

Community Research on Climate Change and Health: From FP5 to FP7

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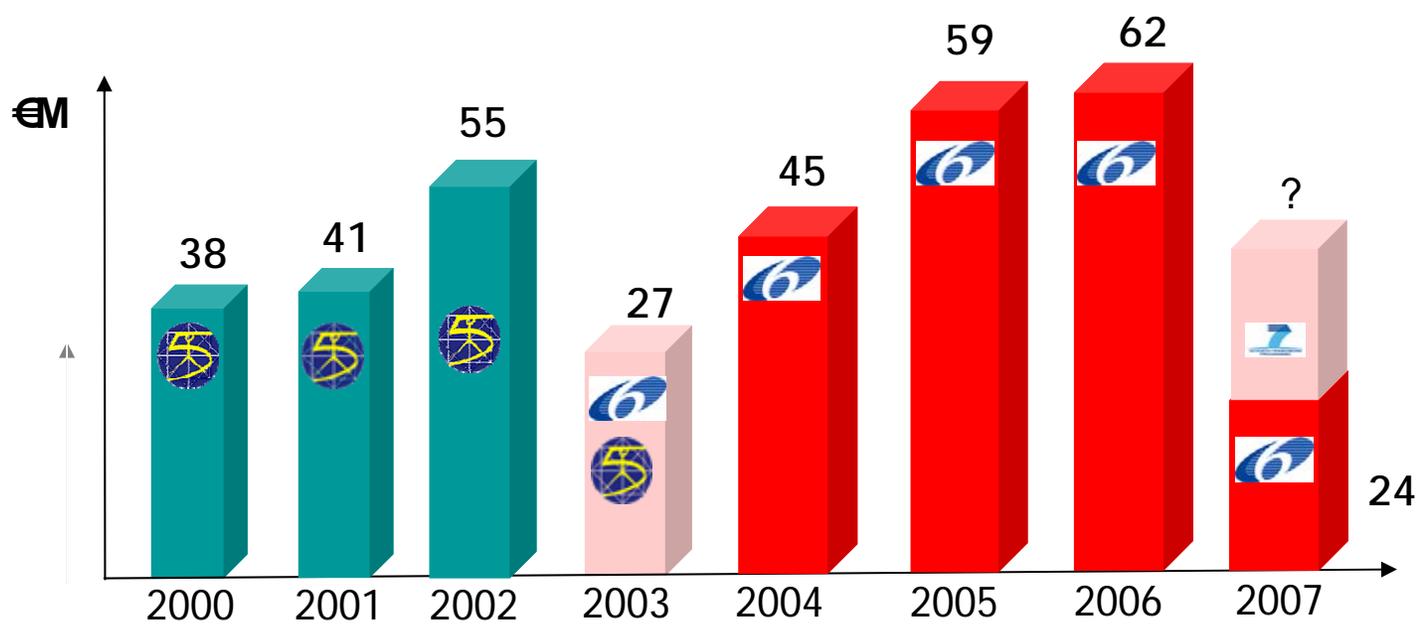
EUROPEAN
COMMISSION

Community Research

➤ Past/ongoing EU projects related to climate change and health



	FP5: 1998-2002	FP6: 2002-2006
Major funding from	<ul style="list-style-type: none"> Key-action 4 (Environment and health) 	<ul style="list-style-type: none"> Thematic priority 5 (Food quality and safety-Environmental health risks area) Thematic priority 6 (Global change and ecosystems) 'Priority 8' (Scientific support to policy) 
Nb projects, budget	92, ~€40M per annum	46, ~€50M per annum
Main areas covered	<ul style="list-style-type: none"> Human health impact (reproduction, neurodevelopment, cancer...) of environmental chemicals (endocrine disruptors, heavy metals...), air pollutants; EMF; UV light; noise... 	<ul style="list-style-type: none"> Integrated risk assessment (chemicals, combined stressors) including cost/benefit, risk/benefit analyses Networks on allergy/asthma, endocrine disrupting chemicals/environmental cancer



