BELGIAN FEDERAL PUBLIC PLANNING SERVICE
SCIENCE POLICY

rue de la Science 8 ▪ Wetenschapsstraat
B-1000 BRUSSELS
Tel. +32 2 238 34 11 ▪ Fax +32 2 230 59 12
www.belspo.be

Research programme
"Science for a Sustainable Development"
(SSD)

RESEARCH AREA: ENERGY

Call for proposals 3

February 2007

Closing dates

Expression of interest (obligatory): Friday 16 March 2007

Research proposals: Thursday 5 April 2007 at 3:30 p.m.

INFORMATION FILE FOR USE BY PROPOSAL SUBMITTERS

TABLE OF CONTENTS

FOREWORD

- This document contains all information useful to the teams wishing to participate in the call for research proposals for the research area **Energy** of the **"Science for a Sustainable Development" research programme**.

- The Public Planning Service Science Policy ("PPS Science Policy") supervises and coordinates the Programme at both the scientific and administrative levels.

- The call is for proposals for **3-year** research projects, prepared by **interdisciplinary networks of 2 to 5 teams** belonging to at least two separate Belgian scientific institutions, including at least one university institution.

- The call is intended for **Belgian university institutions, public scientific institutes, non-profit research centres, and specialised consulting offices**. The participation of specialised consulting offices is limited to a maximum of 25% of the total budget requested by the network.

- The project may require punctual expertise which can be delivered in **subcontracting** form. Such subcontracting may under no circumstances amount to more than 10% of the total budget requested by the network.

- If it brings in an added value to the project and to the development of Belgian expertise, submitters may propose a cooperation with a **non-Belgian universities or public research institutes** (except for international institutions such as the Joint Research Centre).
  This participation will take place on a **co-funding** basis. The funding of non-Belgian partners by PPS Science Policy will under no circumstances amount to more than 20% of the total budget requested by the network. The non-Belgian partner is responsible for the co-funding, from other sources, for at least the same amount as the amount asked from PPS Science Policy.[1]

- The research network must be able to tackle the problem addressed on the national scale. Hence, cooperation between partners from **different Communities or Regions** is encouraged.

- The personnel funded in the project **must be recruited under an employment contract**. Thus, no scholarship student can be taken on in the framework of the project.

- This call offers the possibility of using earth observation data via cooperation with the Space Research and Applications Service and for additional research in the framework of international commitments of the federal government via cooperation with the Service for International, Interfederal, and Interdepartmental Coordination of PPS Science Policy.

[1] For the participation by the "Université du Luxembourg" or by a public research institute from the Grand Duchy of Luxembourg, the "Fonds National de la Recherche Luxembourg" disposes of a budget of 270.000 euro for co-funding the research activities of Luxembourgian partners. In order to know more about the conditions of co-funding by the "Fonds National de la Recherche Luxembourg", Luxembourgian candidates should contact Mr Carlo Duprel (carlo.duprel@fnr.lu, Tel: +352 26192537, Fax: +352 26192535, www.fnr.lu) as soon as possible and preferably before 9 March 2007.

- Expressions of interest and proposals must be submitted in **English.** Proposals must be accompanied by a summary in the coordinator's language. If the submitters deem it useful, a version of the proposal may also be submitted in the coordinator's language.

- The submitters are obliged **to comply with the modalities** laid out in this document. Otherwise PPS Science Policy will not consider their proposal.

- Interested parties must submit an expression of interest, using exclusively the form available on the PPS Science Policy website (http://www.belspo.be), no later than **Friday 16 March 2007. Only those who submit an expression of interest may later submit a complete proposal.** The expressions of interest will be used by PPS Science Policy **only** in order to **seek foreign experts for the evaluation of the research proposals.**

- The proposals must be sent **in five copies** to the following address:

PPS SCIENCE POLICY
RESEARCH PROGRAMME "SCIENCE FOR A SUSTAINABLE DEVELOPMENT"
CALL 3
WETENSCHAPSSTRAAT 8 RUE DE LA SCIENCE
1000 BRUSSELS

The proposals must **also be sent in electronic form** to:

SSD_call3@belspo.be

The proposals (paper and electronic versions) must reach PPS Science Policy no later than **Thursday 5 April 2007 at 3:30 p.m**.

- Closing dates:

Expressions of interest: Friday 16 March 2007

Research proposals: Thursday 5 April 2007 at 3:30 p.m.

1.1 Context

The following elements of the international, European, and national contexts may act as important beacons for maintaining economic growth, appropriate social development, and protection of the environment. They offer a frame of reference for the various actions planned within the Programme.

1.1.1 At the international level

- The Amsterdam Treaty, which notably emphasises the necessity of integrating the environmental dimension into the definition and implementation of the various policy guidelines of the European Union.

- The Lisbon Strategy, whose objective is to position the European Union as the world's most dynamic and competitive knowledge-based economy, via a balanced economic, social, and ecological renewal. An underlying assumption is that the development of a top-quality scientific potential is indispensable to creating a knowledge-based economy. The European Council (Brussels, March 2005) is giving renewed impetus to the Lisbon Strategy aimed at growth and employment in a context of sustainable development where the role of knowledge and innovation is reconfirmed.

- The strategy of the European Union for sustainable development – the Göteborg Strategy (internal and external dimensions), and its current reform.

- Belgium's various commitments in the framework of different international Conventions and Agreements[2], the recommendations formulated by various international organisations[3], and all the European directives, strategic plans, implementation plans... with which Belgium must comply in the areas involved.

- The efforts been made for some time now with regard to the creation of a European Research Area (6th Framework Programme, 7th Framework Programme), in particular the strengthening of cooperation at the level of research projects and programmes (Networks of Excellence, ERA-NETs).

- The positioning of international institutions such as the European Commission regarding basic research as an essential link within the innovation process. Combining basic research - targeted research - multidisciplinary approaches allows developments taking into account all parameters necessary for the creation of new services, new technologies and new products.

- The initiatives of the OECD and other international organisations concerning the dissemination of scientific information and data. The idea is that information and data exchange form the basis for

[2] Agenda 21, the Implementation Plan of the WSSD (World Summit on Sustainable Development), the Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, the Vienna Convention and the Montreal Protocol, the Convention on Long-Range Transboundary Air Pollution (LRTAP), the Convention on Biological Diversity (CBD), the Antarctic Treaty and the Madrid Protocol, the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic Ocean, the Bonn agreement, the antipollution activities at European level, the IMO conventions (International Maritime Organisation), the Aarhus Convention, the Millennium Declaration of the UN, the Doha Declaration of the World Trade Organisation (WTO), the Frankfurt Charter, the Helsinki Agreement on Health and Environment…

[3] International Labour Organization (ILO), World Health Organisation (WHO), Organisation for Economic Cooperation and Development (OECD)...

the development of cooperations and give added value to individual actions. The participation of states implies that they support both the production of information (and hence research) and its structuring.

1.1.2 At the national level

- The priorities of the government coalition agreement of 10 July 2003, in particular those mentioned in the following chapters:

  - The chapter "Environment, Mobility, and Sustainable Development", in which the following problems are mentioned: environment, mobility, consumer protection, and food safety and, more specifically, the implementation of the Kyoto Protocol, research on and development of renewable energy sources, a renewed multidisciplinary approach to the mobility problem, active support to global biodiversity, progress on sustainable development policy, the development of an integrated product policy, protection of the North Sea...

  - The chapter "Two Hundred Thousand New Jobs" concerning the introduction of new measures to keep older citizens working, to improve the quality of work, and to prevent work-related accidents and occupational illnesses...

