

# research eu

## F O C U S

- The EU's outermost regions
- Funding research and innovation
- Success stories



European research area  
**Boosting the potential  
of the outermost regions**



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**The outermost regions:  
innovative asset for Europe**

*Research and innovation are at the heart of European Union policies and their importance for future prosperity was underlined in the Europe 2020 strategy, published by the European Commission on 3 March 2010.*

*In turn, the regions are the lifeblood of the research and innovation system and the outermost regions have a special role. With locations in three different oceans, they host a remarkable biodiversity and have unique climate and geo-morphological characteristics. They offer a huge potential for research and innovation in sectors with high added value, such as agrofood, renewable energies, astrophysics, aerospace science, oceanography, vulcanology, seismology or the study of the effects of climate change.*

*This publication shows, through concrete examples, that the outermost regions are already using innovative and original methods to make the most of their potential. But much more needs to be done in order to exploit their diversity and assets.*

*That effort is linked to a wider initiative in the EU to improve coordination between regional funding available through the Structural Funds, and research and innovation programmes — especially the Seventh Framework Programme for Research.*

*This synergy can make an important contribution to overcoming global challenges such as energy and food security, climate change and demographic pressures. As the Commissioners responsible respectively for research, innovation and science and for regional policy, we are committed to working very closely together to build on progress already achieved.*

*But success requires the commitment of all actors, particularly at regional level, where the partnerships for innovation are formed between research institutes, universities, enterprises and development agencies.*

*Our shared aim is to deepen the relationship with the outermost regions and to work in partnership with them to unlock their innovative potential. This brochure is symbolic of this joint effort. We look forward to a new era for the outermost regions.*

**Máire Geoghegan-Quinn**  
 European Commissioner for Research,  
 Innovation and Science

**Johannes Hahn**  
 European Commissioner  
 for Regional Policy





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## THE EU'S OUTERMOST REGIONS

The EU's outermost regions: the challenges of research and innovation	5
<i>RESEARCH PROFILES</i>	
The Canary Islands (Spain): marine, space and Earth sciences	6
French Guiana: towards a sustainable bioeconomy	8
Guadeloupe (France): new energy sources, Earth sciences, agronomy and health	10
Martinique (France): sustainable development in territorial protection and promotion	12
Réunion (France): ensuring a balanced future for an island open to the world	14
The Azores (Portugal): blue biotechnology	16
Madeira (Portugal): ascribing value to local resources while reaching out for international excellence	18

## FUNDING RESEARCH AND INNOVATION

The EU: a partner to strengthen research and innovation capacities in outermost regions	20
'Regions of Knowledge' and 'Research Potential': lessons learnt and key messages	23
Activities and partnerships financed by EU RTDI instruments	24

## SUCCESS STORIES

<i>MARINE HABITAT &amp; FISHERIES</i>	
Promoting tropical sea science in the western Indian Ocean	26
Azores ready to run new research vehicle	27
Alternative fishing in three Atlantic archipelagos	
<i>AGRICULTURE</i>	
Promoting fruit and vegetables from Martinique	28
Seed management in Macaronesia	29
<i>ENERGY &amp; ENVIRONMENT</i>	
Azores' geostrategic position ideal for climatology and meteorology	29
Hydrogen power on the Canary Islands	30
Island regions: fit for the future with wind, sun and biomass	31
Sun-powered seawater desalination systems to be tested in Italy, Spain and Tunisia	32
Measuring carbon storage in European tropical forests	33
<i>PHYSICS</i>	
Major breakthrough underway for European astronomers to study the Sun	34
Electron microscopy in French Guiana, Guadeloupe and Martinique	35
<i>HEALTH &amp; MEDICINE</i>	
Fostering research on Réunion	36
Innovative and personalised diets for the elderly	37
Advanced imaging sensor for minimally invasive surgery	38
<i>INTERNATIONAL S &amp; T COOPERATION</i>	
Sustainable S & T policy dialogue with Caribbean countries	39

Las regiones ultraperiféricas de la Unión Europea  
 Les régions ultrapériphériques de l'Union européenne  
 As regiões ultraperiféricas da União Europeia

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**Frequent acronyms**

CIP	competitiveness and innovation framework programme	R & D	research and development
CORDIS	Community Research and Development Information Service	RegPot	Research Potential
ERA	European research area	RoK	Regions of Knowledge
ERDF	European Regional Development Fund	RRDC	regional research-driven cluster
FP7	Seventh Framework Programme of the European Community for research, technological development and demonstration activities	RTD	research and technological development
ICT	information and communication technologies	RTDI	research, technological development and innovation
		SF	Structural Funds
		SME	small and medium-sized enterprise
		S & T	science and technology

## The EU's outermost regions: the challenges of research and innovation

*The EU has seven outermost regions: the Canary Islands (Spain), French Guiana, Guadeloupe, Martinique, Réunion (France), the Azores and Madeira (Portugal). Since the entry into force of the Lisbon Treaty on 1 December 2009, the overseas collectivities of Saint Barthélemy and Saint Martin (former communes of the Guadeloupe region) have also acquired the status of outermost regions.*



The geographical position of these regions, which represent 2.3 % of the EU's surface area, affords the EU a presence in three different oceans and seas (the Caribbean, the Atlantic and the Indian Ocean) as well as a privileged position, especially with regard to international ocean management and good-neighbour relations with a significant number of third countries such as Brazil and India. This dual affiliation to the EU and to their own geographical area allows the outermost regions to enjoy a unique position as 'active frontiers of Europe'.

Comprising four archipelagos, two islands and a continental region enclosed by the Amazonian Forest, the outermost regions do not form one single geomorphological entity but do, however, share the same challenges: remoteness, isolation, small land mass, adverse terrain and climate as well as economic dependency on a limited number of products.

By adopting the concept of outermost regions, through Article 299§2 of the Treaty of Amsterdam (now Articles 349 and 355 of the Treaty of Lisbon), the EU has recognised the specific situation of these regions and the need to adapt EU policies

to their situations. While a clearly preferential European strategy in favour of these regions has been pursued since 2004, the potential of the outermost regions in the areas of research and innovation remains insufficiently developed. In spite of an increasing effort to ensure harmony between the main issues of the outermost regions and EU programme priorities, their characteristics make it difficult to obtain the critical mass necessary for the development of activities that determine integration into the European research area (ERA).

Nevertheless, excellent work is being carried out in the outermost regions, particularly in the areas of renewable energy, marine research, health and biodiversity. The European Commission Communication *The outermost regions: an asset for Europe* <sup>(1)</sup> underlines the extent to which these regions possess exceptional potential and assets within the EU, and proposes a change in approach. From now on, the outermost regions are to be considered as 'regions of opportunities', offering growth potential not only for their own competitiveness, but also for the EU as a whole.

Similarly, the staff working document of the Commission entitled *Regions 2020* <sup>(2)</sup> studies the possible impact of the main challenges confronting Europe in the next 20 years. The analysis emphasises the opportunities offered by the outermost regions, which will then be 'in the front line and whose experience will be important for their geographical surroundings and for the rest of the territory of the Union' <sup>(3)</sup>.

The success of this transformation depends on effective structuring of research organisations, using for this purpose all available resources and tools at EU, national and regional levels. The information seminar on the EU research, technological development and innovation (RTDI) funding instruments, organised in Martinique by the Commission and regional authorities

from 3 to 5 November 2009, confirmed the need for these sessions in order to strengthen participation between policies and encourage networking.

This proactive approach has also been supported by the Conference of Presidents of Outermost Regions of the EU in its memorandum of 2009, which confirmed the unique added value brought to the EU by the outermost regions — potential catalysts for development in a number of fields.

	Canary Islands	French Guiana	Guadeloupe	Martinique	Réunion	Azores	Madeira	EU
Location	Atlantic Ocean	South America	Caribbean Sea	Caribbean Sea	Indian Ocean	Atlantic Ocean	Atlantic Ocean	
Capital(s)	Santa Cruz de Tenerife, Las Palmas de Gran Canaria	Cayenne	Pointe-à-Pitre	Fort-de-France	Saint-Denis	Ponta Delgada	Funchal	
Distance from Brussels (in km)	3 054	7 254	6 945	7 050	10 000	2 870	2 566	
Total area (in km <sup>2</sup> )	7 447	83 534	1 703	1 128	2 504	2 322	828	4 303 401
Population (in 1 000 inhabitants)	1 973	209	436	397	783	243	246	493 924
Population density (per km <sup>2</sup> )	265	3	256	352	313	104	296	115
GDP (per capita)	93.7	50.5	70.6	75.6	60.4	66.7	94.9	100
Total unemployment rate (in %)*	10.4	21	25	22.1	25.2	4.3	6.8	7.2
Youth (under 25s) unemployment rate (in %)*	22.4	41.3	55.7	47.8	50	12.1	2.4	15.6

Source: Eurostat 2006; \*2007

<sup>(1)</sup> COM(2008) 642 final of 17.10.2008.

<sup>(2)</sup> *Regions 2020 — an assessment of future challenges for EU regions*, SEC(2008) 2868 final of 14.11.2008.

<sup>(3)</sup> Idem.

## The Canary Islands (Spain): marine, space and Earth sciences

*The Canary Islands, an archipelago of seven islands in the Atlantic Ocean, represent 1.5 % of Spain's national territory. Located 150 km off the coast of west Africa, they are part of Macaronesia, a geographical group of volcanic islands, including the Azores archipelago and Madeira. These islands possess remarkable features.*

Their origins, with volcanic activity still visible today, have contributed to their rugged terrain with tall mountains bordered by deep oceans. They have a privileged position in the Atlantic area, with particularly favourable atmospheric conditions which are unique in the northern hemisphere. This creates significant advantages for studying oceans and astronomic observation. As a result of their isolation, the islands' ecosystems are particularly rich in terms of biodiversity.

The Canary Islands' natural heritage and landscape are diverse and protected. The climate is like permanent springtime, due to the presence of trade winds. This makes them a very popular tourist destination — tourism makes up 75 % of the local economy.

However, with dry or humid tropical microclimates generating significant variations in temperature and rainfall, the islands are confronted with the critical problem of water scarcity. These concerns, especially in conjunction with electrical energy supply issues, have led to an increased search for alternative solutions. For example, the 'El Hierro 100 % RES' project (see <http://www.insula-elhierro.com>), initiated on the corresponding El Hierro island, aims to ensure self-sufficiency in energy via renewable energy sources.

Furthermore, as a gateway to the EU, the Canary Islands are subject to significant migratory pressure. Their geographical proximity to the EU makes it necessary to strengthen their role in development policy, particularly with regard to areas that are critical for sustainable development.

### RESEARCH AND INNOVATION

Research in the Canary Islands brings together a large community of people and enjoys significant resources in the current economic conditions. This territory is driven, in particular, by the agricultural sector, fishing and tourism, enabling it to be placed under the regional policy competitiveness objective.

For the most part shared between public institutions, research activities have developed around several cluster themes which respond, on the one hand, to the need to overcome the difficulties inherent to their

particular situation. On the other hand, these activities tend to develop capacities in areas of excellence with due regard for regional integration and sharing knowledge and expertise.

### CENTRAL RESEARCH THEMES

Horizontal:

- information and communication technologies (ICT);
- biotechnology.

Sectoral:

- tourism;
- transport and logistics;
- energy;
- water;
- climate change;
- biodiversity;
- marine science and resources;
- biomedicine and biohealth;
- astrophysics and space;
- agroprocessing industry;
- African cooperation and development.

### RESEARCH INSTITUTIONS

The scientific community comprises approximately 3 650 research professors from the two large Canarian universities, as well as researchers from various public institutes and centres (1).



The view of Juan Ruiz Alzola, Director of the Canary Islands Agency for Research, Innovation and Information Society:

*'The Canary Islands want to build a different, sustainable future through involvement in a system of research and innovation which enables our productive sectors to be competitive. We are a leading authority worldwide thanks to our sky, our sea and our people: astronomy, marine research, renewable energies and water desalination using ecological methods are just a few examples of what we are achieving despite our geographical disadvantages. Finally, we cooperate with our neighbours as the Canary Islands have always been guided by a spirit of solidarity.'*

(1) The statistics on researchers in the outermost regions are not necessarily the most recent or comprehensive figures.



Canary Islands: Astrophysics Institute (IAC) in Izaña, Tenerife

Universities:

- The University of La Laguna (ULL) with 2 000 teaching staff/researchers: this very old establishment, with a predominantly human and social sciences bias, has 62 departments and 110 laboratories and offers research facilities in biomedical engineering, health, energy and the environment.
- The University of Las Palmas de Gran Canaria (ULPGC), with 1 650 research professors, covers a broad spectrum of primarily scientific and technical subjects and has 36 departments and various research centres and institutes in health (Centre of Applied Algology), physical and satellite oceanography, aquaculture as well as information sciences and technologies (Institute of Cybernetic Sciences and Technologies, Institute of Applied Microelectronics).

Public national and local research bodies:

- Institute of Natural Products and Biotechnology (IPNA);
- Canaries Oceanographic Centre;
- Canaries Centre of Geophysics;
- Space Centre of the Canary Islands;
- Meteorological Centre of Santa de Cruz de Tenerife and Meteorological Centre of Las Palmas de Gran Canaria;
- Canarian Institute for Biomedical Research (UIH-Biti);
- Canary Islands Foundation for Health Research;
- Canary Islands Institute of Technology (ITC);
- Canary Islands Institute of Agrarian Research (ICIA);
- International Scientific Committee (CCI);
- Canary Institute of Marine Sciences (ICCM), an interinstitutional centre of excellence known for its research in aquaculture and possessing one of the largest infrastructures in Europe to research hot-water species.

Centres researching and providing consultancy in agriculture, renewable energy, volcanology and biotechnology:

- Island Council of Gran Canaria: experimental farm, botanical garden;
- Tenerife: Technological and Renewable Energy Institute;
- Lanzarote: Geodynamics Laboratory, experimental farm;
- Fuerteventura: Research Institute at Puerto del Rosario;
- La Palma: experimental farm working in collaboration with the Veterinary Department of the ULPGC;
- the Island Biotechnology Laboratory working in collaboration with the IPNA of the Governing Council of the Spanish National Research Council (CSIC).

Joint research units or groups:

- in this diverse environment, there is a large research centre that stands out: the Canary Islands Astrophysics Institute (IAC), a worldwide centre of excellence with two observatories — one in Teide on Tenerife and one in Roque de los Muchachos on the island of La Palma — with 115 researchers, 60 engineers and 65 doctoral candidates. In addition to its high-performance astronomical instruments and telescopes funded by numerous countries, the IAC is recognised for the breadth of its research, which covers: space; cosmology; the planetary system; atmospheric optics; high-resolution images; optical



Canary Islands: Teide volcano on Tenerife

instrumentation; telescope construction; and astrophysics.

Major research infrastructures:

- Grand Canaries Telescope (Grantecan);
- Ocean Islands Platform (PLOC);
- Supercomputing Centre.

Technology transfer takes advantage of existing installations in a science and technology (S & T) park, which will be completed by other projects supported by the ULPGC.

REGIONAL INNOVATION STRATEGY

The regional innovation strategy falls within the framework of 'Plan II for Canarian research and innovation' and is expressed in the priorities of the regional programmes for development and transnational territorial cooperation. The priorities for the 2007–13 period concern, in particular:

- development of the knowledge economy;
- development and innovation;
- the environment, water resources, risk prevention, energy and transport sectors.

The system of project implementation, known as the 'triple-helix' method, relies on public bodies who delegate to other operators specialised in supporting innovative institutions and enterprises.



