing of methodological skills will facilitate similar healthcare needs assessment exercises in other areas of health care in eastern Europe that are urgently required.

NOVEL ANTIMICROBIAL SUBSTANCES ON THE BASIS OF 3-FORMYL RIFAMYCINE SV: MOLECULAR MODELLING, SYNTHESIS AND ANTI-TUBERCULOSIS ACTIVITY

Contract ref. : ***ERBIC15CT980333***
Proposal ref. : ***PL973192***
Type : *J oint Research Proj ect*
Duration : ***30 Months***
Start date : 01/11/1998
End date : 30/04/2001
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3192

Project

Novel antimicrobial substances on the basis of 3-formyl rifamycine SV: Molecular modelling, synthesis and anti-tuberculosis activity (TUBERCULOSIS)

Keywords

Tuberculosis, Rifamycine, QSAR (Quantitative Structure-Activity Relationship)

Objectives and Contents

Elucidation of structural features of 3-formyl ryfamicine derivatives that are responsible for their antimicrobial activity using QSAR techniques; directed synthesis of up to 15 new congeners selected by QSAR results; experimental in vitro testing of the newly synthesised 3-formyl rifamycine derivatives using a test battery of bacteria; In vitro and in vivo testing of the newly synthesised and potentially active compounds on Mycobacterium tuberculosis. The final goal is to derive new 3-formyl rifamycine derivatives with optimised anti-tuberculosis activity.

Foreseen Results

Improved mechanistic understanding of the structural implications of 3-formyl rifamycines for high anti-tuberculosis activity; generation of new congeners with potentially high suitability for their use as anti-tuberculosis agents.

HEALTH RISKS OF HEAVY METALS IN THE FOOD CHAIN OF INDUSTRIAL AREAS IN CENTRAL AND EASTERN EUROPE

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3193

Project

Health risks of heavy metals in the food chain of industrial areas in central and eastern Europe

Keywords

Heavy metals, food chain, public health, environmental indicators, DSS-ETAAS

Objectives and Contents

Data on the dynamics and effects of heavy metal pollution in the whole food chains of eastern European countries are largely lacking. The project aims (1) to monitor the current contamination with Pb and Cd of the environmental media and man in three industrial zones in Bulgaria, Poland, and Romania (2) to estimate the transfer rates of Pb and Cd in the food chain (soil - forage - livestock - food) (3) to develop land use, livestock production and public health strategies to reduce the health risk of heavy metals in severely contaminated areas.
In detail, the level of pollution with heavy metals will be monitored in air, soil, drinking water, vegetation (fodder crops), and animals including livestock species as well as in food of animal origin. Blood and urine samples from 200 persons of various ages from polluted and comparable non-polluted areas will be taken and analysed in each of the three participating countries after the analytical methods have been standardised throughout all participating laboratories. The analytical data will be correlated with interviews of the sample persons.
A ring test is planned for blood and urine samples. Standardised samples of the other biological matrices will be sent to all participating laboratories to standardise the methodology and to improve the analytical competence of the target countries when necessary. Reference samples will be analysed in Giessen, Aberdeen and Limerick. Solid samples will be analysed with the direct solid sampling electrothermal atomisation atomic absorption spectrometry (DSS-ETAAS) and verified with the ETAAS as usually practised. The DSS-ETAAS will allow for routine analysis of high sample numbers of Cd and Pb.

Foreseen Results

The expected outcomes of the project are an improvement of analytical competence in the target countries and improved technologies for a reduced health risk of exposed populations due to training of public health services concerning sample collection and interview analysis. Through EU - CCE cooperation alternative strategies for optimised land use systems and an increased knowledge on the dynamics and bioindicators of heavy metals are expected.

ASSESSMENT OF EARLY EFFECTS OF URBAN AIR POLLUTANTS ON THE RESPIRATORY TRACT : AN APPROACH BASED ON PERIPHERAL MARKERS AND MOLECULAR BIOLOGY TECHNIQUES

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3197

Project

Assessment of early effects of urban air pollutants on the respiratory tract: an approach based on peripheral biomarkers and molecular biology techniques

Objectives and Contents

Most indicators of classical epidemiology (morbidity/mortality data) as well as functional endpoints lack sensitivity and specificity for an accurate assessment of the impact of air pollutants on human health. The basic objective of the present study is to improve the assessment of respiratory risks of urban air pollutants such as N02 by using an entirely new approach relying on the determination in serum of lung specific proteins. This approach will be coupled with the use of molecular biology tools to elucidate mechanisms underlying changes of these peripheral markers and to test the hypothesis of a predisposition linked to the gluthathione-S-transferases (GST) Tl and M1 polymorphism. More specifically, this project will pursue the following objectives:

. Determine in animals and humans whether the acute or chronic effects of urban air pollutants, in particular N02, can be detected by measuring lung specific proteins in serum such as Clara cell protein (CC16) and surfactant-associated protein A (SP-A).

. Evaluate the sensitivity of these peripheral lung markers by comparison with classical indicators of lung effects i.e. the respiratory symptoms and the lung function tests.

. Determine in animals whether the changes of lung specific proteins in serum result from an increased permeability of the bronchoalveolar/blood barrier and/or an altered synthesis by lung epithelial cells (Clara cell density evaluation, Northern ELISA of CC16 mRNA,...).

. Study in workers exposed to N02 the influence of the GSTTl and GSTMl genotypes on the response of these biomarkers and other effect parameters.

. Test in animals and humans the hypothesis of a protective effect of selenium against the pulmonary effects of N02.

Whenever possible these objectives will pursued by stimulating a transfert of modern techniques, especially in the field of molecular biology and histology, between members states partners and CCE/NIS partners.

Foreseen Results

We expect from this project the validation of new non invasive tests for detecting early effects of air pollutants on the respiratory tract and the collection of data allowing a better derivation of health-based air quality standards for NO2, in particular concerning the thresholds of toxicity and the importance of susceptibility factors.

THE PRESENCE AND RISK OF NITRO-POLYCYCLIC AROMATIC HYDROCARBONS (NITRO-PAHS)

Contract ref. : ***ERBIC15CT980339***
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9049

Project

The presence and risk of nitro-polycyclic-aromatic hydrocarbons (nitro-PAHs)

Objectives and Contents

Polycyclic aromatic hydrocarbons (PAHs) are a well-known class of contaminants which have been intensively studied during the last few years. The presence of their nitro-derivatives (nitro-PAHs) is nowadays also a legitimate cause of concern due to their strong toxicological properties. There are many reports on occurrence of nitro-PAHs in environmental (abiotic) samples like polluted air, soil etc. The ubiquitous character of these compounds is not surprising, considering their formation during incomplete combustion processes and the possible origination via reactions between PAH adsorbed on atmospheric particulates with oxides of nitrogen and nitric acid present in atmosphere. Since only a few reports were published about the determination of nitro-PAH in food, it is the objective of the project to collect new data about these contaminants in diet in order to estimate a potential health risk.
Concerning toxicology studies, nothing is stated in literature about bioaccumulation and bioavailability of nitro-PAHs, hence additional research is urgently needed. Depending on the metabolic activity, the excretion and accumulation of nitro-PAH will be high or low.
Research activities will be focussed mainly on the assessment of the contribution of various sources of contamination to the dietary intake of nitro-PAH (exposure pathways) with special regard to air pollution and food processing. Furthermore, any correlation between nitro-PAHs and PAHs should be elucidated in various sample matrices since their formation processes are partly very similar. The quantification of both nitro-PAHs and PAHs is performed creating “fingerprints” for different types of samples which enables statements about the relationship between different PAH as well as nitro-PAH and PAH and providing information about sources and sample type. An extensive monitoring of the nitro-PAH levels in several food stuffs will be performed throughout all participating countries and the average uptake of these contaminants through diet will be estimated by the results of a duplicate diet study finally.
To study the assumption of high accumulation of nitro-PAH analysis of one aquatic and one terrestrial food chain will be performed. By combining these studies with the analysis of stable nitrogen-isotopes the bioaccumulation potential of the commonly found nitro-PAH in the environment will be described. Further methodologies proposed are based on *in vivo* and *in vitro* bioassays reflecting different types of response/s, which can be expected during exposure for genotoxic, mutagenic and carcinogenic compounds. These methods are very sensitive with different end-points which provide a broad spectrum of information about the toxicity of tested chemicals and thereby to the possibility to estimate the potential impact on human health.

Foreseen Results

In order to compare the toxicity between different nitro-PAH compounds as well as showing the relevance in toxicity to non-substituted PAH, a toxicity equivalent factor (TEF) concept will be produced. Using QSAR technique (quantitative structure activity relationship) only a limited number of toxicity tests has to be performed. With this test set in combination with available data from literature, QSAR is expected to predict the TEF for most relevant nitro-PAH compounds.

NON-NUCLEAR ENERGY
(DEMONSTRATION PROJECTS)

INTERGRATION OF SOLAR THERMAL ENERGY WITH ADVANCED SOLAR COMPATIBLE HEATING SYSTEMS (SOLAC)

Contract ref. :	***ICOP-DEMO-4004-98***	***EC Scientific Officer***
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4004

Project

Integration of solar thermal energy with advanced solar compatible heating systems.

Keywords

Estonia, Russia, Baltic region, Solar heat, collector, heat pump, floor heating, plastic piping, PEX, modernization, boiler

Objectives and Contents

The main overall objective is to demonstrate the technical and economical feasibility of the integration of solar thermal energy with advanced solar compatible heating systems and to create significant local multiplication effects and to build up commercial operations for solar and related components for complete systems.

The first proposed demonstration project is to create and put into operation a demonstration system for hot water supply, space heating and air conditioning of the hotel building in the so called “Burg of Craftsmen” located in the Moscow city park FILI. The demonstration system is planned to combine the recent knowledge, experience and advanced developments by Insolar-Invest (Russia), Neste Oyj NAPS (Finland) and Uponor AB (Sweden) in the field of combined solar energy and low-potential ground heat utilization with heat pump applications for creation of such systems. It is to be noted that the overall heat supply system of the Burg of Craftsmen is foreseen to be based on distributed and partially autonomous systems. The technologies demonstrated are also applicable for smaller buildings and individual medium income households.

The second demonstration object is the Vändra city Hospital building in Estonia. For domestic hot water, the hospital utilizes a solar heat system, which needs improvement. Also the building heat distribution system needs modernization. The heating system of the hospital is based on an autonomic boiler plant. In the boiler house two heavy oil boilers are in use, which need replacement. By using different saving measures it is possible to save 30-40% of the heat production. Furthermore, by upgrading the solar system, the objective is to have the entire hot water and heating requirements covered by solar only during the summer and spring months so that the heavy oil burner could be shut down during this time. Another technical advance which can be widely multiplied in Estonia is the renovation of the radiator network from a single pipe system to a dual pipe system with the latest plastic pipe technology.

Foreseen Results

Besides working and reliable systems in the demonstration sites a foreseen result is the continuance of business activities in the regions of the two sites. During the SOLAC project an infrastructure for the multiplication of technologies applied will be formed. Local designers and installers will be trained and made familiar with the new technologies.

The expected multiplication effects can be reached through the implementation of a business plan prepared by the participating business organizations. It will be based on the demonstration objects and further market studies and be carried out during the project. It will focus on sufficiently large market segments including middle income private households. Local SME’s will have a central role in implementing the business plan.

SMALL POWER PHOTOVOLTAIC (PV) SYSTEMS FOR SOCIAL OBJECTIVES IN REMOTE AREAS (SPORE)

Contract ref. :	***ICOP-DEMO-4008-98***
Proposal ref. :	***PL974008***
Type :	*Demonstration Proj ect*
Duration :	***30 Months***
Start date :	15/10/1998
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4008

Project

Small power photovoltaic (PV) systems for social objectives in remote areas.

Keywords

Photovoltaics, renewable energy sources, Romania, electricity for remote areas, schools, cultural centers, huts, pv monitoring.

Objectives and Contents

From the statistics of the Romanian National Electricity Utility (RENEL), in Romania there are more than 63000 houses not connected to the electrical grid, out of which 50000 are situated in the neighborhood of towns or villages, and more than 13000 are situated in 550 remote small villages. More than 30% of these small villages are located in the area of Apuseni Mountains (western Carpathian mountains).The reports of the Ministry of Education show that more than 70 schools from this region are not connected to the grid (Annex 1).The mean distance to the grid is about 7.5 km and the estimated cost for electrical grid extension is more than 20000 ECU/km. In the Carpathian Mountain there are also more than 50 huts without electricity situated more than 10 km from the grid.

The only solution for improving the quality of life for the inhabitants of these remote regions, in what it concerns their education, culture and access to information, is the use of renewable electrical energy sources. This is the main objective of the project.

The project will install 10 PV solar power sources for: schools, type A (6 systems), huts, type B (2 systems) and cultural centers type C (2 systems). The daily estimated load consumption is: 573 Wh/day (A), 2860 Wh/day (B) and 688 Wh/day (C).

Scientific in training activities:
- workshop will be organized in the second year of the project in Romania
- Editing brochure on the subject: “Renewable energy application in schools”
- Annual contact meetings and visits will be organized at the application sites.

The results will be presented in European Conferences on this subject. Training activities will be conducted with people living in remote areas.

Foreseen Results

More than 100 type A and C and 20 type B applications is expected to be installed in the near future provided the objectives of this project are accomplished.

The market for this application is very large and the perspective customers are interested to cooperate in this project.

The proposed project will also contribute
- To stabilize the rural population in these regions, to bring back people in villages, with benefits for agriculture, SME development, culture and tourism;
- To open and diversify a new market for clean and environmental friendly energy sources through : - electrical energy supply for 6 schools, 2 cultural centers and two huts;
- To create (through monitoring) a data base for solar (and wind) energy, for these regions, useful for further replication of the project and for PV/wind hybrid systems.

BEIUS GEOTHERMAL DISTRICT HEATING SYSTEM

Contract ref. :	***ICOP-DEMO-4012-98***	***EC Scientific Officer***
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4012

Project

Beius Geothermal District Heating System in Romania

Keywords

Romania, renewable energy resources, geothermal reservoir assessment, open fractured geothermal reservoir, demonstration geothermal utilisation, district heating, transfer of technology, dissemination and training.

Objectives and Contents

Beius town has about 15,000 inhabitants and is situated in western part of Romania about 60 km away from Oradea, the nearest major city. Well F-3001 was drilled to a depth of 2576 m by S.C.Transgex company inside the town limits. It intersects a geothermal reservoir approximately between the depths of 1900 and 2500 m with water temperature 75 and 88 °C. The chemical properties of the water are believed to be of suitable nature for a trouble free utilisation. Due to technical and financial reasons, Transgex and Edilul, the responsible local companies, have only been able to do some very limited tests in the well.
The potential use of geothermal energy for district heating in Beius will almost completely reduce the present great pollution impact of fossil fuel district heating production on the environment. After two years, when existing state subventions for house heating will not exist, according to government announcement, the town will desperately need a more efficient district heating system.

The main objectives of the project are:
To validate and quantify the optimal system for utilisation of the geothermal reservoir for district heating and hot tap water production in Beius town, based on measured production characteristics of the well and estimated long-term production capacity of its geothermal reservoir and the participating companies long time experience and technical know-how in the fields of reservoir assessment and geothermal utilisation.

To test the characteristic of the well and the production capacity of the geothermal reservoir by introducing a deep well lineshaft pump of Icelandic design. These type of pumps have over 20 years of operational experience in Iceland and have proofed to be very reliable, in reality they contribute to a great extent to the success of geothermal low temperature utilisation in that country (over 87% of all buildings are heated by geothermal water).

To specify the technique of heat distribution, system operation and last but not least the management organisation, tariff system and invoicing of consumed heat, at present rather inefficient.
Based on the reservoir assessment results and the analysed development of the heat demand the stages of the development of the entire energy system will be defined.
To integrate the results in a feasibility report which will enable the district heating company to further develop its commercial potential, i.e. loan applications etc., to start the implementation phase, in case the proposed system shows economical viability.
To put great emphasis on the dissemination of the project results and training of local experts and decision makers through workshops and publications.

Foreseen Results

The principal results of the project will be to clarify and quantify the potential of the local geothermal reservoir for district heating in Beius and the optimal configuration of the technical and management structure of the system for the benefit of the local population and environment.

S.C. Edilul will use them to develop further its commercial potential and to step into the implementation phase.
To have a demonstration value for other similar potential projects in Romania.

DESODED-DESIGN AND INSTALLATION OF A SOLAR DRIVEN DESICCANT, COOLING DEMONSTRATION SYSTEM

Contract ref. :	***ICOP-DEMO-4034-98***	***EC Scientific Officer***
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4034

Project

DESODEC - Design and installation of a solar driven desiccant cooling demonstration system.

Keywords

Solar energy, solar cooling, desiccant evaporative cooling, CPC type collectors.

Objectives and Contents

The main objective of the project is to demonstrate the feasibility of building climatization using an alternative and environmental friendly energy source, like solar energy, in Armenia economical and climatological conditions.
To accomplish with this objective a solar heating and cooling system, to supply the hot water and cooled air for one building of the American University of Armenia (AUA) will be designed, installed and monitored for one year. The combined system will include a solar field with low-concentration CPC type collectors to provide hot water for the Desiccant Cooling equipment, as well as for other applied hot water uses (shower, kitchen, etc.) and a photovoltaic (PV) array to provide power for the system operation
Between the several technical possibilities, the thermal driven cooling of buildings by desiccant cooling technique is a good solution because it allows for the utilisation of heat in a temperature range from 50ºC to 100ºC and thus is very attractive for solar thermal collectors. Also, the economic interest of this application is clear due to the possibility of using the same solar field for heating in winter and cooling in summer, which makes possible to use the equipment during all year around. The capital investment is then more easy to recover and from the economic point of view it makes the solar heating and cooling technology to come closer of other conventional technologies.
The first stage of the project will be the design of the combined system and its integration on the existing building of AUA. Particular attention will be done to the two main components: solar collectors and DEC equipment. Different options for the solar field will be analysed in terms of long term thermal performance and economic interest. The integration of the different components will be analysed by simulation which will lead to the choice to the better technical/economical choice.
The second stage will be the fabrication and installation of the components and the system chosen in the previous stage, on the rooftop of the American University of Armenia (AUA).
The third stage will, include :
- System monitoring, data treatment and results presentation
- Suggestions of system improvement and recommendations for the further large demonstration system design and fabrication
- Realisation of seminars and publications in Armenia and Russia to spread out the results of this project.

Foreseen Results

At the end of the project, the solar cooling system will be properly operating after the previous stages of designing, installation and testing. All these steps are a source of information and the corresponding activities and results will be presented in conferences, reports and publications. Particular attention will be taken with information of the results to all solar institutions of NIS having in mind the possible replication of the project on other countries with a new (greater) size.
With this project, an important collaboration can be established between different countries of Europe and near East, leading to a true transfer of technology within the joint scientific effort. The experience of the different groups is well complemented by each other, which enhances the probability of success with the project objectives.

" DEMO SOLAR EAST-WEST" - INSTALLATION AND DEMONSTRATION OF EC SOLAR TECHNOLOGY FOR HOT WATER PRODUCTION UNDER REAL USE IN CENTRAL AND EASTERN COUNTRIES.

Contract ref. :	***ICOP-DEMO-4051-98***
Proposal ref. :	***PL974051***
Type :	*Demonstration Proj ect*
Duration :	***36 Months***
Start date :	15/10/1998
End date :	15/10/2001
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4051

Project

Demo solar -east-west installation and demonstration of EC solar technology for hot water production under real use in central and eastern countries.

Keywords

Solar technology, solar know how transfer, demonstration of real solar installations

Objectives and Contents

Demonstration of western technical state of the art and use of thermal SOLAR-Technology in Europe by lectures regarding experiences in solar technology and market penetration in different EC counties at a 3 days start-seminar in one of the participating CEE-countries.
Installation of 3 SOLAR-Demonstration units in both eastern countries, in Bulgaria and Ukraina, demonstrating typical EC standards f.i. selective collectors or standard copper collectors compared with Greece selfcirculating compact installations.
Transfer of SOLAR know how from the EC to CEE/NIS countries by lectures at seminars, technical know how at planning workshops and practical installation and dissemination by use of spezial adopted INFO-materials for eastern countries, as described at task "Dissemination Program".
Development of a "national SOLAR-installation" consisting of mainly national produced components fitting to EC standard in both countries, Bulgaria and Ukraina, to show national standard of production and to ensure lower costs of solar installations by use of components produced at national price level.
Measurement program under pratical use in eastern countries and comparison with results of measurement in participating EC countries including measurement at one typical older national SOLAR- installation in Bulgaria and in Ukraina to compare the standard of development.
Proofing of technical, economical and ecological results by technical monitoring of installations, measurement of main SOLAR parameters and scientific analysis.
Synergy with other EC programs should be obtained by cooperation in the practical use of the solar installations and dissemination of scientific results of the DEMO-project f.i. with the TACIS "Energy Management Training Centre" in Kiev, or the "Renewable Energy Centre" in Sofia
Widespread dissemination of the results in both CEE/NIS countries by cooperation and good contacts with NG Organisations as well as regional and national authorities, synergy with other EC programs (TACIS, PHARE) and good contacts to mass media and TV.
Production of spezial INFO materials, f.i. SOLAR folder, SOLAR booklet, folder scientific results, and a Video film of SOLAR installations for practical use in both languages, Bulgarian and Ukrainian.
Demonstation of practical use of SOLAR energy to provide hot water consumption for households by use of different Solar technology (selective, standard, selfcirculating) at typical household-installation for this CEE/NIS countries.
Possibility of use of solar energy as renewable energy source to substitute fossile or nuklear energy in this countries with an expected amount of up to 350 kWh/m2 installed solar collector per year corresponding to an oil-equivalent of 70l/m2 per year.

Foreseen Results

Installation of 4 SOLAR-Demonstration units in both eastern countries, Bulgaria and Ukraina.
Transfer of SOLAR know how by lectures at seminars and planning workshops
Scientific program by analyzing the results of permanent measurement at the real installations under different meteorological conditions in CEE and EC countries.

" SMALL SCALE BIOMASS" DEMOSTRATION OF SMALL SCALE BIOMASS BOILERSIFORT RESIDENTIAL USE IN HUNGARY AND SLOVENIA

Contract ref. :	***ICOP-DEMO-4052-98***
Proposal ref. :	***PL974052***
Type :	*Demonstration Proj ect*
Duration :	***24 Months***
Start date :	15/10/1998
End date :	15/10/2000
EC contribution :	*3 0 1 .5 0 0 ECU*

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4052

Project

Small scale biomass Demonstration of small scale biomass boilers for residential use in Hungary and Slovenia.

Keywords

Small scale Biomass technology, Biomass know how transfer, Biomass Demo Exhibition.

Objectives and Contents

Demonstration of western technical state of the art and use of BIOMASS-Technology in Europe by lectures regarding experiences in BIOMASS-Technology and market penetration in different EC counties at an international BIOMASS Seminar in one of the participating CEE-countries.
Installation of 3 BIOMASS-Demonstration units in both eastern countries, in Hungary and Slovenia, demonstrating typical EC standards f.i. firewood gasification boilers, boiler for wood chips stoking or pellet stoking boiler.
Transfer of BIOMASS know how from the EC to CEE countries by lectures at workshops, technical know how at planning workshops and practical installation and dissemination by use of spezial adopted INFO-materials for eastern countries, as described at task "Dissemination Program".
Development of a Biomass Demo Exhibition of different types of low emission biomass boilers and furnaces at the standee exhibition, respectively as mobile exhibition which could be transported to different locations in the country to bring the information closer to the potential user.
Measurement program under pratical use in eastern countries and comparison with results of certification measurement in participating EC countries including measurement at typical older national BIOMASS boilers in Hungary and in Slovenia to compare the standard of development.
Proofing of technical, economical and ecological results by technical monitoring of installations, measurement of main emission parameters and scientific analyses.
Synergy with other EC programs should be obtained by cooperation in information activities and dissemination of scientific results of the DEMO-project f.i. with the PHARE program.
Widespread dissemination of the results in both CEE countries by developing a spezific dissemination strategy and by cooperation and good contacts with NG-Organisations as well as regional and national authorities, synergy with other EC programs (TACIS, PHARE) and good contacts to mass media and TV.
Production of spezial INFO materials, f.i. BIOMASS folder, folder scientific results, folder BIOMASS Technology for practical use in both languages, Hungarian and Slovenian.
Demonstation of practical use of BIOMASS to provide heating for households by use of different BIOMASS technology at typical household-installation for this CEE countries.
Possibility of use of BIOMASS as renewable energy source to substitute fossile or nuklear energy in this countries with an expected amount of 5 kWh/kg biomass or 500 l oil per 1 ton of biomass.

Foreseen Results

Installation of 3 BIOMASS-Demonstration units of EC standard in Hungary and Slovenia.
Development of a Biomass Demo Exhibition in both CEE countries.
Scientific program of measurement and analyzing of emissions at different small scale biomass furnaces and comparison with different biomass fuels.

COMBINED DISTRICT HEATING USING GEOTHERMAL WATER AND SEPARATED COMBUSTIBLE GASES

Contract ref. :	***ICOP-DEMO-4062-98***	***EC Scientific Officer***
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EC contribution :	*1 9 8 .2 0 0 ECU*	

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4062

Combined District Heating Using Geothermal Water and Separated Combustible Gases.

Keywords

Geothermal energy, Gas Water Ratio, Recovery of combustible solution gases, District heating, Environmental Impact.

Objectives and Contents

The Joint Demonstration Project aims at recovering combustible gases dissolved in geothermal waters by applying a solution gas separation and processing technology not yet applied in geothermal district heating systems nor in geothermal direct uses at large. It should ultimately add a significant energy input to existing geothermal heating grids and upgrade the environmental impact by reducing gas emissions to the atmosphere.
The project site is located at the Cozia-Caciulata thermal spa and tourist resort in South Central Romania. The local geothermal reservoir is exploited by three wells at average flow rates and well head temperatures of 12 to 15 l/s and 90 to 92 °C respectively. The gas water ratio (GWR) stands at ca 2.0 Nm^3/m^3. The separated gas phase (90 % methane) has been regarded until now of poor energy contents, similar to that of biogas (32 MJ/Nm^3) and discharged accordingly to the atmosphere. The geothermal heat provides space heating and sanitary hot water to 11 hotels as well as thermal water to 7 medical treatment facilities and 3 swimming pools.
The candidate well (n° 2) exhibits a 15 l/s (9 bar, 92 °C) self flowing discharge and a 2.2 Nm^3/m^3 GWR with methane as the prevailing (94 %) solution gas.
The Demonstration Programme, scheduled to last 32 months, will include five stages (i) design, (ii) manufacturing and installation, (iii) start up and commissioning, (iv) monitoring, and (v) dissemination.
The Design Stage addresses a thorough resource/reserve assessment by well testing, reservoir simulation and fluid sampling and analysis as well as an appraisal of project feasibility after evaluation of the gas separation/treatment/combustion process reliability.
The proposed process includes the following items:
- A pressurised well head separator vessel equipped with relevant demister and control/safety devices (water level gauges commanding the gas release electrovalve, by pass and safety valve),
- A gas processing line combining cooling/drying aerial lyres and condensing pots, a gas filter, buffer and gas storage tanks, a gas compressor and an (ethyl mercaptan) odoriser,
- A (poor) gas burner of the type used for biogas combustion.

The produced heat will be injected into the distribution grid via a heat exchanger and a three way valve and the plant operated and monitored by an ad-hoc System Control and Automatic Data Acquisition (SCADA) facility.
Project completion will mobilise a task force involving five partners from EU and Central Europe States.

Foreseen results

Results anticipated from Project completion concern primarily the applicability to geothermal sources displaying high GWR's of gas extraction, treatment and burning technologies used in the oil industry and in the processing of biogas from city wastes. The one year monitoring of the plant should in this respect provide geothermal operators with a data base and relevant assessments of process feasibility.
On the project site proper the expected benefits should achieve a 25 % increase, from 2.8 to 3.5 MW_t, of the geothermal installed capacity equivalent to yearly fossil fuel savings amounting to 650 toe's per well (i.e. ca 2,000 toe's regarding the present, 3 wells, field exploitation status), upgrading accordingly clean air standards.
Last but not least dissemination of the technology would be secured by the involvement in project staff of several actors operating similar geothermal fluid environments identified in Romania, Hungary, Slovakia and Slovenia.

5KW HYBRID SOLAR-WIND DEMONSTRATION PROJECT FOR THE ELECTRICITY SUPPLY OF REMOTE SITES

Contract ref. :	***ICOP-DEMO-4068-98***
Proposal ref. :	***PL974068***
Type :	*Demonstration Proj ect*
Duration :	***30 Months***
Start date :	15/10/1998
End date :	15/03/2001
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4068

Project

5 kW hybrid solar-wind demonstration project for the electricity supply of remote sites.

Keywords

Renewable energy, photovoltaics, wind energy, hybrid systems, stand alone systems, Uzbekistan, central Asia.

Objectives and Contents

-To evaluate the possibility to supply energy in a reliable way, using renewable energies, to remote systems giving a solution to solve problems faced namely by the Uzbeck Agency of Post and Telecomunication.

-To determine under what level of ressources the use of solar and wind technologies in a complementary way is technically feasible and economically competitive.
-To optimize the operation of such systems by edicting rules to be implemented in a control device for power/energy management
-To develop technical guidelines and select sites for a replication phase.
To achieve this goal several steps have been identified :
- Development, installation and monitoring of the demonstration system which will be installed in Bekabad (Uzbekistan) to supply a 5 kW radio relay station.
- Definition of design guidelines, technical specifications to allow the replication of such a system for similar complexes in Uzbekistan and Kazakhtan.
- Processing of existing meteorological data from Uzbekistan and Kazackstan to determine wind resource and solar radiation for sizing purposes and to identify the best sites for further dissemination of the demonstration project.
- Optimization of the size of the different components as well as the energy management system operation of paramount importance for multi-sources systems.
- Realization of a seminar with the participation of neighbour countries and international organizations.
The research will be carried for the Western part by two experienced teams, a research laboratory and a SME, both involved in the hybrid systems application field. This will allow a levelization of the Eastern potential namely related to the optimization of the sizing and operation of such systems. Moreover, the participation of a SME on each side will allow a better transfer of capabilities at the technical point of view.

Concerning dissemination, Uzbekistan and Kazackstan are involved in the project warrantying the possible replication in two of the biggest countries of Central Asia. The climatic resources evaluation phase lead on these two countries will be of help for the sites selection.

Foreseen Results

At the end of the project, a package containing design guidelines and technical specifications will be available to allow the replication of such systems in the Central-Asia region for the electricity supply of sites whenever it is cost competitive with any other solutions. A data base on the potential of such systems in the Eastern partner region will represent also an issue of the project for further development and for the penetration of RE systems in their energetic landscape.

BUILDING INTEGRATION OF SOLAR TECHNOLOGY

Contract ref. :	***ICOP-DEMO-4080-98***
Proposal ref. :	***PL974080***
Type :	*Demonstration Proj ect*
Duration :	***36 Months***
Start date :	15/10/1998
End date :	14/10/2001
EC contribution :	*4 7 1 .8 0 0 ECU*

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4080

Project

Building Integration of Solar Technology

Keywords

Demonstration building, passive solar energy use, photovoltaics, solar thermal system

Objectives and Contents

The overall objective of the proposed project is to draw upon the results of previous R&D work supported by the European Commission and to demonstrate the potential of renewable energies in buildings in countries of central Europe, particularly focusing on Romania and Poland. The action aims at stimulating industry, in particular SMEs and local decision makers to promote the use of renewable energies in their countries.

The following interventions are proposed:

The principles of intervention into the demonstration building will cover passive heating, innovative daylighting concepts and building insulation with innovative buildings materials. Preference will be given to ecological materials with local production potential (e.g. straw, flax, cellulose and others). The overall design concept will be developed in the course of the project.

Design, installation and monitoring of innovative grid-connected PV systems totalling approx. 10 kW_p. The comparison will serve to determine which system is best suited for the specific local situation in terms of installation and operation expertise available and local climatic conditions :

- An innovative highly modular ac-module PV system.
- An innovative string inverter concept which minimizes mismatch losses, increases system modularity and reduces PV system cost (e.g. no module junction box).
- A central inverter concept

Solar thermal system for domestic hot water production. The comparison of two systems will allow to determine which system is best suited for the local climatic conditions of Romania. The solar thermal system will consist of :

- Flat plate collectors of approx. 10 m^2
- Innovative high-efficiency flat plate collectors of approx. 10 m^2 using TINOx absorbers
- A hot water storage
- Interface to the central heating system
- Circulation and heat exchange unit
- Control unit

Foreseen Results

The demonstration building to be constructed on the campus of the University Valachia Targoviste, which is located in the centre of a highly industrialised area, will be the first application of renewable energies sources in a building in Romania comprising innovative active (PV and solar thermal) and passive (energy conscious design, daylighting) means of solar energy utilisation. As such the building site will attract practicians and scientists.

Already in the course of the project a seminar will be organised to inform the public and local decision makers on the potential of renewable energies. An exhibition which will be organised preferably in the lobby of the demonstration building aims at attracting and informing visitors.

DEMONSTRATION OF A GRID-CONNECTED COLOURED PHOTOVOLTAIC FACADE - THE FIRST FACADE IN THE CZECH REPUBLIC AND ONE OF THE FIRST COLOURED PV FACADES IN EUROPE

Contract ref. :	***ICOP-DEMO-4081-97***
Proposal ref. :	***PL974081***
Type :	*Demonstration Proj ect*
Duration :	***18 Months***
Start date :	15/10/1998
End date :	15/03/2000
EC contribution :	*1 9 4 .5 8 0 ECU*

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4081

Project

Demonstration of a Grid-connected Coloured Photovoltaic Façade - The First PV Façade in the Czech Republic and One of the First Coloured PV Façades in Europe

Keywords

Photovoltaics, coloured PV façades, grid-connected system

Objectives and Contents

The objective of this joint demonstration project is to validate the capability of the Czech photovoltaic industry to manufacture efficient and reliable photovoltaic façade elements, and to highlight the value of co-operation with EU companies in this sector. A unique feature of this PV façade will be its coloured panels. As such this will be one of the first coloured PV façades in Europe.

The project partner SOLARTEC / Czech Republic which has an extensive international reputation in manufacturing monocrystalline silicon solar cells including coloured cells, has as yet no demonstration system. This lack of demonstration capability has severely hindered the market penetration of these proven high quality products.