  - The chapter "Oxygen for Knowledge and Enterprise", in particular efforts devoted to new incentives for research and development, further liberalisation of energy markets, better protection of consumers (encouraging responsible consumption, discouraging excessive debt loads, etc.).

  - The chapter "A More Equitable World", postulating that Belgium wishes to introduce an active policy for fair world trade and will strive for a more humane globalisation.

- The Belgian position with regard to the European Spring Summit (Brussels, 25 and 26 March 2004), which among others asserted the following:

  - *"The revision of the Sustainable Development Strategy of the European Union by the end of this year will be an occasion to give a new impulse to priority environmental themes such as sustainable transport, climate, energy, natural resources, public health and biodiversity..."*

  - *"The European Union must continue to play a pioneering role on the international level with regard to environmental protection and must make the necessary efforts in order to strengthen international "governance" in the environmental area, to implement the Millennium Declaration and the objectives established in Johannesburg, to work on a common framework in order to assure the follow-up of the most important UN conferences and to strive for implementation of the Kyoto Protocol."*

  - *"Belgium is a proponent of the Commission's Environmental Technologies Action Plan, an ideal instrument for integrating the three pillars of sustainable development."*

- The Belgian position at the European Spring Summit *(Brussels, 22 and 23 March 2005)* recognizing, along with the other Member States, the necessity of re-launching the Lisbon Strategy. *To meet these challenges, Europe must build new competitive advantages by developing* ***synergies between the economic, social, and environmental dimensions;*** *it must lay special emphasis on* ***knowledge and innovation***.

- The governmental declaration of October 2005 and notably the points that concern **reviving our economy** (stimulating the entry of young people into and avoiding the early departure of older workers from the workforce, stimulating innovation and creativity, making the price of energy reasonable for everybody) and the **new social contract** (raising awareness about what constitutes a healthy, balanced diet, post-2010 discussions on revising the Kyoto Protocol, tax incentives in favour of the use of biofuels for reducing greenhouse gases generated by the transport and distribution sectors, continued work on REACH...).

- The 2005-2008 National Programme for Reforming the Lisbon Strategy, aiming for more growth and more employment, adapted by the « Comité de Concertation Gouvernement fédéral - Gouvernements des Communautés et des Régions » on 26 October 2005. This notably concerns **reinforcing synergies between growth and environmental protection**.

- The various policy plans and policy strategies which are being implemented or being prepared on the national and federal levels, such as the National Environment and Health Plan (NEHAP), the National Climate Plan, the National Ozone Plan, the Federal Sustainable Development Plan, the National Mobility Plan, the National Biodiversity Strategy, the National Nutrition and Health Plan...

- The various (sectoral and trans-sectoral) policy plans and policy strategies elaborated at the level of the Regions and the Communities.

- The decision of the Council of Ministers of 6 February 2004 to proceed in 2007 with the setting up of a Belgian summer base in Antarctica.

- The Government's commitment to achieving the '3% objective' concerning research and development, one of the pillars of the Lisbon Strategy.

- The position of PPS Science Policy within the Belgian research landscape, which offers possibilities for:

  - the analysis of trans-sectoral or horizontal themes corresponding to the competences of different federal departments;

  - the analysis of problems managed at different levels of authority (federal, Regions, Communities).

1.2 Objectives of the Programme and Implementation modalities

1.2.1 Strategic and operational objectives

From a **strategic** perspective, the objectives of the Programme are:

- to preserve and develop the scientific potential in various strategically important areas, with the objective of reducing scientific uncertainties and anticipating future needs for knowledge;

- to offer the authorities of the country the scientific support required for the preparation, implementation, and follow-up of a supranational, federal, regional, or local policy in and between these areas;

- to offer the Belgian research potential in the areas involved the possibility of integrating itself into the various research initiatives at the European and international levels, in particular within the European Research Area.

From an **operational** perspective, the proposed Programme will contribute to developing scientific knowledge and instruments (databases, models, concepts, indicators, etc.) aiming to:

- the analysis of processes: understanding, monitoring, evaluating, and forecasting processes and their mutual interactions which constitute the basis of the functioning of both anthropogenic and natural systems;

- the study of impacts: evaluating the effects of changes in/the evolution of processes and their mutual interactions at the environmental, social, and economic levels;

- the development, follow-up, and evaluation of (existing and/or future) policy measures, on the basis of criteria such as efficiency, feasibility, acceptability… Among other things, the research will study policy measures focused on prevention, adaptation, remediation, management…

1.2.2 Diversified implementation

To fulfil these objectives, the Programme provides a diversified approach which:

- combines **sectoral**, **trans-sectoral,** and **integrated** approaches to the concerned issues;

- encourages **interdisciplinary** research so as to offer support to decision-making on the basis of an integration of different dimensions, perspectives, etc. of the issues concerned and to promote dialogue and information exchange between scientists, decision-makers, and other involved actors;

- offers space for **oriented basic research** and **targeted research actions**:

  - **oriented basic research** will anticipate needs, especially at policy level, by playing a future-oriented and/or alarm-sounding role and by eliminating specific uncertainties, in order to offer a scientific basis for decision-making. Oriented basic research also contributes to (inter)national research efforts.

  - **targeted actions** aim to formulate, within a relatively short time span, answers to specific policy issues at the (inter)national level. This may involve applied research, exercises integrating scientific results, proposals for harmonising, standardising data and information…

- offers possibilities for the **internationalisation of Belgian research**, via:

  - the opening up of this Programme to foreign researchers;

  - initiatives promoting cooperation and synergies between national thematic research programmes, such as ERA-NETs (European Research Area –Networks). PPS Science Policy is currently involved in a number of ERA-NET projects[4]. This opens the way to developing and implementing joint transnational activities such as joint calls, project clustering, etc.;

[4] ERA-NET TRANSPORT (transport research), MARINERA (marine sciences), BIODIVERSA (biodiversity research), AMPERA (Accidental Marine Pollution), EUROPOLAR ERA-NET (polar research), SKEP (Science based knowledge for environmental policy), CIRCLE (Climate Impact Research Coordination for a Larger Europe). (http://www.cordis.lu/coordination/era-net.htm)

- support for the participation of Belgian researchers in international and supranational research programmes and networks, such as those of the European Science Foundation, the European Union, the International Energy Agency, the United Nations, the International Council for Science, etc.

- promotes **cooperation between research projects** funded within the different research areas of the Programme and/or in the framework of other initiatives of PPS Science Policy when these are mutually complementary or demonstrate common areas of interest (**clustering**). The aim is to ensure greater coherency in research and to give the research added value in specific fields.

1.3 Research priorities

The priority research areas of the present Programme are linked to the national and international context described above. The whole set of priority research areas was chosen because of the need to address the complex, global, interrelated problems underlying a sustainable development policy. This choice is a response to strategic needs, at different levels of authority, for policy-supporting research and to the challenge of maintaining and developing national scientific expertise in complex and strategically important areas.

The **priority research areas** are:

- **Energy**
- **Transport and mobility**
- **Agro-food**
- **Health and environment**
- **Climate (including Antarctica)**
- **Biodiversity (including Antarctica and the North Sea)**
- **Atmosphere and terrestrial (including freshwater) and marine ecosystems (including Antarctica and the North Sea)**
- **Transversal Research**: In order to better translate/operationalise the concept of sustainable development, in and between the priority areas, **transversal and generic research** is necessary.

The goal of the research actions is to support specific decision-making in relation to both sector-related and trans-sectoral problems. The Programme thus promotes **interactions between the priority research areas**, so as to respond to common and complex problems such as air pollution (tropospheric ozone, aerosols…), environment-health relations, the impacts of genetically modified organisms (GMOs), the life cycle of products and services, renewable forms of energy, the challenge of globalisation, the integrated management of coasts and basins...