Canary Islands: *Dracaena draco* (Drago or Dragon tree) in Lanzarote

For further information, please visit: <http://www.gobiernodecanarias.org>

## French Guiana: towards a sustainable bioeconomy

*French Guiana is one of the largest French outermost regions, occupying 13.2 % of national territory. It is situated in the north-east of the South American continent and separated from its neighbours by rivers — despite the construction of road infrastructures that could be considered as a link of a future pan-American Atlantic highway. Its humid equatorial climate with an almost constant temperature generates high levels of corrosion. Yet French Guiana has assets: a geostrategic position as the front door to the EU in South America and the crossing point between the Mercosur regional trade agreement <sup>(1)</sup> and the Caribbean Community, Caricom <sup>(2)</sup>.*



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The view of Georges Euzet, Director of Guyane Technopole: *'Guianese scientific researchers have managed to move from individual approaches to collective efforts in order to develop joint technological resources and adopt common research themes. Today, the initiative of working together should enable French Guiana to gain influence within the European research area [ERA], particularly with regard to knowledge and valorisation of Amazonian biodiversity. The next stage we hope to be involved in is in the emergence of a sustainable bioeconomy.'*

Its location close to the equator has enabled the creation of the Kourou Space Centre. Above all, the territory has a humid equatorial forest of 7.5 million ha, providing access to a forest ecosystem of exceptional biodiversity — one of the largest on the planet with 7 000 to 10 000 plant species — as well as a reservoir of materials (wood) and biocomposites, bioresources and gold deposits.

The development of the French Guianese economy is played out through the confrontation between two exceptional dynamics: strong economic expansion coupled with one of the highest levels of demographic growth in the world, due to exceptional fertility and high levels of illegal immigration from Brazil and Suriname. The French Guianese economy is

dominated by the tertiary and the public sectors. The primary and industrial sectors suffer directly from constraints related to remoteness and isolation, despite the setting up of ICT projects. The economy is also heavily dependent on the space activity developed by the centre at Kourou, which promises great technological and economic success.

### RESEARCH AND INNOVATION

In addition to existing economic sectors, the exploitation of new subsoil assets provides an opportunity to move from a trading post economy to an economy which values rare resources, a nugget of which used to be called an 'El Dorado'. Due to the desirable location, research activities have been developed and the research and technological development (RTD) mechanism was set up. This enabled the development of several promising sectors organised around different clusters, including:

- tropical rain forest: research on the tropical rain forest ecosystem;
- agronomy and agro-transformation: valorisation of natural substances for pharmaceutical or cosmetic purposes; promoting plant or animal species;
- water: research on tropical aquatic environments; ocean dynamics and hydrology;



© Claude Delhayre, CNRS Images

French Guiana: termite sampling

- health: health monitoring; research for emerging or re-emerging illnesses (malaria); virology or retrovirology; tele-medicine and remote sensing to monitor infectious illnesses;
- human sciences: ethnology; ethnosciences; archaeology;
- engineering sciences: ICT; alternative sources of energy; material corrosion.

### RESEARCH INSTITUTIONS

Numerous public and private bodies work alongside the University of the French West Indies and Guiana (UAG), which have a higher variable number of researchers than the university. On average, there are 100 researchers and 25 laboratories divided between the following institutions.

Branches of public research bodies:

- Bureau of Geological and Mining Research (BRGM);
- Centre for International Cooperation in Agronomical Research for Development (CIRAD);

<sup>(1)</sup> For further information on Mercosur, please visit: [http://ec.europa.eu/external\\_relations/mercosur/index\\_en.htm](http://ec.europa.eu/external_relations/mercosur/index_en.htm)

<sup>(2)</sup> For further information on Caricom, please visit: <http://www.caricom.org>



© L. Blanc

French Guiana: aerial view of the forest



- National Centre for Space Studies (CNES);
- National Centre for Scientific Research (CNRS);
- French Oceanographic Institute (Ifremer);
- National Institute for Agricultural Research (INRA);
- National Institute for Preventive Archaeological Research (INRAP);
- Institute of Research for Development (IRD);
- French National Hunting Organisation (ONCFS);
- National Forestry Commission (ONF).

- Indigenous American Languages Research Centre (CELIA) joint research unit.

Research on ecosystems is divided among various bodies in a joint or assisting capacity:

- international scientific network Ecolab (belonging to BRGM, CNRS, Ifremer and IRD);
- Brazil: Instituto de Pesquisas Científicas e Tecnológicas do Amapá in Macapa, Museu Paraense Emilio Goeldi, Federal University of Pará;
- Suriname and French Guiana: Amazonian coastal ecosystems;
- GIS Irista: Scientific Interest Group for the Initiative for Interdisciplinary Research on Amazonian Systems and Territories;
- GIS Silvolab: Scientific Interest Group for Forest Research in French Guiana — French focal point of the European network for tropical forest research;
- Ecology of the Forests of French Guiana (Ecofog) joint research unit (belonging to CIRAD, CNRS, Engref, INRA, UAG).



French Guiana: lizard



French Guiana: *Catopsis* plant

The campus of the UAG:

- the different centres and laboratories of the Institute for Advanced Studies of French Guiana, of the Department of Research and Training for Medicine and the Technological University Institute, focusing on: management economics; the study of local government in the Caribbean; renewable energy; mathematics and informatics; molecular materials in the Amazon; development economics; qualitative valorisation of tropical plant products; parasitology; and medical mycology.

Private research centres:

- Petit Saut Hydrology and Ecology environmental management laboratory (Hydreco), French Guiana branch;
- French Guiana Institute Pasteur: prevention and treatment of infectious diseases, malaria and other tropical illnesses; virology and retrovirology.

Joint research units or research groups:

- Quality of Tropical Fruit and Vegetables (Qualitrop) joint research unit (belonging to CIRAD, INRA, UAG/QPVT);

Large-scale research infrastructure:

- Satellite Monitoring of the Amazonian Environment (SEAS) branch;
- French Guianese Space Centre;
- the herbarium of IRD French Guiana, which provides a database that is unique in the world;
- National Network for Long-term Monitoring of Forest Ecosystems (Renocofor);
- National Forestry Commission (ONF);
- Nouragues tropical forests research station (belonging to CNRS);
- Paracou research station (belonging to CIRAD) — Amazonian forest ecosystem.

A technology park, called Technopole, enables technology transfer projects to develop, channelling research activities



French Guiana: *Dendrobates* frog

towards regional development. Finally, thanks to the high-resolution remote sensing satellite receiving and processing station, the region enjoys a unique satellite/ICT platform in Europe.

#### REGIONAL INNOVATION STRATEGY

Within the French Guiana University cluster, all actors involved in the research domain have identified research themes aimed at anchoring European research in the Amazon region. This research is to be disseminated through the following regional cooperation actions:



French Guiana: leafcutter ants

- knowledge of and adding value to Amazonian biodiversity and ecosystems;
- sustainable development of French Guianese societies and Amazonian civilisations;
- dynamics and management of territories in the Amazonian environment;
- health in tropical environments;
- alternative energy;
- biocomposites, biomaterials and bio-inspired technologies.

Five major complementary technologies have been identified:

- tele-technologies;
- biotechnologies in tropical environments;
- development of natural resources;
- renewable energies;
- the fight against the corrosion and degradation of materials.

For further information, please visit:  
<http://www.cr-guyane.fr>  
<http://www.guyane.pref.gouv.fr>

## Guadeloupe (France): new energy sources, Earth sciences, agronomy and health

*Guadeloupe is located in the intertropical zone at the heart of the Caribbean arc, at the crossroads between the Americas and Europe. The island comprises 0.3 % of French territory and boasts a hot and humid tropical climate. Exposed to cyclones, swells and torrential downpours, it faces the risk of flooding and landslides every year. Lying on the subduction zone between the Caribbean and the Atlantic plates, Guadeloupe is subject to earthquakes and, like numerous other Caribbean islands, it has an active volcano: La Soufrière.*

This geoclimate enables Guadeloupe to benefit from a remarkably rich biodiversity with numerous endemic species. It has a national park, a variety of natural islands and marine reserves. Blessed with a high percentage of sunshine as well as trade winds, it is a popular destination with tourists. Tourism — together with agriculture, the agroprocessing industries, public works and civil engineering — is one of the economic growth areas of the island which is currently experiencing high levels of unemployment, particularly among its youth.

### RESEARCH AND INNOVATION

Guadeloupe's background has paved the way for the emergence of innovation in some sectors. The island has thus been able to position itself resolutely as a testing ground for:

- experimenting with renewable energy forms: solar, photovoltaic, thermal, biomass, high-pressure geothermal, small hydro and ocean energy (the share of renewable energy in primary energy consumption is 13.7 %);
- developing and adapting equipment and surface materials to fit the climate and seismic conditions;



Guadeloupe: satellite antenna of the Seismological Observatory of Deshaies



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The view of Vanessa Weck, Head of the Research and Innovation Department of Guadeloupe's Regional Council:

*'Thanks to European funding, the region has been able to benefit from high-quality equipment and to train young, skilled researchers. In this context, and considering the specific nature of our geoclimatic conditions, it has been possible to develop significant expertise and achieve recognition within our regional environment, particularly with regard to agronomy, renewable energy, risk prevention and even health. Our task now is to ensure that this potential is known and valued by those operating in continental Europe and other island territories.'*

- developing knowledge and a database on volcanic/tectonic activity.

With regard to tropical agronomy, the varied nature of the constraints has enabled the development of expertise recognised at international level. One example of this are studies on species adaptation and resistance to climate, parasites and stress.

In light of the emerging issue of sustainable agriculture, food and health, there is a significant body of research examining the impact of pesticides on health and the environment, the reduction of their use or even of any inputs in agriculture. Moreover, the population type, predominantly of African descent, has given rise to the development of strong expertise in certain pathologies. This is particularly the case for sickle-cell anaemia, diabetes and certain cancers.

### CENTRAL RESEARCH THEMES

The economic fabric of the territory, whether it be the agricultural, industrial or services sector, displays the same dynamism when it comes to research and research excellence. Local research is organised around two main sectoral clusters and two horizontal or cross-sectoral clusters.

**Sectoral clusters:**

- biodiversity/health/environment;
- energy.

**Horizontal clusters:**

- applied mathematics/ICT;
- human and social sciences.

**RESEARCH INSTITUTIONS**

In Guadeloupe, approximately 505 researchers and research professors are divided among different organisations working in the sectoral and horizontal clusters mentioned above.

**Public and private research establishments:**

- the University of the French West Indies and Guiana (UAG) with its 16 laboratories organised into departments of research and training — hard and natural sciences, law and economics, literature, physical activity sciences, medical sciences.

**Technological university institutes:**

- National Institute for Agronomic Research (INRA): the only such centre in a tropical area, covering Martinique and French Guiana, too; it undertakes agro-pedoclimatic research, plant production and zootechnics; design and evaluation of cropping systems;
- Centre for International Cooperation in Agronomical Research for Development (CIRAD): agricultural export system, animal health, genetic resources;
- Volcanic and Seismic Observatory of Guadeloupe (IPGP/CNRS/INSU) with a seismic database and a tsunami monitoring network;

- Geological and Mineral Exploration Bureau (BRGM);
- French Meteorological Office;
- Institute Pasteur: epidemiology;
- University Hospital Centre: tropical illnesses (dengue fever) and pathologies common on the island (diabetes, prostate cancer).

**Joint research units:**

- UMR 763 Inserm: joint research unit 763 to fight against sickle-cell anaemia, formed by the Inserm institute, the UAG and Paris 7 University;
- UMR Qualitrop: joint research unit Qualitrop for research on the quality of fruit and vegetables, formed by INRA and the UAG.

**Technical institutes:**

- Technical Centre for Sugar Cane (CTCS);
- Regional Fisheries and Marine Institute (IRPM).

**Structuring equipment:**

- Biological Resources Centre for Tropical Plants and Crops;
- Centre for Biological Resources for the Health Sector;
- Molecular Biology Platform, reorganised with the Centre for Biological Resources for the Health Sector within the Centre for Clinical and Epidemiological Investigation;
- Platform for the Analysis of Pesticide Residues in Liquids and Solids;
- Joint Materials Characterisation Centre.

All of the above-mentioned equipment has contributed towards increasing knowledge and developing areas of research related to local problems, such as: the reconversion of land polluted by pesticides; the adaptation of materials to territorial constraints; ecological characterisation and environmental interaction; the development of a sustainable agronomical model with the minimum of inputs; and the exploitation of particularly interesting molecules.

With regard to exploiting research, although Guadeloupe files more patents at the European Patent



Guadeloupe: modern transmission electron microscope (TEM), UAG

Office than any other overseas region, the number is still modest. There are a variety of initiatives that do however encourage enterprise transfer: the portal/guide of S & T tools and skills of Guadeloupe, as well as the Synergile research cluster dedicated to renewable energies and to equipment and surface materials for tropical island environments subject to risks. Synergile is backed by the Capenergies competitiveness cluster, devoted to developing alternative forms of energy, which brings together 400 researchers from four metropolitan and ultramarine French regions.

Furthermore, the UAG has set up a university enterprise society on its Guadeloupe campus.

**REGIONAL INNOVATION STRATEGY**

Promoting an open approach, the strategy draws on the work of a white paper on research and study groups. It focuses on several, previously identified domains:

- renewable energies;
- risks and equipment;
- promoting biodiversity;
- ICT.

In line with the recommended cross-sectoral approach, these priorities are spread across three major fields of activity: agro-transformation; public works and civil engineering; and tourism. The actions will be implemented in phases, by setting up a co-ordinated organisation, recruiting human resources to develop, identify and guide project initiators and equipping the island with technical resources.

For further information, please visit:  
<http://www.cr-guadeloupe.fr>  
<http://www.guadeloupe.pref.gouv.fr>



Guadeloupe: experimental controlled atmosphere greenhouses, INRA

## Martinique (France): sustainable development in territorial protection and promotion

*The island of Martinique is the smallest territory in the Antilles archipelago — 0.20 % of national territory — and located at the centre of the arc of the Lesser Antilles. It is made of volcanic rock and subject to the risk of earthquakes and volcanoes. Moreover, it is on a cyclone path. The humid tropical climate together with soil diversity creates a wide variety of ecosystems. Martinique is a true natural laboratory with its protected areas. It has remarkable landscapes making tourism, which is currently being developed, an attractive proposition.*



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The view of Jean-Claude Soumbo, Regional Councillor for Martinique: *'Thanks to the EU, it has been possible to undertake a set of activities aimed at developing advanced skills in Martinique. However, although 164 doctoral scholarships have been granted to train young researchers, even with one Martinican Doctor of Astronomy currently working at Oxford University, the results are insufficient and the problem of retaining those researchers and skills in our territory remains. It is necessary to demonstrate that this is possible through a flagship project. The ISIS project, which aims to improve patient monitoring of multi-trauma victims on emergency life support — conducted by the CHU, the UAG and the regional government — is at the cutting edge internationally in this field. Other similar initiatives need to be carried out in order to achieve this objective.'*

Exposed to climatic and geological imbalance, and even demographic and urban imbalance with high levels of unemployment in an ageing population, the protection and promotion of Martinique's natural heritage is a necessary challenge. Agriculture, fishing, tourism and silviculture depend, in fact, on an environment that needs protection. Consequently, the island puts innovation and sustainable development at the forefront of its development. Particular emphasis is on research into the diversification of energy sources, energy

management and consumption — and finally, on the ICTs needed to bridge the digital divide.

### RESEARCH AND INNOVATION

On the basis of these territorial characteristics, research and innovation have developed and grown around the starting point: adding value to Martinique outputs. A skills assessment highlighted important themes, organised around common clusters:

- biodiversity, agronomy, agro-transformation and agro-environment cluster;
- human and social sciences cluster;
- natural hazards, soil, water and geothermal studies cluster;
- health cluster;
- aquaculture and halieutic resources cluster.