Project focus	Number of projects		Total budget (EC contribution)	
	FP5	FP6	FP5	FP6
Chemicals and health impacts	43	12	79.6 (56%)	70.3 (38%) ↓
Air pollution and health impacts	18	2	24.9 (17%)	1.5 (0.8%) ↓
Electromagnetic fields and health impacts	8	1	12.3 (8.7%)	1.5 (0.8%) ↓
Noise and health impacts	4	0	6.2 (4.3%)	0 (0%) ↓
Climate change and health impacts	1	2	0.8 (0.6%)	16.5 (9%) ↑
UV/radiation and health impacts	5	0	5.8 (4%)	0 (0%) ↓
Water-related health impacts	3	4	4.9 (3.4%)	11 (6%) ↑
Integrated environment and health risk assessment	7	6	7.3 (5.1%)	58.1 (31.6%) ↑
Cost/benefit; risk/benefit analyses	0	10	0 (0%)	25.2 (13.7%) ↑
Total	90	37	143	184

CLIMATE CHANGE AND HEALTH EFFECTS: FP5 PROJECTS

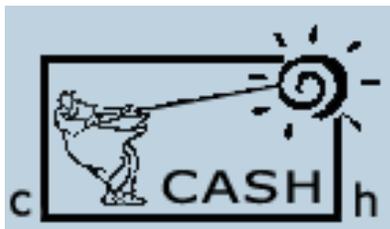
Objectives



PHEWE
Assessment and prevention of acute health effects of weather conditions in Europe
 [EC contribution €0.8M - www.epiroma.it/phewe]

Results

- ✓ The effect of temperature on mortality showed a significant association of mortality to both low and high temperatures in all cities studied
- ✓ The percent variation in mortality was higher for respiratory and cardiovascular mortality and the effect increased with age
- ✓ The pooled analysis showed a statistically significant effect for total and cardiovascular causes of death in all age groups while for respiratory and cerebrovascular mortality a statistically significant effect was observed only for the elderly



cCASHh
Climate change and adaptation strategies for human health
 [EC contribution €1.4M - www.euro.who.int/ccashh]

- ✓ Framework on climate change health adaptation established
- ✓ Systematic reviews on the health effects of climate change carried out
- ✓ Climate change health adaptation prioritised
- ✓ Survey of 24 countries on extreme events prevention and adaptation done
- ✓ Cost benefits of heat adaptation addressed
- ✓ Future developments discussed
- ✓ Publications: see project website

1999 2000 2001 2002 2003 2004 2005 2006

2007 2008 2009 2010 2011

FP5→

FP6→

FP7→





Impetus for increased spending on E&H issues: European Environment and Health Action Plan [EHAP] adopted in 2004 → 38 projects funded by the Sixth Framework of Research (2002-2006) with a total EC contribution of €210M → results starting to become available

Research actions in the Environment & Health Action Plan

- **(Action 5) Integrate and strengthen European environment and health research** → make full use of the results from EU and nationally funded projects in policy development

- **(Action 6) Target research on diseases, disorders and exposures** → improve knowledge of the links between environmental exposures and four priority diseases and to strengthen the integration of the research results into relevant policy measures.
 - ✓ asthma, allergy
 - ✓ neuro-immune disorders
 - ✓ cancers
 - ✓ Endocrine-disrupting effects

- **(Action 7) Develop methodological systems to analyse interactions between environment and health** → research into the adequacy of current risk assessment and possible development of new methodologies to assess better the risks coming from environmental factors, and to improve economic valuation and impact analyses of prevention strategies

- **(Action 8) Ensure that potential hazards on environment and health are identified and addressed** → address issues such as
 - ✓ climate change and health (e.g., spreading of emerging diseases)
 - ✓ water pollution and health (e.g., emerging pathogens in drinking water)
 - ✓ nanoparticles and health



Research supporting Action 5: Integrate and strengthen European environment and health research

Aim for 2004-2006	Supporting research activities	
<p>✓ Analyse the final results of relevant Community funded research projects for policy making, consolidate research results</p>		<p>HENVINET <i>Health and Environment Network</i> [Coordination action; EC contribution €3.2M; www.henvinet.eu] - will review and consolidate ongoing research results in the four priority areas (Action 6)</p> <p>✓ Impact of climate change and air pollution on allergy/asthma</p>
		<p>CAIR4HEALTH <i>Clean air for health - research needs for sustainable development policies</i> [Specific support action; EC contribution €0.4M; started in February 2007]</p> <p>✓ The topic of climate will be considered in relation to air pollution and how this in turn impacts on health</p>