The research must take into account the (complexity of) interactions between the priority research areas. This constitutes an essential guideline throughout the programme (calls for proposals, project selection and management, the valorisation of research results).

For this are planned:
- the integration of interactions and common themes in the appropriate calls;
- joint calls between priority research areas;
- the "clustering" of projects covering different aspects of common and complex problems.

Within these priority research areas, the Programme encourages the submission of proposals dealing with **standardisation**.

The priority research areas and their mutual interactions are described in **Annex I** to this document. Each research area is developed in detail in the corresponding call.

1.4 Continuity with SPSD I, SPSD II, the "Workers' Healthcare" and "Standardisation" programmes

The research programme "Science for a Sustainable Development" is the continuation of the first and second Scientific Support Plan for a Sustainable Development Policy (SPSD I (1996-2001) and SPSD II (2000-2005)).

Compared to SPSD I and II, the Programme integrates new themes, namely "Health and Environment" and "Standardisation". These themes build upon the previous programmes "Workers' healthcare" and "Standardisation and Technical Regulation", which both formed part of the "Scientific Support Plan for integrating the concepts of quality and safety of production environments, processes, and goods into a context of sustainable development" (1998-2003).

On the one hand, all submitters of research proposals **must take account of the research activities conducted in the previous programmes** (see www.belspo.be/fedra).

On the other hand, a **research proposal that is a continuation of a project** funded in the framework of the aforementioned programmes must **clearly describe the relationship of the new proposal to the previous project and its added value** with respect to it. PPS Science Policy will provide the experts in charge of the scientific evaluation of the proposals (see point 4.2) with the relevant English-language material (final and/or interim scientific reports, findings of evaluations, etc.).

These elements will be taken into consideration when evaluating the research proposals.

1.5 Complementarities with other research actions

The research will be performed taking into account:

- the other (previous and/or current) research actions of PPS Science Policy:
  - the research programmes Information Society, Belgian Coordinated Collections of Micro-organisms (BCCM), Social Cohesion, Agora, Earth Observation Research Programme (STEREO), Interuniversity Attraction Poles (IUAP), Technological Attraction Poles (TAP), Action in Support of the Federal Authority's Strategic Priorities, Society and future, etc.;
  - research within the federal scientific institutions.

- other research actions carried out at the federal, regional or community levels.

According to the priority research areas of the Programme, the calls for proposals will establish more direct links with some of these research actions (see e.g. point 3.4).

1.6 Indicative calendar of the calls for proposals

Taking into account the resources made available for the period 2005-2009, various calls for proposals will be launched with regard to the different research areas of the Programme, in conformity with the following indicative timetable:

	2005	2006	2007	2008	2009
Energy		call 2	call 3	(call 5)	
Transport and mobility		call 2		(call 5)	
Agro-food		call 2		(call 5)	
Health and environment		call 2		(call 5)	
Climate (incl. **Antarctica**)	call 1		(call 4)		
Biodiversity (incl. **Antarctica** - **North Sea**)		call 2		(call 5)	
Atmosphere, terrestrial (incl. **Freshwater**) **and marine ecosystems** (incl. **Antarctica** - **North Sea**)					
Atmosphere	call 1		(call 4)		
Terrestrial ecosystems		call 2		(call 5)	
Marine ecosystems		call 2		(call 5)	call 6
Transversal research		call 2		(call 5)	

Calls:

- **Call 1**: call closed
- **Call 2**: call closed
- **Call 3**: call open; projects of 3 years
- **Call 4**: publication planned in 2007; projects of 2 years (targeted research actions)
- **Call 5**: publication planned end 2007 - beginning 2008; projects of 2 years
- **Call 6**: publication planned end 2008 – beginning 2009; projects of 2 years (targeted research actions)

Call 3 : uses the remaining budget of call 2 for the research area 'Energy'.
(Call 4) – (Call 5) : these calls will only be launched if the budgets will be available.

2. CONTENT OF THE PRESENT CALL: ENERGY

2.1. Context

The right to energy for all is an essential dimension of sustainable development ; energy has become a first necessity good allowing, among others, a life which conforms to human dignity. However, our increasing consumption creates environmental and health problems, especially in the developing countries.

The gross domestic energy consumption is increasing from year to year in Belgium, as in Europe and worldwide. If nothing is done to reverse the trend, the European Commission estimates that energy consumption could rise in Europe by another 10% over the next 15 years (the 2005 Green Book). According to the International Energy Agency (IEA), the world energy demand could be 20% higher in 2030 than in the early 2000's.
For Europe this leads to increased reliance on outside sources of energy, principally fossil fuels, with its consequences on supply security, the environment and health, geopolitical equilibria, the economy, fuel prices and on equitable access to energy. In the longer term, with the joint prospect of climate change and exhaustion of certain resources, these stakes could be increasingly felt. An active, sustainable energy policy implies taking all these stakes into account while managing the supply-and-demand policy.

2. 2 Research Topics

Three priority research topics have been distinguished in the research area 'Energy' of the SSD programme: 'Sustainable Energy Policy', 'Renewable Energies' and 'Energy Efficiency and Demand Management'. These three topics were open during call 2 in 2006.

For the research topic 'Sustainable Energy Policy' there were no projects selected during call 2 and the topic 'Energy Efficiency and Demand Management' was only partly covered. Since this call uses the remaining budget of call 2 for the research area 'Energy' (see points 1.6 and 3.1), the call is only open for research projects concerning the research topic 'Sustainable Energy Policy'. If the budget will be available (see point 1.6) a next call will treat the research topic 'Energy Efficiency and Demand Management'.

If the topic of the proposed research is directly related to activities carried out within an international project or programme, (notably those related to Implementing Agreements of the IED, http://www.iea.org/dbtw-wpd/Textbase/techno/index.asp), the proposal must explicitly state that this is the case and must show why and how the network or a part of it might or might not integrate into this international research[5] (see form 11 of the proposal submission file).

Sustainable Energy Policy

[5] The reasons motivating researchers to participate or not in such international programmes must be scientific, methodological, and/or organisational. Administrative aspects linked to Belgium's participation or not in such programmes are to be addressed by the Belgian government.

A sustainable energy policy must take different space and time scales into account. National and European energy policies and those of non-EU countries are interdependent. All of these interacting policies have political, economic, and social consequences that will differ according to the place and time studied.
A long-term vision of our future energy policy is needed at all levels: global, European, and national. Any short-term actions must stem from this long-term vision, as both technical and social transformations of energy systems (energy production, distribution, and use) take place over decades. Such changes imply realigning technologies, infrastructures, institutions, and lifestyles. Defining these long-term ambitions implies shifting from a reflection based on a traditional, largely economic policy to one based on sustainable development.

The present call will aim:

- to carry out a multidisciplinary reflection concerning the evolution of the world energy system in the long-term (2050-2100), taking physical constraints (resource exhaustion, environment, technologies...) and social constraints (fairness...) into account. The reflection must of course focus on both supply and demand and take into account the situation of the emerging and developing countries
- to define the energy options in the short and medium-term for Belgium (2010-2050) by analysing the economic, social and environmental impacts of these options. The research will allow to evaluate the potential for innovation and improvement of the energy systems and products in a transition path way to a sustainable energy system and will take into account:

    - the Belgian situation in a European and global context;
    - the costs of different energy vectors (fossil fuels, nuclear fuels, renewable energy sources, electricity, hydrogen...), taking into account not only the private costs (production, transport, distribution) but also a series of external costs such as environmental impacts throughout a product's life cycle, costs such as price volatility associated with energy dependence, geopolitical hazards (diplomatic, military, humanitarian...) while bearing in mind that costs may vary in time: some energies that are more expensive in the short term may turn out to be cheaper in the long term;
    - the impact of the energy policy on the Belgian society (employment, poverty, housing, economy, development of industrial activities, demand for services...) .