New clusters have sprouted from these sectors in line with current concerns: waste management; refrigeration; maintenance in tropical areas; renewable wind and marine energy; earthquake and cyclone resistant construction; and ICTs.

### RESEARCH INSTITUTIONS

The scientific community, which is in the process of development and consolidation, consists of approximately 250 researchers working mostly in public establishments. The University of the French West Indies and Guiana (UAG) alone employs more than 70 researchers in 15 university labs. The remaining researchers work in national, private and semi-public establishments.

National establishments:

- Institute of Research for Development (IRD);
- National Institute for Agricultural Research (INRA);
- National Centre for Agriculture and Forestry, Engineering and Water Management (Cemagref);
- Centre for International Cooperation in Agronomical Research for Development (CIRAD);
- Bureau of Geological and Mining Research (BRGM);
- French Oceanographic Institute (Ifremer);
- French Meteorological Office;
- National Forestry Commission (ONF);
- Institute of Earth Physics of Paris (IPGP);
- Scientific and Technical Cultural Centre (CCST).

Private and semi-public establishments:

- Technical Centre for Sugar Cane (CTCS);
- Marine Observatory (OMM);
- Regional Agri-Food Centre for Martinique, known as PARM, specialising in research and development (R & D) as well as technological assistance and consultancy for businesses.



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Martinique: completed research on biodiversity at the Martinique Agro-Environmental Research Centre (PRAM)



© Emmanuel Nossif

Martinique: *Vernonia arborescens* (in Creole: *kasé-koutla*), plant for pharmacopoeia

- The emergence of the renewable energy industry cluster is evidenced by a research programme which includes objectives dedicated to biomass, photovoltaic, wind, solar, hydraulic and marine energy.

#### REGIONAL INNOVATION STRATEGY

Despite the fact that more structuring is needed, Martinique's research and innovation sector is increasingly positioned at the heart of economic development programmes. The region is rather focused on technology transfer, even though research organisations' impact on production chains (fishing, agriculture and aquaculture) as well as environmental defence and protection concerns are leading to the adoption of a global regional strategy on RTD.

All stakeholders involved have demonstrated their will to cooperate in order to find and/or create further synergies, to define common objectives and projects in order to facilitate the growth of a network capable of implementing action programmes — in line with the needs of the region and acting as a lever for regional integration.

The first technology park in the Antilles was therefore created in 2008, with the aim of building an innovative networking system. Interregional cooperation follows the same lines — the projects envisaged to develop digital connections, a tourism observatory, a Caribbean-wide research centre and a platform for civil protection.

For further information, please visit:  
<http://www.cr-martinique.fr>  
<http://www.martinique.pref.gouv.fr>

On the basis of this potential, a few joint research groups have formed in order to work on projects of excellence.

- The UAG, in addition to its research on human and social sciences, is developing a research agenda in applied mathematics and IT in the Grimaag research group, which is hosted both on the Guadeloupe and Martinique campuses. The aim is to assure its place in the arena of new ICTs. The modelling of phenomena relating to nitrogen transfer to bananas is being studied by the Ceregmia laboratory.
- Within PRAM, agro-environmental research has brought together organisations (such as Cemagref, CIRAD, Ifremer, INRA and IRD) which are working on issues related to water, pollution, organic farming for fruit and vegetable horticultural systems, sugar cane breeding, animal husbandry, pedology, alternatives to chemical treatments and the timber industry.
- Earth sciences with volcanology and earthquake research are led by the IPGP and the National Centre for Scientific Research (CNRS) at the Mount Pelée observatory.
- Medical research: a medical outpost of the UAG and the Fort-de-France University Medical Centre (CHU), closely reflecting the particular scope of pathologies associated with the territory, is particularly concerned with virology and retrovirology and has become famous for its use of mother-of-pearl in orthopaedic surgery. Other health-related initiatives are: the 'Intelligent survey for information systems' (ISIS) project, monitoring the condition of patients on emergency life support; the Islands project, providing psychiatric assistance designed for

isolated regions as well as monitoring emerging diseases in the Caribbean (since 2005); the International Centre for Cooperation in the Medical and the Health Sector in the Caribbean and the Americas (Cicomsc) network for diagnostic research and the transfer of technologies relating to rare neuromuscular diseases; research into radiological manifestations associated with sickle-cell anaemia; and a feasibility study on a Caribbean forensic molecular genetics referral centre.

- Marine biodiversity around the island favours the halieutic and aquacultural research conducted by Ifremer, experts on fish concentration devices.



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Martinique: Regional Agri-Food Centre for Martinique (PARM)

## Réunion (France): ensuring a balanced future for an island open to the world

*Réunion is a tropical island located in the south-west of the Indian Ocean, to the east of Madagascar with one of the most active volcanoes on Earth: the Piton de la Fournaise (meaning 'the peak of the furnace'). The island comprises 0.40 % of national territory, has a very marked landscape, a number of different microclimates and a multicultural population. Its natural environment is one of the few marine and land biodiversity hotspots recognised worldwide (Unesco registration underway).*

These characteristics make this territory a veritable 'miniature planet Earth' and an exceptional place, owing to both its disadvantages and its assets. In fact, with the highest level of unemployment in the EU in 2007 and continued demographic growth, Réunion will have more than 1 million inhabitants by about 2030. The prediction of an explosion in energy consumption has thus led to sustainable development being prioritised, particularly in the energy sector. The objective is to exceed the current 13.5 % of supplies generated from renewable energy sources and reach self-sufficiency in electricity production by 2025, through the 'Regional plan for renewable energy and the rational utilisation of energy' (Prerure) and the 'Green energy revolution Reunion Island' (GERRI) project.

In this context, and in order to address these challenges, special attention has been devoted to supporting the entire research sector — be it by developing traditional industries, the natural starting point for developing experimentation and research centres, or by emerging sectors.

### CENTRAL RESEARCH THEMES

Tied to the geographical characteristics of the territory and its tropical nature, research activities have been developed with a strong emphasis on the following key themes:

- water, maritime and aquaculture resources;
- natural hazards;
- agro-transformation and plant resources;
- human and social sciences;
- health;
- engineering sciences (ICT energies).

### RESEARCH INSTITUTIONS

With the increase in laboratories and the diversification of research organisations, one of the key assets of the region is public research. Public research benefits from several major national research bodies which have been in existence for a long time.

The constantly growing scientific community, with currently more than 900 researchers and research engineers, is divided among the following major research bodies.

- University of La Réunion: 430 teaching staff and researchers, 300 doctoral candidates, the Institute of Engineering (Esiroi), 17 laboratories and four joint research units organised into three research clusters: biological environment and health; terrestrial physical environments; and human and social sciences in the Indian Ocean.
- Centre for International Cooperation in Agronomical Research for Development (CIRAD), organised into three research clusters: the quality of tropical agricultural and food production (KAPPA); environmental risk, agriculture and integrated resource management (Reagir); and the Plant Protection Pole (3P) at seven dedicated sites, including laboratories and greenhouses, with 41 researchers, 112 technicians and 40 volunteer civil engineers and engineering doctoral candidates.
- Institute of Research for Development (IRD): working on halieutic research, an important element of the regional scientific landscape. Leader of the 'RUN sea science' RegPot project (2009–11) under the Seventh Framework Programme (FP7),



© R. Carayol, Réunion region, 2008

The view of Maya Cesari, Regional Councillor, Senior Lecturer and General Secretary of the Scientific Board of CYROI: *'In order to meet the challenges of the Réunion of tomorrow, research and innovation represent the melting pots in which we can enhance our wealth and our assets, on behalf of the population. We want this research to be exemplary, looking to the challenges of the 21st century (the sea, space, health, etc.), dedicated to fair and sustainable development, reflective of Réunion: this tropical, multicultural and creative island, open to the Indian Ocean and the world.'*

the institute is participating in the regional sea research cluster (PRM). It operates in 6 units with 13 researchers, 13 engi-



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Réunion: bagasse processing at the Bois-Rouge sugar factory



Réunion: photovoltaic panels

neers and technicians and 8 doctoral candidates.

- Bureau of Geological and Mining Research (BRGM), providing expertise in the fields of development planning and natural risks.
- Ifremer, a research institute and one of the PRM partners.

Private research is important for:

- the sugar industry: the Centre for Experimentation, Research and Training in the Domain of Sugar Cane, Varietal Creation and Sugar Technology (CERF) is at the forefront of genetic and technological progress;
- the tropical marine environment: the ARVAM marine R & D agency and Réunion's association for aquaculture development, ARDA.

Furthermore, research and research exploitation are carried out by projects of excellence conducted via partnerships which provide auxiliary facilities, mechanisms and technology transfer.

In the health sector, the Réunion Indian Ocean Cyclotron (CYROI) — a technology platform which combines a radiopharmaceutical production unit and technical research and support centres — is available to researchers and young innovative enterprises. Its research areas concern metabolic, infectious and emerging diseases and the promotion of land and marine biodiversity. The Centre for Research and Scientific Monitoring of Infectious Diseases in the Indian Ocean (CRVOI) is also linked to it.

In the research sector focusing on the sea, the setting up of the PRM brings together all actors involved in this area: the Aquacultural Development Agency, Ifremer, IRD,

the Marine Research and Development Agency and the University of La Réunion.

Working in the field of observation are the Observatory for Atmospheric Physics of Réunion (OPAR) and the 'Indian Ocean satellite-assisted environmental monitoring project' (SEAS-OI). In addition, there is ongoing research in: agronomics (the creation of 3P); ICTs; energy; and biodiversity.

#### REGIONAL INNOVATION STRATEGY

Support for research and innovation benefits from the good governance in place in Réunion, which is visible through the remarkable coherence in the activities of public bodies in defining strategic areas and priority issues for research. It also allows for better synergies between public funds.

With regard to support mechanisms for innovation and technology transfer, there are several different structures.

- The aim of Qualitropic, the only overseas competitive cluster, is to give its seal of approval to projects proposed in the different industry sectors: agroprocessing; agriculture; fishing; aquaculture; health; biotechnologies; sustainable development via renewable energy forms (biomass).
- The Technopole and its incubator help to support projects in four clusters of excellence: new ICT; agroprocessing; health and environment; while the Témergie cluster — attached, as in Guadeloupe, to the Capenergies competitiveness cluster — brings together the main organisations involved in the energy sector.

Finally, the regional innovation strategy aims to coordinate and enhance the work carried out in order to increase attractiveness and competitiveness in Réunion. The strengthening of support tools and mechanisms must be directed at decreasing the significant difference that remains in relation to mainland France. It must also affirm the presence of European research in the Indian Ocean, in particular via the projects planned for Indian Ocean territorial cooperation in the fields of observation, network development and communication.

For further information, please visit:  
<http://www.regionreunion.com>  
<http://www.reunion.pref.gouv.fr>



Réunion: aerial view of the island

## The Azores (Portugal): blue biotechnology

*Situated right in the middle of the North Atlantic Ocean — an area of international interest for marine and climatological observation — the Azores archipelago, a part of Macaronesia, is made up of nine islands representing 2.6 % of Portuguese national territory. The Azores are faced with twofold isolation as a result of archipelagic fragmentation due to volcanic activity and regional tectonism. The region is thus characterised by its real geographic isolation and an extremely varied landscape. It has an oceanic climate with heavy rainfall and limited sunlight.*

The combined efforts at regional, national and EU levels, for example the creation of online schools and ICT centres, have improved the archipelago's connectivity. Accessibility has also been improved by the provision of regional, national and international air connections adjusted to the islands' location.

The fragmented economic activity is subject to nine micro markets, making economies of scale difficult. However, the diversification of the regional economy with the growth of the tourism industry, the restructuring of farms, investment in growth sectors such as the environment in order to reduce energy dependency in particular, have translated into positive growth rates.

### RESEARCH AND INNOVATION

Within this favourable and varied context, the assets of the territory have led to the emergence of research themes organised around the following clusters:

- knowledge of marine resources and the economic potential of the sea;
- biodiversity conservation;
- preventing natural hazards linked to volcanoes and earthquakes;
- study of the effects of climate change, atmospheric science;
- agronomy and veterinary sciences, biotechnology;
- renewable energy (marine).

### RESEARCH INSTITUTIONS

The research units are almost all integrated within the University of the Azores (UAÇ), a young institution organised into three campuses situated on the islands of São Miguel, Terceira and Faial. The university is starting to disseminate its research internationally: 550 researchers are organised in different centres; five of these centres (see below) are accredited by the Science and Technology Foundation, which has the mission of developing, funding and evaluating institutions and projects at national level.

- The centre of the Institute of Marine Research (IMAR), University of the Azores Department of Oceanography and Fisheries (UAÇ-DOP): marine biology, oceanography, fishing and ecology. The intense activity of this centre makes the university an institute of international repute, due to its studies on deep-sea hydrothermal ecosystems. There are five projects ongoing under FP7. Representing the region in the European Centre for Information on Marine Science and Technology (Eurocean), the centre has been involved in preparing the EU regulation prohibiting the use of towed gear and gill nets, which has made the seas of Macaronesia one of the largest protected marine areas in the world.
- The Centre of Volcanology and Geological Risks Assessment (CVARG): volcanology, seismology, geological risks and civil protection. Included in the Esonet European network of excellence, it is also a member of the World Organization of Volcano Observatories (WOVO), affiliated to the Institute of Earth and Space Sciences (ICTE) and responsible for the



© DOP-University of Azores

The view of Ricardo Serrão Santos, Head of the Department of Oceanography and Fisheries, University of the Azores: *'Cooperation in a Europe wanting to be a world leader in science has played a major part in the development of research capacity in the Azores. Thanks to the major projects and networks of excellence in which our scientists participate, the quality and competitiveness of research in certain fields (deep-sea hydrothermal ecosystems and submarine-mounts) is world-class. The University of the Azores has become, in less than 15 years, an internationally recognised institution which has made its mark in blue biotechnology.'*



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Azores: cetacean watching around São Miguel island





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Azores: fumaroles in Furnas village, São Miguel

Azores Volcanological Monitoring System (Simova). Together with the Institute of Meteorology, it coordinates the Azores Earthquake Vigilance System (Sivisa).

- The Azores Biotechnology Centre (CBA) and the Azores Agrarian Research and Technology Centre: studies on the potential of animal and plant resources.
- The Natural Resources Research Centre: research into functional and genetic diversity, including research into new pharmaceutical products.
- Centre of Applied Economics Studies of the Atlantic (CEEAPLA).

Other research centres are also gravitating to the islands.

- In the field of climatology: the Climatology, Meteorology and Global Changes Centre (CCMMG). The archipelago constitutes a natural platform for studying climate and monitoring meteorological phenomena of vast expanses of the globe.
- In the field of biodiversity and health: the Biodiversity and Genetic Resources Research Centre; the Centre for the Conservation and Protection of the Environment (CCPA); the Molecular Genetics and Pathology Unit (UGPM) of the Ponta Delgada Hospital; and the Specialized Service of Epidemiology and Molecular Biology (Seebmo) at Terceira Hospital.
- In the field of social and human sciences: the Centre of Social Studies at the University of the Azores (CES-UA) — sociology and demography; the Gaspar Frutuoso Research Centre (CEGF) — history and heritage; the Centre for Applied Mathematics and Information Technologies (CMATI).
- Other institutions involved in technology dissemination and transfer: the Institute of Technological Innovation of the

Azores (INOVA); the Regional Delegation of the Institute of Meteorology (IM) and the Regional Civil Engineering Laboratory (LREC).

A team of 18 researchers, in partnership with the Massachusetts Institute of Technology (MIT)-Portugal, is working in collaboration with international institutions on the important subject of reducing fossil fuel usage. This is being carried out within the 'Green islands project', which aims to increase the actual level of electricity production using renewable energy forms by 50 to 75 % in 2018.