It is planned to install a 6 kWp coloured PV array at the south oriented façade of the administrative building of the CHEMAPOL-group in Prague / Czech Republic which is located at a busy thoroughfare in the city next to the Ministry of the Environment and adjacent to a football stadium (Eden - Slavia Prague). Real-time information on the performance of the PV façade will be available and be presented in the entrance of the building. Interested visitors will have direct access to this data. A novel inverter technology will guarantee maximum use of the generated electricity.

SOLARTEC will undertake the scientific coordination, manufacture the façade elements in close cooperation with TRIMEX-TESLA / Czech Republic, and be responsible for the installation.

The Austrian inverter manufacturer FRONIUS will contribute with a novel high-efficiency inverter design for grid-connection and give support for the grid-connection and remote inverter operation control.

WIP / Germany will co-ordinate the project, elaborate a monitoring plan, define and install a data acquisition system, perform system acceptance tests and be responsible for the data evaluation.

The Slovenian Jozef Stefan Institute will elaborate a plan for a real-time system for data visualisation and install such a system. The real-time visualisation will inform the visitors of the most relevant output parameters of the photovoltaic façade.

Foreseen Results

The result of this joint demonstration project is a grid-connected photovoltaic system with coloured PV façade elements manufactured by the Czech photovoltaic industry. It will comprise a real-time data visualisation accessible to the public. A unique feature of this PV façade will be its coloured panels. As such this will be one of the first coloured PV façades in Europe.

This coloured photovoltaic façade will serve as reference demonstration system for the Czech photovoltaic industry and it will highlight the benefits of co-operation with EU companies which work at the leading edge of the PV market.

The long-term impact of this high-profile demonstration project should be enhanced awareness amongst the general public and decision makers of the economic viability of PV façade technology and its corresponding environmental benefits.

NON-NUCLEAR ENERGY
(RESEARCH PROJECT)

DEVELOPMENT OF DOMESTIC POWER GENERATION SYSTEMS (DPGS) USING STIRLING ENGINES AND COMBUSTION CHAMBERS FOR NATURAL GAS

Contract ref. :	***ERBIC15CT980501***	***EC Scientific Officer***
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EC contribution :	*2 7 5 .0 0 0 ECU*	

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5004

Project

Development of Domestic Power Generation Systems (DPGS) using Stirling Engines and Combustion Chambers for Natural Gas.

Keywords

Domestic Power Generation Systems, Stirling Engines, Combustion Chambers, Heat Transfer, Gas Dynamics.

Objectives and Contents

The main aims of the proposed research are as follows:
On a theoretical and computational stage:
To set up new and novel two-dimensional mathematical models for describing the working processes of Stirling Engines and the heat transfer and gas dynamics on the external circuit of Stirling Engines and the combustion process of natural gas in Combustion Chambers for DPGS.
To analyse numerically the working process of Stirling Engines and the heat transfer and gas dynamics on the external circuit of Stirling Engines and the heat transfer and gas dynamics on the external circuit of Stirling Engines and in Combustion Chambers for natural gas for DPGS of 1- and 9-kW electricity power and determine their performance.
To put forward recommendations on designs of Stirling Engines and Combustion Chambers of natural gas for the 1- and 9-kW power DPGS with a high efficiency and a low rate of air pollution.
On a experimental stage:
To develop and manufacture a new design of the Stirling Engine and the Combustion Chamber for natural gas for the 1-kW electricity power DPGS.
To make a preliminary testing of the 1-kW newly manufactured Stirling Engine and the Combustion Chamber and the existing 9-kW Stirling Engine with the fossil fuel Combustion Chambers on the engine test beds to evaluate the performance and further de-bugging of the Stirling Engines and the Combustion Chamber designs.
To develop sub-systems for supplying buildings by hot water and heating for the 1-kW DPGS.
To test the newly developed and manufactured 1-kW DPGS for supplying buildings by electricity, hot water and heating. To evaluate the DPGS performance. To de-bug the design of the DPGS.
To suggest recommendations for the design of the 9-kW DPGS on the basis of the 9-kW Stirling Engine and the Combustion Chamber for fossil fuel.

Foreseen Results

The 1-kW electricity power DPGS on the basis of the Stirling Engine and the Combustion Chamber for natural gas will be developed, manufactured and tested. The 9-kW Stirling Engine and the Combustion Chamber for fossil fuel for the use in the 9-kW power DPGS will be tested and de-bugged. The systems to be developed will meet the demands of environmental concerns about pollution and carbon dioxide generation and can be used in buildings for decentralized electricity, hot water supply and heating.

SEMICONDUCTOR METAL OXIDES AS HIGH PERFORMANCE CATALYSTS FOR ENERGETICALLY AND ENVIRONMENTAL IMPROVED CATALYTIC COMBUSTION OF C1-C3 HYDROCARBONS (SMOCAT)

Contract ref. : ***ERBIC15CT980515***
Proposal ref. : ***PL975009***
Type : *J oint Research Proj ect*
Duration : ***36 Months***
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End date : NYA
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5009

Project

Semiconductor metal oxides as high performance catalysts for energetically and environmentally improved catalytic combustion of C_1-C_3 hydrocarbons.

Keywords

Catalytic combustion, C_1-C_3 hydrocarbons, semiconductor metal oxides, energy saving, reduced emissions, environmental catalysis.

Objectives and Contents

The main objective of this project is the development of new catalyst materials for total and selective oxidation of C_1-C_3 fractions in fuels, combined with an effective elimination of CO and NO_x emissions. While there are mature but polluting systems for the thermal combustion of C_1-C_3 hydrocarbons, catalytic approaches are receiving renewed interest with the drive to improve efficiency and reduce emissions.
A catalytically enhanced combustion system operates at much lower temperatures than an open flame burner, and lower temperature also means reduced emission of NO_X. Palladium and platinum based catalysts are generally the most active catalysts for this purpose, but are very expensive. The aim of this project will be to investigate combinations of mixed oxides that are promising to be more effective.
The use of oxide semiconductors (SnO_2, V_2O_5, Ga_2O_3) is very advantageous since these materials are acting simultaneously as gas sensors and catalysts for total oxidation and for toxic gases elimination. It seems likely that these solids, rather simple and cheaper than other conventional materials, will have, even if indirect, a positive impact on human environment.
The project will involve the preparation and the study of the surface properties, the adsorption properties, the electrical conductivity and the catalytic activity of semiconductor oxides supported on alumina. Doping of these oxides with platinum or palladium (~1%) will be also investigated in order to enhance their activity for total oxidation.
The aims of the research program are : finding the most proper preparation conditions for the studied catalysts in order to achieve the maximum catalytic activity, selectivity and long term stability ; working out the optimum operation parameters for these catalysts, including the pretreatment procedures and reaction conditions, which are of industrial importance, especially the operating temperature which must remain sufficiently low to preserve the stability of the catalyst ; understanding the elementary steps in C_1-C_3 and CO oxidation reactions and in NO_X reduction reactions, and the effect of the valence of tin and vanadium on these reactions.

Foreseen Results

Development of an industrially viable technology, allowing the practical optimization of catalytic combustion processes at industrial scale, particularly for a rational use of C_1-C_3 hydrocarbons and environmental purposes.

EVALUATION OF A NEW ENERGY-SAVING MIXING IMPELLER FOR THE PROCESS INDUSTRIES

Contract ref. :	***ERBIC15CT980502***	***EC Scientific Officer***
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5016

Project

Evaluation of a new energy-saving mixing impeller for the process industries.

Keywords

Novel, impeller, energy saving, mixing, stirred vessel, CFD

Objectives and Contents

The adverse impact of CO_2 emissions on human environment (known as the greenhouse effect) has become a major driving force for detailed analysis of the routes for rational use of energy and possible ways of energy saving. Global strategies to reduce these emissions include both studies of power efficiency and retrofit of existing process equipment. One way to reduce energy consumption and to introduce rational use of power is foreseen in implementation of highly efficient components in process vessels, such as mixing impellers, column packings, contact devices.
This project is directed to analysis of a novel energy-saving impeller device. Accordingly, a programme of laboratory testing and research is proposed, to be linked to advanced CFD computer modelling and simulation, with the results evaluated against specific industrial cases.
The programme of research aims to:
- develop mixing theory and reactor design procedures for the novel equipment using both simplified network-of-zones models and more advanced computational fluid dynamics
- experimentally characterise the performance characteristics of a single impeller unit of the novel process equipment, which has shown 30 % saving of power in preliminary testing
- measure and correlate mixing regimes, gas hold-up, mass transfer, mixing rates, and heat-transfer with input power
- check the efficiency of operation of the novel mixing device against most efficient bubble column operation;
- compare these data with multiple impeller arrangement
- evaluate and model industrial examples from antibiotic production, biotechnology, and mineral processing
- trace a strategy for practical implementation of the novel device

Foreseen Results

Characteristics and computational procedures for equipment selection and scale up of a novel impeller device (the NS turbine) leading to an estimated 30 % energy saving in operating fermenters compared to the available technology which will be accompanied by reduction of environmental pollution generated by harmful emission of industrial off-gases.

INFLUENCE OF CO-COMBUSTION OF COAL AND BIOMASS ON THE EMISSION OF POLLUTANTS IN DOMESTIC APPLIANCES

Contract ref. : ***ERBIC15CT980503***
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5022

Project

Influence of co-combustion of coal and biomass on the Emission of Pollutants in Domestic Appliance

Keywords:

Toxic organic compound emissions, co-combustion of coal and biomass, domestic appliances.

Objectives and Contents

The aim of this project is to investigate the co-combustion of coal and biomass in domestic size boilers and study the influence of added biomass on the emission of CO, CO_2, NO_x, SO_x, heavy metals, volatile organic compounds (VOC), and especially the toxic organic compounds. The object is to estimate the environmental impact of co-combustion of coal and biomass and provide recommendations for subsequent improvements to coal fired appliances in order to reduce their emission levels. These types of appliances are currently used widely in Eastern European countries such as Poland and the Czech Republic. In addition the work will develop chromatographic techniques for the analysis of substituted nitrated, oxygenated and alkylated PAC, the health effects of which are generally considered to be more serious than for PAH. The extent to which coal and co-fired appliances contribute to the ambient concentrations of PCB needs to be established. There is very little reliable data concerning the emissions of PCB from such appliances and more appropriate sampling/analysis methodologies need to be established.

Foreseen Results

The aims of the modelling programme are to assess the factors that can influence the organic pollutant emissions and the emission of toxic metal species. In particular the work will identify the pathways and mechanism of formation of toxic organic emissions, particularly VOCs and dioxins, from the combustion of coal and biomass.

These investigations will be undertaken with the object of minimising the effect of emissions and in improving the performance of domestic fires and residential and commercial furnaces.

The development and application of new methods for the analysis of nitrated oxygenated and alkylated PAC will provide new information on the pollutants emitted during the combustion of coal and biomass. Improved compound type selectivity will improve the detection of very low level species. The data produced will aid modifications to combustion processes to reduce environmental impact.

DEVELOPMENT OF HTSC ALTENATORS COMBINING ROTATING AND LEVITATING PRINCIPLES

Contract ref. :	***ERBIC15CT980504***
Proposal ref. :	***PL975032***
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5032

Project

Development of HTSC electrical alternators combining rotating and levitating principles

Keywords

Superconductivity, electrical machines, dynamic compaction

Objectives and Contents

The main aim of this project is the development of an experimental rotating electrical machine (SREM), based on an experimental super-conducting levitated bearing (SLEB), using high-temperature superconductors (HTSC). Preliminary experiments with experimental models have indicated that the presently available HTSC parts in the world market cannot be successfully used as components for the SREM, due to the discrepancy of their properties encountered for their large scale commercial production. The main problems are, therefore, associated with the industrial development of materials with suitable properties and the fabrication technology of high-Tc super-conducting elements for their use in SREM and SLEB construction.
The project has as objectives to:
- develop a reliable technology for the production of advanced HTSC bulk material with as large grain size and less defect as possible, guided by the new theory of powder consolidation - they will constitute the base of SLEB and SREM operating at liquid nitrogen temperature
- fit the design of the machine to the HTSC material shape resulting from the explosive compaction process
- contribute to the basic knowledge of the combination of permanent magnets and HTSC part in high speed rotating machine in order to increase the capacity of industry to treat, design and manufacture high performance SREMs
For this purpose it is planned to:
- develop and adapt the super-conductive material and the technological methods for preparation of HTSC elements and components of the SREM and SLEB
- study the operation of a SREM and a SLEB employing HTSC components prepared by new technological methods
- to determine the requirements to material composition, microstructure and properties in choice of proper technology for fabrication of high-temperature super-conducting elements of a SREM and SLEB

It is planned that this interaction between three phases will enable a breakthrough in the development of HTSC levitation systems to be achieved.

Foreseen Results

Development of an experimental rotating electrical machine (SREM), based on an experimental super-conducting levitated bearing (SLEB), using high-temperature superconductors (HTSC).

RATIONAL DESIGN OF NOVEL MONOLOTHIC MATERIALS FOR THE COMBINED DESULPHURIZATION/DENITROGENATION OF HOT COAL GAS

Contract ref. :	***ERBIC15CT980505***
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5042

Project

Rational design of novel monolithic materials for the combined desulfurization/denitrogenation of hot coal gas.

Keywords

Coal gas, high temperature cleaning, desulfurization, denitrogenation, regenerable sorbent/catalyst, monolithic support

Objectives and Contents:

The primary objective of the project is to develop monolith-type,regenerable sorbents/catalysts for the simultaneous removal of H2S and NH3 from hot coal gas. The specific goals of the project are: to attain a fundamental understanding of the structure – performance correlation of the prepared sorbents; to optimize the activation and regeneration procedures of hybrid sorbents/catalysts; to apply monolithic supports for the design of hybrid sorbents/catalysts; to test sorption/catalytic performance of the developed sorbents/catalysts in a semi-technical pressurized test facility; to evaluate a combined application of the developed sorbents/catalysts with the primary sulphur sorbents (limestone/dolomites) in deep cleaning of a hard coal and a lignite derived fuel gas. The research activities will be directed to: 1) the development of the monolith-type materials which possess sorption and catalytic properties with respect to H2S removal and NH3 decomposition, correspondingly, 2) testing of sorption and catalytic performance of the developed materials in multiple sulfidation/regeneration cycles, 3) physico-chemical characterization of the as-synthesized, used and regenerated materials. The research philosophy is based on application of the monolith-type supports ensuring ease of operation and regeneration of the developed materials. Three types of sorbents/catalysts will be developed, namely monolith supported, washcoated and composite materials. They differ in the type of the monolithic support used and the method of introduction of sorption and catalytic active phase. The developed materials will be tested under model and semi-technical conditions in order to evaluate their sorption and catalytic performance. Special attention will be given to the regenerability of the sorption and the stability of the catalytically active components.

Foreseen Results

On successful completion of the project the main deliverables will be:
- a fundamental understanding of the relationship between the structure and sorption/catalytic properties of the designed materials;
- advanced monolith-type sorbents/catalysts which enable cleaning of hot coal gas by simultaneous removal of H2S and NH3 down to 50 ppm level or lower;
- optimized procedures for the activation and regeneration of the materials developed.

SUSTAINABLE DEVELOPMENT BY RETROFIT AND DEBOTTLENECKING FOR ENERGY BASED SYSTEMS (REDBAS)

Contract ref. :	***ERBIC15CT980506***	***EC Scientific Officer***
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5046

Project

Sustainable Development by Retrofit and Debottlenecking for Energy Based Systems - REDBAS

Keywords

Sustainable Development, Retrofit, Debottlenecking, Energy Saving, Pollution Reduction

Objectives and Contents

The project is aiming to reduce the impact of production and use of energy, in particular CO_2 emissions and to explore and assess new concepts and policy instruments to foster clean and efficient energy technology. The proposal relates to Rational Use of Energy (RUE) in industry. The Consortium includes both developers (UMIST, UPB, VITO, TUB, EVECO, KSPU) and potential users (PETROM and ASTRA ROMANA) of the technologies being researched together with a commitment to exploit a successful outcome.
Research will focus on plant analysis technologies with impact on retrofit and debottlenecking aiming to obtain substantial energy saving over 30%, keeping in mind on the huge energy saving potential of Eastern European intensively energy consuming plants and district heating systems (there a modest saving forecast is up to 60%). In the same time, we keep in mind to develop new engineering technologies, able to create for any plant more than 35 % energy saving or reduction of the environmental pollution, considering the best technologies available today.

The proposed technology is expandable to other processes with concern to energy based systems (eg pulp and paper, food and drink, power). On the other hand we consider also the contribution to integrate this technology with best practice for RUE in buildings. The technology developed can be extended to retrofit of domestic heating systems. Generally industry gives a negative environmental impact, consequently is the entity that can move the world toward sustainability. To achieve sustainable development it has to be a total rethink of industrial processes, especially energy based systems. Various required changes made to the operation of process are so severe that they require retrofit of the original Heat Exchanger Network (HEN).
On the basis of change in operating conditions, retrofit projects can be grouped as improvement in energy efficiency, debottlenecking and process modification. The purpose of the joint research project is to develop systematic and automatic methods for the retrofit design, combined with a facility for meaningful user interaction with enhanced industrial application and extended economical calculations specific to the problem. The technique described above will be further supported with environmental oriented process modifications and appropriate software with economical support for different industrial fields.
Technically, the project will focus on the following aspects:

Procedure for data extraction for retrofit of energy based systems
Development of retrofit procedure for large industrial problems
Procedures for reliable economic data preparation
Specific software release for different types of applications

A very important contribution of this project is stabilisation of RTD potential in the Czech Republic and especially in Romania and Ukraine, where otherwise they would face disintegration of highly skilled teams. The development of a strong link and possible co-financing between participating CEE universities and the industry has been envisaged.

Foreseen Results

A new technology for the retrofit of large energy based systems saving more then 30% of energy
Adapted procedures for data extraction
Support software for the novel technology
Demonstrable case studies in Romania, Czech Republic and Ukraine

OPTIMISATION OF INDUSTRIAL COAL COMBUSTION PROCESS AND REDUCTION IN POLLUTANTS BY ADVANCED TEMPERATURE DIAGNOSTIC TOMOGRAPHY SYSTEM

Contract ref. :	***ERBIC15CT980507***	***EC Scientific Officer***
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5048

Project

Optimisation of industrial coal combustion process and reduction in pollutants by advanced temperature diagnostic tomography system

Keywords

Coal combustion, temperature diagnostic, pollutants.

Objectives and Contents

The demand from users of the coal combustion technology is to reduce the impact of pollutants invasions along with decrease of coal losses, with benefits for the coal economy. The main technological problem is to avoid both the jet turbulence and flame temperature instabilities which influence both on the coal consumption and emission of toxic carbon and nitrogen oxides, etc. The optimisation of coal combustion basic technology by advanced temperature diagnostic tomography system implies the execution of the

Project Objectives: advanced easy assembling low-cost industrial type temperature diagnostic system both adapted for severe temperature conditions and available for temperature tomography of industrial flames will be designed. It will be based on emission-transmission method (temperature range 500-3500 C; wavelength range will be chosen in the range 1.8-4.8 ?m; flame optical density range 0.1-2. This system will include special optical fibre tomography probe for temperature measurements in different areas of combustor. This system will be implemented and tested under conditions of coal power plant and/or pilot industrial type coal burner and the following environmental and economic benefits will be demonstrated:
Reduction of the total amount of pollutants emitted by coal burners in large scale combustors (decrease of both carbon and nitrogen oxides invasions by 25%) and decrease of residual coal losses in ash by 30%. Improvement of temperature distribution inside the furnace will cause the reduction of harmful peak temperatures.
Decrease of coal consumption by 20-25% will be achieved both at burner design and exploitation stages. The optimised coal-combustion process parameters such as jet shape, temperature distribution, and its' stability are caused by necessary mixed components ratio determined by the proposed tomography system. As a result the coal consumption can be minimised.
Increase in the combustion efficiency and safety. Typically the maximum operating temperature of the combustor is close to its maximum value restricted by burning-off temperature of refractory. In order to avoid the emergency situation the overheated parts temperature should be continuously controlled

Foreseen Results

High sensitive and compact detection unit with high spectral resolution allowing to avoid the application of expensive spectrometric systems for industrial combustion process diagnostic;
internal powerful microprocessor subsystem for data acquisition and temperature restoration, virtual control panel for operator and interactive software for analysis and visualisation of temperature profile; process control methodology allowing to minimise the emission of harmful components (COx, NOx, ash, Sulphur oxides); demonstration of real economic and environmental benefits under conditions of coal power plant and/or pilot industrial type coal burner.and measures for dissemination and exploitation of the project results.
The commercial version of the process control equipment would be available on the market in 1,5 years after completion of the project.

DEVELOPMENT OF NEW BUILDING SYSTEMS AND STRATEGIES FOR ENERGY CONSERVATION AND ENVIRONMENTAL PROTECTION

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5063

Project

BECEP - Development of new building systems and strategies for energy conservation and environment protection

Keywords

CO2, atmosphere, emissions, energy, heating, cooling, thermal insulation

Objectives and contents

One of the most important problems of our days is the growing greenhouse effect due to the increasing concentrations of CO2 in the planetary atmosphere. As a consequence, any reduction of the carbon dioxide emissions is a pressing duty throughout the world. More than that, the end of cheap oil and other fossil combustibles is coming fast. New technologies should prevent a major crisis by reducing the energy consumption. Civilian buildings need a large amount of the primary energy (about 30...40%), for heating and cooling. Most of these energy comes from burning fossil fuels. So, there is an enormous potential for diminution of the CO2 emissions by energy conservation measures, especially during the cold season. This implies building retrofit at a very extended scale. After a long period of artificially low prices for energy, the thermal protection in many countries like Romania and Hungary is quite poor, in spite of winter low temperatures and hot summers. However, the current state of the art in building envelope design and construction is, to a large extent, based on empirical rules. This has resulted in poor physical quality. As a consequence the thermal rehabilitation improvement remains a permanent concern in all the European countries. Economical solutions and a suitable strategy, adapted to the low standard of living of many families and to the limits possibilities of the CCE countries must be find. Thermal rehabilitation can be realised also progressively, in several stages. The research activity is focused on the following objectives.

Evaluation of the present status : development and adoption of a unique methodology to establish the building performances, based on criteria kWh/m2· a and kg CO2/m2· a; identification of the structural and thermotechnic characteristics of the most representative groups of buildings (existent and new); specification of the particular requirements in Hungary and Romania; informative lists and short description of already used technical solutions for thermal rehabilitation and solar energy use.

Evaluation studies concerning the technical solutions performances for improved of buildings in urban areas, in rural area and for façade solar collectors.
Analysis of heat and mass transfer in thermal bridges area created by metallic connectors.
Strategy advanced analysis, with scenarios, for gradual energy conservation and diminution of the CO2 emissions.

Foreseen Results

A strong impulse for energy conservation in all the countries is expected.
Technology transfer.
Methodology for assesment of saving potentials for energy and environment.
Instruments for planning energy saving measures in buildings.

RESEARCH AND DEVELOPMENT OF MICROWAVE TECHNOLOGIES FOR CLEAN AND EFFICIENT COMBUSTION OF PULVERIZED COAL AT POWER PLANTS

Contract ref. :	***ERBIC15CT980509***	***EC Scientific Officer***
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5069

Project

Research and development of microwave technologies for clean and efficient combustion of pulverized coal at power plants.

Keywords

Microwave heating, coal combustion, noxious gas reduction

Objectives and Contents

In the framework of the proposed project, a study of the influence of microwave radiation and induced plasma on pulverized coal prepared for burning, on ingnition stage, on physical and chemical processes in furnace, and on exhaust of noxious components with smoke will be performed. Mathematical and laboratory simulations of the underlying physical and chemical processes will be conducted. Special equipment for preliminary microwave heating of coal and microwave treating of flame will be developed and tested at an industrial power plant.
Three main research directions will be followed: i) analysis of the influence of preliminary selective microwave heating of carbon particles on the process of ignition and burning; ii) physical and chemical processes in the combustion flame in the presence of microwave radiation and plasma; iii) development of special equipment for microwave heating of coal and flame treatment, conducting experiments with an operating boiler of an industrial power plant.
The first one includes the study of the interaction of an electromagnetic field with an ensemble of dielectric particles representing coal and impurities, the solution of such problems as propagation and reflection of electromagnetic waves in a medium filled with coal particles and other fuel components, analysis of ionization of gases and of plasma production, localization of the powerful electromagnetic field in necessary areas of the furnace, minimization of radiation losses at the walls of the furnace, ash and impurities.
The second direction includes the analysis of chemical reactions initiated by microwave radiation and by plasma leading to a reduction of noxious gas exhaust, the study of flame front propagation and of the influence of microwave radiation on the stability of the combustion process, an investigation of the conditions of homogeneous ignition, of particles mixing by turbulent gas flow, of additional heat transfer and convection mechanisms due to the presence of plasma. The production processes of free active radicals of oxygen, hydrogen, hydroxyl, etc., the conditions of sulfur and nitric oxide formation in the presence of plasma will also be studied because they can result in a considerable reduction of noxious gases in the exhaust.
The third direction includes experimental work with a pulverized coal fired boiler of an industrial power plant. Design solutions for providing effective absorption of electromagnetic energy by carbon in a burner and for exposure of the flame to microwaves in a furnace will be found. The design will include cost-effective, i.e. inexpensive, modifications of a conventional burner without substantial changes of the whole boiler system. A set of already developed magnetron-type oscillators with an output power of 50 kW and higher will be used as a source of microwave radiation. The experimental industrial boiler will be equipped with special devices for measurements, testing, control, and real time monitoring of physical and chemical characteristics of plasma, gases, coal, and impurities during the burning.

Foreseen Results

Development of methods and facilities to enhance the efficiency of existing coal power plants and reduction of the noxious exhaust without an essential reconstruction.

STUDIES ON HIGH-EFFICIENT IN-FURNACE DRY SO2 CAPTURE FOR CLEAN COMBUSTION PROCESS OF BROWN COALS

Contract ref. :	***ERBIC15CT980510***
Proposal ref. :	***PL975070***
Type :	*J oint Research Proj ect*
Duration :	***36 Months***
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End date :	31/12/2001
EC contribution :	*1 5 8 .0 0 0 ECU*

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5070

Project

Studies on high-Efficiency In-Furnace Dry SO2 Capture for Clean Combustion Processor Brown Coals

Keywords

highly efficient sorbents, dry desulfurisation, fly-ashes

Objectives and Contents

The main objective of the foreseen within the project activities is introduction of a new technology for production of highly efficient sorbents for dry desulfurisation of combustion gases in fluidized bed boilers, thanks to which high efficiency - reaching the level of 85-90% for Ca/S = 2 – will be possible. The innovative aspect of the method is a usage of modified sorbents obtained on the basis of fly-ashes. The aim of the research is to work out a technology for modified sorbents production, installation of necessary for the production machinery, software and other equipment and carrying on laboratory and industrial tests. Sorbents which are to be subject to the project research are to be chemically and physically modified and this will be based on fly-ashes andalkaline compounds mixing and on micronisation of sorbents? grains, respectively. A technological line for modified sorbents production will consist of two crucial parts: first one is based on IVU Erfurt system being in operation in Grosskayana (Germany) the other one will be based on formation of active hydrated calcium silicate and calcium aluminate compounds via mixing with water SiO2 and Al2O3 compounds which together with initially activated ash may create aluminosulfates (including etryngit). Estimated efficiency of the whole technological line is around 20 t of sorbent per hour. For the first time modified sorbents will be used on industrial level in both fluidized and pulverised-fuel boilers. On the basis of recognition of the world market we may be convinced that activities undertaken within the framework of the project are innovative and that the technological line which is to be implemented is a prototype on an industrial scale. The IVU system is the only one in the world where one is able to keep the whole process of hydration under control with a possibility of time, temperature, pressure and CaO dosage regulation. The realisation of the project will allow for creation of high-efficient sorbent, which will revolutionise an approach to fuel desulfurisation and help introduce on a large scale extremely cheap dry method.

Foreseen Results

Production of a mixture of ash and coarse-grained calcium oxide will create fine-dispersional chemically active calcium hydroxide with etryngit nucleus and C-S-H phase (pucelan reaction), highly reactive with SO2, and this will allow for creation of high-efficient sorbent, which will revolutionise an approach to fuel desulfurisation and help introduce on a large scale extremely cheap dry method. The achieved through our new technology sorbent, modified after having been used in pulverised-fuel boilers will help to reach the 90% level of desulfurisation efficiency, for Ca/S = 2. In addition to that potentiality of an interference into ashes mineralogical system shows how vast possibilities of using converted ashes in building industry are, for example as a road foundation or as a stabiliser in excavations.

INTEGRATED DESIGN OPTIMISATION OF BUILDING ENERGY PERFORMANCE AND INDOOR ENVIRONMENT

Contract ref. :	***ERBIC15CT980511***	***EC Scientific Officer***
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5092

Project

Integrated design optimisation of energy performance and indoor environment of buildings

Keywords

Building, energy, calculations, computational fluid dynamics, indoor climate, field measurements.

Objectives and Contents

The objective of the proposed research is to develop and verify an Integrated Simulation System (ISS) for optimisation of the energy performance and the indoor environment in buildings. The Integrated Simulation System will be based on existing software as well as on software developed during the research. The integration of the research areas for building simulation, computational fluid dynamics and indoor climate will be achieved through physical models and numerical techniques, which are able to account for this complex and innovative integration. The Integrated Simulation System will be verified by physical experiments performed under controlled laboratory conditions as well as by field measurements in existing buildings in practice.

The development and establishment of the ISS will support the engineering profession by providing solutions to problems related both to the retrofit of existing buildings and to the design of new buildings**.** It will support a wide area of activities, ranging from research and education to consultancy and design of HVAC systems in buildings. The results from the present project will allow all CCE and EU Member partners to make well balanced technical decisions for particular buildings as well as to perform objective economic calculations already at the planning stage.

This research will be based on effective collaboration between partners from CCE and EC countries. The seminars foreseen and the participation of small enterprises in the project will strengthen the connections between the university partners and industrial organisations. On completion of the project, the skills gained through this collaboration will be applied in the renovation and design of new heating and ventilating systems.

Foreseen Results

The major result of the project will be a general-purpose simulation tool: the Integrated Simulation System. The ISS will support the practical needs of engineers in solving problems related to the rational use of energy in buildings and optimisation of the heating, ventilating and air-conditioning (HVAC) systems. The design decisions based on detailed simulations with ISS will allow designers to satisfy both of the two main targets: low energy consumption by buildings and high quality of the indoor climate.

GASIFICATION OF LOW QUALITY COALS IN FLUIDIZED BED : A NOVEL PROCESS OF CONTROLLED INJECTION OF OXYGEN ENRICHED AIR OBTAINED BY MEANS OF GAS SEPARATING MEMBRANES (MEGA)

Contract ref. :	***ERBIC15CT980512***	***EC Scientific Officer***
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5094

Project

Gasification of low quality coals in fluidized bed: a novel process of controlled injection of oxygen enriched air obtained by means of gas separating membranes (MEGA)

Keywords

Gasification, Low quality coals, Oxygen enriched air, Gas separating membranes

Objectives and Contents

The proposed project is aimed at the development of a new technology for the processing of low quality, high ash coals, their mixtures, as well as of organic wastes like timber, in order to obtain improved energy parameters in gasification and combustion processes.
An important feature of the proposed project is the use of lower temperature regimes of fluidized bed gasification, for which melting of ash components and, hence, diffusion limitations are prevented. However, in order to overcome a difficulty related to reduced reaction rate in this regime, controlled injection of oxygen into gasification unit is accomplished, what permits to intensify the process and decrease atmospheric discharge of solid particulate in flue gas. It is also relevant that oxygen enriched streams will be obtained via flexible membrane gas separation technique. Thus the proposal implies close collaboration of specialists in fossil fuels gasification and membrane technology. This is the first attempt to apply membrane technology in this industrial area. The results of this research can be important for both NIS/CCE and EU countries, because reserves of lower quality coals are available in all these regions and will certainly be used in the next century.

The project is divided into the following main research tasks:
Experimental study of gasification process in the presence of oxygen enriched air and development of the model of gasification process in intensified regime.
Choice of membranes and membrane apparatuses for oxygen enrichment of air for coal gasification; selection of optimized regime of the joint work of membrane and gasification units.
Tests of the process on a demonstration (pilot plant) unit with development of recommendations for further practical application of the process for gasification of different types of feedstock (coals, lignites, solid wastes, mixed feedstocks).

Foreseen Results

Improved technology for the gasification and combustion of low grade coals
Energetic and environmental benefits deriving from the effective gasification of low quality fossil fuels and bio-masses
Manufacture of a membrane air separator for combustion units
Construction of a demonstration pilot plant.

PLASMA GASIFICATION OF THE POWER COALS

Contract ref. :	***ERBIC15CT980516***	***EC Scientific Officer***
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5099

Project

Plasma Gasification of the Power Coals

Keywords

Plasma reactor, flame stability, coal gasification, synthesis, power plants, mathematical modelling, environment, solid fuel utilisation

Objectives and Contents

It is well-recognised that in the long term at least, the world-wide prominence of coal as a utility boiler fuel for power production is assured, even though the proportion used as a total of all fuels is reduced. This assurance becomes more appropriate for the medium and shorter term, however, should natural gas prices start to rise, in a similar vein to that of oil in the mid 1970's.
In the meantime, boiler operators are endeavouring to remain economically competitive with rival technologies and to reduce the costs of their plant by burning cheaper fuels, which are invariably problematical in terms of volatile and ash contents. The consequence of the use of these poorer quality fuels is a reduction in the flame ignition, stability and combustion performance, which become manifest in increased residual carbon in ash, dust and problematical gas species emissions per kilogram of coal burned, especially CO2.
To avoid such problems usually entails the retrofitting of supplementary oil or gas burners to provide the necessary ignition and adequate combustion, thereby entirely negating the economic advantage of using cheaper coals in the first place.

The work envisaged in the Plasma Gasification proposal uses the novel technology of an electric arc to provide the supplementary energy for the effective utilisation of inferior coals. The plasma produced is characterised by a significantly high energy concentration, leading to an enhanced level of chemically active atoms, radicals, ions and electrons that promote the thermo-chemical transformations of the coal and the combustant. The technology can be used directly in the pf burner or indirectly through the creation of a reactor to gasify the coal prior to combustion in the boiler.

The work aims to:
- determine the most appropriate application of plasma technology to enhance utility boiler performance
- undertake a logical and integrated approach to this end by combining fundamental investigation, pilot scale demonstration, mathematical modelling prediction of the consequences at full scale once validated against the experimental data, and ultimately full scale demonstration.