Aim for
2004-2006

Supporting research activities

✓ Study
causes of
asthma and
allergy

GA2LEN *Global allergy and asthma
European network* [Network of
excellence; EC contribution €14.4M;
www.ga2len.com]



✓ WP 'Environment': comparative
analyses of existing data as regards
allergy and asthma in various **climate**
and environmental situations

✓ Focus on traffic-generated air
pollution

✓ Standardisation of methods of
exposure assessment

Research supporting Action 7: Develop methodological systems to analyse interactions between environment and health

Aim for 2004-2006	Supporting research activities
<p>✓ Development of integrated risk assessment methodologies and models for evaluating cumulative effects, interaction between stressors and their influence on human health</p>	<div style="display: flex; align-items: center;">  <div> <p>NOMIRACLE <i>Novel methods for integrated risk assessment of cumulative stressors in Europe</i> [Integrated project; EC contribution €10M; http://viso.jrc.it/nomiracle]</p> <ul style="list-style-type: none"> ✓ Develop new methods for assessing the cumulative risks from combined exposures to several stressors (including mixtures of chemical and physical/ biological agents) ✓ Increase knowledge on the transfer of pollutants between different environmental compartments, including how these processes are influenced by natural stressors such as climate, and on the impact of cumulative stressors, including chemical mixtures ✓ Health impact of chemicals and drought </div> </div>
<p>✓ Development of methodologies, techniques, and models to address complexity in environment/health interactions (multi-causality of disease, toxicogenomics, low dose, long-term exposure, combined effects, etc)</p>	<div style="display: flex; align-items: center;">  <div> <p>INTARESE <i>Integrated assessment of health risks from environmental stressors in Europe</i> [Integrated project; EC contribution €12M; www.intarese.org]</p> <ul style="list-style-type: none"> ✓ aims at producing a new integrated risk assessment framework, based on the full chain approach Specifically, ✓ will review and develop the tools, (modelling and monitoring) methods, methods needed for integrated assessments; ✓ will apply the methods developed to seven policy areas (transport, housing, agricultural land use, water, household chemicals, waste and climate); ✓ will design a web-based integrated assessment toolbox or system which will be the operational means to assess environment and health risks </div> </div>

Aim for 2004-2006

Supporting research activities

✓ Extension and validation of methods and tools for environment and health impact assessment, cost/benefit analysis and the identification of sources of pollution

HEIMTSA *Health and environment integrated methodology and toolbox for scenario assessment*

[Integrated project; EC contribution €5M -will start February 2007]

Main aim:

✓ Improve evaluation of environment and health impacts of policy scenarios in key sectors (transport, energy, agriculture, industry, households and waste treatment and disposal) by extending health impact assessment (HIA) and cost benefit analysis (CBA) methods and tools

Main deliverables:

✓ A methodology for HIA and CBA using the full chain approach
✓ A related modular integrated assessment system (IAS) for implementing the methodology Europe-wide

✓ Results from using the IAS to apply the methodology for health impact and cost-benefit assessment of realistic policy scenarios at the European level

✓ Development of HIA/CBA capability in Europe

Will take into account some effects of **climate change**

Aim for 2004-2006

Supporting research activities

✓ Extension and validation of methods and tools for environment and health impact assessment, cost/benefit analysis and the identification of sources of pollution



2-FUN *Full-chain and uncertainty approaches for assessing health risks in future environmental scenarios* [Integrated project; EC contribution €1.7M - started in February 2007]

Main aim:

✓ Provide decision-makers with mechanistic tools to support the analysis of current and future trends in environmental conditions and pressures that cause health problems

Specific objectives:

- ✓ Develop methodologies for building and assessing future realistic environment and health scenarios
- ✓ Develop methodologies allowing the integrated assessment of multi-stressors, multi-routes and multi-exposure for various target groups (especially children)
- ✓ Improve uncertainty models
- ✓ Apply a full-chain approach for health risk assessment to specific case-studies of general interest to the EU
- ✓ Includes case study in Portugal: Long-term management of air pollution (dust from Sahara, ozone, particulates); relationship to **climate** change - how it will impact health. Downscaling methods (from global to local)

Aim for 2004-2006

✓ Extension and validation of methods and tools for environment and health impact assessment, cost/benefit analysis and the identification of sources of pollution