3. PROFILE OF THE PROPOSALS

3.1 Duration and Budget

The present call offers room for 3-year research projects.

The projects selected within the framework of the present call will start at the end of 2007.

The overall available budget for this call is 1.17 million Euro. The total project budget is limited to 600.000 Euro.

The average budget per partner, for the entire duration of the project, amounts to maximum 80.000 € per year.

3.2 Networks and Coordination

3.2.1 Network

Each proposal must take the form of an **interdisciplinary network,** composed of 2 to 5 funded teams belonging to at least two separate Belgian scientific institutions, of which at least one is a university institution.

The network partners must conduct complementary activities related to a common issue and its integration.

All funded teams will jointly share all obligations and responsibilities during the implementation of the project. The contributions of the different network partners may differ according to the content. Accordingly, different partners may receive different shares of the total budget and devote different numbers of man-months to the research, provided they all bear in mind the principles of a network project.

The call is intended for **Belgian university institutions, public scientific institutes, non-profit research centres, and specialised consulting offices.** The participation of specialised consulting offices is limited to a maximum of 25% of the total budget requested by the network.
In order to be eligible in this call, non-profit research centres and specialised consulting offices need to have scientific research and/or the delivery of scientific services as their (main) objective, which has to be stipulated in their statutes. This has to be shown in the forms 20 and 21 of the submission file through the description of the scientific unit, the relevant scientific experience and the most important publications.

The project may require punctual expertise, which can be delivered in the form of **subcontracting**. The cost of this subcontracting may under no circumstances exceed 10% of the total budget requested by the network.

If it brings in an added value to the project and to the development of Belgian expertise, submitters may propose a cooperation with **non-Belgian universities or public research institutes** (except for international institutions such as the Joint Research Centre):

- This participation will take place on a **co-funding** basis. The funding of non-Belgian partners by PPS Science Policy will under no circumstances amount to more than 20% of the total budget requested by the network. The non-Belgian partner is responsible for the co-funding, from other sources, for at least the same amount as the amount asked from PPS Science Policy.

- For the participation by the "Université du Luxembourg" or by a public research institute from the Grand Duchy of Luxembourg, the **"Fonds National de la Recherche Luxembourg"** disposes of a budget of 270.000 euro for co-funding the research activities of Luxembourgian partners. In order to know more about the conditions of co-funding by the "Fonds National de la Recherche Luxembourg", Luxembourgian candidates should contact Mr Carlo Duprel (carlo.duprel@fnr.lu, Tel: +352 26192537, Fax: +352 26192535, www.fnr.lu) as soon as possible and preferably before 9 March 2007.

The research network must be able to deal with the problem tackled on the national scale. In this context, cooperation between partners from **different Communities or Regions** is encouraged.

The personnel funded in the project **must be recruited under an employment contract**. As a

consequence, no scholarship student can be taken on in the framework of the project.

3.2.2 Coordination

A **coordinator** (belonging to a Belgian research institute in accordance with point 3.2.1, § 4) must be designated in each proposal. In addition to his/her scientific and management qualifications, the project coordinator must be able to synthesise and integrate the research results so as to promote applications and support to decision-making. The specific role of the coordinator is:

- to coordinate all activities to be carried out in the framework of the project;
- to coordinate the internal meetings between the network members;
- to coordinate the meetings with the Follow-up Committee and production of the reports on these meetings;
- to coordinate the production of the interim and final project reports intended for PPS Science Policy;
- to inform PPS Science Policy of any problems that might interfere with the proper implementation of the project;
- to coordinate the synthesis and translation of research results, with a view to applications and support to decision-making;
- to coordinate the publication and dissemination of research results.

3.3 Follow-up Committee, Valorisation, and Data

3.3.1 Follow-up Committee

Each selected project is accompanied by a Follow-up Committee. The objective of this committee is to provide **active follow-up** of the project and to promote **valorisation of the research**. It will carry out this role via the exchange and provision of data and information and by giving advice, suggesting valorisation avenues... This committee is convened once or twice a year (or more, if necessary).

The Follow-up Committee is composed of **potential users of the results,** such as representatives of public authorities at the national, regional, European, or international level, social actors, scientists, industrial actors... The members of the Follow-up Committee are non-funded partners.

In the research proposal, the submitters must describe the profile of the members of the Follow-up Committee (institutions and a list of possible members). The actual composition will be established in consultation with PPS Science Policy. The committee will consist of at least 5 people.

3.3.2 Valorisation

Each research proposal must include **concrete proposals for valorising** the research. This might involve, for example, the organisation of thematic debates and meetings, proposals for disseminating and popularising the results, proposals to integrate data into computerised databases on the national and international levels, the elaboration of targeted messages intended for experts, policy makers, or managers regarding the content of specific results, including its limitations, the related uncertainties, the hypotheses and methods used, etc. The target groups of these valorisation proposals must be explicitly described.

3.3.3 Use and management of data

Concerning the use of existing data or the collection of new data, proposal submitters should take the following guidelines into account:

- Whenever possible, the partners should make use of existing (administrative or non-administrative) databases to meet the needs of their research. For this they must check beforehand whether the data are accessible, at what cost, and how much time it will take to acquire the data. Should it appear after the start of the research that due to partner negligence or insufficient knowledge of the field the data files will *not* be available in time, this may constitute a reason for PPS Science Policy to cancel the contract.
- If the proposal requires collecting new data (e.g. via a survey), the team must justify with **clear and convincing arguments** its choice of methodology, referring to the objectives of the study and specifying why this particular form of data collection is required and preferable to other approaches. This means the proposers must provide sound and detailed argumentation in support of the chosen methodology (sampling, etc.) and highlighting its added value as compared to existing databases. In addition the partners must provide the budget required for this data collection.
- As the data collected in the framework of the proposed research must be available to other users for other purposes, the proposal must clearly indicate when and in what format the data are made accessible, specifying which categories of users are likely to benefit from access to the data.

3.3.4 Intellectual Property

The research contract (see point 4.3) provides that all results deriving from the implementation of the project will become the intellectual property of PPS Science Policy rightfully and in full. The project network will accordingly transfer the results to PPS Science policy. By "results" must be understood all project achievements, all collected data, all source codes and object codes of developed programmes, all interim results, all specifically developed methodology, and more generally everything that results from the various stages and the entirety of the implementation of the project.

This transfer does not include what is or will be in the public domain nor anything in the possession of the network or one of its members prior to the start of the project. These elements are hereafter called the "excluded elements".

In order to meet the future contract requirements, proposals must thus:

- describe how the entirety of the results will be transferred to PPS Science Policy;
- specify the "excluded elements".

4. PROCEDURES

This paragraph describes the procedures for submitting a proposal, the project selection procedures, and the principal contractual obligations applying to selected projects.

4.1 How to answer this call for proposals?

The submission takes place in two steps, first by filing an expression of interest and then by filing a research proposal.

Only those who submit an expression of interest before the stipulated deadline may later submit a complete proposal.

4.1.1 Expressions of interest

Interested parties must submit an expression of interest, using the form intended for this purpose. These expressions of interest will be used by PPS Science Policy **only** in order to **seek foreign experts for the evaluation of the research proposals**.