Foreseen Results

A successful demonstration of the effectiveness of plasma gasification as a viable means of enhancing the combustion performance of low quality fuels and blends in utility boilers along with the establishment of the engineering principles and parameters necessary to ensure high efficiency in universal applications.
An integral part of the results will be the dissemination of the concept to the widest interested audience through appropriate presentations, publications and immediate electronic media.

LOW EMISSIONS WITH EXTREMELY STAGED COAL COMBUSTION - A NOVEL CONCEPT (EXTREMELY STAGED COMBUSTION)

Contract ref. : ***ERBIC15CT980513***
Proposal ref. : ***PL975102***
Type : *J oint Research Proj ect*
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5102

Project

Low Emissions with Extremely Staged Coal Combustion – A novel concept

Keywords

Staged Coal Combustion, Low Emissions, Pressurised Fluidised Bed Combustion (PFBC), High Efficiency

Objectives and Contents

It is the aim of this project to assess the feasibility and technical potential of a novel power production concept based on extremely staged combustion of coal in pressurised fluidised bed combustion comprising a combined cycle scheme for a maximum efficiency and for minimum pollutant emission.
The concept of extremely staged combustion of coal means, that in a first stage, i.e. the PFBC boiler, a fuel gas with a high CO concentration and relatively low temperature is produced by substoichiometric combustion of coal. This eases the subsequent hot gas filtration after which the fuel gas is mixed with air (optional: oxygen) and burned in a second stage, the afterburner. In this way an optimum gas temperature can be reached at the inlet of the gas turbine. Power will be generated by the combined cycle of gas and steam turbine.

The following objectives are tackled in this project:
Performance of experimental combustion tests in PFBC facilities in order to study the combustion behaviour of different domestic coals and the pollutant chemistry at different substoichiometric operating conditions (temperature, pressure, oxygen-concentration). These investigations will provide a basis for the assessment of the feasibility and potential of the technology as well as produce realistic data for modelling purposes and basic engineering studies.
Parallel to the combustion tests also investigations on pollutant chemistry will be performed. Especially efforts are needed to analyse release of heavy metals and SO_2, i.e. performance of in-situ desulphurisation. The impact of different factors (see combustion tests) on pollutant chemistry and release will be studied.
In order to understand and quantify potential pollutant emissions and to improve the knowledge in combustion reaction kinetics, accompanying modelling work (combustion reaction kinetics, thermodynamic modelling of pollutant emission levels) will be done.
A further objective of the project is to perform technical, environmental and economic assessment studies of power generation technologies based on staged combustion of coal in a PFBC combined cycle system and to compare these results with alternative power generation technologies. In the first instance a conceptual model of a commercial sized PFBC staged combustion system will be produced, which will show the potential of the system and possibly identify any problem areas which need consideration.
Finally, alternative conceptual process variants of the extremely staged combustion of coal in a PFBC combined cycle system will be assessed. On the basis of the results of the project partners and the comparison of the different variants it is the aim of the project to develop an optimised basic engineering for a potential commercial extremely staged combustion process and to outline possible difficulties.

Foreseen Results

The main result of the project will be a basic design of a potential commercial plant, presenting the way to go with this concept, highlighting the problems encountered and showing future development possibilities with further development of the state-of-the-art technologies. The results of the work on combustion tests, pollutant release and reduction measures, reaction modelling and technical, environmental and economic assessment will flow into the basic design.

OPTIMISING COOLING TOWER EFFICIENCY BY ADVANCED MEASURING AND ANALYSIS (OCTEBAMA)

Contract ref. :	***ERBIC15CT980514***	***EC Scientific Officer***
Proposal ref. :	***PL975111***	Mr John-Philip RENNEY
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5111

Project

Optimising cooling tower efficiency by advanced measuring and analysis OCTEBAMA

Keywords

Power plants, cooling towers, on-line temperature measurement

Objectives and Contents

The first topic is the measurements of local and integral parameters. In contrast to a state-of-art air mapping method with hundreds of sensors mounted in the measuring plane of the cooling tower, in the proposed project velocity and temperature measurements are performed during 2 to 3 days period without halting the thermo-energetic system itself. For temperature measurements one optional temperature converter and one flow meter are used. They are mounted on servo-positioning system-robotised mobile unit-in such a way that the system fulfils all today valid standards. The duration of measurements in a single point, depending on chosen magnitude of observation scale (quasi-steady state condition), is 15 to 30 s. After the measurement is performed, the servo-positioning system moves to a new pre-chosen measuring point. Velocity and temperature measurements are simultaneously controlled using the computer system, where velocity and temperature data are saved and partially processed. Results are given in such a form enabling the determination of integral and local aero-thermodynamic characteristics in the measuring plane of the cooling tower. Simultaneously two integral parameters are measured: inlet temperature of the cooling water in the cooling tower and output power of the thermo-energetic system. As velocity and temperature measurements are not performed simultaneously, both integral parameters serve as correction elements of these measurements.
A standard or already developed mobile robot unit as servo-positioning system is applied. It has, however, to be modified to enable movement in the surface of the specific cooling tower measuring plane. For positioning the mobile robot unit in the measuring plane of the cooling tower well developed, relatively cheap and already on the market available solutions are applied. The control is performed according to the known coordinates in the measuring plane. At start, the system is operated manually; latter in the project the control process is automated.
Using measurements of velocity and temperature fields in the measuring plane of the cooling tower with lower costs and without process halting, three dimensional topological structure diagrams of velocity and temperature data are obtained, providing a direct means to evaluate the extent to which the falling hot water droplets and the involving cooling air intermix in the fill system. Because air mappings completely characterise the air/water interface across the plane area of the cooling tower fill system, problems with the water distribution system and the fill system can be identified in the mappings and succesfully solved. Through the use of the exit air mappings, the exact location of the water distribution problems across the plan area of the cooling tower fill system causing non-homogenuities in velocity and temperature profiles are determined. Several main causes of the cooling tower air/water maldistribution problems normally can be identified and cured specifically after identification.

Foreseen Results

Development of an experimental method and the production of equipment for on-line temperature and velocity field measurements of air streaming in a cross plane above the water distribution area of a cooling tower. The experimental method enables measurements without power station halting.

ADVANCED COMMUNICATIONS AND TELEMATICS APPLICATIONS

NETWORK OF CULTURAL INSTITUTIONS IN CENTRAL ASIA

Contract ref. :	***SU6009***	***EC Scientific Officer***
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6009

Project

HeritageNet - Network of cultural institutions

Keywords

Virtual Exhibition of Central Asian heritage, CD-ROM, 3-D modelling and GIS techniques electronic catalogues.

Objectives and Contents

The goal of the project is twofold:

I. To contribute to the promotion of culture and art of Central Asia world-wide through development of:
- Web sites,
- CD-ROM on cultural heritage of Central Asia
- Virtual Exhibition of heritage of Central Asia.

II. To enhance expertise pertinent to the research and preservation of Central Asian culture and art through the use of telematics applications:
- Email discussion group
- Distance education training course on preservation of cultural heritage in arm conflicts
- Training courses on 3-D modelling and GIS techniques
- Development of electronic cataloguing systems at the National Museums and in Fine Art Museums

The project will contribute to accomplishing the following objectives :

- to boost scientific research and the exchange of expertise on Central Asia cultural and natural treasures;
- to establish visibility of the target groups in Central Asia on the Internet;
- to ensure constant supply of the first-hand information and certified data on Central Asian culture and art;
- to transfer skills for the information society to cultural and natural scientists both in the EU and in Central Asia;
- to create a positive and attractive image of the region and promote cultural tourism in Central Asia;
- to promote better understanding of each other's cultures in Western Europe and Central Asia;
- to promote international co-operation and to facilitate integration of Central Asia into the world community;
- to make materials accumulated at the HeritageNet commercially available through partnering with publishing houses and tourist agencies.

Value-added service of the project for Europe is building of the better understanding of Central Asia through:

1. bringing together relevant organizations and professionals in Central Asia and the European Union (EU);
2. promoting the flow of information on culture and traditions from the Central Asian to the EU and visa-versa;
3. testing and demonstrating European Commission (EC) sponsored telematics applications for cultural research and promotion in Central Asia.

FURTHER DEVELOPMENT AND PRACTICAL APPLICATION OF HARBOUR PROCESSES MANAGING AND CONTROLLING MODELS, METHODS AND TECHNIQUES

Contract ref. :	***PL976012***
Proposal ref. :	***PL976012***
Type :	*Accompanying Measures*
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6012

Project

Further development and practical application of Harbour Processes Managing and Controlling models, methods and techniques objectives and summary of the proposed activity

Keywords

Harbour port management logistics, telematics simulation and modelling

Objectives and Contents

The proposed Accompanying Measure is based on the results obtained within successful concerted action NR 0312 AMCAI "Application of modern concepts in the automated information - management in the harbours by using advanced IT-solutions funded by the COPERNICUS 1994 Programme of the European Commission. The project AMCAI ran from 1995 to 1997 (are "Communication Technologies").

AMCAI action main results:

- The creation multi-national Network of scientists and experts working in the areas of Modelling, Simulation and the animation of harbour logistic processes

- An application of two classical simulation modelling approaches (process-oriented and object-oriented) to study harbour terminal operations

- A methodology for Container Terminal Data Processing System design

- A world Wide Web based access to simulation and animation studies

- The book "'Managing and Controlling Growing Harbour Terminal" published by The Society for Computer Simulation International.

The Riga Harbour Container Terminal has been chosen by the AMCAI Consortium as the background for their work.

The main objectives of the proposed activity are:

Adaptation and further development of Harbour Processes Managing and Controlling models, methods and techniques, dissemination and practical application of AMCAI results.
Proposed activity is connected with the task of information support of effective transit gateway between Western and Eastern Europe through Latvia by using Modelling, Simulation and Animation.
Companies and commercial partners which operate in Latvian Freeports of Riga, Ventspils and Liepaya could be considered as logistic centres and as the objects of dissemination and industrial utilisation of developed methods and models.

Foreseen Results

A kit of Harbour Logistic processes Managing and Controlling models, methods and techniques (Web-Based Simulation and Animation environment, Integrated Data Processing System design methodology, Harbour Processes Simulation models. International workshops, seminars and conferences will be arranged to disseminate research results. About 20 companies operated in Riga, Ventspils and Liepaya Freeports areas will be involved in these events.
Recommendations of practical application of Harbour Processes Managing and Controlling models, methods and techniques will be presented in a brochure as an annex to the AMCAI-book, printed by The Society for Computer Simulation International.

UNIVERSE EXPANSION

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6017

Project

UNIverse Expansion (UNEX)

Keywords

Objectives and Contents

This project is of dissemination type. It targets at utilising the results of several successful EU projects for solving a number of hard problems Russian academic libraries are facing. The project objectives include expanding the infrastructure created for the EU libraries into NIS countries, as well as technology transfer, personnel and user training and awareness actions targeted at academic and library communities.

A number of projects have been successfully carried out under ACTS and Telematics for Libraries recently. An architecture allowing transparent simultaneous search in several library catalogues was developed, demonstrated and tested in the course of DALI (Telematics for Libraries) project. It is further extended in ongoing under the same programme UNIverse project which allows for creation of logical union catalogues, record deduplication and merge. The ACTS GAIA project defines a generic information brokerage model and tests its applicability, in particular, to publishing domain. The software developed for these projects marks the leading edge in library automation and information search and retrieval systems. The systems mentioned also allow electronic article delivery and tracking of interlibrary loans. Intellectual property rights are specifically cared for during these operations.

One of the major obstacles hampering research and education in Russia is the outdated library information infrastructure. Two major factors can be identified which limit researchers' access to information about recent developments in their field. An obvious one is a lack of funds for updating library collections. The second one is the lack of reference and catalogue information, so academic readers remain unaware of relevant publications even if they are available in the library or can be obtained through interlibrary loan or purchased from the publisher. Providing immediate access to reference materials and catalogue data of international libraries and publishers will increase effectiveness of research and education, thus safeguarding the RTD potential in NIS countries.

On the other hand, many NIS libraries possess unique collections of rare and historic materials which remain undiscovered and unstudied by EU researchers. Providing them with on-line access to catalogue data of leading NIS libraries will improve understanding of history, culture and life in Eastern Europe.

The project proposes the following actions to meet these objectives:

- Installation, configuration and support of DALI and UNIverse software at Russian Academy of Science Library (St. Petersburg), including national customisation
- Setting up an 'EU On-line' room where readers can obtain instant electronic access to European electronic library data with assistance from a help desk
- Training and consultations for personnel of Digital Media department of RASL
- Catalogue automation, i.e., conversion of a relatively small subset of RASL catalogue into electronic form and providing global electronic access to it through DALI and UNIverse systems for demonstration, technology dissemination and promotion purposes
- A conference, workshops and publications targeted at promotion of the above mentioned advanced information and communications technologies among NIS researchers, students and librarians.

Foreseen Results

The objectives and planned actions of the project contribute directly to the creation of the Global Information Society and are in accordance with the Action Plan.

MODEL OF NATIONAL HOST EXTENTION

Contract ref. :	***PL976019***	***EC Scientific Officer***
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End date :	30/04/2000	
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NIS Partners

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6019

Project

Model for National Host extension (MONHX)

Keywords

Objectives and Contents

The central goal of the project is the creation of conditions for the extension of the concept of National Hosts to other European countries beyond the current Union. This has the merit of encouraging closer cooperation between existing Union members and those countries as well as providing those countries, some of them candidates for membership in the Union, with some of the important preconditions for accession to Union status. The existence of National Hosts in the CEE/NIS countries would serve Information Society goals and assist these countries to more rapidly reach the same technical excellence as their colleagues in Western Europe.

We are convinced that the concept of a National Host is the crucial element in bundling of scarce resources within these countries and the fostering of international partnering in the context of EU programs and other international co-operative RTD ventures.

The project has the following main objectives: raising the awareness of key organizations in target countries of the concept and utility of a National Host; transfer of experience of existing National Hosts and best practice information; and, fostering consortia development for National Hosts within specific target countries.

Specific actions include, but are not limited to the following: fact finding missions; information exchange meetings; work-shops; seminars; the dissemination of relevant documents; and, the provision of consultation to develop a CookBook for the necessary and sufficient conditions for National Hosts.

Subject to the discussion with the Commission the consortium agrees to put priority on a number of target countries chosen from the following list: Albania, the former Yugoslav Republic of Macedonia, Slovakia, Romania, Poland, the Baltic states, the Ukraine, Belarus and Moldova. The target groups in these countries will be the opinion leaders and gate-keepers for the purposes of the Information Society, who can form the nucleus of a National Host.

The project will consist of three phases called: Initial Analysis and Awareness Creating the Conditions for the Development of National Hosts; and, the Review and Dissemination of Results.

Foreseen Results

The introduction of a management technique or approach which would allow the targeted countries to participate in European RTD, particularly in the 5th Framework Programme; the preparation of a CookBook including a set of task for future developments, the necessary and sufficient condition for National Hosts in two targeted countries; and, an operating National Hosts in one of the targeted countries.

TRANSFER OF EU EXPERIENCE IN HEALTHCARDS INTO THE CEE COUNTRIES - UNDER THE AUSPICES OF THE NETLINK PROJECT

Contract ref. :	***PL977061***	***EC Scientific Officer***
Proposal ref. :	***PL977061***	Mr Wilson Petra
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7061

Project

NETLINK-CCE

Keywords

Implementation of patient cards in Slovenia and Czech Republic

Objectives and Contents.

The objective of the NETLINK-CCE Concerted Action is to establish a link between the new NETLINK project selected by the commission in the IV framework programme, the purpose being the co-ordination of large implementation of telematics solutions based on networking, patient cards and health professional cards, region or country wide in France, Germany and Italy and the corresponding activities in two Countries from Central Europe (CCE) :
Slovenia and the Czech Republic committed to implement similar solutions.

In the Czech Republic and in Slovenia, the health insurance card projects, developed so far, have drawn from and sought for compliance with the recommendations and results of the EU projects such as EUROCARDS and G7 CARDS. In order to preserve the level of convergence maintained so far, it is necessary for these countries to remain in close working contacts and touch with the relevant activities, which are undertaken in the EU on the bases of the results of those projects and actions.

NETLINK CCE is the direct answer to the task «harmonisation of health cards » one of the two healthcare defined in the ACTION PLAN in Pragues September 1996 for the co-operation between the EU and the East and Central European countries in the context of the implementation of the Information Society.

TRANS-EUROPEAN LANGUAGE RESOURCES INFRASTRUCTURE II

Contract ref. :	***PL977085***	***EC Scientific Officer***
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End date :	31/12/2002	
EC contribution :	*4 7 2 .0 0 0 ECU*	

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7085

Project

Trans European Language Resources Infrastructure II (TELRI II)

Keywords

Language resources, natural language processing (NLP), multilinguality, text corpora, corpus linguistics, dictionaries, infrastructure, networking, language industry

Objectives and Contents

TELRI II is a follow-up of the networking activities of the TELRI Concerted Action. It brings together the resources, efforts and competence of 27 focal national language centres in Europe, including all CEE, three NIS and six EU countries, and links to institutions in all other European countries. TELRI II continues to provide a platform for the exchange of data, tools and expertise between academic and industrial research and for the preparation of joint ventures between East and West, between academia and industry. The TELRI infrastructure focuses on multilingual NLP, thus contributing to the competitiveness and efficiency of European language technology in the global market.

We propose two projects according to the COPERNICUS call, namely the TELRI II Concerted Action (Sector 7.4) and TELPROM Accompanying Measure (Sector 6). TELRI II will establish a concrete research network of tools and resources for the benefit of private and public, industrial and academic users. It will therefore focus on TRACTOR, *the TEL RI Research Archive of Computational Tools and Resources*. TRACTOR is the most important, concrete result of the TELRI CA.

TELRI II will open TRACTOR to academic institutions, publishers, translators, technology centres and language industry. The main objectives are the following:

- The establishment of the TRACTOR Network User Community
- The full implementation of TRACTOR to document and assess the quality of electronic language resources such as software tools and corpus resources
- The maintenance and development of the common infrastructure for the documentation, dissemination and service activities such as newsletters, workshops, targeted training courses and a service helpline.
- The continuous acquisition of tools and resources for TRACTOR from TELRI partners and from external providers.
- The cooperation with similar activities like ELRA, SILFIDE, OTA and ELAN in Europe and other relevant centres globally, with the objective of high-quality service and maximum cost-effectiveness.

All 27 TELRI partners will contribute to TELRI II. Together, they assure a competent and efficient attainment of the objectives, building on three years of successful cooperation in the TELRI Concerted Action.

PAEDIATRIC CRITICAL CARE TEXTBOOK

Contract ref. : ***PL977135***
Proposal ref. : ***PL977135***
Type : *Accompanying Measures*
Duration : ***36 Months***
Start date : 01/01/1999
End date : 31/12/2001
EC contribution : *1 4 0 .0 0 0 ECU*

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7135

Project

ALL-NET Paediatric Critical Care Textbook (ALLNET)

Keywords

Global multimedia multilingual web site for Peadiatric Education and diagnosis support

Objectives and Contents

ALLNET will be an Internet-based multilingual, dynamic (interactive) textbook of paediatrics (hospital-based-paediatrics-emergency and critical care). The Internet "textbook" will be produced simultaneously in French, Spanish, English and Russian/Ukranian. Original submissions of educational materials will be sought internationally, with a strong European emphasis.
Technical production capabilities will be developed at an NIS site, Moscow State University, Russian Federation, thus helping to stabilize RTD potential in the NIS. The prototype for the project can be viewed at http://PedsCCM.wustl.edu/All-Net/main.html

The textbook projects will demonstrate:

- The next level of usage of the World Wide Web: the integration of resources existent on the Web (e.g., x-rays, electrocardiograms, graphics, dynamic echocardiography, videos, etc. already posted)

- The constructive linking of existing Internet-based educational materials (i.e., through direct links to materials, woven within the fabric of the text)

- A content format that allows continuous updating and expansion

- A self-sustaining, commercially-viable multi-lingual format for international collaboration with original submissions in several languages

- Development of Internet-accessible resource banks (interdependent, with reduced duplication)

- Accessibility techniques (multiple serves, one teach in the EC/NIS/USA); streamlined graphics (reduced gif size, limited colour palettes)

NIS: integration of NIS medical professionals into the international community

NIS : technical Web- and educational materials production at Moscow State University; a team that can contract for work during and after project, supported by professional and/or commercial funds

Users involved: practicing physicians, physicians-in-training, medical students, respiratory therapists and nurses worldwide

Foreseen Results

Expected benefit for the citizen: improvements in health care due to use by caregivers.
Expected benefits for users: up-to-date knowledge in field; international collaboration potential; improved ability to access and use Internet resources.
Contribution to EU policies: supports the 1996 CEEEC/EU Forum on the International Society and the goals of the workplan for INCO.

INFORMATION TECHNOLOGIES

DEMONSTRATOR FOR BLACK SEA MARINE ENVIRONMENTAL MANAGEMENT SUPPORT SYSTEM BASED ON TELEMATICS

Contract ref. :	***CP97-7005***
Proposal ref. :	***PL977005***
Type :	*J oint Research Proj ect*
Duration :	***18 Months***
Start date :	1/09/1998
End date :	27/02/2000
EC contribution :	*2 5 0 .0 0 0 ECU*

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7005

Project

Demonstration for Black Sea Marine Environmental Management support System Based on Telematics

Objectives and Contents

This joint research project focuses on strengthening of environmental management for the Black Sea region by developing and evaluating a Demonstrator a Black Sea Marine Environmental Management Support System based on Telematics (Black Sea Web). This demonstrator might provide a model for future expansion of the system among all countries bounded on the Black Sea. Also it will contribute to the further development of the Black Sea region state-of-the-art informatics and telematics.

The innovative design of this demonstrator will allow for access into each others' data on an independent basis whereas each partner will maintain the control of the own data. This concept implicates several databases which are physically and geographically separated, but can be accessed remotely for data retrieval and data transfer from a "Black Sea Web interface". The central element in the system is a Central Meta Directory, describing what information is available at what location. This directory (catalogue) will be embedded in the "Black Sea Web interface", largely based upon GIS for geographical interfacing. The Central Meta Directory will be installed as a World Wide Web server.

The main objectives are:
- To deploy a telematics solution that will help local and regional bodies around the Black Sea by implementing integrated marine environmental management, describing what information is available at what location, and providing IT-systems with automated procedures to access the actual information.
- To offer capability for the implementation of different types of integrated environmental information management through the use of a Central Meta Directory.
- To facilitate the search for and access to specific environmental data by several well-developed navigation systems.
- To develop a Marine Environmental Management Support System which can be used for a wide variety of environmental topics and management levels.
- To increase scope and quantity of environmental information available through the use of the Black Sea Web.

HIGH PERFORMANCE COMPUTING IN GEOSCIENCES II; SAFETY OF CONSTRUCTIONS WITH RESPECT TO ROCK DEFORMATIONS AND MOVEMENTS.

Contract ref. :	***CP97-7006***
Proposal ref. :	***PL977006***
Type :	*Keep in Touch*
Duration :	***36 Months***
Start date :	1/09/1998
End date :	31/08/2001
EC contribution :	*5 0 .0 0 0 ECU*

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7006

Project

High performance computing in geosciences II, safety of constructions with respect to rock deformations and movements

Objectives and Contents

The project deals with the development of high performance solution methods for large scale structural mechanics problems arising in geomechanics, including elasto-plastic flow and problems with friction. Certain benchmark problems formulated by associated industrial partners involving up to hundreds of millions d.o.f. from mining and bridge engineering will be solved. A reasonable computer turn around time in the design phase is only possible for such problems if special iterative solution methods are used. The methods must also be efficient when used on parallel networks of processors. Simple parallelisable methods such as using only diagonal scaling can never be competitive due to the extremely large number of iterations they require. In the Copernicus project Hipergeos CP 940820, new high performance methods have been developed and their feasibility has been demonstrated. As an example, a problem from mining with 4 million d.o.f. which required 16 hours CPU on a 3 processor SF-2 machine requires now only 1.2 hours. In this project also nonlinear problems arising from a material (elasticity modulus) nonlinear dependence on the solution and elasto-plastic problems have been solved.
The continuation of this project aims at further development of the solution methods. On the finite element side, hp finite elements and patched refinement methods to resolve finer details will be used. Also certain mixed variable formulations and corresponding reduced integration methods will be used to enable the solution of nearly incompressible material problems and multi-physics coupled (hybrid) fluid-solid problems. Problems with friction such as between bridge foundation piles and embedding material will be solved. More efficient solution methods for nonlinear problems will be developed. The development and - parallelisation of more robust (with respect to various problem parameters) iterative solution methods for anisotropic problems will be continued. Special software for the benchmark types of problems will be constructed or extended from the current software. All the participating groups have regular contacts with industrial partners or technology research institutes, for instance in other projects running in parallel to the proposed projects. This will enable a further input from practitioners into the proposed continued project. The research contacts will take place regularly in the form of workshops and by mutual longer visits of scientists from various groups. Some of the results will be reported at international conferences. Management experience and experience of coordinating international research work is present among the general coordinator. The coordination of activities among partners from CCE countries will be done by a scientific coordinator from one of these countries.

THE EUROPEAN NETWORK FOR INDUSTRIAL APPLICATION OF POLYNOMIAL DESIGN METHODS

Contract ref. :	***CP97-7010***
Proposal ref. :	***PL977010***
Type :	*Concerted Action*
Duration :	***36 Months***
Start date :	1/09/1998
End date :	31/08/2001
EC contribution :	*1 8 0 .0 0 0 ECU*

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7010

Project

The European network for industrial application of polynomial design mathods

Objectives and Contents

EUROPOLY will be an interdisciplinary network of European companies and research groups developing, using and applying polynomial methods. Polynomial methods are modern design techniques for complex multivariable systems, signals and processes based on manipulations with polynomials, polynomial matrices, and other similar objects. Invented, developed to leading world level and applied in Europe, the methods are considered typically European. Many European research groups and companies from various areas of engineering and science employ polynomial methods to solve different tasks in different industries. Western and eastern groups are comparable in theoretical achievements but the former are in general more successful in industrial applications of polynomial methods. The applications range from robust control systems for industrial processes to digital filters processing signals for mobile telephones. Many bilateral links have naturally arisen between particular research groups and companies leading to successful products such as the software package called Polynomial Toolbox developed recently within an INCO-Copernicus RTD joint project. The EUROPOLY Network, bringing all the polynomial teams together, would further encourage interactions between various disciplines (namely between signal processing and automatic control), the combination of technologies, the transfer of polynomial techniques from a field to another, dissemination of results and cooperation between the academia and industries. The objectives include:
- Transfer of modern polynomial design techniques and software to new specific industrial applications.
- Provision of western experience in applications of polynomial methods and software to the attention of eastern companies and researchers and, on the other hand, advertising new theoretical achievements of eastern groups to western companies and researchers.
- Bringing together groups from different industries, namely from automatic control and signal processing, so that they can learn and benefit from achievements in the other fields.
- Unification of software for polynomial methods enabling exchange of research expertise and technology transfer.
- Development of new software tools based on polynomial methods to cope with particular industrial applications.
- Building new means of scientific information exchange between partners in the network including WWW databases and a Newsletter.

The foreseen activities include two workshops and a Summer School, short exchange visits, meetings, a EUROPOLY Newsletter and the creation of a EUROPOLY Web site.

EASTERN EUROPEAN SPEECH DATABASES FOR CREATION OF VOICE DRIVEN TELESERVICES

Contract ref. :	***CP97-7017***
Proposal ref. :	***PL977017***
Type :	*J oint Research Proj ect*
Duration :	***24 Months***
Start date :	01/12/1998
End date :	30/10/2000
EC contribution :	*1 2 5 .0 0 0 ECU*

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7017

Project

Eastern European speech databases for creation of voice driven teleservices

Objectives and Contents

Due to the progress reached in speech processing technology more and more powerful voice driven teleservices can be implemented, which allow easy access to information services, transaction services and call processing services via the tele-network. Many European companies are active in the field of creating such services and delivering the needed speech technology. For the implementation of the speech processing technology, i.e. speech recognition and speaker verification, language specific spoken language resources, i.e. speech databases, lexica and related tools, are needed. In order to be competitive with American companies starting with a large monolingual market, European companies have to create an effective infrastructure to deal successfully with their multilingual environment. The EU-projects SpeechDat(M), SpeechDat(II) and ELRA are part of such an infrastructure to create, validate and distribute spoken language resources. These projects were focused on Western European languages. Responding on the fast growing trade between Eastern and Western Europe this infrastructure has to be extended to Eastern European languages. In this spirit the proposed project SpeechDat(E) focuses on the creation of spoken language resources for Eastern European languages, namely for Russian (4000 speakers), Czech (2000 speakers) and Slovak (2000 speakers). The main features of these speech databases will be:
- Coverage of applications (application-oriented words, phonetically rich sentences, spontaneous utterances)
- Coverage of speaking styles (commands, carefully pronounced and spontaneous speech)
- Recorded via fixed telephone network
- Suitable to develop and train robust speech recognisers for teleservices.

The results of the project will be speech databases of three Eastern European languages. Each database will contain speech files corresponding annotation files, a corresponding phonetic lexicon, and the documentation. Each speech database will be offered for distribution to the (EU-funded) ELRA, which is specialised in the promotion of speech and language resources.

METHODS AND TOOLS FOR DISTRIBUTED REAL TIME EMBEDDED SYSTEMS DESIGN AND ANALYSIS

Contract ref. : ***CP97-7020***
Proposal ref. : ***PL977020***
Type : *J oint Research Proj ect*
Duration : ***24 Months***
Start date : 1/09/1998
End date : 31/08/2000
EC contribution : *3 0 0 .0 0 0 ECU*

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7020

Project

Methods and tools for distributed real time embedded systems design and analysis

Objectives and Contents

The development of distributed real time dependable embedded systems is regarded nowadays as a real challenge to engineers. The reason for this is that it is very difficult to ensure the safety characteristics of the system, guarantee the time constraints, debug and test the system, guarantee correct communication protocols, manage the whole development process, choose an appropriate embedded computer system architecture and find a tradeoff between the embedded system's hardware and software.
Thus, a number of problems come together: safety time behaviour, communication, hardware and technical system failures, development errors. In this situation a solution can be found only with the help of easy-to-use techniques and the corresponding uniform tool support covering the whole life cycle. GMD-FIRST, CWI and MSU have developed separately different techniques based on different formalisms that aim to solve some of the above mentioned problems. However, none of these techniques is able to cover the whole spectrum. One of the main goals of this project is to combine our approaches by joining their best features and providing an optimal framework for the specification, implementation and analysis of distributed real time embedded systems. Although it seems unrealistic to promise creating a completely unified or universal technique, we can essentially improve the existing ones by extending their capabilities and provide a data conversion between them which will make it possible to switch from one method to another. To evaluate the techniques and get an experience in using them, we plan to apply them to a common realistic case study of industrial relevance from the field of embedded avionics system design. This case study is developed in close cooperation with EAFA (Engineering Air Force Academy, Moscow) and the industrial partners IAS (Institute of Aviation Systems, Moscow) and REDLAB (Moscow). We are going to perform the whole life cycle with each technique, from the given requirements down to implementation, test and test evaluation. The case study will cover the target problems: real time, fault tolerance, distribution (communication) and complexity, optimisation of computer architecture and software. After the case study has been finished and evaluated, the conclusions will be used to enhance the methods and techniques used in the case study, and the results will be implemented by the industrial partners.

DYNAMIC CONTROL AND MANAGEMENT SYSTEMS IN MANUFACTURING PROCESSES FOR THE OPTIMISATION OF THROUGHPUT AND ENERGY USAGE

Contract ref. :	***CP97-7022***
Proposal ref. :	***PL977022***
Type :	*Concerted Action*
Duration :	***36 Months***
Start date :	1/09/1998
End date :	31/08/2001
EC contribution :	*2 0 0 .0 0 0 ECU*

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7022

Project

Dynamic control and management systems in manufacturins processes for the optimisation of throughput and energy usage

Objectives and Contents

This concerted action is a continuation of DYCOMANS phase 1. A novel initiative in the field, DYCOMANS 1 concentrated on increasing awareness, providing a means for mutual understanding between partners and establishing a framework for future joint initiatives. This first phase has identified practical issues that can now be addressed in DYCOMANS 2. It has been recognised that SME' s from both Western and Eastern Europe require assistance in introducing systems for computer integrated manufacturing and control (CIMC). The ultimate goal is to improve competitiveness and to close the gap between SME's and large companies, by providing common software platforms, libraries of models and more accessible facilities. SME's need methods and tools for CIMC systems, tailored to their specific needs because the commercially available CIM systems are often too complex and too costly for small firms. Such systems become now more feasible at a reasonable cost. However, a significant scientific input is required to ensure efficient performance of such systems and to provide plant-wide optimisation. This is especially true of SME's where it is necessary to maintain a competitive edge. The objectives of the programme can be defined as follows:
- Transfer of modern control and management software tools to industry, especially SME's from East European countries.
- Development of methodologies, methods and tools for CIM, particularly for SME's.
- Investigation of a unified approach for efficient control of manufacturing processes with dynamic control algorithms embedded in standard information management systems, and extending into the supply chain.
- Linking factory-wide engineering management with software tools for manufacturing planning and online control.
- Exchanging technical information, creating model libraries and providing a means for efficient technology transfer.

Two workshops will survey the techniques for supervisory management systems and discuss integrated control in manufacturing systems. A training course will be devoted to real time control and manufacturing design software.

DESIGN AND CONSTRUCTION OF LOW PRICED INFORMATION SYSTEM WITH EXTENDED SERVICE AREA IN KAZAKHSTAN, KYRGYZSTAN AND UZBEKISTAN

Contract ref. :	***CP97-7028***
Proposal ref. :	***PL977028***
Type :	*Joint Research Project*
Duration :	***24 Months***
Start date :	01/12/1998
End date :	30/11/2000
EC contribution :	*200.000 ECU*

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7028

Project

Design and construction of low prices information system with extended service area in Kazakhstan, Kyrgyzstan and Uzbekistan

Objectives and Contents

The objectives of the project include:
- Design of an information system with an extended service area.
- Taking advantage of the local relief (ridges and mountains) for installation of sources for autonomous feeding, receiving and transmitting units, etc.).
- Construction of units which will provide long term autonomous operation electronic equipment on ridges.
- Construction of an information telecommunication channel that will connect Almaty, Bishkek and Tashkent.