Supporting research activities

DROPS *Development of macro and sectoral economic models aiming to evaluate the role of public health externalities on society* [Specific targeted research project; EC contribution €1.3M - www.nilu.no/DROPS]

Objectives:

- ✓ Identify emission reduction measures and their costs for PCBs, dioxins and indoor air pollution, and review such information for ozone and heavy metals
- ✓ Evaluate benefits of such measures in terms of reduction of health impacts
- ✓ Evaluate uncertainties related to single health estimates
- ✓ Review existing non-health benefit aspects of emission reductions
- ✓ Based on the cost benefit analysis approach used for the CAFE programme and on its review, develop an integrating methodology that would allow a split between economic and social benefits, both direct and indirect
- ✓ Assess the macro-economic impacts of the constructed scenarios for key economic variables broken down by economic sector
- ✓ Construct and evaluate a number of emission abatement scenarios using the integrated system for cost benefit analysis
 - emission scenarios will be estimated for the emissions in 2010 and 2020. Three emissions scenarios will be developed:
 - Business as usual without **climate** policies (BAU-climate) scenario
 - Business as usual with **climate** policies (BAU+climate) scenario
 - Maximum feasible technical reduction (MFTR) scenario
- WORKSHOP IN BRUSSELS September 10, 2007

Research supporting Action 8: Ensure that potential hazards on environment and health are identified and addressed

Aim for 2004-2006	Supporting research activities
<p>✓ Address topics such as climate change and health including infectious diseases, emerging threats, impact of extreme events</p>	<p>MICRODIS</p> <p>MICRODIS <i>Health and socio-economic impacts of extreme events</i> [Integrated project; EC contribution €5M - Will start February 2007]</p> <p><u>Specific aims:</u></p> <ul style="list-style-type: none"> ✓ Develop the scientific understanding of social, economic and health impacts of disasters (earthquakes, windstorms, floods) in developed and developing societies through theoretical and conceptual models ✓ Evaluate existing methods and tools for assessing impact of extreme events ✓ Establish a sound evidence-base of field data on disaster impacts ✓ Develop tested and robust methods for an integrated analysis of the health, social and economic impacts of extreme events on human populations ✓ Make field survey dataset available to researchers worldwide through the creation of an online searchable database

Aim for 2004-2006	Supporting research activities	
<p>✓ Address topics such as climate change and health including infectious diseases, emerging threats, impact of extreme events</p>		<p>EDEN <i>Emerging diseases in a changing European environment</i> [Integrated project; EC contribution €11.5M - www.eden-fp6project.net]</p> <p><u>Main aims:</u></p> <ul style="list-style-type: none"> ✓ Catalogue European ecosystems and environmental conditions linked to global change able to influence the spatial and temporal distribution of pathogenic agents (Tick-borne pathogens, rodent-borne viruses, Leishmaniasis, West Nile Virus, malaria etc) ✓ Provide predictive emergence and spread models including global and regional preventive, early warning, surveillance, and monitoring tools and scenarios
		<p>POLYSOA <i>Secondary organic aerosols serve as condensation points for cloud droplet formation and play an important role in global climate and atmospheric chemistry</i> [Specific targeted research project; EC contribution €0.8M; http://polysoa.web.psi.ch]</p> <p><u>Main aim:</u></p> <ul style="list-style-type: none"> ✓ Investigate the nature and effects of high-weight polymers found in atmospheric aerosols, contributing to the understanding of their effects both in terms of climate change and risk to health.

Aim for 2004-2006	Supporting research activities
<p>✓ Address topics such as climate change and health including infectious diseases, emerging threats, impact of extreme events</p>	<p>CIRCE <i>Climate change and impact research: the Mediterranean environment</i> [Integrated project; EC contribution €10M; http://www.ncmr.gr/sesame/Web-presentations/CIRCE-overview.pdf]</p> <p><u>Main aims:</u></p> <ul style="list-style-type: none"> ✓ Investigation of (i) interactions of global and Mediterranean climates; (ii) mechanisms of variations of radiative properties of the atmosphere and radiative fluxes; (iii) interactions between cloudiness and aerosols; and (iv) modifications in the water cycle ✓ Evaluation of the economic and social consequences of climate change (impacts on migration, tourism and energy markets, indirect impacts on the economic systems) ✓ Investigation of the consequences on agriculture, forests and ecosystems, human health and air quality ✓ Assessment of the variability of extreme events in the future scenario and their impacts
	<p>ENSEMBLES <i>ENSEMBLE-based predictions of climate changes and their impacts</i> [Integrated project; EC contribution €15M; http://www.ensembles-eu.org]</p> <p><u>Main aims:</u></p> <ul style="list-style-type: none"> ✓ Employment of a systematic probabilistic approach to climate change forecasting, through a system which has been validated on seasonal and decadal timescales ✓ Provision of the first realistic assessment of the practical predictability of climate on the decadal timescale ✓ Application of forecasting to a range of applications in health, agronomy, hydrology and water management, food security, energy, etc. ✓ One objective related to health: Completion of probabilistic assessments of long-term climate change impacts and impacts at seasonal to decadal timescales for the core activities: crops, water resources, forests, energy, insurance and human health