Expressions of interest are submitted in **English**.

Interested parties are asked to use **exclusively** the form available at the PPS Science Policy website:

http://www.belspo.be

The expression of interest must be sent in electronic form to the following address:

SSD_call3@belspo.be

The expression of interest must reach PPS Science Policy no later than:

Friday 16 March 2006

PPS Science Policy will ignore expressions of interest submitted after the closing date.

Only those who submit an expression of interest in time may later submit a complete proposal.

4.1.2 Proposal submission

General guidelines

The proposal is submitted by an **interdisciplinary network** in accordance with the conditions set forth in point 3.

The submitter is asked to use **exclusively** the forms that are downloadable from the internet site of PPS Science Policy (http://www.belspo.be).

No annexes to the submission file will be taken into consideration during the evaluation and selection procedure.

Each proposal must be submitted in **English** in **5 copies**[6].

The proposal must be sent to the following address:

PPS SCIENCE POLICY
RESEARCH PROGRAMME "SCIENCE FOR A SUSTAINABLE DEVELOPMENT"
CALL 3
WETENSCHAPSSTRAAT 8 RUE DE LA SCIENCE
1 000 BRUSSELS

The proposal must also be sent in electronic form to the following address:

SSD_call3@belspo.be

The proposal (paper and electronic versions) must reach PPS Science Policy no later than:

Thursday 5 April 2007 at 3:30 p.m.

PPS Science Policy will disregard proposals submitted after the above-mentioned closing date and time.

Forms

Each proposal form includes three separate sections.

Section 1 - Administrative data
Section 2 - Description of the proposal
Section 3 - Qualification and experience of the participants

[6] If the submitters deem it useful, a version can also be submitted in the coordinator´s language.

The forms can be obtained from the PPS Science Policy website at the following address:

http://www.belspo.be

4.2 Evaluation and selection

4.2.1 Bases for the evaluation

Proposals submitted in the framework of this call will be evaluated externally by foreign scientific experts qualified in the research field involved.

Only **complete submission files** (the English-language version) are presented for evaluation. **No annex** to the submission file will be taken into consideration during the evaluation and selection procedures.

The present text of the call for proposals serves as the basis for evaluating and selecting the proposals.

4.2.2 Evaluation criteria

The general evaluation criteria to be taken into consideration by the experts are the following[7]:

Compliance with the aims, content, and characteristics of the Programme in general (see point 1) and of the present call in particular (see point 2).

Scientific quality

- Clarity of the objectives and tasks, relevance of the method, positioning with respect to the state of the art in the proposed area
- Scientific originality of the proposed research, the innovative character of the expected results, strengthening of existing expertise, contribution of the proposed research to ongoing research in the area involved.

Scientific support to decision-making

- The link between the project's potential scientific results and the scientific support required in order to prepare and implement a supranational, federal, regional, or local sustainable development policy.

Quality of the network

- Experience and international contacts of the submitters
- Added value of the network
- Complementarity of the partners' skills
- Clarity of the division of tasks between partners
- A balanced distribution of funds among the partners
- Realism of the requested resources (duration, budget, personnel)

7 The proposals for complementary research within the framework of an international cooperation will form the object of a simultaneous but separate evaluation by the same experts, according to criteria the most important of which are the added value of the cooperation and the scientific qualities of the foreign partner.

- Added value of foreign partner's contribution

Quality of the management and coordination
- The coordinator's scientific quality and management, synthesising, and communication skills.

Interdisciplinarity
- An interdisciplinary approach in order to meet the requirements of the sustainable development concept, in particular cooperation between natural sciences and human sciences.

Elaboration of the proposal in a sustainable development context
- How and to what extent social, economic, and environmental dimensions are integrated into the proposal;
- How the proposal takes into account the relevance and/or applicability of fundamental sustainable development principles (the precautionary principle, the prevention principle, the principle of vertical and horizontal policy integration, the polluter pays principle, the subsidiarity principle, the principles of solidarity, social justice, and participation...), particularly in the formulation of policy advice.

Valorisation
- Pertinence of proposals for disseminating and making available the information, especially in a perspective of support to policy decision-making;
- The member profile and role of the Follow-up Committee.

Added value with regard to projects funded under previous programmes (SPSD I, SPSD II, "Workers' Healthcare", and "Standardisation") (see point 1.4)

4.2.3 Selection

The research project selection procedure will take place in two phases: a scientific evaluation, followed by a strategic choice. The scientific evaluation is performed by foreign scientific experts qualified in the research areas of the submitted proposals. The strategic choice is made between the scientifically best-ranked and best-grounded projects.

4.3 Contractual Obligations

4.3.1 Contracts

For the selected proposals a contract is drawn up between PPS Science Policy and the network of funded teams.

For this, the submitters of the proposal will be asked at the end of the evaluation and selection procedure to concisely formulate the specifications on the basis of which the contract is to be drawn up. This **technical annex** to the contract will be drawn up in consultation with PPS Science Policy and will take into account the recommendations formulated by the foreign experts and the Programme Committee. Adaptations to the original proposal may relate to the content of the research, the composition of the network or Follow-up Committee, the choice of the coordinator, the proposals for valorising the research, etc.

PPS Science Policy grant the selected projects the **funds required** for their implementation. PPS Science Policy shall reimburse at most, and up to the amount specified in the granted budget, the real costs substantiated by the people responsible for the contract provided those costs are directly related to the implementation of the project.

4.3.2 Intermediary Evaluation

All research projects are subject to one evaluation, whose modalities are specified in the research contract. These evaluations, conducted by foreign experts, concern the project's scientific quality (methodology and interim results) and strategic impact, in the light of its initial objectives. The evaluation will result in recommendations for the continuance (or discontinuance) of the project.

4.3.3 Reports

The contract will define the various reports to be submitted to PPS Science Policy. These reports are to be included in the project work plan and the cost of preparing them (including translations) is to be covered by the project budget.

4.3.4 Data, Results, and Ownership

The research contract provides that all results deriving from the implementation of the project will become the intellectual property of PPS Science Policy rightfully and in full. The project network will accordingly transfer all results to PPS Science policy. By "results" must be understood all project achievements, all collected data, all source codes and object codes of developed programmes, all interim results, all specifically developed methodology, and more generally everything that results from the various stages and the entirety of the implementation of the project.

This transfer will include neither what is or will be in the public domain nor what is in the possession of the network or of one of its members prior to the start of the project.

The network of funded teams retains the right to publish or to valorise the results in whatever form it chooses, subject to prior authorisation by PPS Science Policy.

For archiving and further dissemination, all project (meta)data/results will be submitted to PPS Science Policy and/or to indicated data centres, according to modalities specified in the contract between PPS Science Policy and the network of funded teams.

5. CONTACT INFORMATION

All additional information can be obtained at the following telephone numbers and e-mail addresses:

Secretariat
Mrs A. Delis +32 (0)2 238 37 61
deli@belspo.be]

Energy
Mrs A. Fierens, +32 (0)2 238 36 60
fier@belspo.be

ANNEX I. Description of the research areas and their interactions (excerpt of the Memorandum to the Council of Ministers)

This annex contains an excerpt from the Memorandum to the Council of Ministers, approved on 4 March 2005, which briefly describes the content of the research programme "Science for a Sustainable Development". This annex concerns:

A. The 7 priority research areas of the Programme (energy, transport and mobility, Agro-food, health and environment, climate, biodiversity, atmosphere and terrestrial and marine ecosystems);
B. Standardisation within the priority research areas;
C. Interactions between priority research areas;
D. The "Transversal Research" part.