The project will be performed in four phases: In the first phase, the construction of local networks for the partners from Central Asian republics will take place. The second phase foresees modem connections between the Institute of Physics and Technology, Ministry of Science, Bureau “Granit” and the station of cosmic rays in the Almaty region, as well as completion of equipment and construction of the systems for autonomous feeding. The third phase anticipates the installation of repeating equipment on mountains near Almaty, Merke, Taraz and Tashkent. Testing and operation of the information system will be accomplished in the last phase of the project.

SILICON BASED LIGHT EMITTING DIODES FOR OPTICAL INTERCONNECT

Contract ref. : ***CP97-7037***
Proposal ref. : ***PL977037***
Type : *J oint Research Proj ect*
Duration : ***36 Months***
Start date : 1/09/1998
End date : 31/08/2001
EC contribution : *1 5 0 .0 0 0 ECU*

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7037

Project

Silicon based light emitting diodes for optical interconnect

Objectives and Contents

The investigation of novel materials system and the development of silicon based light emitting devices are crucial issues for an even larger widespread of optoelectronic technologies. This project brings together leading European research groups already with high standing records of achievements in this field to further develop Si-based light emitting devices (LED) for silicon based optoelectronics and optical interconnects.
The objectives of the proposed activity are:
- Fabrication of light emitting porous silicon (PS) and silicon nanocomposites (NS).
- Fabrication of thin silicon films doped with rare-earth elements for LED and active waveguides.
- The development and fabrication of PS based LED with the following performances:
When forward biased: emission wavelength in the 0.5 - 0.8 μ m interval, external quantum efficiency larger than 0,05 %, output power more than 1 μ W, time stability more than 1000 hours, time response less than 1 ms;
When reverse biased: emission wavelength in the 0.3 - 1.7 μ m interval, external quantum efficiency larger than 0,01 %, output power more than 1 μ W, time stability more than 1000 hours, time response less than 10 ns.
- The development and fabrication of the NS based LED with the following performances:
- Emission wavelength in the 0.3 - 0.8 μ m interval, time response less than 1 ns.
- The development and fabrication of the PS based resonant cavity LED.
- The investigation of the compatibility and the possible integration of the developed LED with other optoelectronic components in order to implement the LED with other optoelectronic devices (microcavity, waveguide, photodetector) on the same silicon wafer.

In attaining these main objectives, the following subsidiary objectives will be accomplished:
- Investigation of the physical mechanisms for the photoluminescence (PL) and electroluminescence (EL) in silicon nanostructures.
- Investigation of the physical mechanisms of PL and EL in rare-earth doped films.
- Modelling and simulation of PS and PS based LED.

MICROWAVE-OPTICAL INTERFACE COMPONENTS KEEP-IN-TOUCH ACTION (MOIKIT)

Contract ref. : ***CP97-7039***
Proposal ref. : ***PL977039***
Type : *Keep in Touch*
Duration : ***36 Months***
Start date : 1/08/1998
End date : 31/07/2001
EC contribution : *4 0 .0 0 0 ECU*

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7039

Project

Microwave optical interface components keep-in-touch action (MOIKIT)

Objectives and Contents

This KIT action is related to Copernicus project CP6665 with the title "Improvement in Microwave to Optical Communication Systems Interface". The Copernicus project was concerned with the investigation of two novel ideas concerned with improving the microwave-optical interface of high bit rate optical communication systems. Such systems and therefore their constituent components are vital to the successful performance of modem fast IT systems. The Copernicus project successfully demonstrated that the novel ideas were viable by the construction and measurement of a proof-of-concept bench demonstrator in both cases.

The objectives of this action are:
- The organisation of joint meetings between the three partners in order that they can interchange their ongoing research results in the area of improved specialised components for the microwave-optical interface.
- Visits to the Partners' Institutions to consider novel components and systems relevant to the microwave-optical interface which will result in research proposals suitable for submission to the EC and elsewhere.
- Exchange of documents and software for the benefit of their ongoing research.
- Preparation of further joint papers on the results obtained on the previous Copernicus project C6665 and also on the partners on-going research in the area of components for the microwave-optical interface.
- Access to specialist measurement equipment and specialised software simulators at the Partners' Institutions for use in connection with their on-going research in the area of components for the microwave-optical interface.
- Further publication in professional journals arising from residual work not yet published in connection with Copernicus Project C6665 together with research work undertaken by the collaborators during the period of the KlT action, together with attendance at relevant international conferences.

MALL FOR ONLINE BUSINESS BEYOND THE YEAR 2000

Contract ref. :	***CP97-7041***
Proposal ref. :	***PL977041***
Type :	*J oint Research Proj ect*
Duration :	***36 Months***
Start date :	1/10/1998
End date :	30/09/2001
EC contribution :	*3 5 0 .0 0 0 ECU*

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7041

Project

Mall for online business beyond the year 2000

Objectives and Contents

The objective of the project is to design, develop, implement and test an electronic commerce environment focused on supporting small and medium enterprises (SME's) from EU and CCE, and to establish effective cooperation and trade relations among them. This environment, called Electronic Mall, will actually play the role of SME's incubator especially important f or CCE countries. The project will set up conditions for intensive collaboration among researchers in EU and CCE and promote the state of the art in a subject of mutual interest.
Applying Internet, Multimedia, software agents and database management technologies in electronic commerce, the project aims at covering the following outcomes:
- MALL2000+, an Internet-based software environment for electronic commerce, specially designed to support and serve SME's, particulary by providing means for establishing of virtual offices;
- A basic set of consultancy services, namely consultations for business start-ups; consultations on insurance contracts; consultations on financial transactions; multilingual translation service; consultations on business trends; consultations on Internet security
- A testbed run with at least 100 subscribers from CCE and EU;
- A report on the usefulness of the environment for SME's based on a survey and plan for future development.
After the end of the project the mall is planned to become a self-supporting business entity.

VIRTUAL REALITY AND MULTIMEDIA FOR SMES KIT FOR COPERNICUS 1313 (34010)

Contract ref. : ***CP97-7044***
Proposal ref. : ***PL977044***
Type : *Keep in Touch*
Duration : ***24 Months***
Start date : 1/09/1998
End date : 31/08/2000
EC contribution : *2 2 .0 0 0 ECU*

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7044

Project

Virtual reality and multimedia for SMEs kit for Copernicus 1313 (34010)

Objectives and Contents

The way the information is presented is a traditional way where mostly textual information is used. Many SME's and other enterprises would like to present information about themselves in a more attractive way (pictures, video, sound etc.). Unfortunately people in these enterprises usually have no proper training in the preparation of WWW pages and they usually have no detailed information possibilities offered by WWW technology.
The emerging new technologies like VRML should be used in much wider scope than up to now. The use of this technology requires some special knowledge that common users did not master. Therefore it is necessary to inform SME's and other users about potentials that this new technology can bring. The objectives of this action include:
- Know how transfer of multimedia education (including the methodology and training materials.
- Pilot implementation of the CSCW package together with its evaluation, as well as with practical experiments in the network environment.
- Pilot implementation of distant learning course in the field of multimedia and visualisation.
- Intensification of the cooperation between the partners.
- Preparation of a joint course on multimedia communication between Czech Technical University in Prague and University of Rostock.
- Evaluation of available tools (real audio, real video, M60NE, ISDN based video conferencing) for real distributed education at university level.
- Design of special, short term courses for industry and evaluation by field trials in distributed education.

MOSCOW AND SOFIA TECHNOLOGY TRANSFER CENTRES

Contract ref. : ***CP97-7047***
Proposal ref. : ***PL977047***
Type : *Accompanying Measures*
Duration : ***30 Months***
Start date : 01/12/1998
End date : 30/11/1998
EC contribution : *1 0 0 .0 0 0 ECU*

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NIS Partners

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7047

Project

Moscow and Sofia technology transfer centres

Objectives and Contents

The MS-T'I'C project aims at establishing two Technology Transfer Centres (TTCs), in Moscow and Sofia respectively, for the successful dissemination of the information originating in Western Europe towards the CEE countries. These TTCs will be established in the Stankin University and the New Bulgarian University which maintain close liaisons with the local markets. The information residing in these centres will mainly target:
- SMEs by informing on opportunities, results and technology achievements;
- Professionals by improving their business and management skills;
- University researchers and students by facilitating their adaptation to Western production mechanisms.

The approach taken will be based on previous experience from setting up such services within EU while safeguarding that dissemination of successful practices is disseminated not only in Russia and Bulgaria but in the whole CEE territory as well. More specifically within the objectives of the project fall:
- The review practices in EU in setting up information services.
- The collection of the respective success stories.
- The study of the established, even if sometimes outdated, Technology Transfer (TT) techniques applied in the CEE countries.

Through the last study the consortium will be able to identify the weaknesses and strengths of the methods used thus extracting the success stories. In addition, through this process the team involved will be able to better understand cultural constraints and information reception mechanisms in order to better define and design the services that will be offered.

LIGHT-EMITTING DEVICE BASED ON ER-DOPED AMORPHOUS SILICON FOR OPERATION WITH SILICA GLASS OPTICAL FIBERS

Contract ref. : ***CP97-7048***
Proposal ref. : ***PL977048***
Type : *J oint Research Proj ect*
Duration : ***24 Months***
Start date : 1/09/1998
End date : 31/08/2000
EC contribution : *2 0 0 .0 0 0 ECU*

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7048

Project

Light-emitting device based on er-doped amorphous silicon for operation with silica glass optical fibers

Objectives and Contents

The target of the project is to develop efficient electroluminescent devices such as Si(Er)/c-Si heterostructures which are able to operate with silica-glass optical fibers and are integrable into silicon electronics. The project aims at bringing together partner laboratories with complementary expertise. The project aims at the development of electroluminescent devices. This requires parallel work in three different areas: optimisation of the active films, development of the device structures, device characterisation.

Optimisation of the properties of the active films. The basic problems are :
- The incorporation and distribution of the Er atoms,
- The formation of radiative Er-centers (annealing processes, incorporation of oxygen),
- The high efficiency of photoluminescence emission,
- The low defect density and reasonable transport properties.

The project will concentrate on the optimisation of structures of the type Al/amorphous semiconductor (Er)/n-Si/Al and in the beginning use a-Si:H(Er) as active layer. This device has been shown by some of the proposers to exhibit quite intensive electroluminescence at 300 K (Appl.Phys.Lett. v.70, 240, l997).

Device studies. The optimisation requires a careful study of the device properties. In particular, the following measurements are required I-V-characteristics as function of temperature, structure, electroluminescence, photoluminescence and efficiency, C(V) and DLTS-studies for defect densities in the bulk and at the interface.

The program of the studies is directed toward optimisation of the properties of erbium-doped materials and further development of device structures. It includes technology of fabrication of rare-earth-doped amorphous micro-conductors and structures based on them, characterisation of materials for electroluminescent structures, optical studies (measurements of absorption, photo- and electroluminescence), measurements of electrical properties of semiconductor materials and I-V characteristics of structures, theoretical calculations of energy states and mechanisms of excitation of RE ions, theoretical analysis of operational characteristics of electroluminescent structures. The project will end with the fabrication of a series of electroluminescent devices and an issue of recommendations for their application.

ADMINISTRATIVE BOUNDARY DATA SERVICES FOR THE CENTRAL AND EASTERN EUROPEAN COUNTRIES

Contract ref. :	***CP97-7050***
Proposal ref. :	***PL977050***
Type :	*Accompanying Measures*
Duration :	***18 Months***
Start date :	01/12/1998
End date :	31/05/2000
EC contribution :	*5 0 0 .0 0 0 ECU*

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7050

Project

Administrative boundary data services for the central and eastern european countries

Objectives and Contents

The ABDS for the CEEC aims at the preparation and partially implementation of online delivery of administrative boundary data collected, processed and delivered with defined rules for data model and products using new European and ISO standards, offering quality assurance and fulfilling requirements for the electronic commerce of spatial data. This new service is in harmonisation with the ongoing process of traditional data collection actions (e.g. SABE, GISCO) and projects in preparation or implementation phase aiming the production of data sets with similar content in this countries, preparing the active participation in pan-European activities (sectorial: GI 2000, general: Agenda 2000). The implementation of the service generates in a short term new technology applications and developments by making use of results of research and technological development work already started/finished in the participating countries.

EXTENDING THE EUROPEAN ARCHAEOLOGY WEB OVER BULGARIA, ROMANIA AND POLAND

Contract ref. : ***CP97-7054***
Proposal ref. : ***PL977054***
Type : *J oint Research Proj ect*
Duration : ***24 Months***
Start date : 01/01/1999
End date : 31/12/2000
EC contribution : *1 9 6 .9 9 8 ECU*

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7054

Project

Extending the European archaelogy web over Bulgaria Romania and Poland

Objectives and Contents

The networking and internationalisation of existing academic resources, historical and cultural achievements, as well as the research efforts of the academic community in the field of Archaeology using computer, information and communication technologies is a recent trend with a rapidly growing impact on archaeological research, management and education. In recent years, Internet services have completely changed the way scientists work: e-mail, usenet, FTP and finally WWW architecture now allow scientists to collaborate on distributed resources, e.g. databases and exhibitions over the WWW. Although the countries of Eastern Europe have an important place in the historical and cultural development of Europe, they do not currently have substantial participation in this process of intensifying information exchange, due to their past closedness and current economic problems. There is thus the spectre of an ever widening 'information gap' between the affluent countries of north-western Europe and those countries struggling at the margins.

ArchTerra aims to help redress the current imbalances in access to European networking facilities for professional archaeologists from Bulgaria, Romania and Poland, and to provide the impetus for an active expansion of archaeological Internet communication and information services both within CEC and between EU and CEC. The project is implemented as a research network bringing together computer scientists and archaeologists from five EU countries (the Netherlands, United Kingdom, Italy, France and Germany) and three CEC (Bulgaria, Romania and Poland), and encompasses tasks and objectives in four areas:

technical installation (computer hardware and software, networking infrastructure)
transfer of expertise (technical workshops, extended visits, discussion lists)
creation of new content (WWW database and exhibition) and tools for the management of that content
dissemination (international conference, printed guides, WWW hosts)

The ArchTerra workplan assumes a runtime of 2 years and consists of 15 work packages, organised in a goal driven workflow which fully exploits the complementary nature of the partners' expertise. The project is controlled through a series of meetings and workshops intended to review tasks and deliverables, monitor progress and resolve technical problems.

ArchTerra will establish and/or expand local networks at the partnering organisations in Bulgaria, Romania and Poland. Several popular Internet services will be started and/or extended, new free software products will be developed in order to connect catalogues of archaeological museums to the Internet using the modern Internet/Intranet technologies, many of the actual holdings will be digitised and put into an electronic form to demonstrate the feasibility of conducting research in a supra-national field from multiple distributed workplaces. In the course of these activities the project furthers professional development of the CEC researchers during study visits to western partners, technical workshops, and an international conference.

Although targeted mainly at safeguarding the scientific potential and inclusion of the CEC academic community in the European context of the emerging Global Information Society, ArchTerra is expected also to produce some technical solutions of wider significance to the problems associated with international scientific collaboration, specifically:

how to implement multilingual interfaces to dynamically generated hypertext databases, and
how to provide meaningful access to museum catalogues over the WWW, generated as hypertext interface to relational databases.

While the former addresses the problem of making information accessible, the latter will demonstrate to the international scientific community and to the general public alike the treasures that currently remain hidden in museums across eastern Europe, and which are highly relevant to our common past. ArchTerra will therefore achieve, in addition to a direct improvement in the availability of archaeological information and means of communication within the partnering CEC, a lasting impact on the public and scientific perception of archaeology as shared heritage and as a non-renewable resource across Europe.

ESTABLISHMENT OF ELECTRONIC INFORMATION SERVICES IN CCE/NIS

Contract ref. : ***CP97-7062***
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7062

Project

Establishment of electronic information dervices in CCE/NIS

Objectives and Contents

It is a strategic imperative for Western Europe to be kept informed of developments in Eastern Europe, more than ever at the time of continued changes in the latter. Conversely, Eastern Europe is no less interested in providing the required information and establishing closer ties with the West, more than ever due to its harmonisation efforts and to the dramatic advances toward the information superhighway making it feasible for at least some Eastern European countries to leapfrog and become part of the information society.

The research team of the CCE/NIS providers of electronic information services will undertake the development of an integrated, multi-language Internet based online information system of the CCE/NIS information centres. This will focus on scientific, technical and economic information (STE information) and also on the STE information market of the CCE/NIS region. More specifically, the new system will provide (1) bibliographic information on STE databases accessible to the general public in the countries of the CCS/NIS region (2) full text information on the electronic information markets of the CCS/NIS countries, and their outlooks. The two activities involved take place at the national level and the multi-national level:

1) Development of national information systems in a networked environment (Building of the national meta-databases in the national languages) This requires the implementation of a database standard compatible throughout the region, and also the definition of a data exchange format and the generation of a software import/export filter.

2) Conversion and inclusion of national databases into a network oriented integrated information system of the CCE/NIS. The information on the national databases (which naturally occurs in the national languages) will be appropriately converted and translated into English and fed into the integrated (international) system. This also requires the development of system editor software which will allow data entry and editing in all countries participating in the project, and the development of a multilingual search interface to access information on the offered data and their availability.

EUROPEAN RESEARCH NETWORK FOR INTELLIGENT SUPPORT OF EMG STUDIES

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Proposal ref. : ***PL977069***
Type : *Accompanying Measures*
Duration : ***24 Months***
Start date : 1/09/1998
End date : 31/08/2000
EC contribution : *3 0 0 .0 0 0 ECU*

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7069

Project

European research network for intelligent support of emg studies

Objectives and Contents

Nowadays, Health Care constitutes one of the main challenges of information Technologies (IT) whose duty here is to bring a substantial improvement to the quality and efficiency of the medical practice. In the domain of Electromyography (EMG), this improvement has already been open since large amount of data and expertise has been accumulated and embodied in various computer systems. The European AIM project ESTEEM was a substantial step in this direction. Although this project was reported as successful, it is far from being over. First, the accumulated experience needs to be extended in order to include the experience of medical labs from Countries of Central Europe. Also, the collected data need further analysis in order to extract new knowledge. In particular, the process of knowledge acquisition can be improved by the application of relevant new IT techniques. That is why it is very useful to establish a research network consisting of 15 nodes that include two types of research teams: medical labs and IT research institutions with the principal objective of capitalising knowledge in the domain of EMG. This task relies on:
- The completion and the enhancement of the available knowledge. The idea is to automatically extract new knowledge in the domain of EMG from the available data and by including the expertise of other EMG labs external to the ESTEEM consortium.
- The continuation of the standardisation efforts. The newly acquired data and knowledge will help the physicians in their consensus negotiations. New medical partners will be involved into the discussions to extend the basis for the future standard of medical procedures.
- The dissemination, at a larger European level, of the competence of each node as well as the joint competence of the partners collected through their active collaboration, both in EMG and in related IT areas.
- The support of the establishment of infrastructures necessary to achieve the above objectives.
The recent IT technology developments and particularly those concerning knowledge-based systems, intelligent interfaces and global information exchange through the World Wide Web, provide an ideal framework for achieving the network objectives. In this context, infrastructure support, electronic dissemination of information, workshops, mobility support of researchers and educational/training activities are required.

LEARNING FOREIGN LANGUAGE SCIENTIFIC TERMINOLOGY

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7074

Project

Learning foreing language scientific terminology

Objectives and Contents

The overall aim of the project is to develop intelligent tools to assist users from some CCE/NIS countries in foreign language learning specifically aimed at the learning of scientific, technical language. The approach of the project will be to apply natural language processing (NLP) techniques in developing a generic intelligent foreign language terminology learning system, which can easily be adapted to different source languages, target languages and scientific/technical areas.
This will involve the development of language independent knowledge representations (domain knowledge - linguistics, semantics; pedagogical knowledge, etc.) as well as the implementation of a number of multilingual tools to accommodate different source and target languages and technical areas. Within the framework of this project Bulgarian, Romanian and Russian will be considered as possible source languages, English as a target language, and computer science, business and communication technologies as technical domains. Some of the developed tools will be fully reusable which will allow for adapting the developed system to other source languages, target languages, and technical areas.
The project addresses directly the task of developing multilingual tools for intelligent foreign language learning. The research is intended to make contributions in the following areas:
- In developing techniques for improved semantic analysis of learner inputs, with emphasis on work with translation tasks (in either direction) and on work on free-standing text in the language being learnt.
- In extending knowledge-based representation techniques to describe technical content in intelligent computer-assisted language learning (ICALL).
- In developing open learner models to allow reflective learning.
- In improving methods of foreign language teaching.
- In applying the techniques in a set of realistic domains, namely to technical university students, professionals, SME's staff in CCE/NIS and to translators in CCE/NlS countries who translate technical texts in unfamiliar domains.

The project will be grounded on a number of models, techniques and tools developed in the partner organisations in their previous research in the following directions: NLP (UMlST); terminology learning (University of Sofia, Simferopol State University); learner modelling (University of Leeds): communicative models in ICALL (Simferopol State University, University of Leeds); agent-based models (University of Milan).

ELECTRONIC DATA INTERCHANGE(EDI) IN PORT ADMINISTRATIONS

Contract ref. : ***CP97-7076***
Proposal ref. : ***PL977076***
Type : *J oint Research Proj ect*
Duration : ***24 Months***
Start date : 01/10/1998
End date : 30/09/2001
EC contribution : *2 4 0 .0 0 0 ECU*

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7076

Project

Electronic Data Interchange (EDI) in port administrations

Objectives and Contents

Following the international trend for automating business processes and moving towards paperless business transactions, a consortium of IT & T companies, shipping enterprises and port authorities from EC Member States (Greece, Italy) and Balkan countries (Romania, Bulgaria) is launching an initiative aiming at designing and implementing an EDI system for the automation of the exchange of cargo documents. The operation to be automated concerns the "bill of lading". Customs normally need this information for clearance and Ports Authorities need this information for monitoring the traffic of products imported to or transit through the country.

In the framework of the project, users (administrations and port authorities in the participating countries) will be contacted first and their needs identified and used for developing the specifications of the EDI system to be created. Next, the technological organisations and research institutes participating in the project will investigate the applicable technologies and design software applications customised to the needs of the port authorities and administrations involved. All these applications will be compatible with existing infrastructure of the users.

EDI applications and messages based on the EDIFACT standard will be developed, installed and configured at the premises of user organisations. Following the integration of such applications in the existing infrastructure, a pilot will be launched supporting the exchange of EDI messages between the port authorities of the countries involved. During the pilot operation, systems and applications will be used for the electronic exchange of information contained in the "Bill of Lading" in the form of EDI messages.

Following the successful completion of the pilot operation of the project, an exploitation plan for the commercial deployment phase of the system will be prepared. The participation of port authorities and other users, such as shipping companies from EU Member States and Black Sea countries will facilitate the dissemination of the results among other prospective users and promote the solutions developed in the framework of the project.

GEOGRAPHIC INFORMATION ON-LINE ANALYSIS (GIS - DATA WAREHOUSE INTEGRATION)

Contract ref. : ***CP97-7091***
Proposal ref. : ***PL977091***
Type : *J oint Research Proj ect*
Duration : ***36 Months***
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7091

Project

Geographic information on line analysis (GIS – Data warehouse integration)

Objectives and Contents

The joint research project will solve the problem of integration the geographical information systems with data warehouses. The underlying topic is crucial for the decision support systems (DSS) linkage with GISes. There are many open questions of both theoretical and implementation character. The standard protocols of data interchange must be developed. Special meta-data language describing the character of transferred data is one of the studied means. Data warehouse is devoted to storing aggregated data. As the spatial data are of very special nature, novel methods of spatial data aggregation must be researched and developed. There are still open theoretical questions how to efficiently update the materialised views of spatial data stored in the data warehouse. As one of the data warehouses utilisations is data mining process, methods of knowledge discovery in databases (KDD) will be adapted for spatial data. The prototype of the particular GIS - data warehouse integration will be verified on two real life applications.

The major objectives are:
- Design of methods for achievement of flexible integration geographical information system - data warehouse integration. The coupling of both systems must be symmetric enabling both data pumping from the GIS into the data warehouse and querying the data warehouse by the GIS. The solution must be general enough to be easily reimplemented for either any GIS or at least for a large family of GISes. Special attention will be dedicated to the methodology of data aggregation in the case of spatial data. One pilot prototype integrating DWH and GIS will be delivered.
- Development of specific data mining and KDD techniques with respect to utilisation of unstructured spatial relationships. One package of KDD algorithms applicable to GIS-DWH prototype will be delivered.
- Verification of the proposed technical solution in developing two pilot problem oriented application prototypes.
Two real life applications will be developed, delivered and verified by the SME's companies involved in the project. The applications are focused on historical monument protection (application Al) and floods monitoring simulation (application A2). Subsequent plans for developed software production (including the IPR rights) will be developed.

PARALLEL PROCESSING TOOLS: INTEGRATION AND RESULTS DISSEMINATION

Contract ref. :	***CP97-7100***
Proposal ref. :	***PL977100***
Type :	*Keep in Touch*
Duration :	***12 Months***
Start date :	17/07/1998
End date :	16/07/1999
EC contribution :	*5 1 .6 0 0 ECU*

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7100

Project

Parallel processing ools : integration and results dissemination

Objectives and Contents

In the already finished project CP 93-5383, the viability of developing a complete programming environment for parallel systems has been shown and a first prototype of the environment is currently operative which integrates the different tools developed by the different partners.
However, after the 3 years of cooperation and hard work in the project, it has come to light that there are some points in the environment that could be improved, mainly that part related with the integration of the different tools that compose the environment and has been developed in the project, and that there are news point that could be included in the environment to facilitate its use. This improvement will allow to promote the effective dissemination and use of the environment by other users, and to obtain their feedback. Additionally, the fact that the partners will keep in touch through this project will allow the to collaboratively make the whole environment evolve and improve according to the obtained user feedback.
With this KIT project, the partners will have the chance to meet and continue the improvement of the environment. Moreover, these meetings will be very useful to prepare joint publications in order to disseminate the results of the project.
In addition to this, the consortium is very interested in organising a workshop on software engineering on parallel processing and preparing a joint book showing the results of the project. This book will include not only the description of the tools developed in the project, but it will also provide a general view of the parallel programming life cycle and include a theoretical part of the different aspects involved in parallel programming. Finally, it will include a case study showing how to use the tools developed in the projects in order to develop a parallel application.

INDUCTIVE LOGIC PROGRAMMING NETWORK OF EXCELLENCE

Contract ref. :	***CP97-7102***
Proposal ref. :	***PL977102***
Type :	*Concerted Action*
Duration :	***36 Months***
Start date :	1/09/1998
End date :	31/08/2001
EC contribution :	*2 0 0 .0 0 0 ECU*

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7102

Project

Inductive logic programming network of excellence

Objectives and Contents

Inductive logic programming (ILP) is a research area at the intersection of inductive machine learning and logic programming. The general aim of ILP is to develop theories, techniques and applications of inductive learning from observations and back-ground knowledge in a first order logical framework.
Recent developments have brought ILP closer to practical applications: ILP has been successfully used in a variety of domains including mechanical engineering, molecular biology, and water quality - classification. It can be considered suitable for applications of the following general categories: data mining and discovery, knowledge intensive data analysis, design and configuration, database design, and natural language processing. This makes ILP of central interest to the area of Information Technologies. On one hand, ILP is a relatively new discipline that attracts an increasing amount of research efforts. On the other hand, ILP is mature enough to have developed a number of tools applicable in practice. Rising the awareness of prospective users about the application potential of ILP and stimulating the transfer of research results into practice is therefore of utmost importance for the field. A network of excellence on ILP is an adequate forum for addressing these tasks.

The main objectives of the network are therefore:
- To coordinate ILP research among the nodes of the network.
- To promote the cooperation and exchange of research results among the network nodes.
- To disseminate information on ILP research and applications to the outside world.
- To facilitate the transfer of ILP research results to practice.
- To support the establishment of the infrastructure for achieving the above objectives.

DEVELOPMENT OF TOOLS AND EXPERTISE FOR THE THERMAL INVESTIGATION OF ICS AND MICROSYSTEMS BASED ON THE RESULTS OF THE THERMINIC PROJECT

Contract ref. :	***CP97-7108***
Proposal ref. :	***PL977108***
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Duration :	***36 Months***
Start date :	1/07/1998
End date :	30/06/2001
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Project

Development of tools and expertise for the thermal investigation of ICS and microsystems based on the results of the therminic project

Objectives and Contents

As a result of the THERMINIC project, CP94-922, a very good cooperation has been developed between the Contractors in the last three-years period, in the following fields: development of temperature sensors, development, testing, use and dissemination of CAD tools for the design of ICs and integrated microsystems, development of testing methods especially in the field of thermal and IDDQ testing, development of tools for thermal characterisation of IC packages (thermal benchmark chip, thermal transient measuring equipment).

In the framework of the KIT project the consortium will continue this cooperation. This activity will result in the further dissemination of the results obtained up to now concerning both the CAD tools and the developed test methodology. Continuing the research work in the above fields will be part of the further activity as well. The cooperation of the contractors resulted in a number of common publications, including conference and journal papers and book chapters. The continuation of this activity will cover not only the publication of the new research results but further the publication of some textbooks based on and with the intention to disseminate the results of the THERMINIC Workshop or chapters.

The theoretical expertise of TUB still needs the West European cooperation - the fabrication and measurement facilities of TIMA - in order to bring the results of the THERMINIC project and the foreseen new results close to the European microelectronics industry.

E-STUDY EUROPE

Contract ref. :	***CP97-7109***
Proposal ref. :	***PL977109***
Type :	*J oint Research Proj ect*
Duration :	***24 Months***
Start date :	1/09/1998
End date :	31/08/2000
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7109

Project

E-study Europe

Objectives and Contents

The project E-Study Europe aims at the implementation of an European socio-technical infrastructure for enabling telelearning in CCE that makes it possible for students from the CCE to set up and follow personalised curricula based on available certificated online courses. The concept of telelearning is used in the sense as it is described by Collis (1996), 'making connections, among persons and stored resources, through communication technologies for learning-related purposes'. In this definition, an emphasis is laid on the use of information and communication technologies. To enable telelearning there is a need for a hardware and software infrastructure embedded into an organisational infrastructure. In this project, the hardware and software infrastructure is based on the use of Internet related Multi Media technologies. The project has three primary objectives:
- To contribute to existing multimedia communication technology, especially the HTML based WWW model, by developing of an open architecture Interaction Study Environment (ISE) for distance teaching-training-learning. ISE supports the learners to be "successful independent constructors" of their study process instead of being "successful dependent victims".
- To stimulate and support in a practical way teleeducation in European countries, especially the CCE partners, on the base of dynamic interactive multi media systems, in order to foster the creativity, innovation and spirit of enterprise of learners.
- To set up a transnational nonprofit network organisation to stimulate the practicing of common European standards in the area of distance education and to disseminate the results of the proposed project.
Curricula at the higher and university education level will become more and more flexible and interactive of nature and what Europe concerns also internationally oriented. Future education will become embedded into the rapidly forthcoming global information society. Information and communication technologies (ICT) enable the students all over Europe to put personalised curricula together based on available international certificated, flexible and interactive courses. Teachers will be able to guide students in a flexible and interactive way,

This project aims to take an important step to E-Study in CCE. Based on a generic architecture for E-Study, four E-Study pilots will be set up in Poland and Bulgaria. In these pilots a number of online courses will be implemented. An explicit choice has been made for a work package on *Business Development*. This has to lead to a concrete business plan for setting up a non profit network organisation to stimulate the practising of common European standards in the area of distance education and to disseminate the results of the proposed project.

KNOWLEDGE SHARED XPS-BASED RESEARCH NETWORK USING MULTI-AGENT SYSTEMS

Contract ref. : ***CP97-7113***
Proposal ref. : ***PL977113***
Type : *J oint Research Proj ect*
Duration : ***24 Months***
Start date : 1/10/1998
End date : 30/09/2000
EC contribution : *3 2 3 .0 0 0 ECU*

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7113

Project

Knowledge shared XPS-based research network using multi-agent systems

Objectives and Contents

Due to the increasing demand of globally distributed information within complex researching and developing there is a need for intelligent self adapting global research and development networks, especially under groupware aspects. The main objective of this activity is to design and establish a framework (shell) for an intelligent global research network consisting of connected local (national) working and research networks. This framework will consist of cooperating expert systems (Intelligent Base Systems) with decision support modules for research management and intelligent information and knowledge acquisition provided by applied multiagent systems. The local research networks and working spaces will be realised as Intranets in five different European countries. The centre of the local networks will be an intelligent base system concepted as double layered expert system with cooperating and communication facilities via Internet. The entire knowledge will be shared over the whole network and managed by Intelligent Knowledge Brokers.
The entire network will be supplied with AI-components and methods. Modularity and flexibility will be guaranteed by structuring and designing the whole system in an object oriented way. Adaptiveness and flexible adjustment will be provided by reflecting and evaluating user response and acceptance data via complex feedback and influence loops. Developing this research network as a modular AI-system ensures a high degree of transferability and adjustment capabilities. Using dynamic knowledge and databases and digital repositories controlled by intelligent knowledge brokers guarantees inter- and exchange of specialised knowledge. For the intelligent knowledge acquisition global and local standard multiagent systems will be installed on heterogeneous platforms using CORBA standards. The benefit for the users will be decision supported researching and development facilities as well as intelligent information and knowledge retrieval embedded in collaborative working spaces.

HPCN IN MULTIPHASE FLUID MECHANICS; ACTIVE CONTROL OF SYSTEMS WITH LIQUID/LIQUID OR LIQUID/GAS INTERFACES

Contract ref. :	***CP97-7120***
Proposal ref. :	***PL977120***
Type :	*J oint Research Proj ect*
Duration :	***24 Months***
Start date :	1/09/1998
End date :	31/08/2000
EC contribution :	*2 7 6 .4 7 0 ECU*

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7120

Project

HPCN in multiphase fluid mechanics; active control of systems with liquid/liquid or liquid/gas interfaces

Objectives and contents

The project concerns three selected problems in multiphase fluid mechanics, associated with advanced technological processes. These processes contain peculiarities such as liquid/liquid or liquid/gas interfaces and are subject to active control of heat and mass transfer by vibration or by magnetic field. Such complex problems require high performance computational algorithms and parallel computing technologies. New interfacial mechanisms induced by vibration in liquid/liquid or liquid/ gas systems have been emphasised, theoretically and numerically, by the Perm group in partnership with the Marseille group during the last three years. This understanding allows now to extend this research in the direction of vibrational control of technological processes, such as containerless crystal growth from melting (floating) zones. Optimisation of the floating-zone process of crystallisation has intensely been studied by the Freiburg group who implement new techniques of controlling heat and mass transfer in the zone by vibration or by magnetic fields.