Aim for 2004-2006	Supporting research activities
<p>✓ Address topics such as climate change and health including infectious diseases, emerging threats, impact of extreme events</p> 	<p>CIRCLE Climate impact research coordination for a larger Europe [ERA-NET; EC contribution €0.2M; http://www.circle-era.net]</p> <p><u>Main aims:</u></p> <p>Integration and progress of four activities of what is already being done at the national level:</p> <ol style="list-style-type: none"> 1. Learning from each other: interdisciplinary approach to integrate indicators of climate change including climatology, meteorology, hydrology, biology, soil sciences, marine sciences and forestry, building technologies, sociology and medicine. The latter may cover, for example, heat waves and possible spread of vector-borne infectious diseases 2. Learning will involve exchange of knowledge and experiences on the national programmes, their scientific focus and their management practices 3. This leads to planning - defining tangible ways for the national programmes to support each other on specific issues. It should then be possible to set up working links by connecting the national programmes for their mutual benefit 4. The fourth and major strand is to fulfil the means of an ERA-NET by establishing transnational research programmes and joint calls, which aims at a stepwise alignment of the national research agendas



Website on FP5 E&H projects:
Currently 79 final reports
(sections on air pollution,
cancer, EMF, chemicals...)

- http://europa.eu.int/comm/research/quality-of-life/ka4/index_en.html



Websites on major projects funded by
'*Food quality and safety*'
and
'*Global change and ecosystems*'
thematic priorities

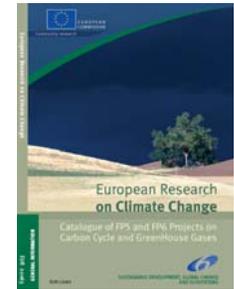
- <http://europa.eu.int/comm/research/fp6/projects.cfm?p=5>
- www.cordis.lu/sustdev/environment/projects.htm

European Commission -
sponsored environmental research:
News and updates
on environmental research

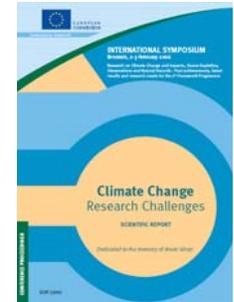
- http://europa.eu.int/comm/research/environment/index_en.htm

- (Planned) Will list all projects with relevance to the E&H Action Plan, funded by FP5 and FP6

European research on climate change: Catalogue of FP5 and FP6 projects on carbon cycle and green house gases



Climate change - Research challenges
(Workshop proceedings)



Workshop on European research on flood risk management: A contribution to the concerns generated by the summer 2005 floods in Europe (workshop proceedings)



http://ec.europa.eu/research/environment/newsanddoc/other_pubs_en.htm

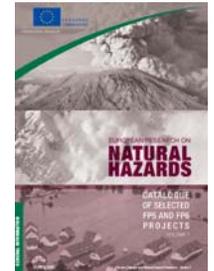
*EU research on environment and health -
expanding knowledge to improve our well-being*



*Global change and ecosystems: EU research
for the environment*



*European research on natural hazards :catalogue of
selected FP5 and FP6 projects*



*Climate change impacts on the water cycle, resources
and quality (workshop proceedings)*