Finally, the Azores are members of the Nereus network of European regions using space

technologies and having at their disposal a European Space Agency (ESA) satellite research station at Santa Maria and Atmospheric Radiation Measurement (ARM), which develops processes for controlling the radioactive and microphysical properties of clouds. In order to give further value to this research, two technology parks in São Miguel and Terceira offer research space in the fields of information and communication, biotechnology and biomedicines.

#### REGIONAL INNOVATION STRATEGY

The following actions have been implemented:

- creation of a Regional Department of Science, Technology and Communications to coordinate and develop research and technology, as well as facilitate the growth of ICT and foster a scientific and technical culture by setting up science centres in the key areas of astronomy, volcanism, the environment and the sea;
- launch of an 'Integrated plan for science, technology and innovation', which proposes support measures for researchers including a project management platform, a database and assistance on how to set up and operate a research unit, how to develop a partnership and how to equip a research unit;
- two technology parks (for information, monitoring, warning, biotechnology and biomedicine) make the favourable environment for knowledge and technology transfer complete.

For further information, please visit:  
<http://www.azores.gov.pt>



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Azores: Lake of São Miguel

## Madeira (Portugal): ascribing value to local resources while reaching out for international excellence

*The Madeira archipelago is situated in the North Atlantic, 980 km from Lisbon, Portugal. With a total surface area of 797 km<sup>2</sup>, it is made up of several islands and islets of which only two are inhabited: Madeira and Porto Santo. The others are nature reserves.*



© Regional Government of Madeira

The view of Raúl Caires, Chairman of the Management Board of Madeira Technopole: *'Research and innovation challenges are closely linked to the capacity to create the conditions necessary for attracting and retaining key skills in our region, as well as the desire to be competitive on international markets. The quality of the projects and the researchers and their strategic vision are the main competitive advantages.'*

low researcher mobility, the difficulty of attracting highly qualified researchers to the region on a permanent basis, and the lack of critical mass necessary to develop certain activities.

In spite of its commitment to developing renewable energy, Madeira remains heavily dependent on petroleum products. These represent additional costs, both as regards the sea transportation of these products and the modest size of the existing power systems.

### CENTRAL RESEARCH THEMES

Research in Madeira has a regional dimension, with an emphasis on regional development, and a global dimension focused on the creation of research centres capable of attracting and retaining researchers and students from international markets.

At the regional level, research focuses on the conservation and valorisation of agricultural and marine resources and overcoming the disadvantages linked to Madeira's extreme remoteness, particularly with the aid of the development of ICT and renewable energy. Applied research is also being

carried out in the fields of mathematics, physics and environmental law. For the last three years, a partnership has been established with the American Carnegie Mellon University, whose degree courses in advanced studies attract students from all around the world.

The recently formed Madeira Interactive Technologies Institute — the product of a partnership between the University of Madeira, Madeira Technopole (Madeira Technology and Science Park) and Carnegie Mellon University — consolidates this experience in fields such as human-computer interaction and service design. The quality of research has received national and international recognition from industry.

With regard to the global dimension of this research, the objective is to create international centres of excellence in highly specialised fields, such as nanotechnology and biotechnology.

Today, research activities are organised around different clusters which reflect the territory's key assets:

- marine sciences and oceanography;
- animal and marine biology;
- plant biology;
- agriculture and agribusiness;
- water and the environment;
- IT and ICT;
- renewable energy and energy conservation;
- interactive technologies and service design.

Characterised by extremely steep mountains, volcanic in origin and a subtropical climate, it is an excellent tourist destination and highly appreciated for its authenticity, abundant and varied instances of flora such as the Laurissilva Forest. It is an ecosystem with an exceptional history, having been classified as a world heritage site by Unesco in 1999.

Madeira's position in the Atlantic Ocean, being without a continental shelf, allows it to serve as a base for marine exploration. Its geostrategic position in international cable networks constitutes a further advantage.

Its extreme remoteness poses certain problems for the development of research capacity:



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Madeira Technopole



© Regional Government of Madeira

Madeira: sea life observation

- traditional culture, ICT, energy, transportation and road traffic management;
- internationalise the region;
- create financial instruments and mechanisms for small and medium-sized enterprises (SMEs);
- promote entrepreneurship;
- devise innovative actions to modernise public administration.

Moreover, innovation features strongly in the regional strategies of the 'Intervir +' operational programme and the 'Madeira-Açores-Canarias' (MAC) transnational cooperation programme for the period 2007-13. Finally, Madeira has created the '+ Knowledge' support system with the aim of supporting technological research, development and demonstration projects of regional enterprises in order to increase their competitiveness.

For further information, please visit:  
<http://www.madeira.gov.pt>

### RESEARCH INSTITUTIONS

The scientific community is structured around public or private non-profit research centres and a university with more than 400 researchers. Research is carried out in the following institutions.

University of Madeira:

- Centre of Mathematical Sciences;
- Centre for Macaronesian Studies;
- Centre of Applied Economics of the Atlantic;
- Education Research Centre;
- Chemistry Centre.

Public or private centres or intermediary bodies/businesses:

- Science and Technology Centre of Madeira (CITMA);
- Regional Agency for Energy and the Environment of the Autonomous Region of Madeira (AREAM);
- Madeira Technopole;
- Centre of Enterprise and Innovation;
- Madeira Electricity Company;
- Madeira Interactive Technologies Institute.

In addition, bodies connected to the regional government in various sectors:

- Madeira Wine Institute;
- Regional Fisheries Department;
- Agricultural Services Department;
- Centre for the Study of Atlantic History;
- Funchal Museum;
- Marine Biology Station;
- Civil Engineering Laboratory;
- a natural park;
- Madeira Botanical Gardens.

AREAM, a private non-profit association, also aims to promote innovation and cooperation in the domains of energy and the environment — as much in the public as in the private sector.

Madeira Technopole helps develop strategic research activities by operating as a platform enabling local development to be stimulated and encouraged in the domains of ICT, enterprise innovation and tourism.

Lastly, CITMA is an institution that aims to stimulate S & T research in Madeira through fellowships and project engineering.

### REGIONAL INNOVATION STRATEGY

The 2007-13 strategic guidelines for innovation are set out in the 'Economic and social development plan for the autonomous region of Madeira' (PDES), which aims to define a more participatory regional innovation system. The guidelines are as follows:

- innovate in tourism, food supply, natural resources and



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Madeira: the city of Câmara de Lobos

## The EU: a partner to strengthen research and innovation capacities in outermost regions

*While the Lisbon target set by the European Council in 2002 to increase R & D investments to 3 % of GDP will not be met in 2010 (the current value is still around 2 %), the 3 % target has had a strong influence on raising the profile and importance of research and research policy in all EU Member States. For instance, the volume of R & D investment has increased in real terms in every EU Member State, resulting in an EU-wide increase of 20 % between 2000 and 2007 as compared with 15 % for the United States.*



Consequently, the R & D investment gap with the United States has stabilised. However other competitors — such as China, Japan and Korea — have progressed more rapidly than the EU over the same period. The need to improve the EU's R & D efforts in the face of rising international competition and the need to address major societal challenges have thus led the European Council to renew the 3 % target as part of the EU's 2020 strategy.

When comparing individual EU Member States and regions, figures for R & D expenditure in all European regions in 2006 show significant differences: 30 % of private R & D expenditure is concentrated in only 10 out of the 271 European regions (4 in Germany, 3 in Sweden, 2 in the United Kingdom, 1 in Finland) <sup>(1)</sup>. In turn, the outermost regions showed levels of R & D investment that were 50 % lower than their respective Member States in 2006 <sup>(2)</sup>.

It was recognised that sustainable economic growth is increasingly dependent on the capacity for change and innovation of regional economies. For this reason, the renewed Lisbon strategy has increased the role of cohesion policy in the development of a knowledge and innovation society.

### COHESION POLICY: SUPPORTING RTDI IN THE OUTERMOST REGIONS

As a result, a significant increase in the overall financial effort of cohesion policy on RTDI activities for 2007–13 has been recorded: 60 % of the credits of the 'Convergence' objective and 75 % of those of the 'Regional competitiveness and employ-

ment' objective have been allocated for expenditures contributing to the achievement of the Lisbon strategy. The budgetary envelope devoted to RDT investments *stricto sensu* amounts to EUR 85 billion, i.e. 25 % of the total cohesion policy <sup>(3)</sup>.

Nevertheless, the added value of cohesion policy in the ERA and the European innovation

area cannot be limited to an increase in the budget devoted to RTDI. Indeed, the cohesion policy's contribution must also be assessed in terms of supporting the development of integrated research and innovation strategies based on the characteristics and specificities of each territory, of strengthening local governance or facilitating the emergence of transnational networks.

In terms of RTDI, cohesion policy supports regional authorities to develop:

- cooperation between companies, and between companies and public research/higher education institutions, by supporting the creation of regional and trans-regional excellence centres;
- RTDI activities in SMEs and give them access to RTD services offered by public research institutions;



Martinique: view of the Pelée mountain volcano

- crossborder and transnational initiatives, aimed at improving cooperation in research and building up the research capacity in the priority areas of EU research policy;
- R & D capacity, notably in ICT, research infrastructures and human resources, in sectors with significant growth potential.

In terms of innovation, the critical role of cohesion policy is to deal with a great diversity of situations across the EU's territory and to assist regions in developing their own innovation systems and in using more efficiently the knowledge and technologies that are locally available. Thus, cohesion policy has supported regions in the development and implementation of regional innovation strategies aiming to enhance their competitiveness.

The analysis of the operational programmes for the European Regional Development Fund (ERDF) and the European Social Fund (ESF) of the outermost regions has demonstrated a clear commitment by the regional authorities to match the 'Lisbon-earmarked expenditures.'

<sup>(1)</sup> Report from the Commission to the European Parliament and the Council — Sixth progress report on economic and social cohesion, COM(2009) 295 final, 25.6.2009.

<sup>(2)</sup> Eurostat, 2006.

<sup>(3)</sup> Commission staff working document - Regions delivering innovation through cohesion policy, SEC(2007) 1547, 14.11.2007.



Réunion: population melting pot in St Denis de la Réunion

Their regional development strategies are carefully balancing between the concern for the fragility of their territories and the use of their endogenous innovation potential.

This approach has, for example, been followed by the French outermost regions. In the second half of 2009, following a thorough diagnosis of the strengths and weaknesses of their territories with respect to innovation, they presented a regional innovation strategy to the European Commission, adapted to the overseas regions.

**RTDI IN THE OUTERMOST REGIONS: EXPLOITING UNIQUE STRENGTHS**

The outermost regions have made it a priority to broaden the range of their production by allowing their companies to create more added-value goods and services. At the same time, this strategy must respect their unique natural heritage. The outermost regions have clear strengths and potential for research and innovation, particularly in areas such as:

- agricultural research;
- biodiversity;
- climate change;
- tropical health;
- marine resources;
- renewable energy;
- astrophysics;
- aerospace;
- volcanology and seismology.

The cohesion policy and two other EU funding instruments for research and innovation — FP7 and the competitiveness and innovation framework programme (CIP) — accompany the outermost regions in their efforts to fully exploit their potential in these areas. The economic, social and environmental benefits of these efforts are important not only for these regions, but also for the EU as a whole.

Furthermore, the outermost regions are embedded in geographical and geopolitical realities that differ from those of mainland Europe. They thus add a special dimension to the EU's external action and participate in the development of a genuine neighbourhood policy through their geographical, cultural and historical links with other countries and peoples, especially in Africa and on the American continent. The outermost regions may therefore play a key role as partners with their neighbouring countries, particularly in research-capacity building projects with an international dimension.

**OPPORTUNITIES FOR OUTERMOST REGIONS IN FP7**

FP7's main objective is to further enhance excellence in the ERA. In this context, the outermost regions have a clear role to play with respect to their unique strengths.

Through various activities, FP7 pursues specific goals:

- giving an edge to European research on the world scene;
- stimulating creative and innovative research;
- enhancing research capacity throughout Europe, be it in terms of research infrastructures or human potential;
- fostering sustainable knowledge transfer.



French Guiana: cocoa broad beans

The outermost regions would have much to gain from a more active participation in calls for proposals that correspond to their key strengths. Through their participation in the Cooperation specific programme, they already managed to contribute to the ERA by focusing on their asset which is, above all, environmental research with a special focus on climate change and renewable energies. The outermost regions could also play an important role by further developing their other strong points, as identified above.

Based on the outermost regions' current participation in the Capacities specific programme and other funding instruments, they could foster their potential, take stock of their existing research capacities and further consolidate them to enhance their integration into the ERA. Particularly, the 'Research Potential' (RegPot) programme, targeted at the convergence and outermost regions, could be used more extensively as a springboard to participate more in collaborative projects funded under the priority themes of the FP7 Cooperation specific programme.

At the same time, the outermost regions' unique situation and strengths could be translated into pioneering research projects, matching the support that is being offered by the People and Ideas specific programmes under FP7. To date, these programmes have not been fully exploited by many research performers established in the outermost regions.

**TOWARDS A BETTER USE OF FUNDING SOURCES**

It is essential to continuously fund research and innovation projects, from idea to implementation, in order to be able to tackle future challenges. The Commission is therefore urging regional authorities to continue to support investments in research and innovation through the cohesion policy and by fully exploiting the different sources of EU funding as well as other public and private funds. Indeed, at a time when pressure on public finances is increasing, a more coherent and efficient use of funding sources can usefully contribute to enhancing regional competitiveness.

continued on page 22



Canary Islands: salt evaporation pond, La Palma

At the EU level, the Union possesses three key support instruments: cohesion policy, which is funded under the SF and the Cohesion Fund; the research framework programme; and the CIP. Synergies of design between these instruments should now be translated into synergies of action by national and regional authorities and other stakeholders.

In this regard, the Commission adopted the Communication *Competitive European regions through research and innovation* (COM(2007) 474 final of 16.8.2007). Its essential message was the need for EU Member States and regions to use EU funding instruments for research and innovation in a more coordinated way. One of the communication's conclusions was the Commission's commitment to issue the *Practical Guide to EU funding opportunities for research and innovation*. This practical guide is now available both as a document in all EU languages and as a web version on CORDIS in six European languages (see [http://cordis.europa.eu/eu-funding-guide/home\\_en.html](http://cordis.europa.eu/eu-funding-guide/home_en.html)). The same information is also available on CORDIS in a graphic format, both downloadable or directly online (see [http://cordis.europa.eu/eu-funding-guide/rel-info\\_en.html](http://cordis.europa.eu/eu-funding-guide/rel-info_en.html)), using the 'mind mapping' concept. Like their counterparts in continental Europe, the research and innovation stakeholders in the outermost regions are strongly encouraged to make better use of these tools.

Making efficient use of available funding to support RTDI easier is a continuous effort. In this regard, the EU Spanish Presidency has organised, in cooperation

with the Commission, the 'Week of innovative regions in Europe' (WIRE 2010) conference — held in Granada, Spain, from 15 to 17 March 2010 — that addressed this issue. It included a discussion on the specificities of the outermost regions within the RegPot programme and the synergies between EU research funding instruments. The conference came up with recommendations for future steps.

#### A NEW PARADIGM FOR EXPLOITING UNIQUE CHARACTERISTICS

Without making any prejudgements about the future, and notably the financial perspectives beyond 2013, the European Commission, giving substance to a new paradigm, proposes to ensure better use of EU research and innovation funding instruments. For now, the outermost regions should be able to seize opportunities in existing community programmes, FP7 in particular, through an active participation in calls for proposals.

The Commission is well aware of the challenges that the EU's outermost regions face when preparing proposals for participating in such calls: remoteness from continental Europe; difficulties of communication and networking; lack of access to services

for the transfer of knowledge on support mechanisms, for assistance in identifying partners or setting up projects; narrow local markets, economically dependent on a few products; and, in some scientific fields, lack of critical mass.