This description offers an overall picture of the content of the Programme and constitutes the starting point for elaborating the calls for proposals. Each element of the Programme is worked out in detail in the involved calls (see point 1.6), taking scientific developments and the evolution of needs in the area of policy support into account. Research proposals must therefore be based on the calls for proposals and not only on this excerpt from the Memorandum to the Council of Ministers.

A. Priority Research Areas

1. Energy

The domestic gross consumption of energy in Belgium is rising from year to year, just as it is in Europe and throughout the world. In Europe this is leading to an ever-increasing dependency on fossil fuels, which has pernicious consequences for the security of energy supplies, the environment and health, geopolitical equilibria, fuel prices... An active energy policy, a top-priority sector for every economy, cannot be carried out without a policy for simultaneously managing demand and supply.

Within the Programme the priority research topics are:

- **Rational energy use** (REU) with the study of the social, cultural and economic variables which influence the energy consumption of households, the study of technical variables such as those influencing the energy efficiency of buildings, the study of communication instruments to promote changes in behaviour, the evaluation of the REU programmes and other policy instruments, the study of the role of new processes that can improve energy efficiency, such as soft chemistry (new materials and superconductivity)...

- **Alternative and/or renewable forms of energy** (wind, biomass, sun, hydrogen, etc.) with the analysis of growth possibilities (by amongst others comparing successful examples of dissemination of various technologies abroad), barriers to their introduction and the consequences of their development (employment, security of the network, emission of greenhouse gases, etc.), analysis of the role of biotechnology, etc., in a sustainable development perspective.

- **Organisation of energy systems over the medium and long terms:** socio-economic study of the potential of technological improvements of energy systems (use of residual heat during energy transformation in centralised versus decentralised systems, reduction of losses during energy transport and energy production, vulnerability, dependency on a single form of energy versus usability of a diversified range of sources, integration of cogeneration including on a non-industrial

scale, combination of energy sources for multiple objectives (e.g. fuel cells for both heating and transport) in order to increase efficiency and effectiveness).

- **Energy policy** with firstly the analytical or future-oriented study of such varied and interdependent themes as energy prices, energy supply security, liberalisation of the markets, expansion of the market, geopolitical considerations... and secondly the analysis of the role of energy in Belgian society (relationships between energy and employment, energy and poverty, energy and the economy, etc.).

2. Transport and Mobility

In various policy documents at the (inter)national, regional and local levels, sustainable transport and sustainable mobility are translated into concrete objectives such as: access to mobility, accessibility, traffic safety and traffic liveability, reduction of the external effects of transport... The objective is to reduce the tension between the increasing (needs for) mobility and the social, economic and environmental challenges entailed by it.

In the framework of this Programme, the following priority research topics - and their mutual interactions - are addressed:

- **Mobility and modal choice**
  - Mobility in time and space: land-use planning, urban planning, demographic trends; new forms of organisation in the economy, leisure, globalisation (increase in international transport), congestion...
  - Social and cultural aspects: right to mobility, trends in travel behaviour and modal choice (habit formation, price, impact of advertising and awareness-raising...)
  - The future of inter-modal and multimodal transport (in the framework of logistics, freight and passenger transport): interoperability, standardisation, competitiveness, cost evaluation, pricing policy, supply and financing of infrastructures...
  - Possibilities for and role of intelligent transport systems and technological innovations in arriving at a more sustainable mobility.

- **Transport and the environment**
  - Environmental impacts of transport: air quality, noise, odours, vibration, fragmentation of space...
  - Environmentally friendly technologies (for the various modes of transport): analysis of technical and socio-economic problems as well as possible solutions for the application of alternative energy sources (electricity, hydrogen, bio-energy (such as bio-ethanol), etc.);
  - Role and possibilities in the area of technical inspection and vehicle maintenance, environmental labels, the purchase, replacement and recycling of vehicles, environmentally friendly driving behaviour...

- **Traffic safety**
  - Social costs of traffic unsafety;
  - Analysis of behaviours; analysis of determining factors; relationship between types of road users;
  - Improvement and utilisation of statistical data;
  - Possibilities in the area of awareness-raising, training, regulations, enforcement, infrastructure measures, land-use planning...
  - Freight transport and safety;
  - Possibilities for and role of intelligent transport systems and technological innovations in the area of traffic safety.

The research concerns the analysis of both **processes and impacts** and the analysis, development, and evaluation of **policy measures**. The research must contribute to the **development of tools to support decision-making**. Specific attention should be paid to institutional aspects (e.g. the integration of transport and environmental policy, the European context, etc.); mutual interactions between mobility, environmental, and traffic safety issues; possibilities, impediments, and effects at the social, economic and environmental levels.

3. Agro-food

The quality of both foodstuffs and the processes used for their production in industry or agriculture is a priority objective of the European and national governments.

In order to be able to guarantee this striving for quality, a great deal of research must be done, covering a variety of aspects, among others human health, impacts on the environment, as well as socio-economic dimensions of the sectors involved.

In order to be able to respond to these challenges, the following research topics are addressed in the Programme:

- **Food safety**: chemical safety and microbiological safety, pathogenic micro-organisms (priorities of the Federal Agency for the Safety of the Food Chain - FASFC), resistance to antibiotics, viruses, materials in contact with foodstuffs; study of and change in the current modes of consumption towards a sustainable food consumption.

- **Food allergies and food intolerances**: food-health interactions, study of the causes, identification tests, impact studies, behavioural analysis...
  Especially in Belgium one is seeing an alarming increase in food intolerances and food allergies, particularly among young children.

- **Food and "novel foods"**: the study of diet, macro- and micro-nutrients, antioxidants, and oligo-elements, pre- and probiotics, health foods, vegetable oils, GMOs, the use of little-known biological resources…
  Putting on the market "novel foods" combining nutritional effects and marketing, raises questions which must be answered by introducing a legal framework (directives and standards).

- **Integrated systems for quality management:** the study of environmental and quality management systems (HACCP (Hazard Analysis and Critical Control Point), LCA (Life Cycle Analysis), systems for rapid warnings about foods, standards, labels, specialised guides for best practices, traceability, authentication, reduction of pesticides, fertilisers, heavy metal contents, and the emission of greenhouse gases...).
  Systems for quality management must also be adapted to the problems facing small producers (SMEs, artisans, etc.), who in our country are important partners in this economic sector.

- **Upcoming production methods - multifunctionality of production:**
  - New cultivation and production methods beyond the dominant methods of production and their social, economic and environmental impact.
  - Increasing the added value of existing products, a different use of production factors, collaborating on environmental protection and/or quality programmes, the production of "non-commodity" goods, making production factors and infrastructure available to third parties...
  - The analysis of agricultural environmental measures: caring for the quality of natural systems, the maintenance of biodiversity, landscape protection, tourism...
  - Study of the possibilities for valorising agricultural surpluses, among others via biofuels.

4. Health and Environment

The "Health and Environment" part is based on the finding that trends in both individual and collective behaviours, in how people work or consume and produce goods and services, have new and sometimes unexpected effects on the environment and health. Indeed, it is estimated that 20% of all illnesses can be attributed to environmental factors, and one finds that certain population groups run an increased risk.

If we look at the WHO´s definition of health[8], we find that it integrates physical, psychological, and social well-being. Working in the health field thus entails that none of these aspects is neglected. This is a comprehensive issue where account must be taken of the numerous risk factors and their cumulative effects.

The research to be carried out under the Programme supports the elaboration or the adaptation of national or European policy strategies, policy plans, and programmes (NEHAP, the Government policy on well-being, CEHAPE, the programme for reducing plant protection agents and biocides in Belgium[9], etc.).