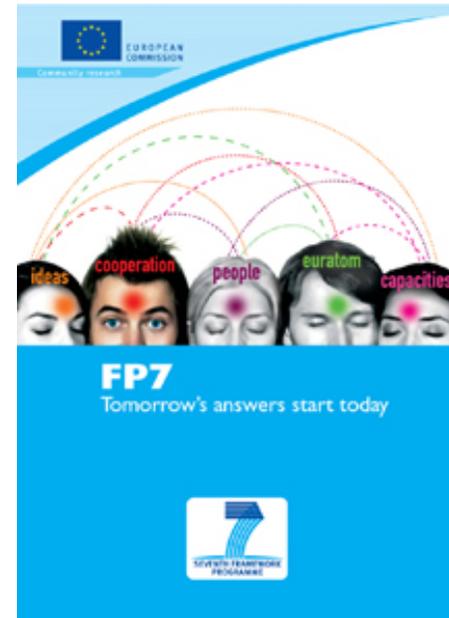
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Community Research

➤ FP7



- ✓ Duration increased from five to seven years
- ✓ Annual budget increased (€5 billion → €9.9 billion at the end of the FP; in 2013 expenditure 75% higher than in 2006)(average increase 40% per annum)
- ✓ 'Environment' budget: around €200 M in 2006, around €250M in 2010; around €350 in 2013.
- ✓ New structure: cooperation, ideas, people, capacities
- ✓ Basic research to be funded via the 'Ideas' programme
- ✓ Flexible funding schemes. New: support for frontier research. No cost models. Increased EC contribution for S/T (up to 75%)
- ✓ Joint Technology Initiatives (long-term public-private partnerships in fields of high industrial/policy relevance)
- ✓ Simpler procedures (submission of documents, audit certificates, subcontracting, evaluation criteria etc). Redress procedure.
- ✓ Logistical and administrative tasks → external structures

Cooperation - Collaborative research: research activities carried out in trans-national cooperation in 10 thematic areas - budget proposed €32.4 bn

Ideas - Frontier Research: "investigator-driven" research carried out across all fields by individual teams in competition at the European level - €7.51 bn

People - Human Potential: Strengthening the human potential in research and technology in Europe - budget € 4.75 bn

Capacities - Research Capacity: research infrastructures; regional research driven clusters; unleashing the full research potential in the EU's "Convergence" regions; research for and by SMEs; "Science in Society" issues; "horizontal" activities of international co-operation - budget €4.10 bn

Joint Research Centre (S/T support to EU policies): €1.75 bn

Joint Research Centre (nuclear)

Euratom

	THEME	PROPOSED BUDGET (€ bn)	TOPICS RELATED TO CLIMATE CHANGE
1	HEALTH	6.10	
2	FOOD, AGRICULTURE AND FISHERIES, AND BIOTECHNOLOGY	1.94	+
3	INFORMATION AND COMMUNICATION TECHNOLOGIES	9.05	+
4	NANOSCIENCES, NANOTECHNOLOGIES, MATERIALS AND NEW PRODUCTION TECHNOLOGIES	3.48	
5	ENERGY	2.35	+
6	ENVIRONMENT (INCLUDING CLIMATE CHANGE)	1.89	+
7	TRANSPORT (INCLUDING AERONAUTICS)	4.16	+
8	SOCIO-ECONOMIC SCIENCES AND THE HUMANITIES	0.62	
9	SECURITY	1.40	
10	SPACE	1.43	
	TOTAL	32.4	

Climate change, pollution and risks

- ✓ Pressures on environment and climate
- ✓ Environment and health
- ✓ Natural hazards

Sustainable Management of Resources

- ✓ Conservation and sustainable management of natural and man-made resources
- ✓ Evolution of marine environments

Environmental Technologies

- ✓ Environmental technologies for observation, prevention, mitigation, adaptation, remediation and restoration of the natural and man-made environment
- ✓ Technology assessment, verification and testing

Earth observation and assessment tools

- ✓ Earth observation
- ✓ Forecasting methods and assessment tools

 Multidisciplinary research on interactions of environmental and climate risk factors and human health is needed to support the Environment and Health action plan and the integration of public health concerns and disease characterisation related to emerging environmental risks.

 Research will focus on:

1. the impact of global change (climate change, land use, globalisation)
2. multiple exposures via different exposure routes
3. identification of pollution sources and new or emerging environmental stressors and vectors (indoor and outdoor environment, issues related to urban environment, air pollution, electromagnetic fields, noise, exposure to toxic substances) including development of integrated risk assessment and methodologies for hazardous substances), and their potential health effects.

