



# Innovation stakeholders *mobilize around* green technologies



## **Water cluster** global competitiveness cluster

The Water cluster, a global competitiveness cluster that received its accreditation in May 2010 when the "green technology clusters" call for projects was issued, brings together businesses, local authorities, training organizations and research institutions involved in the "water" sector in the Provence-Alpes-Côte d'Azur, Languedoc-Roussillon and Midi-Pyrénées regions. It also coordinates France's other water clusters: (Pôle DREAM Eau & Milieux, Pôle de l'Eau Alsace/Lorraine HYDREOS). Its objectives are twofold: to create value and economic development through innovative and collaborative projects, and to spur the export of French technological products, services and know-how while making French research internationally known. Its strategic thrusts are as follows:

- identification and mobilization of water resources;
- concerted management of water resources in a context of rapid global climate change;
- re-use of water from every source;
- institutional and societal approaches.

The Water cluster belongs to the "Green Technologies" network\* set up by the Ministry of Ecology, Sustainable Development and Energy to generate "a cooperative sectoral dynamic based on 14 competitiveness clusters".

At the national level it helps coordinate a working group on environmental metrology and instrumentation. Apart from the ECODREDGE-MED project (cf. p. 38), the majority of projects accredited by the Water cluster relate to:

- green technologies for agriculture (irrigation): the MAISEAU and IRRIS projects, funded by FUI [the Single Interministerial Fund] and the environmental industry, respectively;
- recycling and recovery of urban water: LAGUMEM and NEOPHIL (FUI) and NOWMMA (environmental industry);
- bioenergy via gasification of urban sewage sludge mixed with other wastes: ADWASTE2GAS project (FUI);
- environmental monitoring: FISHBOX (FUI), KRHU (FUI), SIRHYUS (FUI), SMARTPIX (FUI), FRESQUEAU (ANR-funded) projects.

The Water cluster is financed by the State and by the Languedoc-Roussillon, Midi-Pyrénées and Provence-Alpes-Côte d'Azur regions as well as the Montpellier Urban Community.

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\* [www.developpement-durable.gouv.fr/Le-reseau-Eco-technologies-une.html](http://www.developpement-durable.gouv.fr/Le-reseau-Eco-technologies-une.html)



## **Qualiméditerranée** innovating in Mediterranean agriculture and food

The Qualiméditerranée cluster seeks to develop innovation at agri-food companies in the Mediterranean region. The cluster has two strategic foci: competitive and sustainable Mediterranean agriculture and commercialization of new products from agriculture and the associated processes.

Green technologies are addressed, in particular, through projects focusing on limiting the impact of conventional pesticides, whether in the environment (open fields) or in storage facilities (silos). The answers it comes up with relate to the development of new treatment solutions based on the use of natural extracts (FUI, PHYTOMARC or GREENPROTECT projects) or on the development of solutions to optimize conventional treatment

through automation or traceability (TICSAD project). Other solutions are based on the development of prevention models to establish the best times for treatments using meteorological data.

Meanwhile, life cycle analysis (LCA) is a tool increasingly used to compare the environmental impact of different processes or to improve these through an eco-design approach. LCAs are integrated into projects like FLONUDEP (ANR), on the sustainability of the fruit and vegetable sector, or NOVINPACK (FUI), which seeks to design new types of packaging for wine.

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## DERBI Cluster development of Renewable Energy / Building / Industry

DERBI, a nationally-oriented competitiveness cluster, seeks, at the regional, national and international level, to foster innovation, research, training, technology transfer, development and entrepreneurship in the field of renewable energy as it is used in building and industry.

The topics it focuses on are in the following strategic areas:

- self-powered buildings based on an intelligent holistic design, optimized envelope performance and integration of renewable energies (solar thermal, photovoltaic, geothermal, small wind turbines), with special reference to the Mediterranean climate;
- network management and energy storage (electricity, heat, cold) interconnecting dwellings, activity clusters and energy generation sites;
- offsite energy production (electrical power plants, hydrogen, biofuels...) from sun, wind or biomass, whether for remote sites or grid-connected systems.

Many green technologies are under development within the cluster as part of accredited, supported projects (151 R&D projects) and in line with the strategic foci.

In particular:

- The THPE [*very high energy efficiency*] Monitoring project being conducted by an SME, Pyrescom, funded by FUI, the Single Interministerial Fund, in 2006, is focused on developing the concept of building monitoring, a building monitoring system that meets a demand flowing from environmental and economic issues. It comprises instruments, analytical tools, and monitoring and simulation tools. Its support service stands ready to resolve any concerns regarding overconsumption or discomfort. The findings are based on the actual data provided by the building (energy, air quality, comfort, water, etc.).
- The SALINALGUE project, being carried out by the *Compagnie du Vent* (FUI financing, 2010), seeks to culture and harvest microalgae and to turn them into bioproducts. The ultimate markets for the project's products, following the thorough biological refining of the microalgae, are diverse: bioenergy, food, nutraceuticals, cosmetics.
- The cluster strives to bring together all renewable energy channels, but particularly concentrating solar plants. It is deeply involved in the rehabilitation of the THEMIS power station, the first thermodynamic power station to be built, dating from the 1980s. The THEMIS site (Cerdagne, Pyrénées-Orientales) is now an innovation platform where new French technologies are being developed for concentrating solar plants. It is the only such site in France.