In this context the research will concentrate on 2 lines of research and is limited to understanding hazards, their development, and their cumulative effects on health, as well as the development of methods for evaluating, managing, regulating and reducing risks:

- **Health risks related to biological, chemical, or physical exposures**
  A horizontal and/or sector-related approach is taken to address health issues. This research spans the entire programme (transport, energy, climate, Agro-food, the terrestrial environment, the aquatic environment, the atmosphere) and must make it possible to attain greater insights into threats for human health. For example, the repercussions on health of food production and consumption will be worked out in synergy with the Programme's Agro-food theme (cf. sub themes "Food allergies and food intolerances" and "Food and novel foods").

- Since **the work environment** is a specific environment, it offers possibilities for better delineating some causal relationships than would be the case in a general environment. The research performed in this context can determine the pressure and impact of exposures more precisely and reach more reliable and faster decisions for various aspects of the problematic, particularly concerning the development of methods. Some research can fit into the study of a general environment, such as research on workplace contamination or the (bio)monitoring of employees exposed to existing or new hazardous products, to pesticides/biocides...

  Well-being in the workplace is also studied by addressing organisational aspects, namely the study of psychosocial risks, musculoskeletal problems, and human errors. The research performed here will analyse, for different population groups (among others women and older employees), the following dimensions: organisational changes and their consequences, the limitations of the work organisation in specific involved sectors (government departments, agriculture and SMEs, etc.), subject to technological innovation and to the principles of highly demanding European regulations in terms of "quality systems", standardisation, or the evaluation and management of chemical hazards.

8 A general condition of physical, mental, and social well-being that does not consist merely of the absence of any disease or handicap.

9 Decision of the Council of Ministers of 10 December 2004.

5. Climate

The priority research lines take into account (among others) the recommendations of the Intergovernmental Panel on Climate Change (IPCC) and the European Council's Working Party on International Environmental Issues - Climate Change (WPIE/CC) and support the implementation of the Climate Convention, the Kyoto Protocol, and the definition of new post-Kyoto reduction targets. Research on climate change is carried out on various geographic scales: national, European, and global, with specific attention paid to Antarctica.

Research is necessary for:

Understanding the climate system

- Studying the evolution and causes of climate change (natural versus anthropogenic origin);
- Better understanding the mechanisms and factors which influence the climate system (biogeochemical cycles, aerosols, stratospheric ozone, the ocean CO_2 balance...);
- Contributing to the international efforts to identify the various "pathways" which allow the reduction targets to be reached (cf. art 2 UNFCCC);
- The development of projections of future climate evolutions on the basis of climate modelling on the global and regional levels;
- Introducing scientific elements for evaluating the level of "dangerous interference" (art. 2 of the UNFCCC).

Analysing impacts, adaptation, and vulnerability (particularly in Belgium)

- Evaluating the impact of the climate change in combination with other pressure factors on hydrological cycles, sea level, the availability of water reserves, and their management in various sectors (agriculture, transport, energy, etc.);
- Evaluating the risks and the impacts of extreme climatic events on ecological systems and vulnerable socio-economic sectors;
- Evaluating from a scientific and socio-economic perspective the adaptive measures which are necessary in order to anticipate this impact.

Supporting the preparation and evaluation of measures to mitigate climate change

- Evaluating from an economic, social, environment and legal perspective the measures relating to:
  - the sequestration potential in terrestrial and marine ecosystems;
  - reducing greenhouse gas emissions in Belgium (taking into account the three Regions in Belgium and their mutual interactions, as well as relations with neighbouring countries);
  - reducing greenhouse gas emissions outside Belgian borders in the framework of Joint Implementation (JI) and Clean Development Mechanisms (CDM)...;
  - integrating climate policy into other areas, including development cooperation and foreign trade.

More sector-related studies (such as in the area of energy, transport, etc.) performed in the framework of these priority research areas can supplement the global instruments developed here.

6. Biodiversity

"Biodiversity" or "biological diversity" means the entirety of the living world. Along with the diversity of species (flora, fauna, micro-organisms), this also includes genetic diversity within a given species and the (terrestrial and aquatic) environments in which species live. Because biodiversity is the very basis of life on earth, with a broad offer of goods and services (production of food and fibres, carbon storage, nutrient cycles, resistance against climate, etc.), an increased loss of biodiversity such as that currently

observed constitutes one of the major problems that we face. Europe and its Member States have undertaken to "halt the loss of biodiversity before 2010". This goal can only be attained with reliable and coordinated science.

In the framework of this Programme, the goal of the "biodiversity" research area is:

- to understand the causes of the loss of biodiversity: the impact of invasive species, fragmentation of the landscape, climate change, nitrogen pollution, etc.;
- to analyse the conditions and trends of populations, species, habitats and to evaluate ecological services which these species and systems provide;
- to identify priority responses concerning conservation, restoration, and the sustainable use of biodiversity and to provide scientific instruments for assessing the feasibility and efficiency of these responses.

This Programme addresses the *in situ* biodiversity of the marine ecosystems of the North Sea, the North Atlantic Ocean, and the Southern Ocean, as well as that of terrestrial ecosystems and Belgian freshwater areas. In a perspective of sustainable utilisation and conservation, the *ex situ* biological resources kept on our territory are also being studied.

7. Atmospheric, terrestrial (including freshwater), and marine ecosystems

In this research area, attention is paid to the three compartments of the earth system - i.e. the atmosphere (the troposphere and stratosphere), terrestrial ecosystems (incl. freshwater ecosystems), and marine ecosystems - and their mutual interactions.

The atmosphere is to be studied at the global as well European and local levels, to support air quality protection policy: LRTAP, the Vienna Convention and the Montreal Protocol, the Climate Convention (UNFCCC), and the Kyoto Protocol. Each of these agreements requires implementation in Belgium, which among others is based on research on the synergy or conflicts between conventions.

The study of terrestrial ecosystems will focus on our territory and also includes the research relating to surface water and river banks and valleys, so as to support the implementation of the European Water Framework Directive.

The marine ecosystems to be studied include the North Sea and Antarctica, where research is important for the implementation of (inter)national conventions and agreements signed by Belgium (including the Antarctic Treaty, the Madrid Protocol, the Belgian Law on the Protection of the Marine Environment, the Law on the institution of an EEZ (exclusive economic zone), the OSPAR Convention).

Research within these three compartments concentrates on the **"drivers" of ecosystem processes and on environmental policy problems**, such as changes in land use (soil erosion, acidification, depletion...) and biological and chemical interference (eutrophication, photochemical ozone and aerosols in the troposphere, the greenhouse effect, the thinning of the stratospheric ozone layer...) as a result of anthropogenic activities.

Since generally the same anthropogenic activities cause these problems and given the mutual interactions of and links between these various problems, there is a need for an integrated approach to both research and policy.
Research will attempt via **process studies** (understanding and quantifying chemical, biological, and physical processes) and the development of tools (quality monitoring systems, simulation models, etc.), to propose measures, instruments, and/or recommendations for the reduction of sources of pollution, the establishment of standards, the development and evaluation of integrated **management and policy measures**... Where possible, the studies will be supplemented with a socio-economic evaluation of the results.

Relevance of Antarctica research

Antarctica and the surrounding Southern Ocean (SO) are global climate regulators: as a "biological pump", the SO can help to mitigate the effects of increasing CO_2 discharge into the atmosphere; the further melting of ice sheets and glaciers as a result of climatic warming will have a significant effect on the total sea level increase, anthropogenic chemicals above Antarctica degrade the protective ozone layer... Research provides important information on climate evolution, the dynamics of ice caps and glaciers, and biogeochemical processes in and between the atmosphere and the SO, which in turn leads to understanding and modelling sea level and climate change.