 Research will also

1. aim at integrating research activities on human bio-monitoring regarding scientific aspects, methodologies and tools to develop a coordinated and coherent approach;
2. It will include European cohort studies, with attention to vulnerable population groups, and methods and tools for improved risk characterisation, assessment and comparisons of risks and health impacts
3. develop bio-markers and modelling tools taking into account combined exposures, variations in vulnerability and uncertainty
4. deliver advanced methods and decision support tools (indicators, data bases, cost-benefit and multi-criteria analyses, health impact assessment, burden of disease and sustainability analysis) for risk analysis, validation and linkage of models and systems, and for management and communication which are supporting policy development, assessment and monitoring.

Activity 6.1. CLIMATE CHANGE, POLLUTION, AND RISKS

Sub-activity	Budget available (€M)	Nb of topics open
6.1.1. Pressures on environment and climate	36	10
6.1.2. Environment and health ✓ Indoor air pollution in Europe: an emerging environmental health issue ✓ Environmental factors and their impact on reproduction and development ✓ European network on human biomonitoring ✓ European cohort on air pollution ✓ Health impacts of drought and desertification including related socio-economic aspects ✓ ERA-NET for environment and health ✓ Geographical information systems in support for environment and health research	19	7
6.1.3. Natural hazards	13	6
Activity 6.2. SUSTAINABLE MANAGEMENT OF RESOURCES		
6.2.1. Conservation and sustainable management of natural and man-made resources and biodiversity	26	9
6.2.2. Management of marine environments	21	9

✓ Go to: http://cordis.europa.eu/fp7/home_en.html, download Workprogramme (FP7-ENV-2007-1)

Activity 6.3. ENVIRONMENTAL TECHNOLOGIES

6.3.1 Environmental technologies for observation, simulation, prevention, mitigation, adaptation, remediation and restoration of the natural and man-made environment	38	10
6.3.2. Protection, conservation and enhancement of cultural heritage, including human habitat	7	3
6.3.3. Technology assessment, verification and testing	5	2

Activity 6.4. EARTH OBSERVATION AND ASSESSMENT TOOLS FOR SUSTAINABLE DEVELOPMENT

6.4.1. Earth and ocean observation systems and monitoring methods for the environment and sustainable development	21	11
6.4.2. Forecasting methods and assessment tools for sustainable development taking into account differing scales of observation	11	6

Activity 6.5. HORIZONTAL ACTIONS

6.5.1. Dissemination and horizontal activities	3	1
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To be published in November 2007

- ✓ Topics under consideration (indicative topics given in the 1st WP)
- ✓ Budget similar to the 1st call
- ✓ Policy drivers (amongst others):
 - 6th Environmental Action Plan and associated Thematic Strategies (air, waste, marine, soil, pesticides, urban environment)
 - Action Plans on Environmental Technologies and Environment and Health
 - European directives - Water Framework, REACH (chemicals), CAFE (air quality), INSPIRE
 - Renewed Sustainable Development Strategy
 - Green paper "Towards a Future Maritime Policy"
 - Recent Commission Communication on "Halting the loss of biodiversity by 2010"
 - Etc.
- ✓ International collaboration beyond EU welcome

- Main political priority of current Commission
- Research is needed at EU level in order to:
 - ✓ Support EU international commitments and initiatives such as:
 - Kyoto and Montreal Protocols, and post-Kyoto Climate Initiatives
 - UN Conventions (Desertification, Biological diversity,..)
 - International Strategy for Disaster Reduction
 - World Summit on Sustainable Development
 - ✓ Contribute to:
 - Intergovernmental Panel on Climate Change (IPCC)
 - Global Earth Observation System of Systems (GEOSS)
 - International Programmes (e.g., IGBP, WCRP)
 - ✓ Contribute to EU policies such as:
 - 6th Environmental Action Plan and associated Thematic Strategies
 - European Climate Change Programme
 - Action Plans on Environmental Technologies and Environment and Health
 - Water Framework Directive