Eager to fulfil its role as facilitator, the Commission has expressed its willingness to the outermost regions to co-organise information sessions explaining EU instruments and policies. A seminar on EU research and innovation funding instruments, gathering participants from research centres, universities, local authorities and enterprises from the French overseas departments, took place from 3 to 5 November 2009 in Martinique (France). A similar information day will be organised jointly with the regional authorities for the Canary Islands (Spain) as well as the Azores and Madeira (Portugal).

Another event is being organised jointly with EU Member States and their outermost regions on 27 and 28 May 2010 in Brussels, Belgium. The 'Forum for outermost Europe' will raise awareness on the strengths and specificities of the outermost regions among all stakeholders in Europe and beyond. Innovative initiatives and projects which constitute an important added value for the EU as a whole will be presented there.



Madeira: solid waste residues valuation unit in Meia Serra



Canopy of the Amazonian forest

## 'Regions of Knowledge' and 'Research Potential': lessons learnt and key messages

*By October 2009, altogether 151 calls were concluded under FP7. Of these, 24 FP7 grant agreements were signed, involving 36 partners (or coordinators) from the EU's outermost regions. The grants they received total EUR 7.3 million. Regarding the number of proposals submitted, 203 eligible FP7 applications were received from the outermost regions, with the participation of 246 partners requesting a total of nearly EUR 68 million.*

Concerning all FP7 specific programmes, significant participation from the outermost regions could be observed under the Cooperation and Capacities programmes. No participation was registered under Ideas, and a weak presence in the People programme was noted.

Under Cooperation, most of the participation focused on the 'Environment (including climate change)' theme. Capacities had the most successful applications under its subprogrammes 'Research infrastructures', 'Regions of Knowledge' (RoK) and 'Research Potential' (RegPot).

The RoK and RegPot programmes offer great opportunities for the outermost regions to strengthen their research capacities and economic development, and to enhance their integration into the ERA. The outermost regions participated in a total of 20 proposals submitted under the two programmes' main calls between 2007 and 2009.

Under RegPot — a programme exclusively addressing EU convergence and outermost regions — one proposal received funding but five reached the required threshold mark, out of the 14 eligible proposals submitted by outermost regions. This proportion does not differ significantly from that observed

for all RegPot proposals. As for RoK, two of the four proposals submitted were funded and another proposal was evaluated above the required threshold. The latter can be considered a very encouraging result indeed.

When taking a closer look at the experts' comments on the negatively evaluated proposals, the following observations can be made: on the scientific content, the most frequent remarks related to the lack of clear strategy and objectives, insufficient demonstration of the scientific excellence of applicants and not enough detailed implementation measures.

Regarding budgetary and management issues, in some proposals financial plans did not convince the experts, either in whole or in part. In particular, for these proposals, more could have been done in terms of management methodology, decision-making process and risk and contingency plans, both in terms of accuracy and budgeting.

As for the impact of the proposed actions, the long-term sustainability of the research capacity-building measures could have been more guaranteed. Furthermore, the evalua-

tors noted the lack of end-user integration and SME involvement in general.

Finally, the outermost regions should exploit their excellent scientific knowledge and potential in very specific fields, such as:

- agrofood;
- biodiversity;
- renewable energies;
- climate change;
- astrophysics;
- aerospace science;
- oceanography;
- vulcanology and seismology.

All these scientific fields are covered by the thematic priorities of the FP7 Cooperation specific programme.



Guadeloupe: yam plant propagated in vitro culture

© INRA Centre Antilles-Guyane



Azores: waves on the volcanic coastline of Pico Island

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## Activities and partnerships financed by EU RTDI instruments

This graph acts as a tool for identifying:

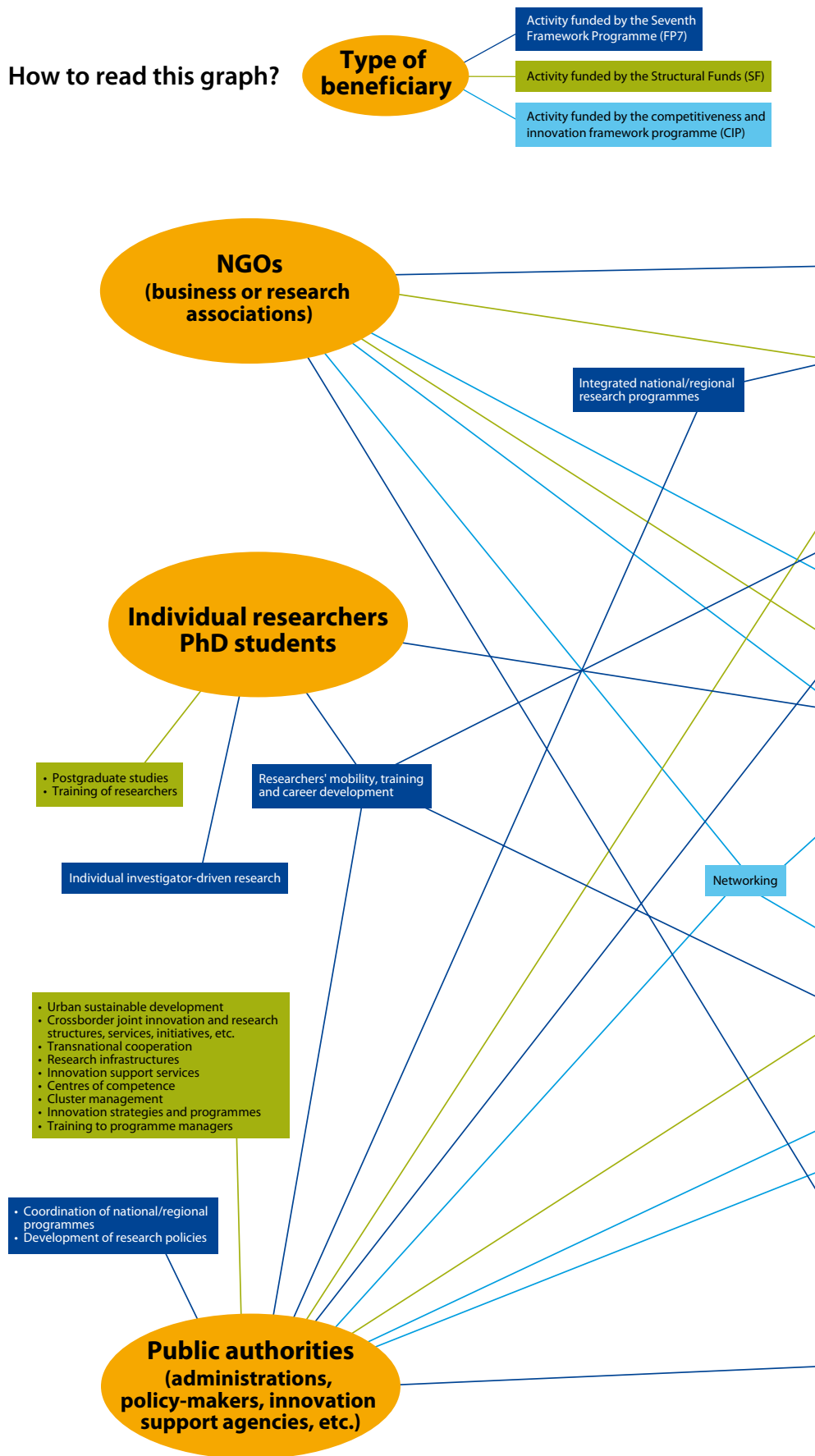
- the types of activities that can be financed by three EU RTDI funding instruments and around which proposals for funding could be built;
- the types of beneficiaries eligible to apply for each activity and the possible collaboration between the beneficiaries for common proposals.

For example, if a non-governmental organisation (NGO) would like to be funded by the CIP, by following the light blue lines they know that they can apply for 'networking' activities, 'pilot and market replication projects' and activities related to 'promotion and dissemination projects'. In the graph they can see that for 'networking' activities, public authorities, companies and research organisations/universities are also eligible. If applicable, they could therefore set up a partnership for putting forward a proposal with these too.

As far as SF activities are concerned, interested beneficiaries should contact their national or regional authority to check whether these are being implemented in their country/region.

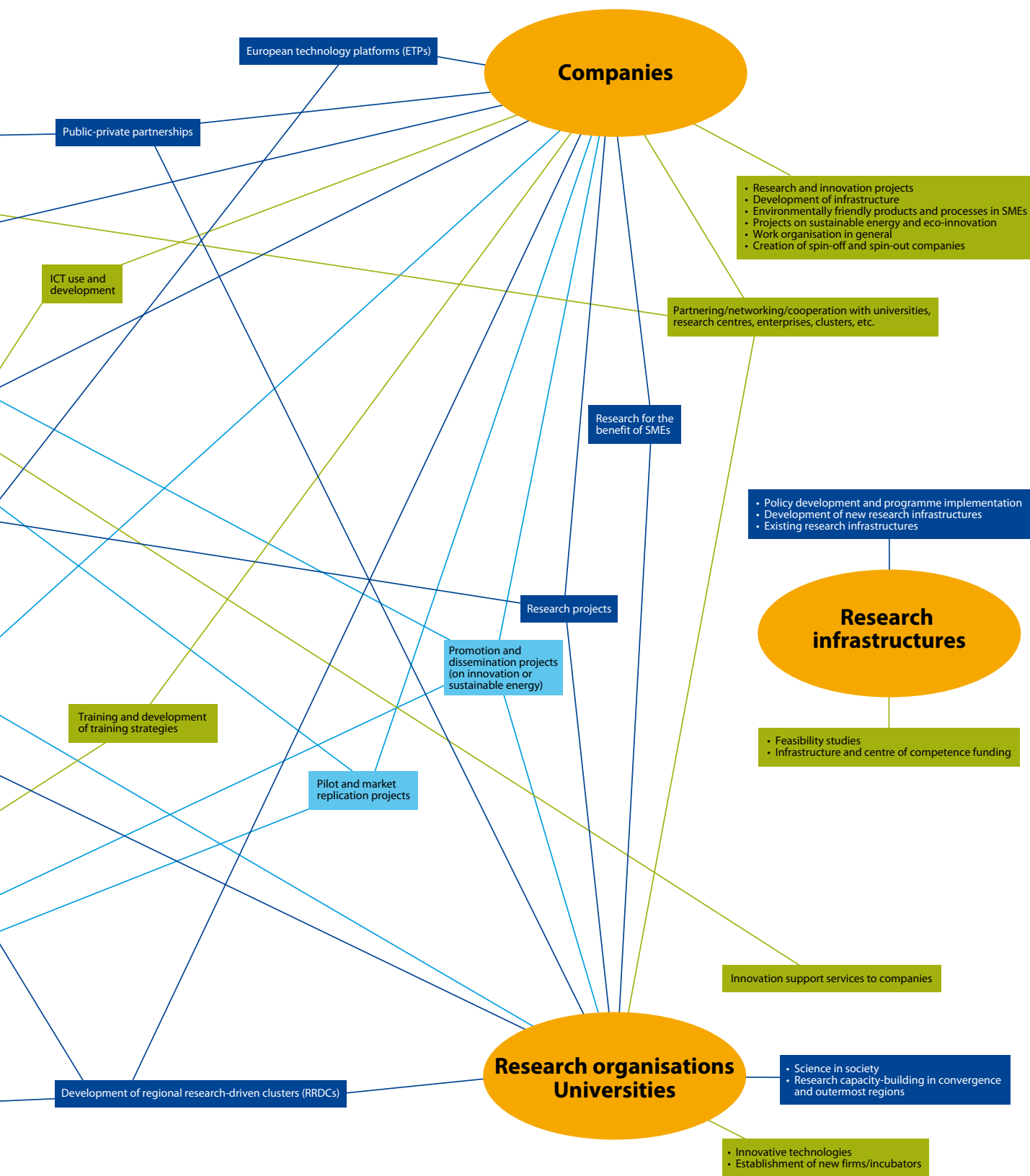


How to read this graph?



This graph is by no means comprehensive — choices had to be made. For more information, namely details on the funding schemes connected with each activity and for access to their websites, please consult the mind map of the EU RTDI funding opportunities and support services ([http://cordis.europa.eu/eu-funding-guide/rel-info\\_en.html](http://cordis.europa.eu/eu-funding-guide/rel-info_en.html)) and the *Practical Guide to EU funding opportunities for research and innovation* ([http://cordis.europa.eu/eu-funding-guide/home\\_en.html](http://cordis.europa.eu/eu-funding-guide/home_en.html)).





## Promoting tropical sea science in the western Indian Ocean

*Human impact on marine habitats and resources is leading to a decrease in biodiversity and depleted fish stocks in oceans and coastal areas. Maintaining the integrity of the marine environment, including reefs, is of major interest to western Indian Ocean states, among which Réunion is the only and furthest outermost region from continental Europe. In Réunion, the main themes of sea science include biodiversity and ecology, environment monitoring and utilisation, as well as fish resources and aquaculture.*

In order to increase its presence on the international stage, including through the region's International Cooperation Partner Countries (ICPC), the European action in the western Indian Ocean needs to be more visible and more evident — a clear aim of the 'RUN sea science' project (RUN stands for Réunion, an abbreviation used in air transport). There are more than 100 programmes on biodiversity in the Indian Ocean, but hardly any of them are steered by European institutions.

The development of aquaculture is a very competitive sector between Réunion and other countries of the region. Réunion's regional council is making a substantial integration effort with the region's ICPC countries, principally through its regional cooperation programme. The 'RUN sea science' project aims to significantly strengthen the regional cooperation policy action of the local government.

In order to meet the scientific and political stakes, the 'RUN sea science' project wishes to improve and develop the research capacities and capabilities of Réunion. This is being achieved in the field of sea sciences by improving regional S & T potential, enhancing human and material resources and developing strategic partnerships and scientific dissemination.

The project defined four major strategic objectives:

- enhance the local critical mass and skills of researchers in sea science;
- increase the visibility of the teams at regional, EU and international levels;

- unlock the technological gaps that limit activities in Réunion;
- support the creation of a sea science pole of excellence in Réunion.

The sea science pole of excellence, called the 'Regional marine pole', is being set up on the island by the 'RUN sea science' research network. It is funded by the SF and additionally supported via the 2008 RegPot programme call, on the initiative of the Institut de recherche pour le développement (IRD) — a French public research institute set up on Réunion 18 years ago. It currently has a staff of 35 scientists.

In order to accomplish the strategic objectives, the IRD and its local partners (Université of La Réunion and the research institutes ARDA, ARVAM, BRGM and Ifremer) have established the following specific actions.

- Reinforce the S & T capacities of Réunion through: upgrading the research equipment necessary for the development of research activities in the sea science field, including genetics, otolithometry, environmental studies, aquaculture and bio-logging; recruitment of researchers from Réunion, in order to maintain the pool of local qualified researchers in sea sciences; improvement of the S & T experience and knowledge of local researchers through short trainings held by EU and ICPC partner institutions.
- Develop strategic partnerships and communication with EU and ICPC sea science institutions: actions at international level, such as the 2009 Western Indian Ocean Marine Science Association (Wiomsa) conference at Réunion as well as thematic workshops and visits to Réunion, by sea science experts from EU and ICPC countries.
- Information and dissemination: various communication initiatives including a website, booklet and documentary movie, presenting the research activities and the application of technology in sea science in Réunion.