The present project results from the synergy between Russian and European colleagues which was created during the ITDC-203 project and allowed the Russian partners to acquire powerful parallel computers that will be used for the present project. The aim of this project is to enlarge the synergies with other EU groups and (i) to optimise real technological processes, (ii) to improve basic understanding on the role of vibration on the interfaces, (iii) to study TEMC associated to magnetic damping, and (iv) to optimise the numerical codes by using HPC methods. The following problems will be considered:
- Vibrational control of the melt during a floating zone in connection with ground-based as well as space experiments carried out by the Freiburg group; vibrational control of a bubble encapsulated in a liquid (this study is directly connected to a space experiment in preparation by another French group supported by ESA).
- Magnetic control of metallic melt during floating zone experiments carried out by the Freiburg and Riga groups.
- Implementation of efficient parallel versions of the sequential codes by the Novosibirsk group.

INFORMATION DISSEMINATION AND EUROPEAN AWARENESS LAUNCH FOR THE IT PROGRAMME IN THE EAST EUROPE

Contract ref. :	***CP97-7122***
Proposal ref. :	***PL977122***
Type :	*Concerted Action*
Duration :	***28 Months***
Start date :	10/07/1998
End date :	09/11/2000
EC contribution :	*4 2 0 .0 0 0 ECU*

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7122

Project

Information dissemination and european awareness launch for the IT programme in the east Europe

Objectives and Contents

The aim of the proposal is to increase cooperation between East and West European organisations within the European Commission's Information Technologies Programme (Framework IV) and the Information Society Programme (Framework V) by:
- Increasing awareness in the Information Technologies (IT) RTD community in the West of the opportunities for collaboration with organisations in the East;
- Enhancing partner search for IT collaborators between East and West;
- Increasing the competence of the Eastern partners who give advice to industry and researchers on participation in the IT Programme.

The Information Technologies Programme contains more than twenty different schemes of assistance, described in documents containing over 300 pages of information. While the Commission frequently attempts to simplify the schemes, the pervasive nature of IT in society means that many different initiatives are required to promote the realisation of the benefits of the Information Revolution. For example, schemes to promote the use of IT in industrial products inevitably are different from schemes to promote the use of multi-media in education. It is therefore inevitable that the complexity of the current IT Programme will be continued in Framework V. Partly because of this complexity, participation of East European countries, especially industry, in the IT Programme is limited. Equally, West European organisations are largely unaware of the opportunities for collaboration with Eastern Europe in the IT Programme.
To help overcome these problems, three activities are proposed:
- Promoting awareness of the potential for collaboration with the East to Western organisations active in RTD in Information Technologies, identified from the databases of the Western partners;
- Active partner search, through personal contacts, brokerage events and joint workshops;
- Knowledge transfer from West to East concerning the operation of the IT Programme.
These will be supported by an Internet-based communication network, to facilitate rapid communication between East and West.

INTEGRATED DESIGN METHODOLOGY OF COMMUNICATION PROTOCOLS BASED ON FORMAL SPECIFICATION - SELECTED ISSUES IN MULTIMEDIA AREA

Contract ref. :	***CP97-7124***
Proposal ref. :	***PL977124***
Type :	*Keep in Touch*
Duration :	***24 Months***
Start date :	1/10/1998
End date :	30/09/2000
EC contribution :	*4 0 .0 0 0 ECU*

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7124

Project

Integrated design methodology of communication protocols based on formal specification – selected issues in multimedia area

Objectives and Contents

The communication protocols are essential components in the communication architectures, which determine the system efficiency. Therefore the research and industry community spend much effort devoted to the methodology and tools to design communication protocols and distributed systems in general. The project COP #62 " High Speed Communication Systems Supporting Multimedia Applications - Selected Issues", (l995-1997) was focused on these topics. The current KIT action focuses on three directions:

- Study of possible improvement of the simulation and implementation methodology, based on the experience gained in the COP #62. Mainly two areas of improvements will be investigated:
1. additional functions to facilitate the automatic simulation of complex verification scenarios. A feasibility study will be done on the integration of these improvements into the EDT package used within the COP #62,
2. additional functions in the implementation libraries to better interface with the existing software for automatic protocol implementation,
3. proposals for enhancing the Estelle description technique resulting from the COP #62 experience in modelling very complex communication protocols.

- Study and further development and analysis of multicast communication protocols for high speed networks supporting multimedia applications. The continuation of the study on multicast communication, with XTP as case study, will be done in the direction of performance evaluation on the formal specifications for the multicast communication protocols on different network configuration (LAN, MAN, WAN), for multimedia applications.
- Dissemination of the knowledge gained during the COP #62 project and this KIT action.

A Web site will be established to offer information on these topics, based on the team’s experience. Also the structure of a design guide "Estelle based design of communication protocols and distributed systems" will be defined and the first version of this guide will be made.

A MULTIMEDIA MULTILINGUAL TEACHING AND TRAINING SYSTEM FOR SPEECH HANDICAPPED CHILDREN-SPECO

Contract ref. :	***CP97-7126***
Proposal ref. :	***PL977126***
Type :	*J oint Research Proj ect*
Duration :	***36 Months***
Start date :	01/09/1998
End date :	31/08/2001
EC contribution :	*3 5 0 .0 0 0 ECU*

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7126

Project

A multimedia multilingual teaching and training system for speech handicapped children

Objectives and Contents

The aim of the project is to develop a new audio-visual pronunciation teaching and training method and a software system for hearing and speech-handicapped persons to help them to control their speech production. A teaching method is drawn up for progression from the individual sound preparation to practice of the sounds in sentences.
The software system is planned to be built from different modules. The basic part is a general language-independent measuring system and database editor. This database editor makes it possible to construct modules for all participant languages and for different speech disabilities. Two modules are planned for its construction in all languages, one of them being for teaching and training vowels for hearing-impaired children, the other one is for correction of missarticulated fricative sounds. These are the most common forms of articulation disorders.
The system helps patients to discover how to control their speech organs by simultaneously comparing the visual patterns (speech pictures) of the normal acoustic speech signal with the defective one. In the system the patient can see and hear the speech pattern at the same time.
The work will follow the traditional steps of speech therapy. These are sound preparation, sound development, practice in words and automation. A picture symbol belongs to all phonemes for those children who do not know letters, together with the sounds, syllables and words in written form, and the speech-sound patterns. In this way the system helps children to learn letters too.
There is a need for the cooperation of scientists who represent different fields, such as digital speech processing, speech acoustics, expertise in linguistics on different levels, in speech therapy, and knowledge of the newest technological facilities. With the cooperation of different experts we will develop the system for all participant languages.
A system will be created and provided with a general language-independent database editor and measuring system, which makes it possible to adapt the method to any European language. The construction of such a method would help experts dealing with speech therapy and make speech education and training more efficient.

MICROMACHINED CIRCUITS FOR MICROWAVE AND MILIMITER WAVE APPLICATIONS

Contract ref. : ***CP97-7131***
Proposal ref. : ***PL977131***
Type : *Concerted Action*
Duration : ***36 Months***
Start date : 01/10/1998
End date : 30/09/2001
EC contribution : *3 2 5 .0 0 0 ECU*

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7131

Project

Micromachined circuits for microwave and milimiter wave applications

Objectives and Contents

This project will deal with:

Technology:
- Realisation of dielectric membranes on high resistivity <100> silicon;
- Realisation of dielectric membranes on GaAs substrate;
- Realisation of GaAs membranes by nonselective etching techniques;
- Manufacturing of ~l μm thin A_mB_v semiconductor compound membranes;
- Realisation of thin dielectric membranes using electrochemical etching techniques;
- Realisation of transmission lines and lumped elements on thin dielectric membranes using microelectronic and micromachining techniques;
- Microwave circuits realisation on thin dielectric membranes;
- Manufacturing of a micromachined terahertz antenna.

Modelling and Design:
- Electromagnetic modelling of transmission lines and lumped elements for the 1mm wavelength range based on dielectric membranes;
- Lumped elements modelling of the same structures;
- Modelling of the interconnections between membrane supported elements and bulk active devices.

Test and Measurements:
- Studying and testing the transmission lines and functional units;
- Critical analysis of technological problems concerning the microcircuit manufacturing.

Si/A_mB_v Semiconductor Heterobonding:
- Studying and developing fusion bonded III-V material techniques;
- Realisation of bonding silicon and III-V materials with an insulating silicon dioxide layer in-between;
- Demonstrator realisation:
- Manufacturing of a micromachined antenna for millimetre and submillimetre wave application;
- Manufacturing of a microwave integrated circuit based on heterobonding of Si/A_mB_v compound semiconductors .

FORMAL SPECIFICATIOND TOOLS FOR STRATEGIC PLANNING

Contract ref. : ***CP97-7132***
Proposal ref. : ***PL977132***
Type : *J oint Research Proj ect*
Duration : ***36 Months***
Start date : 01/12/1998
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7132

Project

Formal specification tools for strategic planning

Objectives and Contents

The aim of STRADIWARE is to formalise the linkage between quantified business objectives, decisions to implement IT systems, and the IT systems themselves. The system will also provide formal linkage descriptions between dependencies within IT projects. This will be achieved by a heterogeneity-reconciling linkage mechanism between the various tools and information representations.
At present IT systems rarely satisfy the aim of supporting business objectives. STRADIWARE will reduce the dissatisfaction by coupling business objectives to IT support. There is a large, growing market for analysis and recommendation of remedial actions for preexisting IT systems and for the development of new systems strictly controlled by quantified business objectives.
Thus the STRADIWARE project complements Action 18 "Euromethod pilot projects in the CEE countries" in the PECO Action Plan by providing the essential linkage from IT projects (managed using Euromethod) to higher level business objectives and processes (outside the scope of Euromethod).
STRADIWARE will use an advanced multimedia user interface to produce outputs which are easily understood by nonexpert users. This is necessary so that business managers, who may not be familiar with the technical aspects of IT projects and their development methodologies can nevertheless use STRADIWARE to understand the linkages between business objectives and IT projects.
STRADIWARE brings together appropriate endusers in realistic business situations in the IT support development cycle with IT SMEs in both CEE and EU countries supported by one CEE and one EU Research Institute each with appropriate (commercially tested and developing) expertise to transfer to the IT SMEs.

MICROELECTRONICS VIRTUAL LABORATORY FOR COOPERATING IN RESEARCH AND KNOWLEDGE TRANSFER

Contract ref. :	***CP97-7133***
Proposal ref. :	***PL977133***
Type :	*J oint Research Proj ect*
Duration :	***36 Months***
Start date :	01/09/1998
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7133

Project

Microelectronics virtual laboratory for cooperating in research and knowledge transfer

Objectives and Contents

The main objective of the project is the setting up and maintaining an East-West Virtual Laboratory (VL) for promoting cooperative research, development and training activities between the partner institutions in CEE and EC countries as regards the design of dependable microelectronics systems, which is one of the most dynamically developing application fields. VL can be seen as an implementation of a research network based on advanced IT.
VL will offer a new quality in cooperative research by facilitating immediate exchange of information, sharing of software tools developed by the partners, enabling joint work on research projects and practical designs, providing access to libraries, benchmarks, design examples etc., and serving as a source of information not only for the partners, but also for all interested people and institutions, including national industries with a special emphasis on SMEs. For these purposes, Internet-based multimedial tools and procedures will be developed.
Three lines of complementary actions are foreseen in order to achieve the main strategic goal of the project: developing the concept and setting up the Research Network environment, cooperative R&D and training activities supported by virtual resources of this environment, and making the R&D results visible for outside world by organising User Forums and publishing regularly electronic newsletters. The scientific mission of VL is to address the challenging topics in "Design of dependable microelectronics systems" by joining scientific competence and research efforts from related fields like microelectronics design, design methodologies, software/hardware codesign and test generation for reaching new dimensions in the quality and dependability of tomorrow' s computing systems.

PAN EUROPEAN LINK FOR GEOGRAPHICAL INFORMATION

Contract ref. : ***CP97-7136***
Proposal ref. : ***PL977136***
Type : *Concerted Action*
Duration : ***36 Months***
Start date : 15/07/1998
End date : 14/07/2001
EC contribution : *3 9 5 .0 0 0 ECU*

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Project

Paneuropean link for geographical information

Objectives and Contents

In the last few years a wide discussion has begun among the European Geographical Information Community and various initiatives are in process in order to create a European Geographical Information Infrastructure (EGII) which should provide a stable, European-wide set of agreed rules, standards and procedures for creating, collecting, exchanging and using geographical information (GI). In general, a GI infrastructure assumes a working system to exchange data which requires a technical infrastructure, a set of standards for the exchange and the interpretation of data and organisational arrangements, including economic and legal agreements.
The PANEL-GI project will constitute a GI European Network aimed at involving partners from the Central and Eastern European Countries (CEEC) in the process of creation of a Pan European Geographical Information Forum. This network is considered to give an important contribution to realise in perspective a full and integrated European GI context.
The wider goal of the project is to contribute to the establishment of the foundations of the Information Society in CEEC, in the particular area of GIS, as defined in the Prague Information Society Forum. To act in such direction the Network intends to cover a number of GI issues that make possible to classify the project in a mainstream enclosing keywords as European Geographica1 Information Infrastructure (EGII), GIS, Interoperability and Open GIS, metadata, data availability, GIS Applications and European Dimension.
The objectives of the present proposal are characterised in the following strands:
- Networking, to create the EU-CEEC framework.
- Tutoring, that is the production a "PANEL-GIS" package which aims at assessing and producing guidelines on the above mentioned GI issues.
- Technology transfer, that is the exploitation of the established network.

INDUSTRIAL TECHNOLOGIES AND MATERIAL RESEARCH

RESEARCH ON CLEAN HYBRID MICROMACHINING / HMM / PROCESSES

Contract ref. :	***ERBIC15CT980801***	***EC Scientific Officer***
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1192

Project

Research on Clean Hybrid Micromachining (HMM) Processes.

Keywords

Micromachining processes, electrodischarge machining, electrochemical machining, laser beam machining

Objectives and Contents

Hybrid micromachining (HMM) processes offer considerable industrial potential in microshaping of parts with geometrical features of dimensions 5 µ m - 500 µ m, to accuracy as close as 1 - 10 µ m, and in the production of mirror-like surface finishes, that is roughness lower than 0.05 µ m Ra.

A set of combined, or hybrid, novel unconventional processes will be investigated which offer new possibilities in the microshaping of precise features, and very fine surface finishes (microfinishing) applicable in the manufacturing of micro - electronic components, miniature machine parts, such as gears, manipulators and microrotors and for apparatus needed for very fine measurements and the production of ultra-mirror polished surfaces. The thermal, electrochemical, ultrasonic, chemical and abrasive interaction of these hybrid processes with new materials such as special alloys, metal-matrix composites and advanced ceramics will be studied, as these effects influence manufacturability in respect of the accuracy of shaping of very fine features and quality of finish achieved.

The project will consist of extensive experimental investigations linked to a computer-based simulation of the hybrid processes. The following hybrid machining processes will be investigated: electrochemical - laser micromachining (ECLMM), ultrasonic - electrodischarge micromachining (USEDMM) and abrasive - electrodischarge microfinishing (AEDMF). The fusion of these processes will produce synergetic effects on the accuracy of material removal and microgeometric surface structure that have hitherto not been achieved. A major contribution to improved clean technological working conditions of these manufacturing processes will be made.

Foreseen Results

Both the advantages and disadvantages of the processes and their applications to innovative manufacturing technology will be established. Based on these findings, prototype, novel hybrid machine tools will be designed, built and tested in European industry (Philips).

DEVELOPMENT OF NEW GENERATION OF ENVIRONMENTALLY-SAFE PERSONAL MOBILE COMMUNICATION DEVICES AND THEIR IMPROVEMENT TOWARD SUBSTANTIAL REDUCTION OF HUMAN BRAIN HIGH FREQUENCY IRRADIATION

Contract ref. :	***ERBIC15CT980802***	***EC Scientific Officer***
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3188

Project

ESP-CODE.: Development of New Generation of Environmentally-Safe Personal Mobile COmmunication DEvices and their Improvement Toward Substantial Reduction of Human Brain High Frequency Irradiation.

Keywords

Health, communication, cellular telephone, superconductivity, YBCO, thin film, surface resistivity.

Objectives and Contents

The high-frequency irradiation (the frequency range used is commonly 0.9÷2.2 GHz and the RF power is not less than 3 W) is very harmful for a human health of mobile phone users. Medical investigations have exhibited unambiguously that a use of a wireless phone results in a strong influence first of all on a brain leading to easy tiredness and morbidity. With this regard, high-T_c superconducting materials (HTSC) offer the outstanding extraordinary promise to be applied due to their extremely low microwave surface resistance at high frequencies. HTSC materials application for the front-end device of the base station allows to reduce significantly the phone transmitter power to 0.5÷0.6 Watts without any deterioration of receiving distance and quality. This would be a crucial improvement to prevent completely any harmful effect to the human health of users, to reduce remarkably a general HF radio radiation level of the environment in populated regions what is extremely important in particular for children as well as to lower the HF radiation intensity at powerful transmitting centres (by factor 15÷25) to provide a much healthy conditions for their operators.

Working in collaboration, researchers of 6 European groups (University of Twente, Department of Applied Physics, Enschede, The Netherlands; Institute of Materials Research, Karlsruhe KernForschungsZentrum, Germany; INFN, INFM, Department of Physics, University of Genoa, Italy; APD Cryogenics, Aldermaston, UK; Institute for Metal Physics, National Academy of Sciences, Kiev, Ukraine; Institute for Solid State Physics and Semiconductors, Academy of Sciences, Minsk, Belarus') will jointly study and develop the improved & miniaturized performance of microwave devices based on the newly developed HTSC YBCO thin film materials to prevent an increasing harmful influence of the wireless-communications-induced HF irradiation on the human health and environment.

As a result of the common activity we are planning to manufacture a prototype of the low-noise (noise coefficient 0.4 dB comparatively with the existing systems having 3-4 dB) Cryogenic Entrance Device (Bandpass Filter+Pre-Amplifier) for the receiver of the base station of the mobile or cellular network with future commercialization.

Foreseen Results

The first intermediate result is to develop a technology of production of YBCO films with perfect crystalline structure, high smoothness and low surface resistance for a use in 2 GHz filter. For this scope, we plan to use the improved or modified thin film production (Pulsed Laser Deposition, magnetron sputtering, Liquid Phase Epitaxy).

The newly developed software allows to optimize the miniaturized planar filter topology to obtain the required a whole set of stopband parameters within the film area about 1". Therefore, a second expected result is the development of the miniaturized and optimized topology of effective filter for about 2 GHz range using a small-area YBCO film (about of 1"). It will reduce significantly a cost of a whole device.

DEVICES FOR ULTRAFAST OPTOELECTRONICS MADE FROM LOW-TEMPERATURE GROWN GAAS AND RELATED MATERIAL

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6004

Project

Devices for ultrafast optoelectronics made from low-temperature grown GaAs and related materials (DUO)

Keywords

Ultrafast optoelectronics, LT-GaAs, non-stoichiometric III-V semiconductors, photoswitch

Objectives and Contents

Progress towards the high frequency regime is observed in all domains of electronics. Nowadays, ultrafast optoelectronics allows generating ultrashort electrical pulses, testing fast electronic and microwave circuits and characterising materials used for this purpose. A key point in ultrafast optoelectronics is conversion of ultrashort laser light pulses into electrical pulses as short as possible. Among different techniques, photoconducting switching consists in closing an open electrical circuit by illuminating the semiconductor (SC) substrate of a circuit in order to make it a conductor.

Such generation of ultrafast electrical pulses requires very short duration pumping light pulses as well as high mobility and short lifetime of the photo excited carriers in the SC substrate. Among all the SC materials suitable for the fabrication of fast photoconducting switches, low temperature grown GaAs (LT-GaAs) and related III-V compounds exhibit very good properties. LT-GaAs was widely studied because of the unique combination of its electrical and optical properties which promise numerous important microwave and optoelectronic applications. Despite of it, these promises remain unrealised up to now because the physical mechanism responsible for the extraordinary properties of LT-GaAs is still under discussion.

The objectives of our project are concerned with the study of LT- and ion-implanted materials (synthesis, fast optical and electrical characterisation) and the understanding of the origin of their amazing properties, and with the fabrication of ultrafast optoelectronic devices made from these materials.

A complex study of highly non-stoichiometric GaAs and other III-V SC with nanometer size metal precipitates will be performed. Epitaxial layers of GaAs grown by low temperature molecular-beam-epitaxy and ion-implanted GaAs samples will be investigated. The material parameters will be determined by transient optical nonlinearity, time-resolved photoluminescence and electrical field distribution measurements. We will use the best device-related materials for the fabrication of ultrafast optoelectronic photoconducting switches. It is a realistic objective to make photoconducting switches that generate electrical pulses with the magnitude of several kilovolts and picosecond duration. Their performance will be tested by using several techniques.

Foreseen Results

We expect to obtain a better knowledge on the synthesis and of the physical properties of non-stoichiometric SC. We intend to determine the main mechanisms responsible for the unique properties of such SC: high mobility and resistivity, short carrier lifetime. The synthesis of device-adapted non-stoichiometric materials will lead to design and fabrication of devices with better performance. One can expect to produce photoconducting switches that generate either free propagating electromagnetic pulses with frequency spectrum reaching a few THz, or guided electrical pulses with a duration of hundreds of fs.

WOOD BIOMASS AND WASTES UPGRADING: DEVELOPMENT AND APPLICATION OF CLEAN PROCESSES FOR FINE CHEMICALS, OILS AND CARBON SORBENTS PRODUCTION, - BIOVAL NETWORK

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8009

Project

Wood Biomass and Wastes Upgrading: Development and Application of Clean Processes for Fine Chemicals, Oils and Carbon Sorbent Production.

Keywords

Wood biomass, wastes, clean processes, pyrolysis, hydropyrolysis, fine chemical production, carbon sorbents, bio-oils.

Objectives and Contents

The study and the realisation of wood biomass chemical processing and wood wastes upgrading are proposed with the following objectives:
- Selection of clean technologies for transformation of plant polymers to organic compounds (fine chemicals) or bio-oils
- Exploration of new ways of wood wastes upgrading by coprocessing with coals or plastics by pyrolysis and/or hydropyrolysis
- Chemical pretreatments of wood and wastes in order to improve their upgrading for bio-oils and sorbents production
- Extraction, isolation, identification and characterisation of final and intermediates products by a large panel of physico-chemical methods

Foreseen Results

Development of new principles and methods for production of liquid fuels and carbon sorbents by thermal treatments of wood, wood wastes and blends (wood-plastics and wood-coals).
Realisation of the demonstration scale sustainable clean technologies for the production of natural-origin compounds for pharmaceutical, cosmetic, food and chemical industries (syringaldehyde, vanillin, levulinic acid e.a.) from wood biomass and wood wastes.
The network will be launched in the field of wood waste utilisation, which should improve cooperation between science and small and medium size enterprises in EC, CCE and NIS.

ENVIRONMENTAL FRIENDLY LUBRICANTS IN DEEP GRAWING OF STEEL SHEET METAL

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8017

Project

Environmental Friendly Lubricants in Deep Drawing of Steel Sheet Metal

Keywords

Sheet metal forming, deep drawing, environmental friendly, lubrication, lubricants cleaning

Objectives and Contents

At present the vast majority of the liquid lubricant are mineral based oils with additives. The use of this mineral oils has become more and more questioned in all areas of application. The growing environmental, health and safety awareness have caused a rapidly growing interest for environmentally friendly oils (vegetable and synthetic) as a base for all kind of lubricants even for metalworking.
The gained knowledge and its presentation in guidelines and CA tools will support the selection and implementation of environmental friendly lubricants especially in SME's where the lack of experts is frequently evident.

Foreseen Results

Not all types of environmentally friendly oils are suitable for metalworking applications. Deep drawing process present a wide range of demands on lubricants, from the almost negligible to the most severe. The main goals of the proposed research are:
1. Analysis of possibilities of environmental friendly lubricants use and of constrains for their especially in deep drawing operations (requested technological parameters, demands for tool design, sheet metals, lubrication methods...). Gained data will be gathered in lubricants, material and process databases and guidelines.
2. Development and testing of environmental friendly/biodegradable lubricants and EP-additives for deep drawing of steel sheet metals.
3. Analysis of compatibility of lubrication process with later treatment of the parts and the necessity of lubricant cleaning.
4. The final goal of the project are guidelines to help the production engineer for selection and implementation of proper lubrication processes. As nowadays more and more computer supported tools are used the project results will be prepared for integration into CAPP system, the sensitivity of modern FEM codes for lubrication parameters will also be tested.

DEVELOPMENT OF PLASMA-BASED PRODUCTS AND PROCESSES

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8023

Project

Development of Plasma-Based Products and Processes

Keywords

Plasma technology, plasma processing, low temperature plasma, chemically active plasma

Objectives and Contents

A substantial part of the latest developments and break-throughs in industrial technology can be attributed to the use of innovative plasma techniques. As plasma-based products and processes stand for high-energy efficiency and low environmental impact, it is essential that they are adopted and implemented by industry to the largest extent. Unfortunately, there is, in particular in CCE/NIS countries, still a gap between the plasma research community and the potential industrial user.

The proposed network aims at closing this gap by linking pilot plasma projects in the fields of flue gas cleaning, laser development, textile treatment and thin film technology. These projects have the common objective to develop and optimize plasma-aided processes and manufacturing techniques. In many of the projects, specialized diagnostics are deployed to study the plasma-physical phenomena that determine the performance characteristics of a given process. Others involve state-of-the-art modeling or *in situ* tests in an industrial environment. The network will thus promote the multi-disciplinary interaction of experimentalists, modeling experts and engineers. Meanwhile, contacts between industry and the scientific community will be established or reinforced by the organization of topical workshops in the fields of plasma technology, laser material processing and chemically active plasmas.

Foreseen Results

It is expected that the network will contribute to reaching the technical goals of the individual projects and thereby enhance the credibility of plasma technology in the CCE and NIS. It is indeed by finding a way to industry that the extensive plasma-technological expertise in these countries can be preserved.

PHOTONIC DEVICES : NEW LIQUID CRYSTALLINE COMPOSITE MATERIALS

Contract ref. : ***ERBIC15CT980806***
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8040

Project

Photonic devices: new liquid crystalline composite materials (PHOTOCOM)

Keywords

Liquid crystalline composite materials, Polymer dispersed liquid crystals, Liquid crystals, Dichroic dyes, Nanoparticles, Optical application, Adaptive optics, Diffraction gratings

Objectives and Contents

The industrial importance of this project is to achieve the knowledge for constructing new devices with improved performances as compared with the ones, based on liquid crystals, commonly used in optical laboratories.

In particular higher brightness, reduced response time, increased accuracy of phase modulation and larger size of the active area are aimed at.

The goal is to develop new liquid crystalline composite materials - mainly new types of polymer dispersed liquid crystals (PDLC) and to fully understand the behaviour of dichroic dyes doped liquid crystals (DDLC) and to analyse the nanoparticles dispersed liquid crystals (NDLC), which appear very promising for optical applications. This will lead to establish new types of devices important for optical information processing (optical memories, wavelength up and down converters, new information displays, high-resolution modulators).

Foreseen Results

The results of the present Concerted Action will be the establishing of a network able to solve specific problems for obtaining reliable long life devices, i.e; with the aim of enhancing the switching speed, reducing the threshold voltage, and designing new materials with electro-optical behaviour not so strictly dependent on the surface conditions, etc.

INTEREUROPEAN PULSED LASER DEPOSITION NETWORK FOR NOVEL MATERIALS (INPULSNET)

Contract ref. :	***ERBIC15CT980807***	***EC Scientific Officer***
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8043

Project

Inter-European Pulsed Laser Deposition Network for Novel Materials (INPULSNET)

Keywords

Pulsed Laser Deposition, novel methods, epitaxial growth, novel materials, optoelectronics, magnetics, laser based micro/nanofabrication.

Objectives and Contents

Pulsed Laser Deposition (PLD) of thin films has attracted an increasing attention in recent years. The method, originally specialising in compound materials, such as superconductors, and refractory metals, has now evolved into a very promising scheme targeting towards the very demanding application sectors of optoelectronics and information storage. Its unique aspects include simplicity, low cost and great experimental versatility. The relatively high growth rates, as well as the insignificant film contamination, have recently been exploited in producing excellent stoichiometric control and epitaxial growth of very complex materials. These significant results are products of informally established fruitful collaborations of the participating institutions, and demonstrate the uniqueness of the scheme.

The aim of the concerted action is to exploit the potential of the scheme, focusing on the growth and laser processing of materials of great technological importance within the target application sectors. Research concerns the investigation of PLD through the fabrication of low loss ferrimagnetic oxide thin films, multiple layers for magneto-optical recording, as well as amorphous, polycrystalline and epitaxial materials of extreme importance in optoelectronics and microelectronics (laser media, photosensitive materials, holographic recording media, conductors, insulators etc.). Furthermore, the project targets to the investigation of fundamental aspects of the processes and the introduction of novel microfabrication schemes such as microablation and nano-structuring. The technical goals of the network are focusing on providing a Reference Facility for exploiting the PLD schemes in the growth of high quality thin films, multi-layer structures and specialised microfabrication. They include the investigation of the potential applicability and industrial exploitation in the target application sectors. The project methodology incorporates: PLD feasibility studies and the development of reliable methodologies, strong interaction and exchange of know-how among the EC and CEE/NIS partners as well as interaction and diffusion of acquired knowledge via networks, meetings and the open literature.

Foreseen Results

The capitalisation on the expertise and experience in the fields of interest and the know-how transfer among the partners will be the basis for the establishment of reliable materials growth methodologies via PLD. The investigation of fundamental issues will provide the basis for the development of new methods and novel, alternative, materials structures, potentially leading to the exploitation of the related technology.

CONTROLLING OF THE ACTIVITY OF THE ACOUSTIC CAVITATION: NOVEL APPROACHE AND THEIR INDUSTRIAL, AND ENVIRONMENTAL APPLICATIONS

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8045

Project

Controlling of the Activity of the Acoustic Cavitation: Novel Approaches and their Industrial and Environmental Applications

Keywords

Acoustic cavitation, bubbles activity, ultrasonic technologies, sensors

Objectives and Contents

The lack of methods for controlling the cavitation activity and the devices to measure the cavitation intensity is responsible for the fact that the potentialities of the ultrasonic techniques are still only partially utilised. The goal of this project is the development of effective tools for controlling the acoustic cavitation activity to increase the performance of industrial, medical, and environmental ultrasonic technologies. The enhancement of cavitation activity will be achieved by suppressing the screening effects in the cavitation zone and by increasing the bubble collapse rate. The approaches to be developed will be based on the effects revealed by the participants within preliminary sonoluminescence and cavitation activity studies.

The approaches to be developed in the framework of the research project will facilitate the application of the intense acoustic fields in industry (degreasing, dispergating, sonochemical processing of metals, impregnation of porous materials), in pharmacology (emulsion preparation), and in chemical technologies, forming thus a basis for modernisation of ultrasonic technologies in former Soviet Union and in countries of EU. This project will contribute to basic understanding of cavitation phenomena and will be favourable for elaboration of environmentally friendly effective technologies (capillary defectoscopy without surfactants and organic solvents, sonoelectroabrasive and sonoelectrochemical processing of metals, etc.) as well as the cavitation sensing device including microelectrode sensor to be used in vivo conditions.

Expected results

Experimental and theoretical background for controlling the cavitation activity will be developed and the algorithm of the optimisation of the sonification processes will be proposed. These investigations will also form a basis for elaboration of novel sensing devices for measuring the cavitation activity, including acoustic sensors and microelectrode detectors to be used in vivo conditions. Prototypes of new ultrasonic apparatuses will be created. Industrial implementation of the approaches to be developed will result in the pronounced increase in performance and productivity of key ultrasonic technologies (cleaning and degreasing, decomposition of some chemical wastes and bacterial contaminants, medical technologies).

NOVEL TECHNIQUES FOR IMPLEMENTATION OF IMMOBILIZED BIOCATALYSTS IN INDUSTRIAL PROCESSES

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8056

Project

Novel Techniques for Implementation of Immobilized Biocatalysts in Industrial Processes

Keywords

Immobilized biocatalysts, immobilized enzymes, immobilization techniques, bioreactors, biotransformations kinetics, process monitoring and control, up-scaling, commercialization

Objectives and Contents

The main objective of this project is to facilitate the implementation of new materials and techniques into industrial biocatalytic processes. The project involves multidisciplinary, transnational teams integrating expertise on immobilized biocatalysts (IMBs) that covers development of carriers/supports and techniques for immobilization, methods for the characterization of IMBs, novel approaches for biotransformations, development of bioreactors using IMBs, process monitoring, process control and scaling up of processes.

Independently, the existing consortia in Slovakia, Czech Republic, Sweden, and Germany are unable to fulfil time-limited and technologically complete tasks proposed by commercial partners. The desired technological achievement by this concerted action will be an integrated multidisciplinary approach capable of introducing immobilization techniques into biocatalytic processes. Working groups with such competence do not yet exist in Slovakia and Czechia, but the existing R&D potential is an appropriate basis for improvement to the desired levels assisted by the integrated working groups in Germany and Spain. A regular exchange and dissemination of knowledge, materials, methods and other forms of know-how would help to stabilize and improve the existing R&D potential of the Slovakian and Czech working groups and commercial partners.

Industrial biocatalytic processes, such as the production of organic acids (e.g. L-(+) tartaric acid, amino acids (e.g. L-tryptophan), semisynthetic beta-lactam antibiotics (based on 6-APA, 7-ACA and cephalotin), and delactosed milk, continuous fermentation for beverages, and denitrification of waste/pollutants (phenolic) in water and soil will be jointly studied by this consortium. All these industrial processes represent sustainable (bio) technologies, “clean” from the environmental point of view and an improvement over existing approaches.

Foreseen Results

The results of this concerted action will facilitate the implementation and maintenance of immobilized biocatalysts in industrial applications (even in an international perspective) by providing standard criteria and tools for screening and evaluation of immobilized biocatalysts as well as technologies for process monitoring and control.

TOWARDS ECOLOGICALLY FRIENDLY MACHINING (ECOFRIM)

Contract ref. :	***ERBIC15CT980810***	***EC Scientific Officer***
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8058

Project

Network Towards Ecologically Friendly Machining (ECOFRIM)

Keywords

Machining; cutting fluids; dry machining; disposal, reuse and recycling of cutting fluids

Objectives and Contents

The NETWORK addresses the problem of environmental legislation and its enforcement (which, in CCE/NIS, lags behind EU) in the area of machining, with special reference to cutting fluids. The strategic objective of ECOFRIM is to raise the awareness of industry and government departments regarding the continued use of conventional cutting fluids in machining and encourage remedial action to the benefit of the machine tool operators and the environment. This will additionally assist CCE industry to meet EU environmental directives.