*On EUROPA
website*

■ http://ec.europa.eu/research/future/index_en.cfm



RESEARCH

On CORDIS website



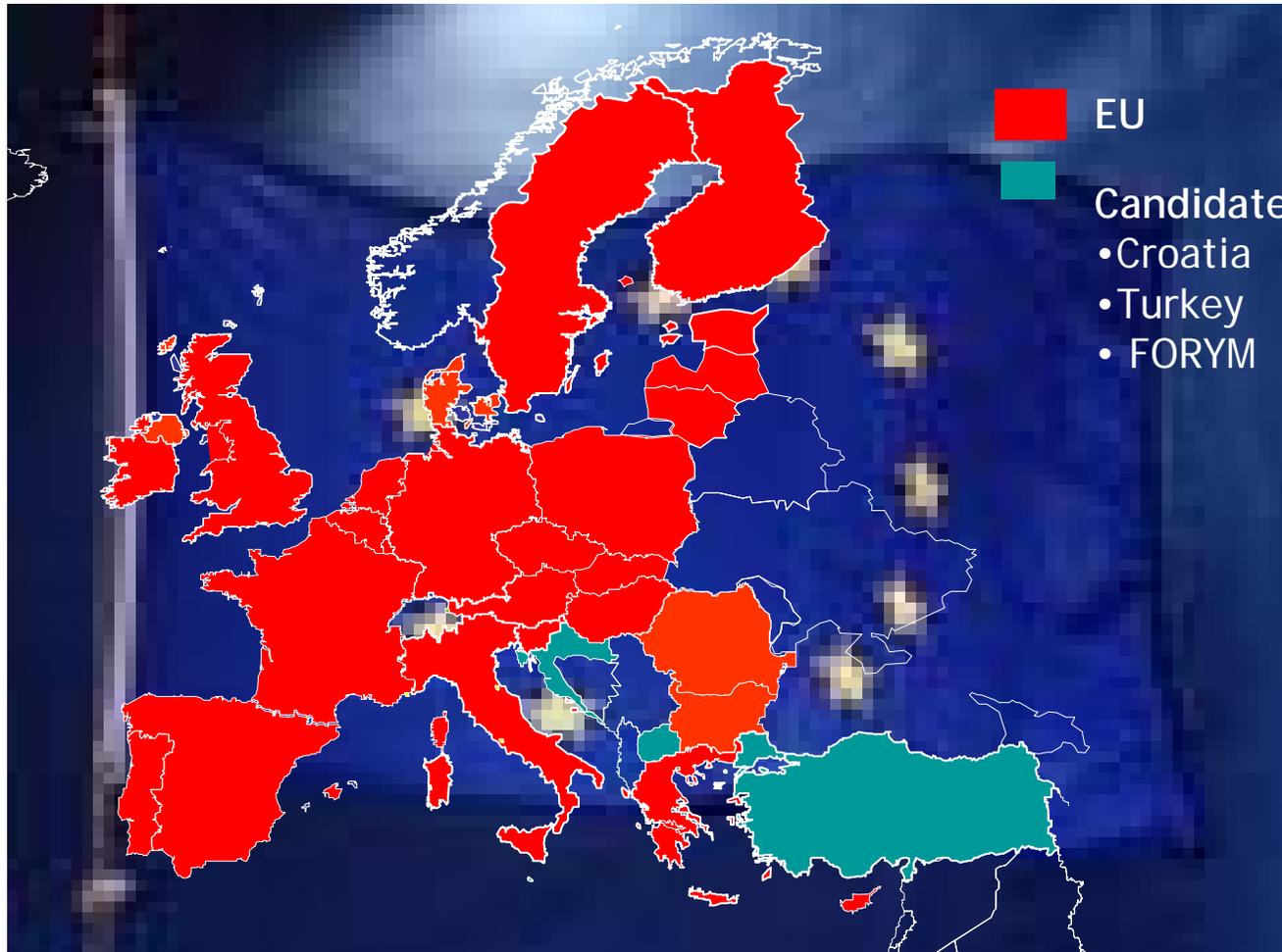
■ <http://cordis.europa.eu/fp7/>

*E&H: Open
Stakeholder
Consultation:
Priorities for
Environment &
Health Research in
FP7*

■ http://ec.europa.eu/research/environment/newsanddoc/article_3907_en.htm



Thank you for your attention



This paper was produced for a meeting organized by Health & Consumer Protection DG and represents the views of its author on the subject. These views have not been adopted or in any way approved by the Commission and should not be relied upon as a statement of the Commission's or Health & Consumer Protection DG's views. The European Commission does not guarantee the accuracy of the data included in this paper, nor does it accept responsibility for any use made thereof.