© Run sea science

### Project title

Improvement of the tropical sea science research potential in the western Indian Ocean, and of the technology capacities in Reunion Island (RUN sea science)

### Programme & call

'Research Potential' (RegPot) programme, call: FP7-REGPOT-2008-1 'Unlocking and developing the research potential in the EU's convergence regions and outermost regions'

### Project coordinator

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### Project website

<http://run-sea-science.fr/?rubrique26>

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### Project title

Scientific re-equipping of accredited R & D units — remote operated vehicle (ROV)

### Programme & call

European Regional Development Fund (ERDF), 'Operational programme for the economic and social development of the Azores' (Prodesa) 2000–06

### Project coordinator

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### Project title

Deep water fishery resources in the central east Atlantic (PescProf)

### Programme & call

European Regional Development Fund (ERDF), 'Interreg III B — Madeira, the Azores and the Canaries' 2000–06

### Project coordinator

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<http://www.pescprof.org>

## Azores ready to run new research vehicle

*Enhancing the Azores' S & T capacities has been a major objective for research and scientific development in the region. A recent project is doing everything possible to renew and update the scientific equipment in duly certified R & D units, by purchasing new equipment such as a remote operated vehicle (ROV) for a myriad of research projects.*

A ROV is an unmanned device connected to a vessel via a tether, from which it is remotely operated and from where data is collected and viewed. The vehicle can operate at depths of up to 300 m from the vessel.

The purchase of a ROV, among other research equipment, is foreseen as part of the re-equipping of the University of the Azores' Department of Oceanography and Fisheries. The ROV will provide the opportunity to conduct countless research projects in coastal areas, along the underwater island slopes and on seamounts.

Specifically, this will consist in prospecting the general benthonic and pelagic biodiversity, prospecting and monitoring shallow-seated hydrothermal sources and characterising habitats. The research vehicle can also be used to prospect underwater heritage, monitor sunken vessels, oversee under-

water building work or port structures, verify deep-sea cables, other equipment and scientific moorings, and compile images for the study of marine geology.

For the University of the Azores' Department of Oceanography, this project represents a qualitative leap forward for marine research in the autonomous region of the Azores: it enables work to be carried out at depths little explored so far.



## Alternative fishing in three Atlantic archipelagos

*The study of marine resources is important for the sustainable development of the fisheries sector. Via this research, new innovative technologies can be developed and introduced. In order to find alternatives to traditional fisheries, the PescProf projects I, II and III set out to enhance knowledge about marine resources and study the specific island characteristics of three Atlantic archipelagos: the Canary Islands, the Azores and Madeira.*

Studying marine resources involves biological, ecological and oceanographic investigations. In detail, the PescProf projects:

- explored new areas of fishery, i.e. the sustainability of exploiting various species of marine fauna living in the deep sea;

- assessed the stock of the Madeiran shrimp and deep-water crab;
- investigated unconventional deep-sea test procedures;
- analysed innovation and interchange of fishing technology in the regions;
- reported the actual state of affairs as regards processing and conservation of catches (on board and ashore);
- tested commercialisation techniques for the species explored.



The projects came in very useful to the fisheries sector in the three regions involved. They enabled the development of alternative fishing technologies and end products from deep-sea fish, and opened the potential for future commercial exploitation. Scientifically, the projects have also proven to be extremely valuable — they enhanced knowledge of marine biodiversity, allowing the results to be published and consumer acceptance to be tested through tasting sessions.

## Promoting fruit and vegetables from Martinique

*The biodiversity of fruit in Martinique has not been fully exploited to date. However, it could lead to the creation of specific markets which would further develop this potential. It is in this context that research into the quality and promotion of tropical fruit and vegetables has been carried out at the Regional Agri-Food Centre for Martinique (PARM).*

PARM is a scientific and technical instrument created on the initiative of the regional council to carry out R & D, assistance and consultancy for professionals in the agrofood sector. PARM as an entity has been operational since 2003. It has a steering committee which includes professionals representing all spheres of the agrofood sector. This committee is the main way in which PARM meets the needs and expectations of the agrofood sector.

Four working committees, chaired by representatives from the business world, have been set up for each sphere of the agrofood sector:

- fruit and vegetables;
- fisheries and aquaculture;
- meat and milk;
- processing firms.

A scientific committee has been set up since 2009, with the aim of consulting experts to carry out experimental programmes within PARM.

PARM's role is to contribute to the economic development of the agrofood sector by developing new ways to valorise primary production and to reinforce the level of performance of firms involved in processing.

In order to meet this objective, PARM has three guidelines:

- to implement R & D programmes aimed at fostering the promotion of products from all spheres of the agrofood sector by generating added value;
- to make available services and technological resources to firms in the agrofood sector, enabling them to improve their competitiveness;
- to promote the training of agrofood professionals, students and trainees, setting up partnerships for on-the-job training.

PARM's activities are distributed over three centres, the aim of which is to carry out additional and cross-sectoral work with the support of a microbiology and physicochemical

laboratory. These are an R & D centre, a sensorial analysis centre, and a technological assistance and advice centre (ACT).

The R & D centre represents the core of PARM's work. It carries out development projects for products and processes, and leads joint projects for specific sectors or private projects, meeting needs defined in the project specifications.

The sensorial analysis centre studies the organoleptic qualities of fresh or processed products from the agrofood sector in an objective way, making use of a highly efficient analytical tool. Comparative studies of products, sensorial maps, tests of consumer acceptability, or the control and monitoring of product quality are implemented for the private sector or to support the R & D work carried out by PARM.

The ACT ensures that PARM's skills and tools are in line. The centre's main objective is to foster the development of agrofood enterprises in Martinique. It supports joint projects aimed at specific sectors or private projects, for needs such as quality assistance, technological consultancy and the dissemination of regulatory and technological information to professionals.

An example of research carried out recently at PARM is a project concerning the study of mangoes and mangots (wild mangoes). The choice of these two fruits, typical of Martinique, was made with a view to the potential that already exists in terms of mature orchards and the nutritional profiles of these fruits.

Research into mangoes and mangots has three aims:

- to increase knowledge of Martinican fruit and vegetable varieties, highlighting their technological potential;
- to support innovation and new products by creating added value, with a view to conquering new markets or niche markets adapted to consumer demand;
- to valorise the diversity and typical nature of tropical fruit and vegetables.

The study should strengthen initiatives for the diversification of fruit through the acquisition of knowledge — varieties of fruit with good technological aptitude will be highlighted and product models will be proposed to drive innovation. In the long term, this project will allow new opportunities to be created for this sector, developing additional jobs and placing new products on the market.

### Project title

Pôle agroalimentaire régional Martinique (PARM)

### Programme & call

European Regional Development Fund (ERDF) 2000–06 and 2007–13

### Project coordinator

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<http://www.parm.asso.fr>



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### Project title

*Germobanco Agrícola de la Macaronesia* (Germobanco I, II and III)

### Programme & call

European Regional Development Fund (ERDF), 'Interreg III B — Madeira, the Azores and the Canaries' 2000–06

### Project coordinator

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### Project website

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### Project titles

Climate and meteorology of the Atlantic archipelagos (Climaat I and II)  
Coastal maritime system (ClimarCost)

### Programme & call

European Regional Development Fund (ERDF), 'Interreg III B — Madeira, the Azores and the Canaries' 2000–06

### Project coordinator

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## Seed management in Macaronesia

*The islands of the Canary Islands, Azores and Madeira — part of the Macaronesian islands — started three successive projects called Germobanco I, II and III in order to protect and preserve the huge agricultural biodiversity in Macaronesia and value the potential of local crop varieties. Several new seed management systems were implemented.*

The overriding aim of the Germobanco projects was to build up a germoplasm bank of species of vegetation for agriculture, improve the competitiveness of exports and the quality of products. Furthermore, the risk of pests needed to be reduced and traditional crop varieties restored.

The Germobanco projects thus focused on biotechnology in order to guarantee the conservation of existing biodiversity in vegetation. A series of actions were taken to this end, including harvesting of crops, quarantine, conservation and classification.

This resulted in the establishment of four germoplasm banks of species, containing identifiable varieties with assured genetic integrity, orientated to meet the demands of the agri-

cultural sector. Two of these banks for genetic resource conservation are located in the Canary Islands (La Palma and Tenerife), one in the Azores (Terceira) and one in Madeira. All four banks are based on the same methodology and are interconnected by a transnational communication network.

The projects conserved 4 978 species altogether, despite the initial obstacle of sharing genetic information from crops in this widespread area. Conditions were created to produce the first seeds (four local species) certified by the Spanish Ministry of Agriculture, Fisheries and Food. The agricultural products resulting from the scientific investigation were certified for their quality and their compliance with environmental standards.

## Azores' geostrategic position ideal for climatology and meteorology

*The geostrategic position of the Azores makes these islands an ideal place for climatological and meteorological investigations. The Climaat I, Climaat II and ClimarCost projects developed, by means of a scientific cooperation, the methodologies needed for studying meteorology and climate of the Atlantic island regions, including the surrounding ocean.*

The project partners' aim was to collect climatic and meteorological information, process it and make it public. The project also intended to promote the geostrategic position of the islands' territories in the domain of climatology and meteorology. As a result of their location in an area with few monitoring points, the Azores islands are ideal observation platforms.

The projects' specifically created website required daily updates. Running the site included the development of databases, particular technologies for recording and providing data in real time (but also at later times), as well as the maintenance of all communication channels and data transfer between the project teams.

Twice a day, numerical models were run to forecast weather conditions for three days. The sea-wave model enabled the prediction of sea conditions in terms of direction, height, duration and length of sea waves — thanks to a system of wave-riding buoys moored off the coast. This was particularly important for supporting navigation and safety at sea, providing assistance to

maritime and port constructions and defining maritime climatology for future use in coastal engineering projects.

Island climatology at a local scale was provided via the development of specific methodologies, in particular through the CIELO model. Its application was intended for different applied climatology purposes, namely hydrology and agro-ecological zoning as well as land management of small islands.

With these methodologies, the Climaat I, Climaat II and ClimarCost projects have also participated in other projects. They have thereby contributed to a deeper understanding within different fields of the island environment.



## Hydrogen power on the Canary Islands

*The Canary Islands Institute of Technology (Instituto Tecnológico de Canarias, ITC) is working towards positioning the archipelago as a world reference in what is known as the 'hydrogen economy'. One important aspect relates to the production of fuel for vehicles running on hydrogen from renewable energy sources (RES). The use of hydrogen as an energy vector increases the possibilities of using available RES in transportation. Projects such as Hydrohybrid have made the Canary Islands an international testing platform for integrating RES and hydrogen technologies.*

Hydrohybrid was a demonstration project carried out by the ITC, involving the design, installation, assessment and optimisation of a small-scale hydrogen stand-alone off-grid production system to be used as fuel for a small vehicle. The Hydrohybrid project operated on photovoltaic (PV) and a low-powered wind turbine. It represented the first hydrogen production installation in the Canary Islands.

The Hydrohybrid system consists of the following elements:

- 10 kW wind turbine;
- 3 kWp PV subsystem;
- power conversion/conditioning unit;
- water purification subsystem;
- proton exchange membrane (PEM) electrolyser with nominal production of 1.16 Nm<sup>3</sup> H<sub>2</sub>/h;
- low-pressure hydrogen storage tank: 1 000 l/15 bar;
- hydrogen booster compressor;
- high-pressure hydrogen storage: 50 l bottles/200 bar;
- regulation, control and monitoring systems;
- small fuel cell powered vehicle;
- electricity-generating fuel cell.

The experience allowed the ITC to advance in the understanding of technologies related to the production, storage, distribution and use of hydrogen produced from RES.

The Hydrohybrid project complements other hydrogen-related projects carried out by the ITC, such as Hydrobus, RES2H2 and RenewIslands. These projects have contributed to make the ITC a leader in the integration of RES and hydrogen technologies not only in the Canary Islands, but also in Europe's outermost regions.

The main goal of the ITC is to promote the industrial development of the region, fostering R & D and innovation in the following emerging technological fields:

- renewable energies;
- water and sustainability;
- medical engineering;
- biotechnology;
- environmental analysis.

The ITC also fosters regional innovation and entrepreneurship by its participation in European networks such as the Eurada network, the regional Innovation Relay Centres (IRCs), the Business Innovation Centres (BICs) and the European BIC Network (EBN).

Attached to the Regional Ministry of Employment, Industry and Trade of the Canary Islands Regional Government, the ITC carries out its activities in collaboration with the two local universities and other regional, national or international R & D centres.



### Project title

Hydrohybrid

### Programme & call

European Regional Development Fund (ERDF) 2000–06

### Project coordinator

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## Project title

Insular regions' cooperation for maximising the environmental and economic benefits from the research in renewable energy sources (INRES)

## Programme & call

'Regions of Knowledge' (RoK) programme, call: FP7-REGIONS-2008-1 'Regional contributions to the reduction of CO<sub>2</sub> emissions'

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# Island regions: fit for the future with wind, sun and biomass

*Sustainable development is an essential target of many islands throughout the world, especially in Europe. One of the requirements is the reduction in use of fossil resources and slowing climate change. A much larger integration of renewable energy sources (RES) and energy efficiency in the overall energy balance is advantageous.*

RES, especially if combined with investments in energy-efficient technologies, can answer many problems relating to the economy of islands. Optimum use of available RES could contribute to an island's energy autonomy and to the reduction of its high exposure to volatile oil energy markets. Combining RES with energy storage technologies, such as hydrogen or batteries, could reduce consumption of external fossil fuel in the transport sector. Problems of high increase in rates of energy consumption during seasonal peaks can be reduced by high-scale deployment of energy savings and efficiency solutions in the tourist sector.

In order to further develop regional policies and strategies in the field of RES, the INRES project selected three regions which are representative of economic, climatic, geographical and infrastructural characteristics and diversity in European island areas: Samsø (Denmark), Crete (Greece) and the Canary Islands (Spain). The three regions have achieved encouraging results, especially during the last decade, in implementing RES, in their economies. Each of them has benefited from government grants and development programmes.

The Canary Islands' authorities, for example, have developed measures for a 100 % supply coming from RES, mainly solar and wind, in some islands of the archipelago. In Crete, 14 % of the electricity production is nowadays ensured by wind farms; other supplies come from extended thermal solar energy, while photovoltaics are under construction and 8 % of energy demand is covered by agricultural biomass. Since winning a competition in Denmark in 1997, Samsø Island has achieved 100 % renewable energy sufficiency via straw-fired heating plants, solar heating and wind turbines, onshore and offshore.

INRES aims to enhance the cooperation among these island regions in favour of regional policies and to establish a mutual learning process among regional research-driven clusters (RRDCs). The RRDCs are key collaboration structures for enhancing the use

of energy-efficient and renewable energy technologies. Inside each cluster, the liaison among research entities and the business sector (especially SMEs) is achieved by involving public authorities that represent national governments (Crete and the Canary Islands) or European institutions (Samsø) at local level. SMEs from industry, tourism and service sectors are important players in these clusters.

The INRES project consortium, consisting of 10 partners, has hence the following objectives.

- To diagnose the state of the art: core competencies in the three regions, research agendas, economic impact of renewable energy policies; profiling, analysis, forecast of CO<sub>2</sub> emissions, industry-driven policies for CO<sub>2</sub> reduction.
- To build an interregional network: organise three regional workshops plus three interregional workshops; generate a research agenda for a self-sustainable energy environment and energy innovation with key stakeholders across the regions.
- To design a common action plan: exploiting results from local research about renewable energy; addressing insular regions' challenges; further integrating skills by involving local partners from the three main sectors (public, research, industry); setting up business plans.

The INRES project is thereby contributing to the economic self-sustainability of the regions, R & D networking and cooperation, the promotion of energy innovation as well as renewable energy policy and strategy developments.



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## Sun-powered seawater desalination systems to be tested in Italy, Spain and Tunisia

*In many places of the world, drinkable water is already a scarce resource and its rarity will increase dramatically in the near future. The water problem is particularly acute in small villages or settlements in remote rural areas. A new project, called Mediras, aspires to develop and demonstrate cost-effective and reliable solar-driven desalination systems for regions affected by water scarcity and high insolation.*

Today, industrial-scale sea and brackish water desalination plants are well developed and provide big cities with fresh water. However, small villages or settlements in remote rural areas do not have the infrastructure to benefit from these techniques. The technical complexity of such large plants is high and cannot easily be scaled down to very small systems and water demands.