The themes of the NETWORK include reuse, recycling and disposal of existing cutting fluids as well as alternative fluids and dry machining. These topics will be considered in the twice-yearly Network meetings, of which the Proceedings will be published. Participation of industrialists not in the Network will be encouraged. These papers and Network activities will be promoted on an Internet Website together with a cutting fluids' database, multilingual glossary and a guide for reducing the waste of metalworking fluids.

It is to be noted that the same types of fluids are used in other industrial sectors, e.g. in hydraulic machinery, coolants for diesel engines, quenching media.

Foreseen Results

Initial information and technology transfer EU to CCE partners will assist and accelerate the process of increasing awareness in CCE of environmental consequences of machining. This will facilitate the identification of common areas of existing and proposed research and allow such research to be coordinated between members. Thus more rapid progress will be made enabling the identification of important gaps in CCE research themes which are already being undertaken by EU colleagues. Cross-fertilisation of ideas will therefore be promoted. It is hoped that government and industrial action will be more effective and speedy through dissemination of information and participation of officials and industrialists in NETWORK activities.

UTILAZATION OF POWERFUL BEAMS OF PENETRATING RADIATIONS PRODUCED BY DENSE PLASMA FOCUS DEVICES TO CREATE THE ECOLOGICALLY CLEAN TECHNOLOGIES OF MATERIALS TREATMENT TO IMPROVE ITS CHARACTERISTICS AND TO SOLVE APPLIED PROBLEMS OF MATERIAL SCIENCES (BERAMAS)

Contract ref. : ***ERBIC15CT980811***
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8072

Project

Utilization of Powerful Beams of Penetrating Radiation Produced by Dense Plasma Focus Devices to Create the Ecologically Clean Technology of Material Treatment to Improve its Characteristics and to Solve Applied Problems of Material Sciences.

Keywords

Plasma-focus, powerful beams, plasma streams, radiation resistive materials.

Objectives and Contents

Among innovative technologies those ones, which are connected with extreme densities of power flux, are of a special interest particularly in the field of material sciences. One of the sources of various penetrating radiations known as a Dense Plasma Focus (DPF) device can generate powerful beams of different nature - namely high energy electron and ion beams, plasma streams, soft and hard X-rays, and neutrons - with the highest power flux densities available at the moment in the laboratory framework. The beams can be applied to a creation of the ecologically clean technologies of materials treatment, development, testing and investigation of radiation resistive materials, to simulate interaction processes of high temperature plasma and beams of various "hard" radiations with a first wall, taking place in fusion reactors of both inertial and magnetic confinement types, in accelerators, in air- and outer-space vehicles and in another radiation facilities.

Based on a fast, relatively low voltage electric discharge in gases, the DPF is an ecologically clean device in comparison with such sources of hard radiation as isotopes, fission and accelerators. At present time the following materials are under investigation: three types of steel namely austenitic nickel-free steels (for instance, Fe-12Cr-20Mn); low-nickel steels (for instance, Fe-12Cr-14Mn-4Ni); ferrite-martensite steels type of Fe-9Cr(W,Ta,V). Among vanadium alloys, mainly alloys based on V-Ti-Cr and V-Ga systems will be processed.

Foreseen Results

As the main results of the proposed concerted action affording the beams-material interaction project we expect:
-Development of a new generation of the ecologically clean penetrating radiation sources based on a Dense Plasma Focus device, directed to a material surface modification;
-Formation of a general body of knowledge about the near-surface processes taking place under the combined interaction of the powerful beams of various penetrating radiation types with a solid matter;
- Testing of some promising radiation-resistive and corrosion-resistive materials and to make a choice in favor of the most prospective ones for use in applications.

CRYSTALS WITH CONTROLLED SHAPE AND MICROSTRUCTURE FOR SCIENCE AND INDUSTRY (CRYSHAPE)

Contract ref. : ***ERBIC15CT980812***
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8078

Project

Crystals with Controlled Shape and Microstructure for Science and Industry (CRYSHAPE)

Keywords

Grain boundaries, phase transitions, shaped crystal growth, sapphire, copper

Objectives and Contents

Improvement of the quality and output of high quality shaped sapphire crystals in order to expand the areas of applications of the sapphire crystals.
- Development of a growth technology for sapphire bicrystals containing individual grain boundaries (GBs) to study the GB wetting phase transitions.
- Development of the growth technology for metallic bicrystals containing individual grain with tubular and platelet-like shape and for bicrystals with a controlled GB inclination.
- Development of an experimental method for studies of the GB phase transitions with the aid of Auger electron spectroscopy using Cu bicrystals with a controlled GB inclination.
- Development of an experimental method for studies of the GB faceting phase transitions using Cu bicrystals with a tubular GB.
- Development of the application of shaped sapphire single crystals with a controlled orientation of the surface facets as shaped substrates for the waveguides in studies of the superconductivity and quasiparticle interactions in amorphous and non-equilibrium alloys.
- Theoretical modelling of the influence of the geometrical form and size of the shaped structures on the energy spectra of charge carriers in quantum wires and dots.
- Experimental study of solute segregation at individual GBs in bicrystals of Fe-Si and Mo-Ni alloys and determination of the thermodynamic parameters of segregation (enthalpies and entropies).
- Detailed study of the anisotropy of grain boundary segregation in an Fe-Si base alloy.
- Development of the technology for the growth of Zn tricrystals with GB triple joints of controlled shape and crystallography.

Foreseen Results

The research will increase the output of high-quality shaped sapphire crystals and expand the areas of application of sapphire crystals. Shaped sapphire crystals can be effectively applied as high-pressure mechanical parts, high temperature windows, windows for scanners, cutting tools, several high temperature devices, research and technological equipment, jewellery, and biomedical materials. New methods of the growth of shaped single crystals and bicrystals with shaped GBs and new methods of the on-line computer control of the growth processes suitable for the industrial application will be developed.

ABRASIVE WATER JET CUTTING, A CLEAN TECHNOLOGY

Contract ref. :	***ERBIC15CT980821***	***EC Scientific Officer***
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8082

Project

Abrasive Water Jet Cutting, a clean technology

Keywords

Water jet, abrasive, non-thermal cutting, recycling, manufacturing

Objectives and Contents

Abrasive Water Jets use the world's two most abundant resources - rock and water - to cut nearly every engineering material. This cutting technology expands with a rate of more than 20% every year in the western world.
Water Jets are non-thermal cutting tools. Compared to thermal cutting techniques like plasma and laser the Abrasive Water Jets do not cause reaction products (toxic products like aerosols, oxide layers) or structural change (annealing, thermal stresses) which cause further machining operations. Water Jet cutting is compared to thermal cutting techniques a clean technology. Nevertheless it consumes energy, water and abrasive. The abrasive together with the removed material has to be disposed.
However Abrasive Water Jets have a big potential to become a cleaner technology. This is the aim of this concerted action. To reach this aim parallel working groups will be concentrated on two topics: 'efficiency' and 'abrasive'.
The consortium is headed (CO, SC and scientific consultant) by Research Institutes with long-time experience in Water Jet technology as well as in running and coordinating international projects. Their competence together with their partners will ensure to reach the goals of this Concerted Action.
Countries from the eastern part of Europe start now to go into this new field of industry. By including them into the concerted action, the partners from EU will profit from research activities from eastern partners as well as in other direction. On the other hand it will be ensured, that these countries reach the same safety and environmental level in their techniques, like SMEs from EU. The contacts of institutes in CCE-countries will be used to disseminate the technique to SMEs and other interested groups.
The cooperation between the EU and the eastern countries and the agglomeration of know-how will strengthen the position of water jet industry on the European and world market.

Foreseen Results

By choosing optimal process parameters, increasing efficiency of pumps and nozzles the used energy and the amount of water and abrasive can be reduced. By selecting optimal abrasive in relation to cutting efficiency, disintegration behaviour and recycling capacity, the amount of abrasive can be reduced drastically by recycling.

PLANT LIFE NETWORK IN CENTRAL AND EASTERN EUROPEAN COUNTRIES

Contract ref. :	***ERBIC15CT980813***	***EC Scientific Officer***
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8083

Project

Plant Life Assessment Network in Central and Eastern European Countries (PLAN - EAST)

Keywords

Network, power plants, remaining life assessment, process plants, high-temperature components, safety, reliability, availability, Eastern Europe

Objectives and Contents

Significant efforts of the European Union in the last years have been devoted to support the economic recovery in the Central and Eastern European Countries. R&D play an important role in this recovery. Exactly in this area much can be done simply by transferring some of the West European experience and technology, adapting them, of course, to the specific "eastern" conditions. The organizational forms and implementation tools already existing in EU (here the existing CEC DG XII Network PLAN – Plant Life Assessment Network, coordinated by JRC Petten) should be maximally used, re-used, extended, etc., in order to improve the efficiency and return of investment. Main objective of this proposal is to make available, for Central and Eastern European Countries, the relevant recent R&D results obtained in the EU countries in the area of life assessment and management of power and process plants. The objective will be achieved by extending an existing EU - Network (PLAN - Plant Life Assessment Network) to the Central and Eastern European Countries.

Practical goals of proposal (all regarding the management and assessment of life of industrial plants) are:
- To raise awareness in "Eastern" countries about the new technological developments and their applications in the European Union Countries,
- To avoid the redoubling of the data and research effort,
- To disseminate information on the field of R&D activities between European Union Countries and Central and Eastern European Countries,
- To intensify co-operation in R&D fields in Central and Eastern European Countries,
- To established a network for the free exchange of information about initiatives regarding R&D also by means of the modern Information Technology (electronic forum).

These goals will be achieved by: co-ordination of clusters and themes (like in adopted project PLAN), establishment of the PLAN – East Office and Info Booth, development of the PLAN – East WWW – database and information site, workshops, seminars and other dissemination means.

Foreseen Results

Project's network will provide means to ensure a better co-ordination of the research and thus promote scientific and technological co-operation and integration between European industry, research bodies and universities.

The project is expected to yield benefits related to plant life optimization, improvement of safety, accessibility and other economic parameters of plant operations, improvement in inspections and maintenance practice and improvement in risk management. This is especially true for the large industrial plants (e.g. power and process plants) and, in them, the critical systems and components (e.g. the high temperature components). Many of these plants face serious problems related to their advanced age and extremely high risk potential (environmental, techniques, ecological) not limited to Central and Eastern European countries only.

DESIGN OF IMPROVED-QUALITY OPTICAL ELEMENTS FOR OPTICAL PARAMETRIC OSCILLATORS IN THE MID-INFRARED SPECTRUM

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8087

Project

Design of Improved-Quality Optical Elements for Optical Parametric Oscillators in the Mid-infrared Spectrum

Keywords

Nonlinear optical materials, characterization of linear, nonlinear, thermal and electric properties, nonlinear optical devices

Objectives and Contents

The generation of coherent tunable radiation in the infrared spectrum (1-20 μm) is important in various cross-disciplinary fields as fundamental high-resolution spectroscopy and optical frequency metrology, environmental physics and development of fast opto-electronic devices. The most convenient way to generate IR radiation is through parametric frequency down-conversion of available visible-near-IR laser sources using second-order susceptibilities of nonlinear media. Existing IR nonlinear semiconductor crystals (AgGaS2, AgGaSe2, GaSe) still suffer from imperfect quality in terms of transparency, power handling capability and phase-matching properties, which prevents their use in sensitive devices such as optical parametric oscillators (OPO's), or merely their wide marketing.

Furthermore, the state-of-the-art of their technology still make them hardly available. The goal of this action is to improve the quality of some of the existing semiconductor materials by bringing together the skills of crystal growth specialists and nonlinear optics physicists for their characterization. In parallel to the quality improvement of these birefringent phase-matched materials, the action will be focused on the growth and characterization of new nonlinear compounds (LiInS2 and isotypes), still commercially unavailable. These compounds also exhibit interesting ferroelectric properties as KTP or lithium niobate (LiNbO3). The use of these latter materials as electric field periodically poled quasi-phase matched (QPM) devices (PPLN or PPKTP) is now increasingly popular, with the possibility of generating efficiently any wavelength within their limited transparency window (<4). To this extent, these new IR ferroelectric compounds, with their extended IR transparency, might be potential candidates for the creation of electric field periodically-poled QPM , quasi-phase-matchingTl3AsSe3, ZnGeP2, parametric oscillators (OPO's).

Foreseen Results

The improvement of the growth and post-growth technologies of AgGaS2 and GaSe is expected to lead to the production of competitive material in the market in terms of optical quality (residual absorption loss lowered to 1%/cm in their transparency range). First demonstrations of continuous-wave OPO's or difference-frequency devices using these semiconductors are expected.

INDUSTRIALLY RELEVANT KNOW-HOW EXCHANGE AND TRANSFER IN THE FIELD OF THERMAL COATINGS WITH HIGH-TECH MATERIALS.

Contract ref. : ***ERBIC15CT980815***
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8089

Project

Industrially Relevant Know-How Exchange and Transfer in the Field of Thermal Coatings with High-Tech Materials (COATRANS)

Keywords

Thermal spraying, coating technology, corrosion and wear, thermal barrier coatings, bioactive materials

Objectives and Contents

The objectives of the project can be summarized as follows :

At the strategic level :
- To bring together scientific competencies and SME's from EC, CEC and NIS countries acting in fields of thermal spraying of high-tech materials,
- Better information of the involved SME's concerning the possibilities and limitations of thermal spraying (TS) of advanced materials,
- To disseminate non confidential, very specific technical information,
- To offer better tools in increasing quality and productivity of SME's from EC, CEC and NIS.
- To promote the know-how transfer from the research and academic media to the small and medium size industrial partners, in the field of thermal sprayed coatings with high-tech materials.

At practical level :
- To combine existing research results and making them available,
- To exchange information, research results and personnel between EC, CEC and NIS partners,
- To disseminate theoretical and technical information,
- Avoidance of the unnecessary research activities covering already solved thermal spraying problems that are not patent pending or company know-how,
- To translate in several languages some of the results of the participants,
- Establishment of an information transfer network in order to evaluate "the State of Art" in the Central and East European countries,
- Creation of an informational framework for both East-West and Research-Fabrication technology transfer network, in order to increase the know-how implementation efficiency.

The network members will approach problems of high technology as spraying the TBC (Thermal Barrier Coating) materials and biocompatible (bioactive and –passive) ceramics. The scientific programme will include the following tasks:
- Spraying of samples and small specific components. All the spraying-active partners will perform spraying tests with the materials and the substrates that will be agreed at the first consortium meeting.
- Examination of thermal sprayed coatings
- Optimisation of the local thermal spraying conditions in order to reach comparable results.

Foreseen Results

One of the most important results of the project is the possibility of accessing highly competent technical information resources by companies acting in the field of the proposed project having limited financial resources, short delivery schedules or less qualified personnel. The information that is intended to be made available will be presented in the languages of all the participants, in order to create a non-discriminative access for all the participant countries.

COMPOSITE APATITE-BASE CERAMICS IMPLANTS FOR SURGERY: RESEARCH, DEVELOPMENT AND SMALL-SCALE PRODUCTION

Contract ref. : ***ERBIC15CT980816***
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8090

Project

Composite Apatite-Base Ceramic Implants for Surgery: Research, Development and Small-Scale Production (CABCIS)

Keywords

Apatite-base ceramics, hydroxyapatite, biocompatible/bioactive materials, implants for bone surgery

Objectives and Contents

Apatite-base ceramics are finding wide application in practical surgery for replacement or repair of damaged hard and even soft tissues. At present, research and development are mainly concentrated on implantation of pure hydroxyapatite (HA) ceramics. However, HA is only prime inorganic component of the hard tissue. Some other substituted forms of apatites present as the additional constituents in the human body, the biological, chemical and mechanical behaviour of them being quite different from that of HA. Because of the chemical and phase composition of bone in non-uniform and changes with time, a way of bone replacement by the properly prepared composite apatite-like ceramics is the most prospective to achieve the benefit in practical surgery. In this context, the present project proposal is aimed at development of sustainable, clean technology to produce new kind of biocompatible, bioactive materials for surgery; to improve cooperation between the chemical and physical science, ceramics technology, biology and medicine, from one side, and small-scale industry from the other side, and to cover the deficiency in west- and, especially, in east Europe countries in high-quality, high-performance materials for surgery. The work will be carried out on the base of concerted actions of the network of the well-authorised research groups and small-scale producers. Such a cooperation is essential condition for the benefit. The output from this cooperation will be the development of new materials, technology and small-scale production of improved implants for the bone surgery.

Foreseen Results

The applied results will be disseminated through the workshops and seminars in which surgerists, dentists and representatives of local authorities interested in the topic, will participate. Moreover, the products to be developed in the framework of the concerted activity will be available for clinical testing.
The achievements, which are expected to have a significant impact for practical dentistry and surgery, are:
New type of inorganic compounds to fill lock of knowledge in the field of Biomaterials.
New type of ceramic powders, implants and coatings with controlled bioresorption behaviour and biointegration ability (properties of the tissue to be replaced).
New commercial production in the market which will be available for in vivo and clinical testing for the medical community over the world.

TRANSFERRING INNOVATIVE DRYING TECHNOLOGIES TO INDUSTRY (TIDTI)

Contract ref. :	***ERBIC15CT980817***	***EC Scientific Officer***
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8093

Project

Transferring Innovative Drying Technologies to Industry

Keywords

Drying, industrial techniques, new processes, technological transfer

Objectives and Contents

Although drying is one of the oldest operations of process engineering, its complexity (simultaneous heat and mass transfer with chemical and mechanical phenomena) makes it little understood. New products and new requirements like product quality effective energy utilisation, environmental impact and global competitiveness require new processes and a better understanding of the phenomena.

The partner laboratories are working on prospective aspects of drying technologies like superheated steam drying for different materials, pulse combustion system for dewatering of industrial wastes, spray-drying of liquids and pastes and drying on inert particles. They also have a long experience on modelling of heat and mass transfer, drying thermodynamics, chemical and mechanical phenomena occurring during transfer operations and instrumentation and process control of dryers.

During the socialist period, the CCE (Countries of Central Europe) and NIS (New Independent States) countries had powerful scientific schools of drying, parts of which are maintained till now. The presented project concerns the task of developing scientific cooperation between scientists of Western and Eastern Europe in the area of drying, forming structures of innovative drying technologies transfer to industry, especially in the eastern countries.

Private intermediary structures, such as «Techno-park» in Russia and Regional Innovation Centre of Veszprem in Hungary, dealing with the transfer of new equipment to industry and technology applications will be used and developed.

The project includes the development of databases on existing technologies and innovations in drying, and on the needs in drying technologies of different industry branches in Central Europe and Russia.

Foreseen Results

The action will be beneficial for both the EU and CCE-NIS countries in several ways, mainly:
- Development of co-operative work between European schools of drying
- Scientific training of personal from CCE and NIS in EU countries
- Development of contacts between industry and university in all concerned countries
- Adaptation and use of private intermediary structures in Russia and Hungary

to develop these transfers of technology.

PURE / COMPUTER AIDED PROCESS ENGINEERING IN CLEAN TECHNOLOGIES DESIGN

Contract ref. : ***ERBIC15CT980818***
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8095

Project

PURE. A Concerted Action on Computer Aided Process Engineering (CAPE) in Clean Technologies Design

Keywords

Clean technologies, computer aided design, process synthesis

Objectives and Contents

The strategic objectives of the PURE network are :
- To identify, assemble and share knowledge, experience and understanding of current world-wide best practice in CAPE research, application and education in the specific context of clean technologies design and operation
- To collate and document this information, to form a package suitable for transfer to the wider research, industrial and education communities in Eastern Europe
- To take appropriate actions and initiatives to disseminate and transfer this package to its target communities with the specific objective of awareness-raising within the targeted communities
- To develop an improved understanding of the true research position and special industrial needs in Eastern Europe in the field of CAPE in clean technologies.

To address its objectives, PURE net operates via the following mechanisms :
1. Technology Working Groups (TWGs) established in each of the focus areas Development of New Unit Processes, Whole Process Synthesis, Flexibility, Operability & Control and Performance Monitoring & Optimisation
2. Workshops, at which the TWGs discuss and share their experience and ideas and develop and deliver materials to be incorporated into the Dissemination Package and the Review of Potential and/or to be presented at the Technology Transfer Seminars.
3. A Dissemination Package, prepared from the above materials and materials obtained from projects and initiatives in European Union, designed for widespread distribution to the research and industrial communities, primarily in Eastern Europe.
4. Technology Transfer Seminars, at which the Dissemination Package will be presented to its target audiences - East European industry.
5. A Review of Potential, describing the current research and industrial situations in the participating Eastern European countries and the potential for improved research infrastructure and Industry/Academia interactions.

Foreseen Results

An improved Europe-wide awareness of clean technologies and their potential for improving business performance will create a better informed “market pull” and is a key objective of the proposals. Network-developed E&T materials will be made available to universities for in-house use, resulting in a major broadening of awareness of the technology and its potential impact on the industry's competitive position. It is expected that the improved cohesion between research infrastructures, achieved by the "levelling up” process, will markedly improve the prospects of successful future research collaboration between companies and research organisations in both Eastern and Western Europe, as improved equality of partnership will be achieved.

NETWORK ON CLEAN TECHNOLOGY FOR ECOLOGICAL HIGH QUALITY " COTTONIZED" FLAX FABRICS PRODUCTION FROM WORTHLESS RAW MATERIAL (NETECOLFLAX)

Contract ref. :	***ERBIC15CT980823***
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Type :	*Concerted Action*
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8097

Project

Network on Clean Technology for Ecological High Quality "Cottonized" Flax Fabrics Production from Worthless Raw Material – "NETECOFLAX"

Keywords

Textile Clean Technology, Flax by-products, High Quality Fabrics

Objectives and Contents

It is the aim of this Concerted Action to create a network in order to co-ordinate the research work of the participants on the following topics:
a) Development of a manufacturing process to obtain 'cottonized' flax fibres from worthless raw material using mechanical and chemical-mechanical operations,
b) Development of a new clean technology for bleaching the 'cottonized' flax fibres roving and yarns (flax and blends with flax) without chlorine,
c) Development of technological treatments for stiffness reduction and surface properties modification of the fibres in order to increase their spinnability,
d) Optimisation of the 'carded cotton' spinning process to get 'cottonized' flax yarns in blends up to the 50% of flax and with linear densities between 20 and 30 tex, and
e) Characterization of the new yarn structure for yarn and fabric properties prediction using the models developed by the participants.

Co-operation between the network and the European industry, in particular with small and medium size enterprises, will be promoted in order to attain the following objectives:

f) Industrial application of the developed technologies to produce ecological high quality 'cottonized' flax fabrics,
g) Introduction of the ISO 9000 standards to remove technical and trading barriers existing between Eastern and Western European countries, and
h) Preparation of the CCE textile industry for environment management system according to the standard ISO 14000.

A clean technology for manufacturing 'cottonized' fibres will be elaborated. 'Cottonized fibres', which are elementary flax fibres with properties similar to the cotton, will be produced from worthless raw material as oakum or nonspun long fibres. This kind of fibres will be used in blends with wool or cotton to obtain ecological 'high quality' products.

Foreseen Results

Development of a new clean technology to obtain high-quality fabrics from worthless flax by-products. Improving the competitiveness of the Eastern Europe Textile Industry. Stabilisation of the Research Potential on Textiles from Eastern Countries.

TIME-MODULATED CVD TECHNIQUES FOR PREPARATION OF ADVANCED THIN FILMS MATERIALS " TIMOC"

Contract ref. :	***ERBIC15CT980819***	***EC Scientific Officer***
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8104

Project

Time-Modulated CVD Processes for Preparation of Advanced Thin Film Materials - TIMOC

Keywords

Semiconductors and dielectrics, thin films, novel CVD techniques, time-modulated processes, large area optoelectronics.

Objectives and Contents

Progress in many branches of modern industry relies on the application of advanced thin film materials. Important examples are the fields of
- Solar energy utilisation (large area photovoltaics, optical and protective coatings),
- Communications (thin film optoelectronic devices, large area displays), and
- Intelligent machining (sensors, hard coatings)
which need low-cost, environmentally clean and flexible technological solutions.

The main objective of this Concerted Action is to promote a new trend in chemical vapor deposition technology, which is targeted at the synthesis of structurally engineered thin film materials via periodic modulation of the preparation conditions. Important advantages of the Time-Modulated Chemical Vapor Deposition (Mod-CVD) approach are:
1. High degree of freedom in the design of CVD processes for the preparation of thin films of certain needed properties.
2. Mod-CVD relies on computer control of the process rather than on the use of sophisticated and expensive hardware. Thus, it represents an "intelligent technology".
3. Cost reduction is achieved through both the process optimization leading to minimal amount of waste and the elimination of toxic and costly wet-chemical treatment.

The network will link partners who have already established research programs dealing with different thin film materials and their applications. Thus, the partnership will be focussed on the development of time-modulated CVD techiques to prepare a variety of advanced thin-film materials for electronical and optical applications. These materials include modifications of thin film Si, large band gap semiconductor & dielectric films (SiC, SiOC, GaN, AlN), and hard carbon & diamond films. The cooperation will be carried out by network meetings, distribution of information via Internet, joint publications, and several joint activities for the purpose of standardization of the computer process control units. This will lead to interchangeable interfaces & periphery and to the construction of a mobile prototype.

Foreseen Results

The expected results are of technological, industrial, and environmental dimension:
- Mod-CVD techniques will improve the quality of the mentioned thin film materials,
- Application of the newly synthesized materials in optoelectronic devices,
- Collaboration with industry for transfer of process design and material deposition methodology,
- Development of a cost-effective and environmentally clean plasma technology.

INDUSTRIAL REALIZATION OF AMORPHOUS SILICON HETEROSTRUCTURES FOR ELECTRICAL APPLICATIONS (IRASHEA)

Contract ref. :	***ERBIC15CT980820***	***EC Scientific Officer***
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8106

Project

Industrial Realization of Amorphous Silicon Heterostructures for Electrical Application (IRASHEA)

Keywords

Amorphous silicon, heterostructures, industrial products, switching and memory device

Objectives and Contents

- To create a network consisting of EU, CCE and NIS groups having similar and/or complementary scientific interests and two companies interested in the industrial realization of the devices constructed on the base of metal-a-Si-Si heterostructures.
- To coordinate the study of the electrical properties of the heterostructures, the development of new design which enables the increase of the operating frequencies and cost-efficient, environment-friendly industrial realization.
- To establish the permanent links between scientific research groups and industries.
- To contribute in the novel applications of the heterostructures as frequency generator, memory cells, switches.

Foreseen Results

From the scientific and technological point of view :
To elucidate the mechanism responsible for the oscillatory behavior, the memory and the switching-effects (mainly the Belorussian team) and to investigate the non-linear I-V characteristics of MASS (mainly Thessaloniki team).
To explain and to fit theoretically the properties of MASS (mainly the Lithuanian and the Bulgaria team) and to optimize them, concerning technical application (mainly the German team).

Concerning Industrial Applications, it is expected :
To achieve a final industrial version of MASS, which will be of lower cost and better quality than the roughly prepared laboratory version.
To find out which of the system parameters are more suitable for the control of the device.
To optimize them, concerning technical applications, for better quality.
To try to apply MASS industrial electronic products.

ENVIRONMENTALLY FRIENDLY CROSSLINKED POLYURETHANE - MATERIALS FROM PRECURSORS OF COMPACT ARCHITECTURE (EFCPM)

Contract ref. : ***ERBIC15CT980822***
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8107

Project

Environmentally Friendly Polyurethane Materials Based on Precursors of Compact Architecture

Keywords

Polyurethanes, organic coatings, aqueous dispersions, crosslinking, hyperbranched polymers, microgels, gelation, polyisocyanates, physical properties

Objectives and Contents

To establish a network of cooperating academic and industrial research centres resulting in preparation and characterization of novel crosslinked polyurethane materials from functional precursors of polymer networks of compact architecture. The compact precursors will be based mainly on hyperbranched polyesters and microgels containing hydroxyl groups. For crosslinking studies, the precursors will be used either in high-solids solutions or in aqueous dispersions formed by phase inversion; polyisocyanates will be used for crosslinking. Mechanical and other physical properties of the resulting networks will be determined. Theoretical studies will involve simulation of structure and molecular-weight distribution of the precursors, simulation of network build-up and of mechanical properties of the formed networks. The accumulated knowledge will be used for formulation of protective coating materials. The application properties of these materials will be tested.

Foreseen Results

The results obtained will be used in development of polyurethane protective coatings materials with improved processing and materials properties that are friendly to the environment. These will be high-solids compositions of low V.O.C. (volatile organic compounds) content and partly water-based systems. The application potential of these coatings will be determined. In addition, basic relations between the precursors architecture, initial composition of the systems, and reaction history on one side, and reaction kinetics, viscosity, gelation, network build-up and development of a complex of mechanical and other physical properties, on the other side, will be established. By development of simulation methods, it will be possible to predict these relations.

AGRO-FOOD

METALS IN THE ENVIRONMENT: TOXICITY AND ASSESSMENT OF LIMITS

Contract ref. :	***ERBIC15CT971003***
Proposal ref. :	***PL967075***
Type :	*J oint Research Proj ect*
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End date :	28/02/2003
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PL 96 7075

Project

Metals in the Environment: Toxicity and Assessment of Limits

Keywords

Metal toxicity, lead, cadmium, pollution, environment, human food chain

Objectives and Contents

1. Define critical limits of the heavy metals lead and cadmium in human and animal food, water, air and soils.
2. Produce a computer model for cadmium and lead in the human food chain that can be utilized in specific instances in the field, such as by food quality inspectors to determine effects of emissions on food quality.
3. Define low productivity systems with close-to-zero cadmium and lead accumulation
4. Identify significant sources of cadmium and lead contamination and means of controlling them

Increased concentrations of trace metals in the environment that are of anthropogenic origin have necessitated a thorough evaluation of existing knowledge to enable objective and uniform limits to be established. The current situation, with limits that vary between regions and frequently reflect the practical possibilities rather than the necessary maxima, hinders international trade and fosters consumer concern. Research is proposed that involves defining limits for two of the most toxic metals to humans, lead and cadmium, in human and animal feeds, soils, air and water through a dynamic modelling process. The objectives of the model are to characterise the levels of lead and cadmium in biological processes and to establish dose -response relationships that can be utilised to identify critical thresholds for toxicity effects. The latter will be used to establish recommendations for limits in human and animal foods and water.
Initially literature will be collected onto an electronic database using electronic abstracting systems e.g. CD-ROM abstracts, and printed works. Some practical research may be undertaken to fill gaps in existing knowledge, particularly on the impact of different metal species in animal, plant, and soil systems. The models for lead and cadmium will each be composed of five sub-models in key sector areas, created initially by the five partners of the project - Agricultural crops (University of Debrecen, Hungary); Horticulture, viticulture and pomiculture (University of Bucharest, Romania); Animal sources (University of Cambridge, UK); Animal and human physiochemistry and toxicology (Institute of Human and Animal Physiology, Kazakhstan) and Non-food intake (University of Valladolid, Spain). Three of the proposed five partners currently collaborate in a Copernicus project to reduce toxic effects of heavy metals in agriculture and will bring a considerable amount of endogenous data to utilise in the modelling process. Sub-models in the first two sectors will employ standard models for chemical equilibria in soil and water and will be combined to form a plant and soil model. The two animal sub-models will also be united, following close collaboration between Cambridge, UK and IHAP, Kazakhstan, in their construction. Finally all sections of the model will be combined by Cambridge and if possible made interactive with the literature database. The model will be tested in a range of situations to assess its sensitivity and validity. Following revision it will be utilised to identify 1) systems of agricultural and industrial production that involve minimal accumulation of cadmium and lead, 2) critical pathways and metal concentrations in the human food chain that create a substantial risk to human health 3) rates of accumulation of cadmium and lead in the environment that could present risks in the future and 4) areas requiring concentrated research effort.

Foreseen Results

1. A computer model will be produced that will enable critical limits of lead and cadmium in human and animal food, water and air to be defined.
2. A computer model will be produced that can be utilised in the field to determine the specific effects of cadmium or lead pollution on the concentration in critical substances, such as human food.
3. A statement of the major risks posed by different sources of lead and cadmium will be made, and safe systems of agricultural and industrial production defined.

DEVELOPING A RAPID SCREENING METHOD FOR THE ASSESSMENT OF THE QUALITY OF DRY FOOD INGREDIENTS USING NIR SPECTROSCOPY

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9006

Project

Development of a Rapid Screening Method for the Assessment of the Quality and Safety of Dry Food Ingredients Using NIR Spectroscopy

Keywords

Food quality, dry food ingredients, rapid methods, mycotoxins, NIR spectroscopy

Objectives and Contents

Dry food ingredients (like spices, dried fruit and vegetables, bran, etc.) are present practically in all dishes and as natural products normally contain a certain degree of mould contamination. So far aflatoxins and ochratoxins were considered the most dangerous, but were not considered as a problem of European growers as they are formed mainly under tropic climate conditions. Recent studies however show that e.g. Fusarium under certain environmental conditions can produce mould species under the changing conditions might be producing toxins as well. Some of the reasons have been traced back to changing handling of agricultural products under new processes. To some extent these new methods increase the probability of mold infections and toxin formation. Due to their cumulative effect onto the body organs the danger is very high in spite of the only low toxin levels in contaminated products.

It is essential to have a rapid method to screen spices coming in from different places onto the European market. Our preliminary studies have shown, that NIR spectroscopy could be the best solution for this purpose. The advantages of NIR technology are as follows:
- it is rapid, an answer will be given within seconds,
- it is non-destructive and non-consumptive of sample material,
- it is reagentless and therefore environment-friendly,
- it causes practically no running cost, and
- instrumentation of the NIR technique is so far developed to make it possible to design a handheld and relatively cheap instrument.

As the NIR technology is a correlative one, it must be calibrated. For calibration an exact "reference lab method" is needed. Existing lab methods include: Howard mould count, chromatography, enzymatic and immunologic methods, PCR. Our investigation showed that currently used methods are not ideal for our purposes as some of them detect only the viable part of mould biomass - which does not correlate to mycotoxin content - and other methods are too specific and determine only one or a few of the existing moulds. Besides this their results are partly operator dependent, time consuming and/or may be extremely expensive.