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## BIOÉNERGIESUD the mass effect of the Languedoc-Roussillon region

BIOÉNERGIESUD is a network of 90 industrial and academic stakeholders focused on the issues that arise in developing bioenergy processes: new cultures and technological roadblocks.

Financed by the Languedoc-Roussillon Region, the Regional Directorate for Business, Competition, Consumer Affairs, Labour and Employment (DIRECCTE), ADEME and Europe, the BIOÉNERGIESUD network brings its players together to foster new innovation and industrial development projects. It now has more than 90 member organizations—ranging from technological and industrial enterprises, to energy producers and distributors, competitiveness clusters, and research agencies—with common issues and objectives.

BIOÉNERGIESUD's missions revolve around six areas of expertise in which green technologies are ubiquitous:

- Biomass pre-treatment: biochemical and biotechnological processes, thermochemical and catalytic processes;
- methanation: as it relates to the environmental biorefinery concept, comprising organic waste treatment, digestate recovery, water recycling and the uses of biogas;

- 3rd-generation biofuels: mass algaculture, extraction and separation processes...;
- gas analysis and separation: separation and purification technologies;
- measurement and process control: innovation in sensors, online analysis method;
- channels and impact studies: new Mediterranean energy crops, societal and environmental analysis of bioenergy channels.

To serve its members, BIOÉNERGIESUD offers them custom-tailored activities: technical seminars and coordination of working groups, general and targeted technology watches, coaching in setting up projects and in the search for funding and partners; and greatly enhances their visibility. Hence, BIOÉNERGIESUD is well positioned both to meet the technological issues faced by bioenergy and advanced biofuels channels and to anchor the development of such new industries in the Languedoc-Roussillon Region; in addition, it will seek to expand its scope to all countries of the South.

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## EcoTech-LR

a regional platform: “Environmental Technologies for Agro-bioprocesses”

The EcoTech-LR regional platform was created with the support of the LR Region to stimulate research and the industrial transfer of environmentally sound technologies for agro-bioprocesses, drawing on the areas of expertise of four applied research laboratories with diverse and solid industrial relationships: LBE (INRA), Biomass & Energy (CIRAD), UMR ITAP (IRSTEA/Montpellier SupAgro), LGEI (EMA).

The platform’s structure comprises four technological facilities with one cross-cutting focus:

- the TraitPol facility, on effluent and waste treatment;
- the BioFuel facility, on energy production from biomass;
- the MesurPol facility, on pollution measurement;
- the ReducPol facility, on reduction of phytosanitary pollution;
- the ELSA cluster on tools and methods for eco-evaluation, eco-design, LCA (cf. p. 32).

With a view to stimulating innovation, the EcoTech-LR platform develops internal multi-laboratory research projects, in preparation for industrial transfer, and specific industry-related activities:

- provision (under certain conditions) of the experimental equipment used by each of the strata;
- performance of testing and research;
- training;
- joint research projects, including CIFRE theses (Industrial Agreements for Training through Research);
- assistance in the creation of innovative businesses and business hosting.

One example of such joint research (IRSTEA/EMA/INRA) has been a project to predict BMP (BioMethane Potential) by UV and NIR spectroscopy (cf. p. 26), which won a Pollutec award for innovative technology and resulted in an industrial transfer to a regional startup.

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Agence Régionale de l’Innovation  
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## Transferts LR

transfer of innovative technology and know-how in Languedoc-Roussillon

An association founded in 2005 at the initiative of the LR Region and the State, Transferts LR supports business competitiveness through innovation and technology transfer in the Languedoc-Roussillon region. To that end, it supports the region’s companies in project structuring, the identification and mobilization of technological, human and financial resources, and develops strong partnership with regional, national and European centres of expertise in innovation. Transferts LR’s work is at the interface between research and business; it is accredited as a “technology dissemination centre” by the Ministry of Research.

Transferts LR is active in six areas related to green technologies—air, water, noise and waves, soil, energy, and waste—through its efforts to develop natural resource management technologies. These efforts depend on close working relationships between research laboratories and dynamic, frequently networked, “eco-businesses” of Languedoc-Roussillon.

Transferts LR supports numerous innovative projects involving individual firms or consortia of varying size. Support is provided

right from the preparation stage and continues through prototyping, piloting and the construction of an industrial-scale demo. These projects, lasting 6 to 36 months, represent a significant investment (several million euros). For example:

- ECODREDGE-MED (cf. p. 38).
- Phyt’eau BV Mod (ERDF, OSEO, and LR Region funding), a collaborative regional R&D project to develop an integrated tool to deal with the issue of the use of plant protection products in agricultural watersheds. It draws on the expertise of UMR LISAH (INRA/IRD/Montpellier SupAgro) and the companies Envilys and Eurofins IPL Sud.
- The technological feasibility project “Design, Fabrication and Testing under Real Operating Conditions of a Prototype Geophysical Observatory Device Integrated into Drilling Operations”, conducted by the ImaGeau company with the scientific support of UMR Geoscience (CNRS/UM2) and a grant from the Languedoc-Roussillon Region.