Furthermore, the lack of energy sources, as well as missing or weak and unreliable connections to the electricity grid, complicate the use of standard desalination techniques in such places. In many south Mediterranean, Middle Eastern and North African countries, hotels and resorts have a significant fresh water problem during the summer season. Many already have their own desalination system to produce fresh water from sea or brackish water.

In arid and semi-arid regions, the lack of drinkable water often coincides with high isolation. This speaks for the use of solar energy as the driving force in water treatment systems, especially in remote rural areas without grid connection and with limited access to fossil fuel. The main disadvantage of common desalination technologies compared to solar energy, such as reverse osmosis, multistage flash or multiple-effect distillation, is the need for a constant power supply close to 24 hours a day. Especially for small (i.e. < 50–100 m<sup>3</sup>/day) solar-driven desalination systems aiming for low technical complexity, new technologies must be developed which can be better adapted to the intermittent energy supply delivered by the Sun.



The modular system set-up to be used by the Mediras project is based on the highly innovative membrane distillation (MD) technology. MD is a desalination technology that has been investigated over the past few years and that uses solar thermal and photovoltaic energy supplies. The results demonstrate that MD is mostly suitable for small distributed desalination systems in the capacity range between 0.1–20 m<sup>3</sup>/day. It is very robust against different raw water conditions and operable with alternating energy supplies such as solar energy.

The Mediras project is placing a strong emphasis on the design, set-up and operation of different demonstration systems. Altogether five systems will be installed in potential user sites in Pantelleria (Italy), Gran Canaria and Tenerife (Spain) and Tunisia.

The different systems to be installed in Europe and North Africa will be three compact systems of two different sizes (150 l/day and 300 l/day) and two multimodule two-loop systems (3 m<sup>3</sup>/day and 5 m<sup>3</sup>/day) for full solar energy supply and for combined solar and waste heat energy supply. Comprehensive performance evaluation and water quality analyses will be conducted on these systems.

In order to favour the market penetration of MD systems, the project will focus on cost reduction and quality improvement of MD modules and systems. Furthermore, it is aiming to develop components such as brine cooler and brine disposal units for ground-water desalination at inland locations with limited raw water resources. Scalable system configurations are also to be developed, in order to adapt them to different customer demands. For health protection, solar energy-driven units for potable water disinfection will be integrated into the desalination units. Suitable markets and target user groups will be identified for the technology.

The Mediras project partners are highly complementary and consist of 10 research institutions, SMEs from the solar business and distributors who have a network in Africa and Spain.

### Project title

Membrane distillation in remote areas (Mediras)

### Programme & call

Cooperation programme, call: FP7-ENERGY-2007-4.1-03 'Small distributed systems for seawater desalination'

### Project coordinator

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## Project title

*Un réseau de dispositifs permanents pour un suivi à long terme des écosystèmes forestiers guyanais*  
(Guyafor)

## Programme & call

European Regional Development Fund (ERDF) 2007–13

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# Measuring carbon storage in European tropical forests

*Forests in French Guiana represent more than one third of French forests — 8 063 million ha. They therefore play a key role in the French contribution to reducing greenhouse gas emissions. It is thus essential to make a precise evaluation of carbon storage in these forests and to analyse their potential to attenuate global warming.*

Levels of carbon dioxide (CO<sub>2</sub>), the main greenhouse gas in the atmosphere, have considerably increased since the start of the 20th century. Carbon emissions are of anthropic origin and stem from the consumption of fossil energies (oil, coal or gas) and land use conversion.

The consumption of fossil energies is, at a rate of 75 %, by far the main source of annual carbon emissions. It is therefore imperative to reduce this consumption in order to combat global warming. Land use conversion, mainly deforestation, is a more limited source of carbon emissions. Moreover, a recent study shows that tropical forests might absorb a significant amount of CO<sub>2</sub>.

Under the Kyoto Protocol, which entered into force in February 2005, the signatory countries are committed to meeting certain objectives. They stipulate a reduction in carbon emissions of 5.12 % by 2012 with respect to 1990 levels and, in the longer term, carbon emissions should be reduced more drastically.

The Guyafor network has been in existence since 2000, as a result of the joint efforts of the Centre for International Cooperation in Agronomical Research for Development (CIRAD) and the French National Forestry Office (ONF). Guyafor is a network of permanent forestry initiatives in French Guiana whose scientific partners carry out research activities aimed at providing an estimate, by 2011, of the carbon stored in Guianese forests. The total cost of the project amounts to EUR 792 600. The EU contributes 62.5 % of project funding, an amount of EUR 495 600.

Currently work is directed mainly towards biomass balance. More specifically this concerns:

- determining the balance of above-ground biomass stocks for the main types of Guianese forests using dendrometric and biological data and improved estimation models, and extrapolating these balances for French Guiana territory;
- detecting any long-term changes in demographic processes (reproduction, growth, mortality) and their consequences on carbon balance;
- identifying factors (climate-ground interaction, internal forest dynamics) which may be at the origin of these changes.

In 2010, Guyafor should be able to provide an estimate of the quantity of carbon contained in the above-ground biomass of Guianese forests. It should also be able to provide estimates of carbon flows with a minimum of six to eight years' monitoring.

One of the first results of this project concerns changes in the amount of carbon stored in managed forests. The extraction of timber or wood for energy, while it provides goods and income, contributes to carbon emissions in the atmosphere thus accentuating the effects of deforestation. In a forest, carbon is captured through forest regeneration (new trees emerging, the growth of existing trees). Inversely, carbon is emitted into the atmosphere when trees disappear (natural mortality, logging). The difference between these flows indicates whether the forest is emitting carbon (negative flow) or storing carbon (positive flow).

As a result of Guyafor, it emerges that the period of time required to replace carbon stocks lost through timber logging is 45 years. It is very probable that this duration could be reduced by using low-impact logging techniques and reducing the damage and loss to forests.

The project will have a direct impact on the region by attracting the attention of potential investors. It will also allow French Guiana to equip itself with a long-term forest monitoring tool, which will be invaluable with regard to scientific issues (the dynamics of biodiversity in the face of climate change) as well as for land planning initiatives and sustainable local development.



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## Major breakthrough underway for European astronomers to study the Sun

*Understanding the processes that take place in the Sun is crucial. The Sun is of paramount importance as it sustains life on Earth. It has a direct influence on every planet in the solar system, and there are many parallels between the processes that take place in the solar atmosphere and the planetary magnetospheres, including the Earth's. As such, the Sun is the only place where scientists can study the interaction between plasma and magnetic fields in detail, making it a fundamental physics laboratory. An EU-funded project for a European solar telescope (EST) will look at these processes through a 4-metre telescope, to be installed in the Canary Islands.*

The EST project is a conceptual design study of the large aperture EST, involving 29 partners plus 7 collaborating institutions from 14 different countries. It is being promoted by the European Association for Solar Telescopes (EAST), a consortium aiming to develop, among others, this large aperture telescope and thus keep Europe at the forefront of solar physics in the world.

This was the agreed course of action to take, following a meeting of leading European solar astronomers held in Freiburg, Germany, in June 2006. A memorandum was signed which stated the intention to develop, construct and operate the next-generation large aperture 4-metre class EST in the Canaries. Solar astronomers worldwide unanimously agree that such a large step in observational capability is needed to fully understand the fundamental processes of plasma physics that are at work in the outer layers of a star.

Over the course of the past 20 years, a number of European countries have constructed powerful ground-based telescopes that have increased our knowledge of the Sun. The most advanced European facilities are currently to be found in the Canary Islands' observatories. However, the development of a 4-metre class telescope, such as the one planned by the EST project, will represent a major breakthrough and give unprecedented joint capabilities to European astronomers to study the Sun.



One of the main properties of the Sun is its magnetic field. Fascinating events such as auroras as well as potentially hazardous phenomena for the living environment, including damage to satellites or overloading of power lines, are energy events that result from the interaction of the magnetic field with ionised material (more commonly known as plasma) from the outer parts of the Sun. One aim of the EST project is to study the initial stages of this interaction.

The EST will be optimised for studies of the magnetic coupling between the deep photosphere and upper chromosphere. This will require diagnostics of the thermal, dynamic and magnetic properties of the plasma over many scale heights, by using multiple wavelength imaging, spectroscopy and spectropolarimetry. The EST design will strongly emphasise the simultaneous use of a large number of visible and near-infrared instruments, thereby improving photon efficiency and diagnostic capabilities relative to other existing or proposed ground-based or space-borne solar telescopes. To achieve these goals, EST will specialise in high spatial and temporal resolution, using instruments that can efficiently produce two-dimensional spectral information.

The study aims to demonstrate the scientific, technical and financial feasibility of EST. It includes key aspects needed for a conceptual design of the whole telescope, such as opto-mechanical design, cooling mechanisms, adaptive optics, instrumentation and control. Different existing alternatives will be analysed for all systems and subsystems, with decisions taken on the most adequate ones that are compatible with the scientific goals and technical strategies. Technical specifications will be given at the end of the design study for all systems and subsystems.

### Project title

The large aperture European solar telescope (EST)

### Programme & call

Capacities programme, call: FP7-INFRA-2007-2.1-01 'Design studies for research infrastructures in all S & T fields'

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## Project title

Accroissement/modernisation du potentiel de micro-caractérisation du Centre commun de caractérisation des matériaux des Antilles et de la Guyane (C<sup>3</sup>MAG) de l'Université des Antilles et de la Guyane (UAG)

## Programme & call

European Regional Development Fund (ERDF) 2007–13

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# Electron microscopy in French Guiana, Guadeloupe and Martinique

*The Joint Centre for Materials Characterisation (C<sup>3</sup>MAG) at the University of the French West Indies and Guiana (UAG) is currently developing its potential in electron microscopy and associated microanalyses. Research into life sciences, the environment and materials science requires state-of-the-art equipment.*

It is imperative that researchers have high-performance and versatile characterisation equipment at their disposal in order to make progress in the research areas requiring morphology, structure and composition studies of samples of different sizes and types. Other equipment should enable on-site analyses to be developed, thus opening up perspectives for the kinetic monitoring of reactions, the examination of samples in their native environment or in an aseptic or chemically inert environment.

C<sup>3</sup>MAG meets varied needs. It makes available to all the research teams at the UAG and research institutions in French Guiana, Guadeloupe and Martinique characterisation equipment which is indispensable to the development of their research topics. Moreover, C<sup>3</sup>MAG makes its equipment and skills available to industry in the three regions in the form of expert studies, materials analysis or R & D contracts.

Increasing demand in the sector of chemical microanalysis led, in the past, to the updating of the original equipment. This took place by adding analytical material, such as energy-dispersive X-ray spectrometers (EDXS) and an electron energy loss spectrometer (EELS).

However, ageing equipment (purchased in 1992) and the emergence of new needs in electron microscopy have led C<sup>3</sup>MAG to renew its scanning and transmission microscope facilities. An environmental scanning electron microscope (ESEM) has been purchased for this purpose. Apart from conventional studies of mineral and organic materials, it allows hydrated objects to be observed and analysed (micro-organisms, biological tissue, cells) at ambient temperature, without specific preparation which might affect the samples.

The centre also acquired an analytical transmission electron microscope (ATEM) equipped with a field emission gun. This device increases capacity for the ultrastructural characterisation of mineral, organic or biological materials (conventional imaging, atomic imaging, electronic diffraction). Microanalysis and nanoanalysis, both elemental (a few atoms) and molecular (energy resolution), are carried out by means of the X-ray emission spectroscopy (EDXS) and EELS with which the microscope is equipped. Low-temperature microscopy, used to preserve ultrastructure in samples and to minimise irradiation damage,

is an additional element which is required in the fields of biology, medicine and materials science. The high-temperature sample holder (up to 1 000 °C) meets needs in the sectors of physics, chemistry and materials science.

C<sup>3</sup>MAG is now an important instrument for international research. Since 2006, the use of its equipment has allowed research teams to publish more than 30 articles in well-known international journals and to make more than 40 contributions to national and international congresses.

In addition to its regional importance, the centre's work also has an international facet. C<sup>3</sup>MAG, associated with the Surfaces and Interfaces Technology Group (GTSI), is the largest operational platform of materials characterisation equipment in the Caribbean. The activities and skills developed within C<sup>3</sup>MAG have already led to close relationships being built with other universities and research institutes in the Caribbean.

The main objectives of the project are both short-term and medium-term. The short-term operational objectives are as follows.

The acquisition of an analytical environmental scanning electron microscope equipped with:

- a cold plate (from -50 °C to +50 °C);
- a high-temperature plate (from ambient temperature to 1 000 °C);
- an X-ray detector for elemental microanalysis.

The acquisition of an analytical transmission electron microscope equipped with:

- a field emission electron gun;
- an X-ray detector (elemental nanoanalysis);
- a spectrometer electron energy loss filter (elemental and molecular nanoanalysis, filtered images);
- a cold sample holder (from -150 °C to +50 °C);
- a high-temperature sample holder (from ambient temperature to 1 000 °C).

Associated medium-term objectives include:

- increasing the performance of research teams which, until now, had to rely on equipment from mainland Europe;
- fostering research through partnerships between teams in different disciplines;
- intensifying cooperation with universities and research institutes in the American/Caribbean zone;
- extending the international influence of the centre's research;
- expanding R & D support for companies in the three regions.



© C<sup>3</sup>MAG

## Fostering research on Réunion

*Cyclotron Réunion Indian Ocean (CYROI) manages a high-level technological platform cofinanced by the EU. This infrastructure, opened in 2008, is available to enterprises and public laboratories in Réunion and the Indian Ocean, as well as those in Europe and the rest of the world.*

CYROI hosts four types of activity:

- radiopharmaceutical production;
- medical fundamental research;
- economic development of biotech start-ups;
- training and scientific cooperation.

Radiopharmaceutical production of radio-tracers (18 FDG) by CYROI enables the early remote sensing of cancer by means of positron emission tomography (PET). Every year, these products avoid 1 500 people being evacuated to mainland France for health care. The production of other radio-tracers is planned in the near future, such as F-DOPA or NaF.

Fundamental research is defined by an independent international scientific council composed of 17 members and organised around three priority themes.

- Metabolic diseases: CYROI houses the Working Group on Chronic Inflammation and Obesity (GEICO) which works on three main areas: inborn inflammation/immunity; oxidative stress/cellular physiopathology; nutritional and medicinal anti-inflammatory strategies.
- Emerging infectious diseases: leptospirosis, chikungunya, dengue fever, influenza and others. CYROI hosts the University Hospital Group on Infectious Diseases (GRII) as well as the Centre for Research and Scientific Monitoring of Infectious Diseases in the Indian Ocean (CRVOI).
- Promotion of land-based and marine biodiversity: CYROI hosts the Chemical Laboratory for Natural Substances, the Regional Agency for Marine Research and Valorisation, and the Association for Herbs and Medicinal Plants in Réunion. In this field, there is close cooperation with the other Mascarene Islands which, together with Réunion, form one of the world's hotspots in terms of biodiversity.

Other research groups are currently being formed, including the University Hospital Research Group on Radiochemistry.

As part of economic development, CYROI hosts young innovative companies in the field of biosciences. For example:

- Adisculpt, which develops and markets a medical device for the purification of adipose tissue cells in the realm of cosmetic surgery;
- Octans, which has created cosmetics based on Cilaos spa water and active ingredients from tropical plants. It received the second prize at the 2009 national cosmetic awards;

- Bioalgotral, which is developing a process to extract biofuel from micro-algae.

Other young and innovative companies will move to the centre in the coming months.