Foreseen Results

To develop a rapid method based on NIR spectroscopy to detect moldiness and possible toxin contamination in spices and other pre processed food material. This work will form the basis for the development and production of a small dedicated instrument to enable complete screening of these materials as they are imported into the European community, thus contributing to the safety of European consumers.

RAPID, SPECIFIC DETECTION OF LISTERIA MONOCYTOGENES BY ANTIBODY-BASED TEDCHNIQUES AND ON-LINE SENSOR TECHNOLOGY; DEVELOPMENT OF IMPROVEND CONTROL OF FOOD SAFETY FOR INDUSTRY AND THE CONSUMER (LIMAB)

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9012

Project

Rapid, specific detection of *L isteria monocytogenes* by antibody-based techniques and on-line sensor technology; development of improved control of food safety for industry and the consumer.

Keywords

Food-borne pathogens, *L isteria*, antibodies, virulence proteins, synthetic peptides, biosensors, industrial monitoring, immunoassay formats

Objectives and Contents

The overall objective of the project is to develop rapid, specific test methods for the detection of *L isteria* in foods, with the aim of introducing appropriate quality control into food production processes of the CCE partners.

The methods will be used both to assess the quality of raw materials and the final food product, including where possible on-line sensor technology. The reduced cost and improved speed of the new methods will allow much more extensive sampling than present methodology. It is envisaged that the methods will be incorporated into advanced quality control procedures, such as the HACCP system.

Objective 1 : To develop suitable antibodies and associated analytical technology for rapid and convenient specific detection of *L isteria monocytogenes* in at-risk foods; to use those antibodies in solid-phase immunoassays in microtitre-plate, dipstick or magnetic bead form, and in an on-line biosensor
Objective 2 : To optimise the technology in the laboratories of the academic partners
Objective 3 : To validate the technology in suitable trials in the laboratories of the industrial partners
Objective 4 : To introduce the technology for routine detection of *L . monocytogenes* in raw materials and foods, as part of a HACCP or other quality-control system; to train process workers in the operation of the system
Objective 5 : To disseminate the results of the project both within the proposed consortium, and more widely to other potential industrial users

Foreseen Results

Although many important intermediate findings are expected, the final outcome is seen as a number of definite results :

- Availability of antibodies specific to *L isteria monocytogenes*
- Exploitation of batch sampling methods for rapid, convenient, detection of the pathogen, using the above antibodies
- Development of biosensor for rapid, convenient, 'on-line' detection, using the above antibodies
- Inclusion of the *L . monocytogenes* detection methods in a working quality control system (e.g. HACCP) in a factory of the CCE industrial collaborators; validation of that system
- Wide dissemination of the results of the project via the procedures outlined above.The usual publication in science journals and at conferences is also expected. As mentioned previously, the industrial partners in the project will receive extensive training and advice from the research partners.
- Additionally, at the end of the project, an application for funding under Accompanying Measures will be made to hold a workshop for further dissemination of the complete results of the project; this workshop will preferably be held in conjunction with a suitable international conference being held in a CCE country.

IMPROVED METHODS FOR PRODUCING POLISH AND UKRAINIAN FERMENTED FOODS (IMPPUFF)

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9017

Project

Improved Methods for the Production of Polish and Ukrainian Fermented Foods (I.M.P.P.U.F.F.)

Keywords

Sour dough bread, fermented foods, yeast, lactobaccilli, selenium, bioavailability, speciation.

Objectives and Contents

The parameters affecting the production of sour dough bread will be investigated in terms of improving consistency and manufacturing efficiency, as well as consumer-acceptability and nutritional quality. Sour dough bread is consumed throughout Europe but the initial focus will be on the Polish manufacturing techniques. In addition to this, the project will address the pan-European problem of reduced dietary-selenium intakes. Initial work suggests that selenium levels can be significantly increased during the initial fermentation stages of the bread production.
To ensure that the enrichment of bread via the above route is nutritionally valid, *in vitro* and *in vivo* studies will be carried out. This will provide valuable information as to the validity of *in vitro* models for use by developing countries which may not have access to the levels of funding required to carry out human studies.

Project objectives:
- To advance existing manufacturing technologies as part of the development of an improved Polish sour dough bread.
- To reduce the manufacturing time by up to 80%, whilst improving the consistency of production, consumer acceptability and nutritional quality of the bread.
- To produce a selenium-enriched bread, and to ensure that this food provides an effective way to supplement the diets of the populations of Poland and the Ukraine.
- To develop a selenium-enriched fermented food using the improved fermentation technology, but which is applicable to the Ukrainian national diet.
- To promote a high level of information, skills and technology based transfer from the UK and France to Poland and the Ukraine, as well as between Poland and the Ukraine.
- In addition to the objectives intrinsic to the activities described in the workplans, the project coordinator undertakes to explain and instruct the CCE/NIS partners in the requirements for the submission and co-ordination of EC proposals in readiness for them to assume this role in the 5th Framework.

Foreseen Results

- An improved sour dough bread manufacturing process will provide a more efficiently produced, safer loaf with increased nutritional and marketable characteristics.
- The human bioavailability study will provide evidence that selenium-enriched sour dough bread is a nutritionally valid way to increase dietary selenium intakes and a route by which European countries with a selenium-deplete diet can redress the nutritional shortfall. It will also allow a significant transfer of scientific expertise to the CCE/NIS partners with regard to the implementation of human metabolism studies and the use of advanced analytical procedures *e.g.* HPLC-ICP-MS.
- A minimum of 2 licences or patents, and a strong basis for collaboration with Industry.
- A transfer of wide ranging technologies and information between partners.
- A minimum of 5 peer-reviewed publications on the project's multidisciplinary approach.
- Oral presentations of work at international conferences.
- Satellite symposium or workshop associated with one of the above conferences.
- Dissemination of results and conclusions through FLAIR-FLOW.

MODELLING AND DESIGN OF MULTIPHASE BUBBLE-BED REACTORS FOR ADVANCED FOOD-INDUSTRY TECHNOLOGIES

Contract ref. : ***ERBIC15CT980904***
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9021

Project

Modelling and design of multiphase bubble-bed reactors for advanced food-industry technologies

Keywords

Bubble (bio)reactors, food scale-up, stability, unsteady, macro-scale patterns, interfacial factors, yield control, selectivity, efficiency

Objectives and Contents

Bubble columns and airlift loop reactors represent an important class of multiphase reactors offering advantages of low investment and operating costs as well as large flexibility of working conditions. Application area of these reactors includes a wide spectrum of industrially important chemical processes and bioprocesses in gas-liquid or gas-liquid-solid systems as well as various environmental technologies. In the future, extensive use of such reactors can be envisioned in novel bioprocess technologies employed in the food industry for manufacturing high quality and environmental-friendly food products.

Modelling of multiphase reactors as well as development of methods for their design and scale-up has to respect key role of hydrodynamics and mass transfer in multiphase reactors in which mass transfer rate is often the rate determining step of the reaction process and complex hydrodynamics of multiphase systems may decisively influence performance and efficiency of reactors as well as reaction yield and product distribution. Proposed research programme reflects the complexity of hydrodynamic conditions in multiphase reactors. Their adequate description cannot be based only on information about steady state system behaviour and requires deeper understanding of non-stationary phenomena influencing decisively the quality of multiphase dispersion and intensity of interfacial contact in a reactor. The scientific objectives of the project include primarily experimental identification and modelling of non-stationary macro-scale flow patterns of individual phases in bubble columns and loop reactors and determination of the effect of flow pattern variations on mixing of phases, mass transfer rate and shear stress level in respective types of reactors. Particular attention will be paid to the problems of formation and stability of multiphase dispersions in reactors and to the conditions of mutual transition between different bubbling regimes ocurring in bubble bed contactors. The analogy between the hydrodynamic behaviour of bubble columns and fluidized beds will be employed to describe flow pattern instabilities and bubbling regime transitions. The experimental programme will also include investigation of the effect of phase properties on the nature of multiphase dispersions and on their hydrodynamic and mass transfer characteristics.

Foreseen Results

The effect of hydrodynamic conditions on the yield and selectivity of reaction processes will be then tested for selected bioprocesses with imminent application prospects. Ultimately, it is the goal of the project to employ fundamental knowledge acquired from the project studies as an innovative tool for design of multiphase reactors with desired hydrodynamic behaviour fitting with the requirements of particular reaction processes and for effective and fast process control and improvement of process efficiency.

CONTROLLED PRODUCTION OF FUNCTIONAL EXAPOLYSACCHARIDES BY THERMOPHILIC LACTIC ACID BACTERIA TO OBTAIN UNIFORM, HIGH QUALITY FERMENTED MILKS (EPS FROM LAB)

Contract ref. : ***ERBIC15CT980905***
Proposal ref. : ***PL979024***
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9024

Project

Controlled Production of Functional Exopolysaccharides by Thermophilic Lactic Acid Bacteria to Obtain Uniform, High Quality Fermented Milks

Keywords

Exopolysaccharides, lactic acid bacteria, fermented milks, starter cultures

Objectives and Contents

Most of the thickeners in current use by the food industry are polysaccharides from plants. An alternative class of biothickeners are the exopolysaccharides. Exopolysaccharides (EPS) are extracellularly synthesized or secreted microbial polysaccharides. Several lactic acid bacteria (LAB) strains produce EPS. EPS from LAB can be subdivided into homopolysaccharides and heteropolysaccharides. The latter group of EPS receives renewed interest, since they play an important role in the rheology, texture and body, and mouthfeel of fermented milks. EPS from LAB therefore have great technical potential for development of novel and improved products.

A thorough fundamental knowledge of the factors that influence the biosynthesis of EPS from LAB is necessary, since contradictory results have been reported regarding the influence of physical and chemical factors on EPS production by LAB. Often studies were limited to physicochemical characterizations and to visual texture observations. Furthermore, these strains only produce less slime and EPS biosynthesis is very unstable. Thus manufacturers rely on prefermentation processing such as increasing milk solids and/or additives for product stability. Consequently, clearly *in situ* production of EPS and exploitation of the EPS-producing characteristic has economic benefits. Quantitative data must elucidate the influence of several fermentation conditions on EPS biosynthesis and on the subsequent rheological properties of fermented milk systems. This is necessary to control how biosynthesis and secretion can be enhanced by process engineering. Finally, the physical (*e.a.* molecular size) and rheological properties (viscosity, thixotropic/pseudoplastic character) of a polysaccharide are closely related to its threedimensional structure or conformation. It would be of interest to understand this structure/function relationship and hence to have the means to modify the biopolymers to influence the properties of the native polysaccharides.

The specific objectives in support of the above aims are:
- to characterize heteropolysaccharides from selected LAB strains;
- to determine the functional properties (in terms of rheological and texture characteristics) in relation to EPS composition;
- to optimise the yield and composition of EPS using appropriate fermentation strategies;
- to control LAB strains with the ability to consistently produce EPS of defined composition and function.

Foreseen Results

The project is expected to provide stable functional EPS-producing LAB strains for use by the food industry, to produce functional EPS from LAB with defined rheological properties, to establish fermentation protocols for production of functional EPS from LAB, and to produce fermented milks with improved viscosity and texture.

PRUSSIAN BLUE BASED HIGHLY SELCTIVE CHEMICAL AND BIOLOGICAL SENSORS FOR FOOD CONTROL

Contract ref. :	***ERBIC15CT980906***	***EC Scientific Officer***
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9027

Project

Prussian Blue Based Novel Highly Selective Chemical and Biological Sensors for Food Control.

Keywords

Prussian Blue, electrodes, hydrogen peroxide, oxidases, food analysis.

Objectives and Contents

The great number of substances providing the quality of raw materials and food products are substrates of oxidases. Electrochemical biosensors for analysis of raw materials and food product quality are commonly developed by coupling of specific oxidases and platinised electrodes. The food safety related compounds such as pesticides and heavy metals can be also analyzed using oxidase based biosensors by inhibition of terminal oxidase or coupled enzyme. For optimal amperometric oxidase-based biosensors a selective detection of hydrogen peroxide at low potentials is required. Moreover H_2O_2 itself is an important safety related factor in food industry.

Since most of the analytes contain a number of reductants the selective detection of hydrogen peroxide could be done only by its selective reduction in the presence of oxygen. This is possible by the use of either peroxidase modified electrodes or electrodes modified with the inorganic polycrystal Prussian Blue (iron(III) hexacyanoferrate(II)).

Prussian Blue (PB) modified electrodes are selective electrocatalysts of hydrogen peroxidase reduction at around 0 V vs. SCE in the presence of oxygen, what is not peculiar to platinum, more stable and active than peroxidase modified electrodes, much less expensive than both platinum and peroxidase electrodes.
The general purpose of this project is to substitute the well-known platinum or peroxidase-based biosensors for food control to novel cheap and highly selective chemical and biological sensors based on Prussian Blue, which will improve the selectivity and sensitivity of existing analytical systems providing the assessing both the quality of raw materials and food products and the safety related factors.

Among directions planned for this work the following topics will be emphasized :
- studies of the electrodeposition of Prussian Blue onto carbon supports in order to achieve the stable and selective electrocatalyst of hydrogen peroxidase reduction;
- the screening of new specific hydrogen peroxide producing oxidases, their purification and characterization;
- the optimization of oxidases immobilization in polyelectrolyte membranes on the surface of PB modified electrodes;
- development of novel highly selective chemical and biological sensors based on PB modified electrodes;
- integration of PB based chemical and biological sensors in flow-injection systems;
- the development of multianalysers on the basis of developed sensors for simultaneous determination of several substances;
- application of multianalysers for rapid on-line assessing of food quality and safety-related factors.

Foreseen Results

This proposal aims to the improvement of the selective detection of hydrogen peroxide and immobilization of new specific oxidases to develop the novel highly selective chemical and biological sensors for detection of H_2O_2, organic peroxides, glucose, lactate, glutamate, lysine, other aminoacids, alcohol. The food safety related compounds such as pesticides and heavy metals will also be analyzed using oxidase based biosensors by inhibition of terminal oxidase or coupled enzyme. The novel biosensors will be used for the construction of analyzers for express analysis of these substances.

ON-LINE ELECTROCHEMICAL PATHOGEN ALARM BASED ON DNA HYBRIDISATION

Contract ref. :	***ERBIC15CT980915***	***EC Scientific Officer***
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9044

Project

On-line electrochemical pathology alarm based on DNA hybridisation (PATH-ALARM)

Keywords

Biosensors, food, pathogen, nucleic acids, electrochemistry, lipid films.

Objectives and Contents

Basic studies of DNA modified electrochemical sensors for hybridisation detection. Development of DNA loaded lipid bilayer (BLM) films as DNA probes. Comparative study of direct electrochemical and BLM based systems for detection of pathogen DNA. Establishment of sampling and pre-enrichment protocols for optimised practical microbial DNA detection.

The food industry requires highly efficient systems for the detection of pathogenic microbial organisms. Conventional biochemical and immunochemical methods involve complex procedures and cannot as yet offer rapid on-line detection. Alternatively, the identification and recognition of pathogen DNA by complementary strand hybridisation opens up the possibility of direct, ultraselective techniques that may operate in reagentless mode.

This project will exploit a variety of electrochemical and allied interfacial strategies to create sensitised, selective pathogen DNA recognition surfaces. Specific pathogen and constructed model nucleotide sequences will be studied. Detection limits will be quantitated, and further techniques for signal enhancement examined. In parallel studies, lipid bilayer (BLM) films will be used as sensor interfaces; BLMs sensitised with probe DNA molecules will be exploited here. Effects on BLM biophysical and micromechanical properties will be investigated; it is expected that surface effects induced by DNA hybridisation will enable BLM constructs to be used eventually for specific DNA detection.

From baseline studies, selected transduction methodologies will be combined with more established methodologies for microbial enrichment and DNA amplification. Requirements for the latter will be evaluated in the light of matrix effects and microbial detection limits necessary for individual food processes. The transfer of bioelectrochemical detectors from discrete analysis to continuous operation as part of a practical flow system will be evaluated. The project will, therefore, also examine a range of instrumentation issues relating to the viability of ultrasensitive biophysical probes once incorporated into a possible complete analytical module.

Foreseen Results

Electrochemistry of double/single strand DNA at different surfaces examined. Merits of BLM based and direct electrochemical DNA problems established. DNA detection limits and resolution capability of different sensor constructs evaluated in biofluids. Sample flow related to sensor response dynamics. Strategies established for integration of hybridisation detectors to DNA amplification. System performance as a possible pathogen alarm assessed.

RAPID ANALYSIS IN BEVERAGE INDUSTRY BASED ON AUTOMATED ANALYZERS WITH INTEGRATED BIOSENSORS (RABINAIB)

Contract ref. : ***ERBIC15CT980907***
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9050

Project

Rapid Analysis in Beverage Industry Based on Automated Analysers with Integrated Biosensors

Keywords

Automated analyzer, integrated biosensors, beverage industry

Objectives and Contents

Food-quality control is becoming increasingly important to guarantee not only the customer a constant quality of the purchased product, to allow food industry to control raw materials, storage conditions and the production process itself, but also to facilitate the export of food products from CCE/NIS countries to the European Communities. Although, personal costs are relatively low in these countries continuous and rapid testing using conventional analytical techniques are almost non-existing due to the needed rather expensive equipment (GC, HPLC, GC-MS) and/or chemicals (especially enzymes). Moreover, a proper control of various quality parameters would allow not only to introduce the products in foreign countries, but also to recover raw materials simultaneously avoiding the contamination of the environment (process-integrated environmental control).
The combination of specific biosensors and suitable automatic analyzer systems which are ale to independently follow the concentrations of several compounds of interest in a process in real time and thus allowing to establish a feedback process control system are seen as an attractive alternative to the conventional analytical techniques. The high specificity and selectivity of the enzimatic recognition reactions, the frequent reuse of the enzyme due to its immobilization on the sensor surface, the possibilities for cheap mass-production would also enhance to a great extend the possibility for applying this versatile and cheap technique in food quality control also in CEC and NIS countries. The practical application of biosensors in process control is, however, presently restricted by several drawbacks, which are inherent to the biological recognition elements. These problems are related with the intrinsic thermal instability of enzymes due to denaturation of the three-dimensional structure, the dependence on the signal on free-diffusing compounds, non-defined electron-transfer pathways between the enzyme and the electrode surface, etc. However, the long-term stability of biosensors can be significantly increased when they are integrated into a suitable analytical instrument which allow to minimize the contact time between sample and sensor, to keep the sensor in optimal conditions like pH-value or temperature. By using intelligent and polymer bound new redox mediators and specific enzymes isolated from special microbial sources not only the intrinsic and operational stability, but also electron-transfer pathways to the electrode will be optimized. Therefore, this project integrating the complementary expertise of the consortium is focusing on the development of an automatic analyzer especially tailored for the needs of the beverage industry with integrated fast responding, sensitive and selective biosensors. Research tasks are focused on four major areas concerning both fundamental and applied research, namely :
- to isolate, purify and characterize new enzymes with improved stability,
- to design and synthesize new intelligent redox mediators and redox polymer networks with improved electron transfer characteristics,
- to design and develop biosensors and biosensor arrays based on the newly isolated redox enzymes and new mediator structures, and
- to integrate and intensively test these biosensors and biosensor arrays into an automatic analyzer especially tailored for use in industrial environment.

Foreseen Results

This project is focusing on the development of an automated analyzer integrating various enzyme based biosensors to simultaneously monitor key analytes in the beverage (wine) industry. This will be achieved by first, modifying an existing analyzer (OLGA) to be adapted to existing spectrophotometric methods. Parallelly, specific biosensors and biosensor arrays for monitoring the target analytes will be designed and developed for the specific needs of the wine industry, using new enzymes, new mediating systems and enzyme engineering techniques. Finally, the developed biosensors will be integrated into the automated analyser and the whole analysis system as such will be evaluated in real conditions.

IMPROVEMENT OF EVAPORATORS FOR NUTRITIONAL LIQUIDS BY ENCHANCED SURFACES, IENES

Contract ref. :	***ERBIC15CT980908***
Proposal ref. :	***PL979053***
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Duration :	***36 Months***
Start date :	01/01/1999
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9053

Project

Improvement of Evaporators for Nutritional Liquids by Enhanced Surfaces

Keywords

Liquid films, evaporation

Objectives and Contents

Falling liquid films systems are suitable for concentrating food products such as fruit juices and milk by evaporation. Effects of mass transfer resistance, molar flux and film breakdown can decrease dramatically the efficiency of low-pressure evaporators. The main objectives of the project are to design new enhanced surfaces for concentrating viscous and heat sensitive food products and to make recommendations for the improvement of the efficiency and reliability of low-pressure evaporators. This will reduce the costs and improve the quality of the concentrated products. Another objective is to provide a systematic database for falling film evaporation of wide-boiling mixture on enhanced surface tubes. From a fundamental point of view, the hydrodynamic Marangoni effect will be studied as well as film breakdown and heat transfer enhancement in evaporating falling film by both model experiments and theoretical modeling. The hypothesis that the effects of horizontal standing waves and rivulet flows can be applied to the heat transfer enhancement and to improve the film stability will be verified. Mathematical modeling will be performed on hydrodynamics and heat/mass transfer in evaporating falling liquid films on non-uniformly heated surface in order to obtain correlation between heat transfer coefficients and film breakdown condition.

Contributions to applied and fundamental research will concern flow patterns in non-uniformly heated liquid film from an experimental point of view, and from a theoretical one it will concern standing waves and geometrical parameters and stability. The project is of course also concerned with the improvement of apparatus efficiency.

Foreseen Results

This proposal aims to contribute from a fundamental point of view to the knowledge of evaporation process. Its application will allow to improve industrial evaporators used for nutritional liquids and to produce concentrated goods at lower cost.

DEVELOPMENT OF AN ASSAY FOR QUANTITATING RESIDUES IN MEAT PRODUCTS

Contract ref. : ***ERBIC15CT980914***
Proposal ref. : ***PL979058***
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Duration : ***36 Months***
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9058

Project

Development of an assay for quantitating residues in meat products.

Keywords

Meat, residues, immunoassay, clenbuterol, ß-lactamases.

Objectives and Contents

The objective is to develop a homogeneous immunoassay which will be the basis of a general method for estimating low molecular mass (MM) residues in meat and other foodstuffs. By engineering a free cysteine group near the active site of an enzyme of high catalytic activity and whose wild-type form is completely devoid of cysteine or cystine, we will aim to obtain a derivative whose activity will not be modified by coupling to a low MM hapten. Conversely and for steric hindrance reasons, the activity should be significantly decreased upon binding of an antibody directed against the same hapten. This will allow the concentration of the free hapten in an extract to be estimated by a direct competition method. The system which has been chosen to evaluate the potentialities of this method is the assay of the β-agonist drug clenbuterol in meat extracts using a ß-lactamase enzyme.

Foreseen Results

It is expected that, if successful, this project will yield a rather general method for the assay of low MM contaminants. It should not be difficult to derivatise a wide variety of target compounds so that they will attach covalently to the single SH group introduced into the enzyme by site-directed mutagenesis.

DEVELOPMENT OF RAPID METHODS FOR ASSESSING THE QUALITY OF STARCH PARTICLES FROM VARIOUS CEREAL SPECIES FOR PURPOSES OF AGRICULTURAL AND FOOD INDUSTRY

Contract ref. : ***ERBIC15CT980909***
Proposal ref. : ***PL979070***
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9070

Project

Development of rapid methods for assessing the quality of starch particles from various cereal species for purposes of agricultural and food industry

Keywords

Starch particles, rapid methods, particle characterisation, quality assessment, cereal species, barley cultivars, quality improvement, starch degradation, starch processing

Objectives and Contents

The project objective is to improve the quality of starch raw materials used in agricultural and food industry by selection of suitable cereal cultivars. The main goals are therefore to develop a rapid reliable and cost-effective methodology for assessing the quality of starch particles for the industry.

Starch is a principal food-reserve polysaccharide in the plant kingdom. It forms a major source of carbohydrates in the human diet and is of great industrial importance. Starch particles from various cereal species occur usually as a bimodal size distribution. While the large starch particles are easily digested by enzymes, the smaller ones are more inert to enzymatic hydrolytic action and cause technological problems in food industry.

Therefore, the methodology has to be able to characterise the ratio of large and small starch particles. Field-flow fractionation (FFF) techniques are ideally suited for size characterisation of starch particles. FFF based on different applied fields will be used to study the size distribution of starch particles. The selection of the best suitable FFF technique based on selectivity, precision, accuracy and time- and cost-efficacy is one of the main goals. The multilateral character of the proposed collaboration enables detailed studies of many fundamental aspects (sample preparation, instrumental and methodological optimisation, interpretation and validation of results, inter-laboratory comparison). SPLITT procedure will be used for lab-scale preparation of size standards of cereal starch particles. These standards will be characterized by various FFF techniques. Degradation studies of starch particles and macromolecules will be performed by both chemical and enzymatical means. Barley cultivars will be cultivated under monitored conditions to provide samples of starch particles with known environmental and genetic conditions.

Foreseen Results

The results of this multilateral study will be used for selection of suitable cereal cultivars for agricultural and food industry. It will be based on the following developments: A suitable procedure for liberation of starch particles from the grain by mechanical and chemical means will be developed. The selection of the best suitable FFF technique based on selectivity, precision, accuracy and time- and cost-efficacy will be performed including procedures for data evaluation and validation. This technique will be used for characterisation of samples of barley starch particles with known environmental and genetic conditions. The obtained results will be compared in some cases with measurements by other methods. The size standards of cereal starch particles will be prepared by SPLITT procedure in lab-scale format. The developed methodology will be applicable for other research projects dealing with particles of the biological origin and should contribute to improvement of the economy of starch processing in food industry.

MULTICHANNEL ELECTROCHEMICAL BIOSENSOR FOR RAPID FOOD SAFETY MONITORING

Contract ref. :	***ERBIC15CT980910***	***EC Scientific Officer***
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9091

Project

Multichannel Electrochemical Biosensor for Rapid Food Safety Monitoring - MEBFOOD

Keywords

Enzyme, antibody, electrochemical biosensors, inhibition, prototype, supported liquid membrane extraction (SLM), flow immunoassay, fluorescence, pesticides, phenols, food

Objectives and Contents

Public concern on the food safety and the impact of the constant application of pesticides and other artificial agrochemical substances desires a wider control of contents of toxic compounds in various food products. The traditional analytical methods for low molecular weight toxic compounds such as gas chromatography and high pressure liquid chromatography are expensive because they require costly laboratory equipment, highly trained personnel, and because they are time consuming. The initial screening of toxic compounds should be technically simple, inexpensive, useful for routine analysis of a large number of samples and potentially it should be carried out directly at the sampling site. These requirements can be met by applying biosensors, which are based on an electrochemical sensor with immobilised antibody. In addition, multichannel biosensor devices providing simultaneous information on several toxic substances will considerably increase the usefulness of such an approach. The project therefore has the following objectives:

- Synthesis of new derivatives and conjugates for development of immunoreagents for analysis of toxic compounds in food
- Kinetic and equilibrium investigation of the interaction between antibodies and antigens in order to obtain antibodies recognising a group of related compounds (e.g. antibody against triazines, antibody against phenoxyalkanoic acids)
- Development of simple and cost effective multichannel biosensor arrays combining several biorecognition principles (immunoreaction, biocatalytic conversion of substrates, enzyme inhibition) on one screen-printed electrochemical strip
- Development of an on-line sample extraction immunoflow system for enhancing sensitivity of the multichannel biosensor
- Validation and application of the multichannel biosensors for monitoring of toxic compounds in key important food products as vegetable, fruit, grain, bread, beer, and milk
- Intercollaboration with the projects PL979112 and PL979027, i.e., exchange of reagents, certified food samples, prototype, joint meetings and final report.

Foreseen Results

A screening program for toxic compounds in food samples will enable a strategy to be developed for the steady improvement in food safety. The absence of rapid and efficient analytical systems has made it difficult for authorities in CCE and NIS to deal with these problems. The project will make a significant contribution to food quality monitoring in the participating states.

EMULSIONS IN FOOD INDUSTRY AS A CONTAMINANT OF THE ENVIRONMENT:HYDRODYNAMICS OF FILTRATION AND TURBULENCE ENCHANCED COALESCENCE (EFICENT)

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9098

Project

Emulsions in Food Industry and as ContamInant of the ENvironmenT: HydrodynamIcs of Filtration and Turbulence Enhanced Coalescence (EFICIENT HI FI TEC)

Keywords

Emulsions, membrane, filtration, drop motion, drop coalescence, turbulence, surfactant, drop solubilization, soil remediation

Objectives and Contents

The overall objective of the project is to unveil the factors governing the newly developed technology (which is still very much at an empirical level) for the formation of fine, monodisperse, simple and multiple emulsions through membrane filtration. This new technology is important for food and cosmetic industries, for soil remediation from organic pollutants using chemical floods, but also for other industrial applications, like oil recovery and detergent fabrication. Studies of collision and coalescence in turbulent flow, and studies of motion and stability of drops in capillaries are expected to contribute to better understanding of several fundamental phenomena in interface and colloid science. Many complex physicochemical phenomena are involved in this process, such as motion and stability of drops in constricted capillaries with complex topology in the presence of surfactants and wetting films, with drop-wall interaction; drop solubilization by micellar solutions; detachment of drops protruding from the membrane for laminar or turbulent continuous phase; collisions and coalescence of drops depending on the external driving force, the interaction forces, the kinetics of adsorption, the Gibbs elasticity and the interfacial viscosities due to the surfactant, the drop size and deformability, etc.
The project aims at:

1) Quantitative understanding of the mechanisms and interdependence of all the aforementioned phenomena, by performing a series of carefully-controlled and well-characterized laboratory experiments, and development of computer models incorporating the above mechanisms in the appropriate form.

2) Use of the results from the model studies, to carry out computer simulation of the filtration process and pollutant removal.

3) Optimization of the process and preliminary pilot plant experiments.

Foreseen Results

The deeper understanding to be gained from the successful completion of the project will increase the efficiency and reduce the cost of the new technology for the formation of fine, monodisperse, simple and multiple emulsions through membrane filtration, and will enable the practitioner to make the optimum design of the process according to the requirements of the specific application. The development of a reliable theoretical model of the motion and interactions of drops in a porous medium under partially miscible conditions will produce a powerful tool for better practice and further improvement in soil remediation from organic pollutants using aqueous surfactant solution floods.

DEVELOPMENT OF A NOVEL COST-EFFECTIVE TECHNOLOGY FOR INDIVIDUAL QUIK FREEZING OF FOODS BY HYDROFLUIDISATION (HYFLOFREEZE)

Contract ref. : ***ERBIC15CT980912***
Proposal ref. : ***PL979101***
Type : *Joint Research Project*
Duration : ***36 Months***
Start date : 01/01/1999
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9101

Project

Development of a Novel Cost-Effective Technology for Individual Quick Freezing of Foods by Hydrofluidisation.

Keywords

Fluidisation, immersion in non-freezing aqueous solutions; pumpable ice slurries; osmotic mass transfer; improved food quality, sensory properties, nutritional value; shelf-life extension; environmentally friendly coolants; recycling of freezing media.

Objectives and Contents

The primary objective is to develop improved hydrofluidisation technology for producing high quality IQF (individual Quick Frozen) foods. The sub-Objectives and contents are :
- to design and build a prototype HFM (HydroFluidisation Method) freezer and scale it up to industrial dimensions
- to specify the range of fruits, vegetables and fish suitable for HFM freezing
- to determine the thermal, rheological and osmotic properties of non-freezable liquids and pumpable slurries
- to optimise these fluids for HFM applications with respect to food quality whilst taking regard of legislative and environmental aspects
- to formulate new food products using osmotic mass transfer (e.g. dessert fruit frozen in syrup-type sugar solutions)
- to optimise the heat and mass transfer in the food and the freezing fluids. To identify anti-foaming agents improving the heat transfer
- to specify antioxidants, flavour additives and micronutrients in the freezing media for extending shelf-life and improving nutritional value and sensory properties
- to specify flexible, low thermal resistance, cheap and safe packaging or protective films for foods for which direct immersion is not advantageous
- to assess the quality of the foods frozen by HFM
- to select low-cost methods for purifying, recycling, transforming, re-using or disposing of the HFM media in an environmentally friendly way
- to transfer the HFM to the food industry, promote the benefits of the HFM and suggest other HFM applications.

Foreseen Results

This work will develop the hydrofluidisation technology for cost-effective individual quick freezing of foods. This will benefit the European frozen food industry, especially in the CEE and NIS countries where inexpensive food processing equipment is much needed. This novel technology will reduce the wastage of raw food materials, will save energy, investments, operational and labour costs and will produce better quality frozen foods.

ELECTROCHEMICAL IMMUNOSENSORS FOR CONTROL OF PESTICIDE AND MICROBIAL CONTAMINATION OF FOOD (IMMUNOSENS)

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9112

Project

Electrochemical immunosensors for control of pesticide and microbial contamination in food

Keywords

Immunosensors, rapid measurement, pesticides, micro-organisms, food monitoring

Objectives and Contents

Microbial and pesticide contamination of food products are extremely important hazard factors for human health. Therefore the development of simple techniques suitable for their monitoring is a task of great actuality nowadays. The main requirements of these techniques are high sensitivity, simple measuring procedures and short assay duration. Two new types of immunoenzyme electrodes for food quality monitoring will be developed in the framework of this project. These will be based on the following principles which will allow a significant reduction in assay duration:

1. Enzyme-channelling systems with two labels (glucose oxidase and peroxidase). These approaches have the potential to detect antigen (contaminant) - antibody binding without an absolute requirement for separation steps.

2. Water-soluble polyelectrolytes for immunoreactant immobilisation. This will permit all interactions to be carried out in solution with subsequent rapid separation of bound and non-bound species.

Screen-printing and ink-jet printing techniques will be applied to prepare electrodes for amperometric and potentiometric measurements. Stationary multi-channel sensors and portable sensors for sequential testing will be developed. Widely used pesticides (simazine, atrazine, 2,4 D) and important infectious micro-organisms (Salmonella, Staphylococcus) will be used as model antigens in the developed immunosensors. The new techniques will be compared with existing established procedures and potential fields for further
application will be characterised.

The following objectives are planned as the main milestones of the project:
- production, isolation and testing of immunoreactants for detection of pesticide and microbial contaminants; - kinetic studies of immune reactions of native and labelled antigens with antibodies;
- development and optimisation of the proposed electrochemical immunosensors;
- development of measuring devices for stationary and "on-site" analyses;
- application of the immunosensors to testing of food products (juices, fruits, vegetables, meat);
- metrological characterisation of the developed assays;
- comparison of the new assays with established chromatographic and ELISA reference techniques.