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## GreenStars

looking to a new generation  
of microalgae-derived biofuels and products



GreenStars, winner of the “Institutes of Excellence for Carbon-free Energy” (IEED) call for projects, is a set of collaborative platforms bringing together France-based stakeholders in the microalgae value chain. Microalgae are recognized as being extraordinarily rich in proteins, lipids, fibre, vitamins, minerals and pigments. Because they are such a rich source of these substances, microalgae offer great potential for innovation in the areas of energy, chemicals, human and animal nutrition and cosmetics; and are emerging as a promising solution for the future and a possible source of major economic developments.

GreenStars is seeking, between now and 2020, to develop useful compounds—in particular, high-performance biofuels and high-value-added molecules—from microalgae, using CO<sub>2</sub> emissions and waste substances from human activities. GreenStars is supported by INRA and brings together 45 partners (research organizations and universities, local authorities, competitiveness clusters, and business people). The project budget is €160 million over 10 years. It boasts three major assets: a strong capacity for innovation; expertise and technologies drawn from the best teams in French public research, innovative SMEs and major industrial groups; and quality infrastructure possessing substantial technological means.

The Trimatec competitiveness cluster contributes to the development of innovative R&D projects on green technologies, in four topic areas:

- Algal biomass production and enhancement, a largely unexplored resource that constitutes an appropriate response to environmental imperatives (conservation of natural resources, conversion of CO<sub>2</sub>). Algae enhancement has great potential in the production of biofuels, proteins, high value-added molecules for cosmetics, pharmaceuticals...
- The use of separation (ultrasonic, microwave...) and membrane technologies: ecological processes that enable separation to be done in the liquid or gaseous phase with minimum energy consumption, zero greenhouse gas emissions, and a reduction in the volume of final waste.
- Supercritical fluids applications: when substituted for traditional organic solvents in the extraction and purification processes, supercritical fluids leave the products treated and the environment unaffected. Other possible applications are nanopowder synthesis, impregnation of materials, or degreasing.
- Control of confined environments to respond to the imperatives of protecting persons, goods and the environment. The technologies developed have applications in areas such as health, nuclear, and micro-nanotechnology.



Trimatec brings together a network of 249 members and partners in the Languedoc-Roussillon, Provence-Alpes-Côte d'Azur and Rhône-Alpes regions. At the end of 2011, the cluster had accredited 158 projects valued at some €725 million. As the environmental technologies sector is characterized by a multiplicity of emerging industries and an array of SMEs with varying levels of visibility, Trimatec's approach is to foster or create structured ecosystems in each of its topic areas. In addition, Trimatec is actively involved in the national network of 14 EcoTech clusters set up by the Ministry of Ecology, Sustainable Development and Energy.

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## Risk cluster

innovative risk management solutions

The competitiveness cluster "Risk management and territorial vulnerabilities"—commonly called the "Risk cluster"—has since 2005 been bringing together companies, major groups, research laboratories, technical centres and training institutions, seeking to innovate and offer concrete management solutions for natural and industrial risks, among others.

It aims also to boost the economic growth of regional businesses and to develop their R&D. With nearly 230 members spread over two areas of activity (the Provence-Alpes-Côte d'Azur and Languedoc-Roussillon regions), the Risk cluster supports 91 R&D projects (totalling €168 million, with more than €62 million worth of aid) in four strategic areas:

- 1 Environmental monitoring and risk management systems
- 2 Training in major risk management
- 3 Risk management in CO<sub>2</sub> storage
- 4 Technological risk management in industrial waste treatment
- 5 Innovation and civil security

Since 2010, the Risk cluster has been responsible for the DéFiRisq mission: "Defining Emergent Risks". That mission, jointly funded by the State, the Languedoc-Roussillon Region, the cities of Nîmes and Alès and the *Conseil Général du Gard*, is focused on four priority areas: nanoparticles, agricultural practices, drug residues and indoor air quality. Each of these areas affords development opportunities for local companies and laboratories.

The cluster is also much involved in the "EcoTech" network, comprising 14 ecotechnology-focused competitiveness clusters. Developed by the Ministry of Ecology, Sustainable Development and Energy, it enables the Risk cluster to take action in a strategic area, namely environmental impacts: water, air, soil, noise, odours and adaptation to climate change.

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The Institute's main facilities will be at three sites: Montpellier-Étang de Thau (headquarters), Narbonne, and Nice-Plaine du Var.

GreenStars will help train the engineering resources that will be needed tomorrow and should be able to create jobs and new opportunities in numerous industrial sectors. This IEED will endow France with an industrial vision of the whole production chain and make the country a major player in this field at the international level. Within five to ten years, GreenStars hopes to be among the world's major centres of excellence in the field of microalgae biorefining.



▲ Production of microalgae in reactors, FUI project Salinalgue.

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