CYROI's fourth activity is training and scientific cooperation — either with countries in the Indian Ocean (the Comoros, Madagascar, Mauritius, Seychelles, etc.) or internationally. Thus, the second congress of the International Association of Neuroinfection Studies will take place in December 2010 on Réunion. This activity corresponds to regional ambitions and should lead to:

- the creation of a regional university hospital centre in Réunion, developing multidisciplinary high-level research programmes. The Réunion-Mayotte health region represents a population of almost 1 million people and justifies the creation of such a centre;
- participation in the Qualitropic competitiveness cluster, an approved body which is unique in ultramarine territory and whose theme ('Agri-nutrition, health in a tropical environment') is based on the historical background of agriculture in Réunion;
- young scientists from Réunion being offered the technical and financial means to develop professional activities on the island. Réunion University aims to develop its activities in the field of science and high-level professional training.

CYROI has a budget of EUR 23 million allocated as follows: EU: 60 %; regional council: 13 %; district council: 13 %; self-financing: 9 %; state: 5 %. The budget is used to fund CYROI buildings for an amount of EUR 15 million and equipment for EUR 8 million.

In conclusion, here are a few indicators to summarise CYROI:

- 15 research programmes are currently under way;
- a technical platform of 4 500 m<sup>2</sup> in size;
- a capacity to accommodate 120 researchers;
- nuclear magnetic resonance (NMR) — 600 MHz;
- LC-MS/MS mass spectrometry;
- a P3 virology laboratory;
- an A2 animal centre for research purposes;
- an insectarium;
- radiochemical, microbiological, cellular and molecular biology, biochemical, life chemistry, organic chemistry and immunology laboratories.

### Project title

Cyclotron Réunion Océan Indien (CYROI)

### Programme & call

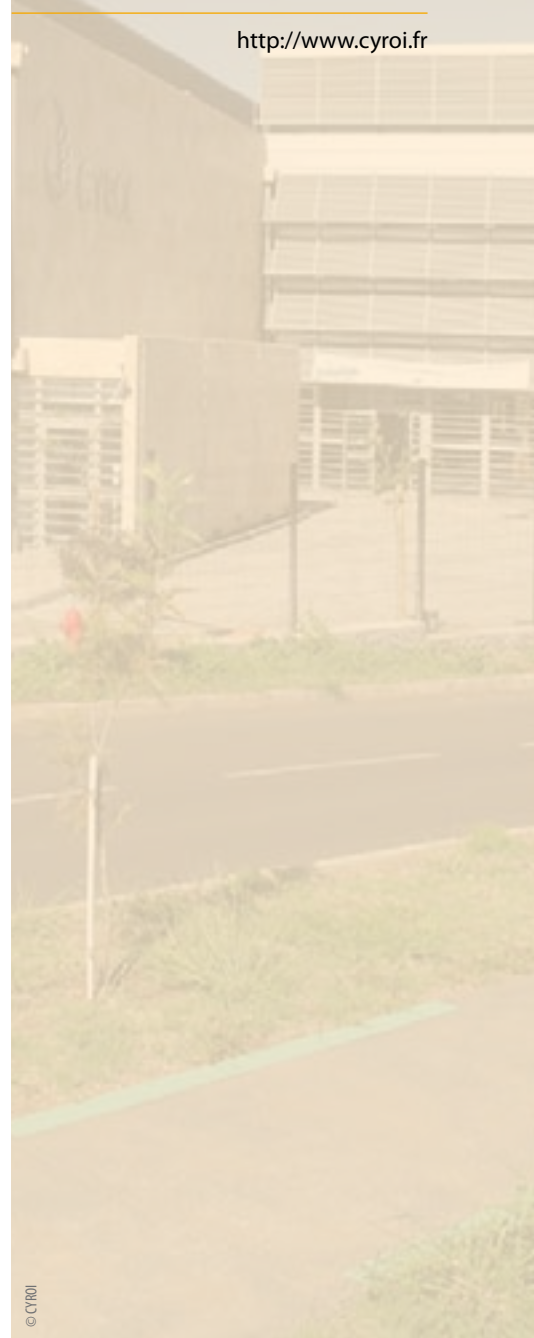
European Regional Development Fund (ERDF) 2000–06 and 2007–13

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## Project title

New e-services for a dietary approach to the elderly (RistoMed)

## Programme & call

Capacities programme, call: FP7-SME-2007-1 'Research for SMEs'

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# Innovative and personalised diets for the elderly

*Most nutraceutical SMEs have limited access to information which could give a clue about the nutritional impact of their product. At the same time, the need for more personalised diets is an urgent requirement of EU health care systems, particularly for ageing and elderly people. In response to these challenges, the RistoMed project is developing a new e-health service for ageing and elderly people that will enable participant SMEs to penetrate the market with the production of innovative and personalised diet models.*

Nutraceuticals have a variety of constraints and are defined differently across EU Member States. In addition, they are less effective compared to usual diets which depend on cultural scenarios. Consumer acceptance of nutraceuticals depends on how perfectly they are being integrated into traditional eating habits of elderly people. As a result, nutraceuticals are difficult to customise to the needs of a specific user, and their market is quite slow and fragmented. The RistoMed project will integrate biotech nutraceuticals, specifically designed and delivered to ageing and elderly people, into biotech/ICT strategies for coping with the complexity of specific nutritional requirements.

RistoMed brings together eight partners from four countries for this new and innovative e-health service. Three biotech SMEs will collaborate with four RTD performers (i.e. universities and research institutes) to solve the common problem of delivering innovative nutraceuticals to control and prevent age-related diseases. A new RistoMed web platform will deliver recipes and procedures containing nutraceuticals and probiotics specifically designed for elderly people and the institutions working with them. The RistoMed web platform will be developed by the ICT-SME leading the consortium.

Overall, the RistoMed project has six main objectives:

- develop new e-health dietary services focused on elderly people, with particular attention to the prevention and treatment of inflammaging, oxidative stress and gut microbiota problems;
- identify new processes and procedures for the correct delivery of nutraceutical products, in order to properly introduce these products into the basic diet of the elderly and respect a standard healthy diet for ageing people;
- develop an online software solution capable of verifying the nutraceutical efficacy of the products and evaluating their nutritional claims;
- contribute to a 'European way of nutrition' within the EU for a healthy life;
- generate information and create consensus around the project's

main concept and objectives among the sector stakeholders (pharmaceutical companies, hospitals/clinics, catering companies, food companies);

- verify the efficacy of dietetic intervention and correct some of the new health protocols (development of individualised dietetic approaches) and apply, as far as possible, the results obtained during the course of the project.

The first objective is the software platform (accessible via <http://www.ristomed.eu>) which will be designed to manage nutritional and bromathological data. The target groups will be able to configure their personalised menus and focus particularly on inflammatory problems, oxidative stress and gut microbiota.

To reach the objectives, RistoMed will carry out a careful assessment of the health status of the participant subjects, including targeted laboratory analyses on inflammation, oxidative stress and gut microbiota alterations. These efforts ultimately aim at developing a paradigmatic type of nutritional intervention in the elderly, as well as a consensus among stakeholders in different countries.

The project results are expected to have a significant impact on the competitiveness of SME participants. These will be able to expand their business by proposing not only nutraceuticals to the market but also an integrated solution to better manage the dietary and nutritional needs of elderly people for preventing inflammation, oxidative stress and gut microbiota alteration.



## Advanced imaging sensor for minimally invasive surgery

*The current state of the art of minimally invasive surgery (MIS) is confronted with two major shortcomings when it comes to visualisation. This is due to the unavailability of miniaturised imaging sensor chips, providing sufficient requirements and performance results. In turn, this leads firstly to a lack of stereoscopic optical vision, which causes lack of depth perception during surgery, and secondly, to the difficulty of obtaining high-resolution imaging performances in a low-cost disposable sensor. And this is where the MiniSurg project steps in.*

The five partners in the MiniSurg project are researching the convergence of miniaturised imaging sensor technologies in order to perform advanced MIS. They aspire to overcome the limitations in crosstalk, packaging and manufacturing of current complementary metal-oxide semiconductor (CMOS)-based miniaturised units, and create an integrated unit of higher performance and low cost of approximately EUR 10. The goal is to provide natural stereoscopic surgery visualisation based on CMOS sensors, which will be integrated into an endoscope for clinical evaluations.

MiniSurg aims to accomplish the performance-related goals by special pixel design and specific on-chip optical design. Using a unique packaging design will enable the overall dimensions of a distal camera used in medical endoscopes to be minimised.

Both the stereoscopic process vision and high-imaging resolution will enhance surgery safety and control. Better resolution allows the surgeon to identify and understand the tissue more easily. It enables minimal invasive approaches to delicate organs, such as small blood vessels and nerves.

How will the MiniSurg partners address and solve the major technical problems of noise-level and crosstalk distortions? The system on a 7.5 mm diameter chip will be designed for maximum area efficiency by minimising electrical contact areas. Stereoscopic imaging performance that goes beyond the state of the art will be achieved through the research and design of a pixel array of 1 850 horizontal over 925 vertical and a pixel aspect ratio of 3  $\mu$  width over 4.5  $\mu$  height, accompanied by a significantly low crosstalk level (< 10 %).



To accomplish the system performance goals will require unique packaging design and multilevel interfacing. First and foremost, the project partners will design a chip package for the optic mounting. The high accuracy of this assembly (> 10  $\mu$ m) will enable the chip to be shrunk for a minimum of pixel area, due to the tolerances during optic assembly.

MiniSurg incorporates a micron-sized lens array, an advanced image sensor module and supplementary software algorithm technologies. The distal stereoscopic imaging is achieved by collecting light through a pair of left and right pupils, thereby each side is focusing on a definite pixel column via the micro lens array.

In short, the project's major objectives are to:

- research and develop a MiniSurg CMOS sensor based on key specifications such as 7.5 mm diagonal and over 2 MB pixels;
- achieve a low level of optical and electronic crosstalk;
- create a compact and high-accuracy packaging and assembly;
- design an endoscope based on a MiniSurg CMOS chip, to be used in clinical evaluations of stereoscopic endoscopy.

Further derived challenges of MiniSurg are to:

- research and design the sensor for the best signal-to-noise ratio and dynamic range results;
- design a miniature pixel architecture that maximises dynamic range while keeping the electrical crosstalk at a very low level;
- research and test the use of CMOS technology, including its adaptation, to implement a specialised microlens technology and colour filters for medical imaging;
- provide an on-chip high-throughput digital output, without increasing the die size;
- design and manufacture an on-chip microlens array to maximise light sensitivity and minimise interchannel crosstalk;
- manage clinical tests for evaluating the new imaging sensor performances in clinical conditions.

### Project title

Miniaturised stereoscopic distal imaging sensor for minimally invasive surgery (MiniSurg)

### Programme & call

Cooperation programme, call: FP7-ICT-2007-3.6 'Micro/nanosystems'

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## Project title

Fostering the European Union — Caribbean research and innovation policy dialogue and networks (EUCarinet)

## Programme & call

Capacities programme, call: FP7-INCO-2009-1.2

'Biregional coordination of S & T cooperation including priority setting and definition of S & T cooperation policies'

## Project coordinator

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# Sustainable S & T policy dialogue with Caribbean countries

*FP7's new emphasis on international research cooperation is giving a further boost to S & T dialogue between the EU and Caribbean states. The EUCarinet project aims to strengthen sustainable policy dialogue on S & T between EU Member States and associated states on the one hand, and countries from the Caribbean region on the other — namely members of the African, Caribbean and Pacific Group of States (ACP), overseas departments and collectivities as well as overseas countries and territories (OCTs).*

The project benefits from the expertise of participants coming from: Belgium, Spain, France, Italy, the Netherlands and the United Kingdom in the EU; and Cuba, the Dominican Republic, French Guiana, Guadeloupe, Jamaica and the Netherlands Antilles in the Caribbean region.

The index of human development calculated by the 'United Nations development programme' (UNDP) reveals huge inequalities among countries in the Caribbean region. In general, the region has significant challenges to face. These include unbalanced geopolitical relationships, vulnerability due to the very nature of insular and small-sized states, economic and natural shocks including natural disasters, climate change and management of natural resources, reduced social cohesion and, in some cases, significant poverty.

In the field of higher education and research, the Caribbean region is doing quite well (except some lower-income states such as Haiti) in comparison with other surrounding countries in Central and South America. However, although the research institutions of the region have a long history of cooperation with their counterparts in the EU Member States, they are under-represented in FP7 participation. This is why the EUCarinet project is targeting EU Member States which have research organisations either located or actively involved in the Caribbean region, as well as the Caribbean states themselves.

The EU is present in the Caribbean especially through the French overseas departments and Dutch and British OCTs. The Caribbean area benefits from a strong relationship with the EU due to its prominent role within the ACP and its inclusion within the so-called Cotonou Agreement (or ACP-EC Partnership Agreement), signed in 2000 in Cotonou, Benin. The agreement, signed by all ACP states except Cuba, is to last for 20 years and should enable ACP member states to smoothly integrate into the global market.

The EUCarinet project specifically aims to:

- create the conditions for a sustainable multi-stakeholder policy dialogue on S & T

between the EU, its Member States and associated states on the one hand, and the Caribbean region on the other, leading to a joint definition of S & T cooperation policies;

- foster interregional (EU-Caribbean) and intraregional cooperation, in order to identify and prioritise research areas of mutual benefit and interest;
- stimulate and support the participation of Caribbean research stakeholders in FP7, with a focus on the People programme fostering the international mobility of researchers.

To achieve these aims, the EUCarinet project will set up a coordination mechanism to bring together key EU and Caribbean policy-makers and programme managers, representatives of universities, research institutions, the private sector (especially SMEs) as well as other representatives of civil society.

Moreover, to reinforce S & T cooperation at all levels, the EUCarinet partners wish to coordinate their actions with many other projects and instruments, such as:

- EU external policies, in particular activities carried out by means of the European Development Fund (EDF) and the ERDF, targeting ACP countries and the overseas departments;
- the Development Cooperation and Economic Cooperation Instrument (DCECI), an EU instrument for external assistance;
- the CIP and the Enterprise Europe Network, supporting enterprise creation and competitiveness, investments, innovation and technology transfer;
- all the specific programmes described in the European Commission's Communication *An EU-Caribbean Partnership for Growth, Stability and Development* (COM(2006) 86 final);
- the EU-funded EUCarinet coordination action, geared towards strengthened S & T dialogue with Latin American partner countries;
- the ProInvest programme, promoting investment and technology transfers in ACP countries.



## Community Research and Development Information Service

CORDIS is an interactive information platform that keeps you up-to-date with the latest news, progress and initiatives in European R & D activities. CORDIS is free of charge and offers access to funding programmes of the EU, to information on partnerships as well as to research projects and their results.

### FP7 initiatives: 'Regions of Knowledge' and 'Research Potential'

<http://cordis.europa.eu/fp7/capacities>

The FP7 'Regions of Knowledge' (RoK) initiative aims to strengthen the research potential of European regions, in particular by encouraging and supporting the development of regional research-driven clusters (RRDCs), and bringing together universities, research centres, enterprises and regional authorities. The 'Research Potential' (RegPot) scheme aims to unlock and develop the potential of research groups in the convergence regions and outermost regions of the EU.



### Inforegio: the EU's regional policy website

[http://ec.europa.eu/regional\\_policy/index\\_en.htm](http://ec.europa.eu/regional_policy/index_en.htm)

Regional policy aims to achieve solidarity within the Union through economic and social cohesion, while helping to finance specific projects for regions, cities and citizens.

The Inforegio website provides information on the main regional policy of the EU, its resources, programmes and project examples. The programmes funded by the European Regional Development Fund (ERDF) in every European region are presented here, as well as the special status enjoyed by the outermost regions within the EU.



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