Foreseen Results

This project aims to develop new rapid immunoenzyme electrodes. Enzyme-channelling effects and inter-polyelectrolyte interactions will be applied in order to simplify assay procedures and to decrease overall assay duration. Measurement devices for stationary and "on-site" analyses will be produced. The sensors produced will be applied to sensitive, rapid detection of pesticide and microbial contamination in food. The generic nature of the approaches to be employed could be used to develop analogous immunosensors for
other food contaminants. These devices will have an impact on environmental protection and improvement of the quality of life. The immunosensors developed will be recommended for ecological and food quality control services in the NIS countries participating in the project.

Collaboration in this field will stabilise the NIS scientific potential and play an important role in the dissemination of state-of-the-art experience in biotechnology.

SOCIAL SCIENCES

THE MANAGEMENT OF INNOVATION AND THE MODERNISATION OF POST-SOVIET INDUSTRY: OBSTACLES AND OPPORTUNITIES

Contract ref. : ***ERBIC15CT981001***
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0009

Project

The management of innovation and the modernization of Post-Soviet industry: obstacles and opportunities.

Keywords

Post-Soviet industrial enterprises, personnel management, management training, survey, Russian regions, Georgia, Belarus.

Objectives and Contents

-To generate an understanding/ based on extensive empirical research, of the economic, technical and social barriers to innovation and modernization in post-Soviet industrial enterprises and to evaluate the relative importance of different obstacles

-To study the ways in which post-Soviet managers are seeking to overcome these barriers and the extent to which they are developing more effective systems of investment appraisal and implementation and forms of production and personnel management appropriate to a market economy.

-To investigate the extent to which the former system of scientific and technical research and innovation is being transformed to facilitate the development and implementation of indigenous technologies

-To identify the most appropriate forms of financial and technical assistance and management training which can further assist management in overcoming the barriers to innovation and modernization to disseminate the results of the research in the form of interim and final research reports and briefings drawing appropriate practical and policy conclusions from the research

These objectives will be achieved by:

Conducting an initial survey of 180 industrial enterprises in seven Russian regions, Georgia and Belarus to identify patterns of innovation, barriers to successful innovation and the ways in which these have been overcome

Conducting intensive case studies of 45 innovating industrial enterprises over a period of two years to monitor the process of innovation from conception to implementation.

The research will be carried out by experienced teams of economists and sociologists in seven Russian regions associated with the two leading research centers in the field in Russia, the independent Center for Comparative Labour Relations Research (ISITO) and the Center for Labour Market Studies (TsIRT) of the Institute of Economics of the Russian Academy of Sciences, and by one team each in Georgia and Belarus. The EU participants have considerable experience of research in Russia in this field and have been working collaboratively with the Russian participants for more than five years.

Foreseen Results

The principal results of the project will be a better understanding of the social and institutional barriers to technical and organizational innovation in Russian Industry and examples of best practice in enterprises, which have successfully overcome those barriers.

IMPROVEMENT OF LEGAL, ORGANIZATIONAL AND ECONOMIC CONDITIONS FOR INNOVATION ACTIVITY AS A FACTOR FOR ACTIVATING EFFECTIVE MODERNIZATION OF BRANCHES OF INDUSTRY

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0012

Project

Improvement of legal, organizational and economic conditions for innovation activity as a factor of activating effective modernization of branches of industry.

Keywords

Russia, legal conditions, organizational and economic conditions, intellectual property, modernization of industry.

Objectives and Contents

The objectives of the declared measures are:

1. Providing political and economic circles of the European Union and of the Russian Federation with analytical information on the situation in. the Russian Federation in the field of innovation activity and on the influence of this situation upon the prospects of technological cooperation of the European Union and the Russian Federation;

2. Providing the Parliament and the Governmental bodies of the Russian Federation with recommendations on the creation of legal, organizational and economic basis of the effective innovation process, aimed at modernization of the branches of industry.

In accordance with the working plan in the framework of the declared proposal, investigations of the situation in the Russian Federation will be carried out along the following main directions:

- Stimulating the innovation activity of the producers of goods and services in science effective sectors of economy;

- Financial support of the innovation activity;

- Informational support of the innovation activity;

- Providing for the industrial orientation of scientific researches;

- Intellectual property;

- Innovation activity infrastructure

Foreseen Results

Revealing the main obstacles for innovation processes activation in the Russian Federation. Revealing a set of systematically interrelated organizational and economic mechanisms, successfully used by the EU countries in the period of the beginning of economic growth, as well as of the legal basis for the effective functioning of such mechanisms. Developing recommendations on the matters of innovation policy of the Russian Federation and related to it matters of scientific, technological, industrial and economic policy, upgrading the legal basis of the innovation activity, creating and providing for functioning of effective organizational and economic mechanisms for carrying out innovation activity in Russia with regard to the EU experience.

INTACOMP INTEGRATED NETWORD OF RTD ACCOMPLISHMENTS

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0025

Project

Integrated Network of RTD Accomplishments

Keywords

Database, national RTD potential, RTD indicators, telematics infrastructure, search engine.

Objectives and Contents

The approaching accession of some of the most developed CCE countries raised questions concerning key issues of the national RTD policy and impact. Like many other, these concerns are no longer internal affairs, since they belong to the area in which these countries are supposed to reach the European standards before they can be really invited to join the European Union.

Studies conducted in this area have shown that not many such questions can be answered using solid quantitative data. The top level policy makers themselves have removed the former strict planning regime of RTD, but at the same time, regrettably, they have not established adequate data collection and evaluation mechanisms that would permit one to get an objective insight.

RTD indicators are important to policy makers of all levels, starting from managers of small industrial enterprises looking for better technology or for a prospective product, as well as to managers of venture capital who need reliable information to decrease the risk factors of their operations, and ending by parliamentary or governmental bodies who establish legal conditions, formulate supportive measures, define money flows, and take top-level political decisions influencing the RTD.

The primary objective of the proposed project is to provide a uniform database structure and access methods across the interested countries to promote exchange of information and support integration of the RTD community into the research structures of the European Union. We propose to build a network of databases containing key data about research projects sponsored with either national or international funds. We are assuming that both the data capture and update of a selected RTD sector will be done using automated tools with minimum or even no human intervention.

One of the proposed research goals is to develop a task-specific search engine which will be able to simulate a standard dialogue with the existing national databases of grant agencies or the databases of international funding entities (EC, NATO, etc.), and to extract key data reflecting the respective national participation in research projects sponsored by these entities. The usage of this tool in the context of RTD databases can be characterized as implementing a telematic service of public interest. We anticipate that the data collected during the project lifetime will establish a sufficient empirical background for a comparative analysis of RTD character in the CCE partner countries and that these data could be used to derive some conclusions about success stories which will be studied as a part of the project.

Foreseen Results

The project is supposed to create an experimental integrated network of databases holding keydata concerning selected sector(s) of the national RTD accomplishments of the CCE partner countries. A presentation standard will be established which will be enable an automated search and update of these data over the Internet using a task specific search engine. The empirical data stored in the database will be used to an analysis of the national RTD profiles and typical success stories.

INNOVATION NETWORKS AND INDUSTRIAL MODERNIZATION - A STUDY ON ARMENIA, LATVIA AND RUSSIA (ST PETERSBURG REGION)

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Proposal ref. : ***PL970026***
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0026

Project

Innovation Networks, Industrial Modernization. A Study on Armenia, Latvia and Russia (St Petersburg region)

Keywords

Industrial modernization, innovation networks, knowledge transfer, modernization policy, St Petersburg region, Latvia, Armenia.

Objectives and Contents

The planned project will analyze and support the development of innovation networks as a key element of industrial modernization in Russia (St.Petersburg region), Latvia and Armenia. It is based on the idea that in the current economic transition the prospects for industrial modernization and economic recovery in these countries will depend not only on costs and prices but even more on the qualitative, innovative and institutional factors which so far have been largely neglected. The project will draw on the research in two West European countries (Finland, Germany) to develop a conceptual model of innovation networks and business cooperation. This model will be utilized and 'tested' in the conditions of the three CCE/NIS countries.

The research will be undertaken in three steps during two years (September 1998-August 2000):

- Stage I will involve a review, elaboration and transfer of the conceptual scheme developed in the Tampere region and in Baden-Wurttemberg to establish innovation networks.

- Stage 2 will be the main phase and include multi-level analyses in the three countries. It will consist of (1) descriptions of state of national economies and their key industries, (2) analyses of regional innovation policy, (3) company-level analyses in key industries including new SMEs, (4) analyses of innovation related support institutions, and (5) analyses of coordination mechanisms for innovation policies in each country.

- The final stage 3 will involve the development of strategies to support co-operation among companies and with support organizations and the development of innovation networks in Armenia, Latvia and in the St. Petersburg region.

Foreseen Results

- the project will improve the understanding of the economic and industrial situation in the three countries, and of the innovation needs and barriers in their key industries. It will produce new knowledge about national and regional policies related to industrial innovation and modernization in these countries,

- it will examine whether and in what way experiences and models from West European regions in developing innovation networks can be transferred to East European countries/regions,

- it will support the development of innovation and cooperation strategies in the target countries both on company and on institutional level. By this it is hoped that more coherent innovation policies will develop which can boost both growth and employment.

THE MODERNISATION OF THE CONSTRUCTION INDUSTRY IN RUSSIA AND POLAND : POLICY CONDITIONS AND ORGANISATIONAL INITIATIVES FOR A SUCCESSFUL TRANSITION TOWARD A MARKET ECONOMY.

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0028

Project

EAST CON 2000: The Modernisation of the Construction Industry in Russia and Poland: Policy Conditions and Organizational Initiatives for a Successful Transition Towards a Market Economy.

Keywords

Construction industry, Russia, Poland, Best Practice.

Objectives and Contents

Overall objectives :
- To deepen the understanding of trends in the modernisation of the construction industry in Russia and Poland
- To identify, analyse and circulate information on the factors critical to a successful re-organization of companies to match the requirements of the new market
- To improve the capacity building of local institutions to support the construction industry 's transformation process and to provide local and national policy makers with the necessary insight to generate a set of policy recommendations.
- To generate content and methodological expertise to be disseminated via the training activities of the Eastern Academic partners

Operational objectives :
- To complete a study on the contextual and policy conditions and main issues in the transition of the Construction Industry in the transition toward a market economy.
- To gather interview data on the critical processes and leading edge companies in the construction industry in each of the participating countries and their relations to the existing policy scenario
- To complete at least two industrial case studies for each critical process in each Eastern European country (about 10 cases in each country) in order to identify best practice and draft "best practice notes".
- To convene three sectoral conferences on best practices in the construction Industry and the policy innovation that can support them
- To examine the implications for sectoral policy makers in the Eastern Europe countries, and for EC level policy makers and prospect EC industrial partners.

Scientific workprogramme :
- Partners will gather contextual and background data as a precursor to the case studies and cross-national comparison. Data will be collected by a literature review and interviews with relevant stakeholders in the industrial sector.
- Researchers will identify critical processes and case studies of leading edge companies, using local data collection workshops. Company case studies will be undertaken through structured and semi-structured interviews, corporate documents and reports.
- Partners will undertake a comparative analysis of field research data using Inductive Cross-Case Analysis, with reference to literature on trans-national and inter-cultural studies. They will therefore develop policy recommendations and best practice notes.

Foreseen Results

The project will develop knowledge to be used in the modernisation of Russia and Poland's construction industry. Dissemination constitutes an integral part of the research process: cycles of consultation with the Industry through the Advisory Panel and two sectoral industry conferences are an integral part of the research design. The project deliverables will be circulated as well through the partners' academic network. It will also allow the sharing of methodological knowledge between partners. Training will form one of the outputs from the research.

MODERNIZATION OF TRADITIONAL INDUSTRIES IN COUNTRIES IN TRANSITION ON THE BASIS OF THE KNOWLEDGE FROM THE RESTRUCTURING OF OLD INDUSTRIAL AREAS IN AUSTRIA AND GERMANY CASE OF SLOVENIA, HUNGARY AND POLAND

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Proposal ref. : ***PL970031***
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Start date : NYA
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0031

Project

Modernization of traditional industries in countries in transition on the basis or the knowledge from the restructuring of old industrial areas in Austria and Germany - Case of Slovenia, Hungary and Poland

Keywords

Industrial modernization, innovation policy, restructuring traditional industries, manufacturing industries, old industrial areas, Poland, Slovenia, Hungary.

Objectives and Contents

The principal objective of the proposal is to reduce the deficit in regional, technology and industrial policy, to create a know-
ledge basis for the future activities and to develop conditions and directions for the restructuring of traditional industries in
Slovenia, Hungary and Poland drawing on the experience in the EU countries Austria and Germany especially. As regards the innovative environment, technology transfer, information networks and innovation activities in enterprises. It will adapt, and not simply copy, existing forms of regional, technology and industrial policy and their instruments, as well as know-how of management of socio-economic reconversion processes to the Slovenian, Hungarian and Polish situation. The general aim therefore is the know-how transfer in this research field as a support for the process of transformation of the traditional industries in Hungary, Slovenia and Poland-An essential part of the project will consist of the diffusion of the created knowledge to different actors (to the selected enterprises, local authorities, regional Chambers of Commerce and Industry and ministries responsible for economic affairs, regional policy, technology policy, environment, employment and education).

The project consists of two parts: the empirical analysis and the elaboration of policy measures and recommendations. In the first part the experience with restructuring processes of traditional manufacturing industries in Austria and Germany will be analyzed with special emphasis on the regional dimensions of the problems (old industrial or monostructural areas). A detailed analysis of the structure of manufacturing in all five countries will be elaborated on the basis of the official statistical data. In transition countries the branches most affected by the transition process will be identified as well as their regional distribution. A survey of enterprises in the selected branches and regions with a unique questionnaire and interviews about the restructuring process in traditional industries in Slovenia, Hungary and Poland ill be done. In the second part operational policy measures and instructions will be deducted from this empirical work based on experience in the two EU-countries and adapted to the specific situation in Slovenia, Hungary and Poland.

Foreseen results

The final result of the cooperation will be the preparation of a manual (handbook) containing description of business environment suggested generic strategies of selected branches with emphasis on selection of operational technology measures and instructions for the modernization of traditional industries in the three countries in transition.

A GLOBAL APPROACH OF THE DRUGS SITUATION FOR IMPROVING THE DECISION - MAKING PROCESS IN THE FIGHT AGAINST DRUGS: BUILDING A PRACTICAL MODEL OF SOCIAL AND ECONOMIC GLOBAL DIAGNOSTIC.

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0033

Project

A Global Approach of the Drugs situation for improving the Decision-Making in the fight against drugs: Building a practical model of social and economic global diagnostic.

Keywords

Illicit drugs methods for decision makers, model for a global diagnostic, Slovenia, Czech Republic, Bulgaria, Romania.

Objectives and Contents

The global approach consists of not considering the drugs phenomenon as a specific (isolated) phenomenon but as an aspect of many other general phenomena developed in contemporary societies. This conception - which is innovative in the drug's Seld - leads to the design of a multidisciplinary drugs strategy (masterplan) integrating the intervention of different sectorial specialists. But this overall strategy must be based on a global multidisciplinary diagnostic (objective analysis of the reality in the field). Such a global diagnostic is not the adding up of the sectorial points of view. It is a different way of using sectorial knowledge.

The objective of this project is to conceive and develop such a global diagnostic framework, based not on theoretical issues but on empiric findings of field studies, which already exist but are not related. This research will be developed in different countries (three Member States and 5 CCE) in order to check the validity of some general hypothesis or the necessity to introduce some specific factors, according to national or regional characteristics. The expected result is a harmonization of the methods that experts and decision-makers could apply, and an easier transnational understanding of common or similar situations.

In short, a global multidisciplinary diagnostic has to involve:-

- the correlation between facts and mechanisms analysed by the sectorial approaches;
- the facts and processes where the drug situations are correlated with other phenomena, not perceived as a part of the drugs specific problematic (for example, economy, employment, education, city planning, international trade agreement, control of bank activities, etc.)
- the factors (other than the illicit traffic) determining the transnational aspect of the drugs scene.

Among all these drug related situations (to make an inventory) we have to check if and what we may consider as general processes (as observable in the (CCE as in the UE) in order to try a conceptual ordering (model) of this social and economic characteristics and mechanisms.

Foreseen Results

This comprehensive model will be practically translated in a methodological framework (guidelines or protocol) for global diagnostic. This methodological tool will be disseminated among the experts and decision-makers by publications, proposals of training modules and using future action-projects. Taking into account the multidisciplinarity of the project, the team of partners was built on geographic and disciplinary criteria with the view to cover the main field of necessary competencies, including Electronic Data Processing.

MODERNISATION OF FOOD PROCESSING INDUSTRY THROUGH RECIPROCAL TECHNOLOGY TRANSFER EU-LITHUANIA-RUSSIA

Contract ref. : ***ERBIC15CT981005***
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0035

Project

Modernization of food processing industry through reciprocal technology transfer EU - Lithuania- Russia

Keywords

Lithuania, Russia, food processing industries, casestudies, technology transfer, technology adaptation, database.

Objectives and Contents

The consumers in the former socialist countries use a considerable amount of their incomes on food (nearly 60%). The prices are relatively high and the qualities low in comparison with EU-countries. The productivity of all parts of the agricultural system is much lower than, for example, the Danish and Dutch productivity. The explanation is easy. Probably it is also easy to suggest a technology transfer from EU to the East. However experiences since 1989 exhibit that such kinds of transfer are complicated mechanism. The main objective of the proposed project is to build a model for supporting directed, sustainable and efficient transfers. The empirical examinations are restricted to the food processing industries of Lithuania and Russia (Nizhni Movgorod region). These two regions are of comparable size, number of inhabitants and industries, and had comparable economic indicators in the Soviet Union. It gives opportunities for regional comparisons.

The proposed project collects data from nearly all enterprises by means of a very detailed questionnaire. The data are stored in a common, easily accessible base with good facilities to produce statistics. For-this very reason the survey has its own right. Subsequently, the project observes a sample of constructive entrepreneurs during a period of 10 months. The case studies focus upon vital decision-making processes in relation to procurement of new technologies.

The theoretical model for technology transfer is built in several steps. Analyses of the empirical data are carried out, mainly cross sectional analyses - either into a region or between regions - are fulfilled. Different objectives are pursued. The results cover:
a) Systemic, structural and entrepreneurial conditions for productive and constructive entrepreneurship in food processing industries,
b) The need of technological improvements,
c) Conditions for successful transfer and for motivation of transfer, and
d) Possibilities of reciprocal application of transfer experience in Lithuania and Russia.

All the analytical results are pieced together and become the elements of a model for technology transfer. The model is a base for assessment of possibilities for modernization of an industry, for industrial innovation and for safeguarding RTD potential through its involvement in the process of technology transfer. Furthermore, the model shows how governmental and other institutional set-ups influence entrepreneurship and adaptability of technology. It is a step to a better judgment of when, why and how EU transfer will be directed towards an efficient and sustainable development and modernization of the recipient countries.

Foreseen Results

The following results will be produced during work on the project
Model of an efficient support system for technology transfer and assimilation from EU to Russia and Lithuania.
Evaluation of possibilities for reciprocal application of EU technology transfer experience in Lithuania and Russia.
Conclusions of comparative analysis of the conditions affecting the efficiency of technology transfer from EU to Lithuania and Russia. A set of propositions for the policy makers about improvement of conditions for technology transfer in Lithuania and Nizhni Novgorod region. A list of technologies that are the most necessary, economically accessible and technically compatible with the needs and demands of food processing industry in Lithuania and Nizhni Novgorod region. Empirical and comparative data about systemic, structural and entrepreneurial situation of food processing industry in Lithuania and Nizhni Novgorod region.

DYNAMIK; SOZIOKULTURELLE ZUSAMMENHAENGE UND SUBJEKTIVE BEDINGUNGEN DER VERBREITUNG ILLEGALER DROGEN UNTER JUGENDLICHEN IN DER NACHKRIEGSZEIT. VERGLEICH DER ENTWICKLUNGEN IN DER UKRAINE, IN DEUTSCHLAND UND IN SPANIEN (INTERDRUG)

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0036

Project

The dynamic, socio-cultural context and subjective conditions of the spread of illegal drugs amongst young people since the Second World War. A comparative investigation of the development in the Ukraine, in Germany and in Spain.

Keywords

Ukraine, illegal drugs, historical and comparative analysis, drug addiction

Objectives and Contents

The spread and use of illegal drugs are side effects of social modernisation and with increasing frequency such cases are to be found in many post-Soviet societies like the Ukraine. Because of the official negations of a drug problem under the USSR regime neither sufficient methods for the securing of information or for scientific research, nor effective strategies for the social dealing with the use of drugs have been developed until now.

The project's objective is an extensive investigation into the spread and use of illegal addictive drugs in the Ukraine. The examination is historical and based on the post-Second World War period - from 1950 until the present day - and it is put into a comparative context by relating it to the developments in Germany and Spain. The historical perspective assumes a latent spread of drugs in the USSR. The use of illegal drugs will be set in context to the whole 'drug culture' of a society. The comparative perspective shall show the European dimension and illuminate the specific character of each country and culture as regards their respective drug problems.

The consumption of illegal drugs is viewed as a risk-driven behaviour which is typically found in young people and strongly related to their personal development. The individual is, at this stage, influenced by specific subjective, social and socio-cultural factors. The investigation will analyse the spread and conditions of drug consumption through a representative, quantitative analysis. This analysis will then be extended in further qualitative investigations.

Foreseen Results

The research shall contribute to the development of effective and socio-culturally suitable preventive strategies. To set the Ukraine situation against a European context the project will show comparative material and evaluations of prevention of drug addiction in Germany and Spain.

STEFAN CEL MARE SECTORIAL TECHNICAL EFFICIENCY AND FINANCIAL ANALYSIS A COMPARATIVE EVALUATION LOOK FOR MOLDAVIAN AND ROMANIAN ECONOMICS

Contract ref. : ***ERBIC15CT981007***
Proposal ref. : ***PL970039***
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0039

Project

Sectorial Technical Efficiency and Financial Analysis a Comparative Evaluation Look for Moldavian And Romanian Economies (STEFAN CEL MARE)

Keywords

Moldova, Romania, technological progress, best performing firms, privatization.

Objectives and Contents

The main objective of this project is to have a better evaluation of the economic performance of the productive activity in Moldova and Romania during the on-going process of transition. The identification of efficient enterprises or the factors hindering the productive activity of inefficient ones is perhaps the first condition for innovation and modernization of different sectors of the productive activity.

Depending on the available data, we will select a subset of sectors, which will be examined in detail. In order to attain our main objective we propose first, an extensive analysis of technical efficiency and effectiveness over at least ten years before the dramatic changes of the former regimes. We will also check the existence of technological progress and compare its evolution with that of the efficiency. Secondly, we continue the analysis of technical efficiency and realize a detailed comparison between public and recently privatized firms for the same selection of sectors. Moreover, we switch from technical to allocative efficiency and try to select the best performing firms within a specific sector in order to provide a model for other firms. Finally, we aim to track out similarities and differences between the two neighbouring countries.

Adapting methodologies lying at the frontiers of Economics, Statistics and Mathematics, the project proposes to use first-ranking research potential in a new research direction, in the benefit of the local research community and policy makers. The project aims to build up two East research teams composed on certified researchers and consolidated with three young (1+2) doctoral students partially trained in West centers. These teams could represent the core of a future network of East researchers working in the important field of the quantitative evaluation of performances within an economy.

For the scientific production, we expect to provide between three and six high quality papers to be submitted to wide recognized reviews in the field. Moreover, an international workshop will be organized at Bucharest with expected participants from other East research centers, renowned West research centers and policy makers from Moldova and Romania. Finally, another important- aim is to build an extensive catalogue of computer programs supporting the application, continuation and expansion of the research performed within this project.

Foreseen Results

We wish to create a link between university and policy makers in these two countries by closing the gap between the market and technical evaluation of the firm in and after the transition period. We expect that the work on this project will create a network of researchers willing to pursue their collaboration after the achievement of this project. An indirect contribution of this proposal is that results of our research could be further used in other East countries switching gradually to market economy. This possible extension of our proposal could be a small step towards the future co-operation of these economies with West European ones.

COMPARATIVE ANALYSIS OF FACTORS AND STRATEGIES OF MODERNIZATION FOR ENGINEERING ENTERPRISES IN ECONOMIES UNDER TRANSITION: EXAMPLE OF RUSSIA AND UKRAINE

Contract ref. : ***ERBIC15CT981012***
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0042

Project

Comparative Analysis of Factors and Strategies of Modernisation For Engineering Enterprises In the Economies under Transition: Example Russia and Ukraine. (Joint Research Project)

Keywords

Engineering enterprises, industrial modernization, innovation policies, regional comparison, Russia, Ukraine.

Objectives and Contents

The objectives of the project are to:

- Analyse and describe, the influence of technological; organisational and managerial; marketing and information factors on the process of modernisation;
- Provide a comparative analysis between companies in the two NIS and between companies in NIS and EU countries;
- Develop and disseminate a set of recommendations on improving the strategies of modernisation at the enterprises.

A specific emphasis will be given to engineering enterprises in Voronezh Region, Russia and Lugansk, Ukraine.
Theoretical and methodological background will be prepared in co-operation for research of each factor. Studying of technological factors will be directed by the Institute for World Economics and International Management, Germany, information factors - by University of Macedonia, Greece, marketing factors - by University College Galway, Ireland, organisational and managerial factors - by Voronezh State University, Russia. Each partner mentioned above is specialised in particular field of social sciences relevant to corresponding factor of modernisation. Such specialisation will assist in-depth research. The following research activities will be conducted: literature review, infrastructure review, expert survey, enterprise survey, preparing case studies. Empirical research at the NIS enterprises will be conducted by research teams from Lugansk and Voronezh. For studying each factor a separate research team will be organised both in Voronezh and Lutgansk. It is important to note that the NIS institutions participating in the project have close relationships with regional enterprises. This can guarantee successful implementation of the empirical part of the project. The empirical results got than will be translated into English and jointly analysed. Based on this analysis a set of recommendation will be worked out for mangers of the NIS enterprises, policy makers, managers of the EU enterprises.
A set of co-ordinating measures is foreseen to provide effective co-operation. One of the main features of the proposal is that the partners have experience of co-operation in the EU funded projects. Voronezh State University have already collaborated with University of Macedonia and University College Galway in the TACIS and TEMPUS projects.

Foreseen Results

The results of the proposed co-operation will be disseminated in Russian and English in the following ways:
- Preparing books
- Preparing case studies based on the data of the NIS enterprises
- Designing special course Modernisation and Anticrisis Management: preparing dissertations in the relevant research field
- Opening WWW Site devoted to the project.

ILLICIT DRUG TRAFFICKING IN COUNTRIES OF CENTRAL EUROPE:A COMPARATIVE STUDY OF STRATEGIES AND POLICIES IN THE CZECH REPUBLIC, HUNGARY AND LITHUANIA IN RELATION TO THE EUROPEAN U.

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0045

Project

Illicit Drug Trafficking in Countries of Central Europe: a comparative study of strategies and policies in the Czech Republic, Hungary and Lithuania in relation to the European Union.

Keywords

Czech Republic, Hungary, Lithuania, drug trafficking, drug control policies, legal framework.

Objectives and Contents

This research proposal seeks to investigate to what extent the current drug control strategies in the Czech Republic, Hungary and Lithuania are driven by the European Union's external policies on drug control. Further, it will explore the socio-economic conditions and mechanisms that generate a favorable environment for the illicit trafficking of drugs. Its primary objectives consist of the following three strands:

1. To assess the capacity of each of the three states under study to respond to the challenges of drug trafficking. This will involve an analysis of the strategies and policies adopted to combat organized crime and drug trafficking. In this context we will examine the effectiveness of the existing legal framework to combat this activity, the efficiency of the resources available, the efforts made to establish special law enforcement agencies and the result of international co-operation between such agencies in this area.

2. To examine the social and economic mechanisms involved and consequences of the prevalence of drug trafficking activities for the three countries under study. This strand will consist of an examination of the economic and social factors which contribute to the spread of the traffic and consumption of drugs in the Czech Republic, Hungary and Lithuania and also an analysis of the impact of such activities on society and on its economy reflected in the high levels of drug dependency.

3. To undertake comparative research. The strategies and policies of combating drug trafficking in each country will be compared with the recommendations and action plans issued by the European Commission and the Council of Europe with the view of addressing the apparent disequilibrium existing between the external and internal pull factors which influence the drug policies in the Czech Republic, Hungary and Lithuania.

Foreseen Results

The project will provide a critical analysis of the current strategies and policies for the control of drug trafficking in the Czech Republic, Hungary and Lithuania, and put forward policy suggestions for best practice. This will contribute to national policy
decision-making and sustainable change, as well as enhancing policies of co-operation and transfer of knowledge between the case-study countries and more generally within the wider European framework.

ORGANISATIONAL FACTORS OF RUSSIAN RESEARCH CENTERS - RESTRUCTURATION : THE CREATION OF NEW HIGH TECHNOLOGY SMES

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0046

Project

Organizational Factors of Russian Research Centers' Restructuration: the Creation of New High Technology SMEs.

Keywords

Russia, defense research, privatization, research institutes science cities.

Objectives and Contents

The proposed research deals with a very sensitive issue: how to prevent pauperization of scientific and research potential in Russia and the effective modes of diffusion to local domestic industry.
The project intends to analyze in-depth the organizational innovations that are being implemented by the institute Vector to preserve fundamental research potential while developing market outputs in new high technology SMEs it controls. The organization developed by Vector combines industrial or even market outputs (R&D) and scientific activity (S&T) (international projects in fundamental research, seminars, publications, etc.).
The objective of this project is to analyze in-depth a particular form of organization that is coping with the so called "privatization process" of science, identify the necessary changes in order to prevent pauperization of S&T assets, and verify the adaptability of the model to other research organizations, in particular in the nearby science city of Akademgorodok, Novosibirsk.
Relying only on private funds research institutes are now engaged in a process of "science privatization". This in several cases means a pauperization of the institutes, of Russian S&R potential: insufficient funds are devoted to the renewal of long term fundamental researches for which the market is not ready to pay. How to raise funds with market oriented research while still supporting fundamental research and scientific activities is a major concern today for the institutes and for Russian science.
A successful re-organization, still in due course, has been followed by a former Defense State Research Institute: "Vector". This institute has developed an innovative and hybrid organizational concept to deal with scientific and market objectives. It is completely committed to guarantee the success of the case studies and the proliferation of the results.
To carry-out the scientific project work a consortium composed by five organizations: CERNA (F), Vector State Research Institute (RU), Novosibirsk State University (RU), GHEA (I) and Institute of Economics and Industrial Engineering (RU), has been set-up. This confers the task force the scientific and technical competencies necessary to carry-out successfully the research. Moreover, external technical support will be supplied by CNRS of Lyon while local Novosibirsk government will assist the researchers in the project work carried out in Russia.
The proposed working scheme is based upon on an effective distribution of tasks, roles and responsibilities between the Russian research units and the European task force. The three Russian institutes will be responsible for preparing and organizing the case studies and research work concerning local authorities and environment. The European teams, on the other hand, will prepare the theoretical basis and framework to bring forward the economic analysis of the institutes and the linked industrial apparatus. All partners will participate to the case studies. Homogeneity of the joint research work is guaranteed by the Coordinator's experience in carrying out research projects and by full scientific cooperation and exchange between the five organizations.

Foreseen Results

The main result will consist on the elaboration of a model of industrial organization well suited to fit the challenges that research institutes have to face in Russia and Eastern Europe. This model will be based on the casestudy of the Research Institute Victor. The secondary result will consist on recommendations about the conditions and possibility of replication of the model and on the public policy on possibilities to improve the model.

TELEMATICS AND COMMUNICATIONS TECHNOLOGY INDUSTRIAL COMPARATIVE STUDY (TACTICS)

Contract ref. :	***ERBIC15CT981010***
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0048

Project

Telematics and Communication Technology Industrial Comparative Study Tactics.

Keywords

Advanced Communication Technology, Bulgaria, Romania, FYR of Macedonia, innovation, modernization, restructuring.

Objectives and Contents

The project comprises a social sciences analysis of the supply and use of Advanced Communication Technology and Telematics in Bulgaria, Romania and FYR of Macedonia in comparison with Western European progress and the needs of a competitive market economy. This is a policy oriented empirical socio-economic research project, providing a comparative analysis of the effect on the transformation process and restructuring of the traditional industries under the conditions of adaptation to, and integration with, the European and world market.

The research will describe the state of art in supply and use of communication technologies and telematics in the three Balkan countries in the context of the administrative economy of the recent past. It will analyze the progress in the field of communication technologies and telematics in the 1990s, formulating the possible future strategies in the field as prerequisites for improving the conditions for innovating and modernizing the countries' industries.

The study is confined to the three Balkan countries, which up to the end of 1996 belonged to the so-called 'second pattern' of East-European transition towards market economy, which unlike the 'first pattern' (Poland, Czech Republic, Hungary) is characterised by slowing down the reforms, lack of privatization, a limited access to credits and imposing suppressive restrictions on the independent economic agents. The work will differentiate the common and steady features of this 'second pattern' of delayed transformation and point to the specifics of each of these countries so as to help them follow a pragmatic policy of innovation and modernization.

The research is based on the Techno-Economic Network (TEN) approach as an extension of network analysis to situations where technical change is a key variable. The empirical study of TEN dynamics is based on qualitative and quantitative research methodologies and will combine case-study analyses and a focused survey with text analysis and secondary analysis of available statistical and economic data.

The study will identify the key innovative technologies in the sector of computer technologies and telematics with potential for modernizing of the traditional industries. It will provide representative empirical information and an assessment by the managers and R & D personnel of this industrial sector of the effectiveness of the legislative basis and the government policy, their views of the major problems and difficulties facing the modernization of traditional industrial sectors and its integration into the European and world market. The case studies of the behavior of the economic agents in the selected industrial sector will reveal the patterns and strategies of a successful economic behavior, especially of an innovation-oriented one. Expert conclusions will be produced by the project's authors, which will recommend measures for improving the policy and jurisdiction in the sphere of innovation and industrial modernization and for encouraging effective co-operation on a regional and European level.

Foreseen Results

Business leaders in the sectors addressed may use the project recommendations to propose to their governments. This may lead to the adoption of policies and legislation, which will enable business to thrive and accelerate two way trades between Eastern and Western Europe. Improvement in trade with the outside world is the project objective, this being the only hope for economic revival in the Balkan countries.

Project Index

Keywords Index

A

B

C

D

E

F

G

H

I

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y

Z