Through its physical isolation, its extreme environment, and its unspoiled state, Antarctica also constitutes a unique ecosystem with special species and populations, that can serve as a model for understanding universal biological (ecological, physiological and biogeographical) processes. Research contributes to better understanding the complexity of biotic communities under extreme conditions and yields potential medical and industrial applications. Biodiversity research in Antarctica is also the basis of the proposed international measures for the protection of Antarctica and its surrounding oceans.

Relevance of North Sea and North Atlantic research

The North Sea is characterised by a very high productivity and highly diversified habitats, but it is also a sensitive ecosystem under heavy pressure from intense human activities. In order to arrive at a sustainable management and a sustainable exploitation of the North Sea, there is a need for research that focuses on deepening existing scientific knowledge about the structure and functioning of the North Sea ecosystem (including biodiversity) and the processes which take place within it, including responses to anthropogenic pressures and a better understanding of the social/economic impacts of direct and indirect human activities on the ecosystem.

Along with the Belgian part of the North Sea and in particular the coastal area, the areas through which it is directly influenced (the Channel, the Scheldt Estuary) and/or where the effluents of this part of the North Sea can have a measurable impact (the Southern Bight and the central North Sea) also deserve attention. The transition between the ocean and the North Sea is also an important area of study.

B. Standardisation within the priority research areas

The Programme encourages, within the priority research areas and if this appears relevant, the submission of proposals on standardisation.

Standardisation is a powerful means of achieving technical progress and developing the economy; it can contribute to a better quality of life in general by raising quality, safety, reliability, and efficiency levels. Standards have a positive effect on the entire society (business organisations, governments and economic leaders, suppliers and buyers of products and services, and finally consumers and users in general).

At the economic and social levels, standardisation is an instrument that harmonises and facilitates transactions, inspires trust, limits risks, and supports the dissemination of innovation.

Standardisation is also an essential instrument supporting the implementation of European environmental policy choices. The implementation of environmental policy (in the areas of noise pollution, waste, soil, biomonitoring, discharge of pollutants, etc.) requires appropriate standards for

tests, sampling, and analysis, since it is essential that environmental quality be comparably measured worldwide. This is the task of international standardisation.

Moreover, there is an increasing awareness of the importance of standards and how they are designed. The Commission (DG Enterprise and DG Environment) is preparing a communication on the integration of environmental aspects into European standardisation. The CEN is striving to fit all environmental aspects horizontally into all of its standards, even as they are being developed within a sectoral framework. The objective of all this is to ensure that no unnecessary barriers are introduced and to keep the negative impact on the environment as low as possible.

The research to be carried out in this framework must meet the following criteria:

- The research should fit within the priority research areas proposed in the Programme;
- It should be prenormative research making it possible to contribute to the development of standards;
- The research should make it possible to contribute to the identification of impacts, problems, and gaps related to standardisation in a sustainable development context;
- The research should analyse the role of standardisation as an instrument for a sustainable development policy.

C. Interactions between priority research areas

A trans-sectoral, integrated approach to research is needed for several reasons: to evaluate the impacts of a problem or the validity of a measure, strategy, or technology at the social, economic, and environmental levels; to take into account in an optimal manner the complexity of a problem, the reality in the field, and the institutional context; to contribute towards adequately fulfilling national and international commitments.

The Programme will therefore encourage **interactions between priority research areas**, making it possible to tackle common, complex problems such as:

- *air pollution (ozone, particles…),* a problem common to the areas energy ↔ transport and mobility ↔ atmosphere, terrestrial and marine ecosystems ↔ climate ↔ health;
- impacts associated with *genetically modified organisms* (GMOs), a, issue interfacing with Agro-food ↔ consumption ↔ health ↔ terrestrial ecosystems ↔ biodiversity;
- *the work/leisure relationship* interfacing with ↔ energy ↔ terrestrial and marine ecosystems ↔ biodiversity ↔ health;
- *product and process life cycles,* interfacing with terrestrial ecosystems ↔ atmosphere ↔ biodiversity ↔ energy ↔ Agro-food ↔ working conditions;
- *renewable forms of energy*, associated with the areas of energy↔ agriculture ↔ terrestrial and marine ecosystems ↔ climate;
- the *global character of challenges:* production and consumption ↔ transport and mobility ↔ energy ↔ health ↔ biodiversity ↔ climate;
- the *integrated management of coasts or catchment areas, which is linked to the research areas* energy ↔ agriculture ↔ transport and mobility ↔ terrestrial and marine ecosystems ↔ climate ↔ biodiversity ↔ production and consumption;
- ...

The research must take into account the (complexity of) interactions between priority research areas. This constitutes an essential guideline throughout the Programme (calls for proposals, project selection and management, valorisation of research results).

For this are planned: integration of interactions and common themes into appropriate calls, *joint calls* between priority research areas (e.g. energy – transport, agro-food – biodiversity, health – climate,

health – Agro-food), the *"clustering"* of projects covering different aspects of common, complex problems...

D. "Transversal Research"

In order to better translate/operationalise the concept of sustainable development within and between the priority research areas, **transversal and generic research** is necessary. Accordingly, the Programme includes "Transversal Research" dealing with the following questions:

- Changing unsustainable production and consumption patterns;
- The role of the spatial and temporal dimensions of sustainable development;
- Devising and analysing instruments supporting a policy of sustainable development, in particular instruments aimed at a better balance between the social, economic, and environment-related pillars of sustainable development.

Sustainable development is all about **equating the human population with the available resources and space**. This implies analysing the links between the geographic or climatic framework of a region and all of the region's economic, social and cultural productions. This requires a transversal approach and can be analysed via the different research themes.

In order to strengthen the coherence of the Programme, the transversal research topics should preferably be addressed in relation to the 7 proposed priority research areas, without excluding other areas that might contribute towards operationalising the sustainable development concept (e.g. residential construction).

Under this heading the following research topics are addressed:

- **Spatial dimensions of the sustainable use of the ecosystems**, underscoring the importance of policies for land-use planning, habitat, infrastructures, etc.;
- **Production patterns**, taking into account the economic, environmental, and social impacts throughout the production chain
- **Striving for sustainable consumption** at both the individual and collective levels (well-being, health, employment, quality of life, excessive debt burden, redistribution, pollution, waste, natural resources, etc.)
- **Time management in relation to consumption profiles and production methods** (leisure, combining a private and a professional life, flexibility of companies, etc.);
- **Globalisation of the economy** and its consequences, particularly with respect to geostrategy, North-South relations, the use of natural resources, climate change, inequality, and poverty
- **Social changes** (demographic development, (im)migration, etc.) and their implications in a sustainable development perspective
- **The quest for an economic development** (competitiveness of companies, employment...) **compatible with the sustainable management of human and natural capital** (uncoupling, dematerialisation, qualitative growth, etc.)
- **Ethical aspects linked to sustainable development,** notably in relation to the responsibility of the various actors, access to resources...
- Different **visions of sustainable development** and their implications
- **The role of decision-making processes** in striving for sustainable development
- **The multifunctionality of the primary, secondary and tertiary sectors,** i.e. agriculture, industry, and services
- The **role of standardisation** as an instrument for a sustainable development policy;
- **Resource management**; this includes analysing the present dependency on finite resources, analysis of bottlenecks over the short, medium and long terms, studying links between resource

use, energy consumption, and environmental pollution, and conducting further research on how to reduce the discrepancy between environmental stress and the environmental carrying capacity, the ecological footprint, and the ecological debt.