

An original experience: the innovation clusters of the Piedmont Region

The regional R&I system

Regional Innovation Clusters have their foundations in the policy guidelines set up by regional law 4/2006, which instituted a regional system for research and innovation identifying STPs as a key factor to raise, together with universities, technology districts, technology platforms and university incubators, in order to increase the economic development of the region through the leverage of innovation.

The principles of the regional system for R&I, described in specific guidelines and in the research regional program for the years 2006-2009, are the following:

- Selectivity
- Additionality
- Demand side approach
- Focus on human capital
- Intervention only when market failures exist
- Participation to European networks

Selectivity

Priority areas for research and innovation investments are identified through specific studies and a double track strategy, based on the distinction between *science/technology pushed* sectors and *demand pull* sectors, defined as follows:

Science/technology pushed: sectors characterized by a predominance of research concentrated in the stage of the process of knowledge production and a top-down and straightforward model of transformation of knowledge into economic value

Demand pulled: areas in which research activities are located near the market and oriented by it with a bottom-up process.

Alternative energies have been identified as a *science pushed* sector of intervention, where financing are addressed directly to applied research in the public (research projects) and private sector (pre-competitive research activities of enterprises).

Additionality

Research strategy is strictly connected to regional policies in the field of regional development.

Demand side approach

The regional research system develops different kinds of cluster policies, featured by a demand side approach:

- Technology platforms, based on expressions of interest by market
- Industrial districts, featured by technology driven policies
- Clusters of innovation, featured by application driven policies

The final aim is to ensure that the knowledge and technologies in the area has to be translated into product and process innovations, contrasting the factors limiting investment in research and innovation in order to support the competitiveness of the territory.

Focus on human capital

The regional research system is aimed to directly sustain the knowledge development, contrasting the brain drain and creating opportunities for people operating in research field. Human resources are a key element in technology transfer process.

Intervention only when market failures exist

Public action is concentrated in areas where there is a clearly identifiable market failure in the production process of products, processes and services, divided into the following three types:

- Offer of knowledge and technological opportunities
- Application of knowledge and innovation
- Meeting between demand and supply of knowledge

Participation to european networks

The participation to european regional networks is a key element in the regional research system strategy.

The regional strategy has been converted into a 3-year operational program which consists of eight strategic objectives, articulated on five lines of action.

Strategic Objectives:

- Directly supporting development activities for new knowledge
- Enhance the attractiveness of the regional system of international research
- Strengthen the regional system of higher education
- Redefine the governance of the regional system of innovation and research
- To support a claim of qualified innovation
- Supporting innovative activities of enterprises
- Promote collaboration between the research system and the industrial system
- To support the integration between the different levels of government and policy planning for research

Regional innovation clusters and the role of STBPs

Innovation clusters were born in 2008 in the framework of the regional strategy in the field of R&I, identified (in line with the definition adopted by the European Commission in its Communication 2006/C323/01) as "synergistic coordination structures between the different actors in the innovation process innovative of a specific technology and application domain, and provision of services and infrastructure for innovation ", with the following objectives:

- Transpose and interpret the technological needs of enterprises, in order to direct actions to support research and innovation
- Promote the sharing of knowledge and the convergence of investment on new trajectories of development of innovative products or services
- Promote investment in and use of common facilities and laboratory equipment
- Encouraging the mobility of human capital among firms and between firms and research system
- Encourage the involvement of the business community and the international research networks
- Facilitate access of enterprises to sources of scientific knowledge and technology of industrial interest

- Provide specialized services with high added value and to promote the ownership of the value of innovation by firms belonging to the pole
- Facilitate access of enterprises belonging to the polo community resources in research, development and innovation
- Transpose and interpret the educational needs of businesses, with the aim of improving the technological and management
- Encourage development of new entrepreneurship
- To support the internationalization through collective actions of promotion and product marketing

One of the eight technology domains identified by the Region is dedicated to **renewable energy**, energy saving and sustainable energy, divided into 4 different themes and 4 different areas of interest:

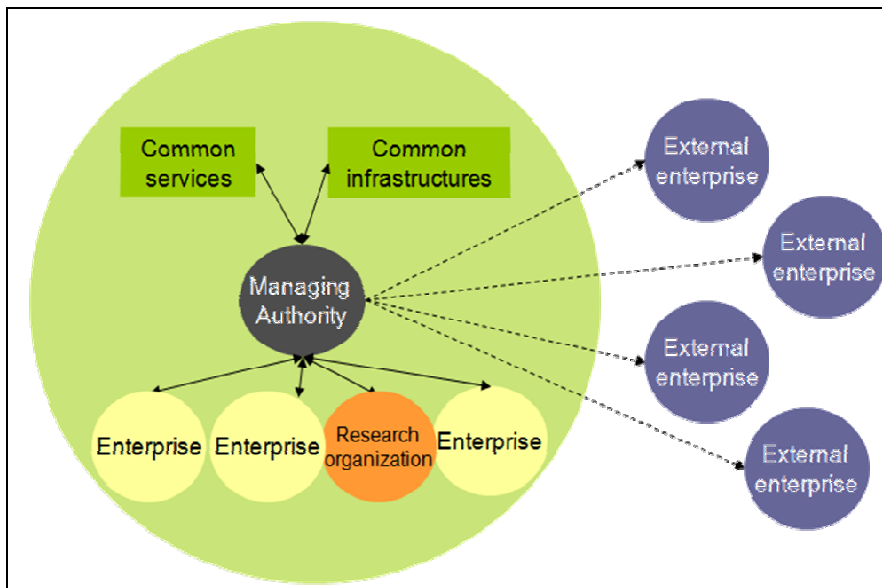
- Sustainable Architecture and hydrogen
- PV, biofuels, biomass and short agroenergy chains
- Plant design, systems and components for renewable energy
- Mini-hydro and biomass from agricultural farms

The Piedmont Region has established a regional model of cluster characterized by certain basic requirements relating to the creation, development and management of the same:

- Innovation clusters are designed as groups of a significant number of independent companies and research institutions active in a particular sector or geographical area, with a strong interaction between the participants
- The members of the cluster jointly define the investment strategies and development of the same cluster
- The aggregation to the cluster of innovation gives to companies the possibility to use services and facilities provided by the operator at a cost price
- Cluster members can benefit of specific assistance for activities related to R&I
- Each cluster shall have a managing authority with headquarters in the territory of reference of the technological domain, which acts as a coordinating structure between the different actors in the innovation process by supporting access to services and providing its infrastructure.

Part of the activities of the managing company:

- o investment in plant, equipment and instrumentation for research, innovation, training and technology transfer
- o technology animation, through initiatives aimed to:
 - Marketing and attraction of new businesses
 - Management of open access installations
 - Organization of knowledge and technical and professional skills transfer programs in order to stimulate demand for research and innovation by enterprises and business involvement in projects and initiatives for research and development at national and European level
- o Each cluster management authority submits an application form on how it plans to set up and develop the activities of the cluster, according to annual work programs evaluated by the Piedmont region



The Piedmont regional model of innovation cluster

Articulation of the annual program

The annual plan of each innovation cluster describes:

- The design trajectories, intended as research areas on which the operator aims to articulate the efforts, describing for each:
 - o the reference scenario (market analysis and regional system positioning)
 - o the expected benefits in terms of:
 - Development of new knowledge
 - Implementation of new knowledge for the actors of the cluster
 - knowledge spillovers for local actors
 - impact on employment
 - Identifying new business opportunities
 - o The lines of development of individual trajectories, with an indication of short-, medium- and long-term economic objectives and an economical analysis of the sector
 - o A detailed strategic agenda of every single line of development, describing:
 - R&I projects and services for which it intends to seek funding
 - The list of entities belonging to the innovation hub
 - The quantification of the resources involved
 - The timing for the implementation of measures

Clusters of innovation can benefit from regional funding for two different categories of initiatives:

- Projects for research and innovation, including:
 - o technical feasibility studies preparatory to industrial research
 - o Projects or industrial research and / or experimental development
 - o Projects or innovation of product / process
 - o projects for the innovation of processes and products through interaction with the user
- Services for Research and Innovation
 - o services for intellectual property management (IPR)

- technology intelligence services
- support services to the design and introduction of new market products / services
- Services for access to international networks of knowledge
- services for the mobility of qualified staff
- services to support of new innovative enterprises

Management authority's task is to collect applications for project funding and/or services under the annual program, making a preliminary assessment of the same based on the following elements:

- Quality of technical and scientific level of innovation proposals
- Ability to aggregate companies and research organizations
- Relationship level with the targets set in the lines of development
- Level of maturity and their feasibility in the short to medium term
- Ability to integrate with other regional, national, European initiatives or actions implemented by other cluster of innovation

The proposed strategic agenda is evaluated with the help of experts in specific technology domains, and on the basis of the results is assigned to the cluster a budget for the realization of activities evaluated positively.

SBTPs, due to their expertise and infrastructures play a leading role in the Piedmont experience in the field of technology transfer and innovation clusters.

Regional STPs in fact, were Identified as managing authorities of 6 of the 12 different clusters of innovation created with the aim to sustain technological paths by building industrial research projects, delivery of services with high added value and animation technology.

Cluster of Innovation in the field of RES and environment: POLIGHT and Environment Park's case study

Environment Park plays, within the regional strategy, the role of managing authority of *POLIGHT*, the innovation cluster dedicated to domains of **sustainable building** and **hydrogen**.

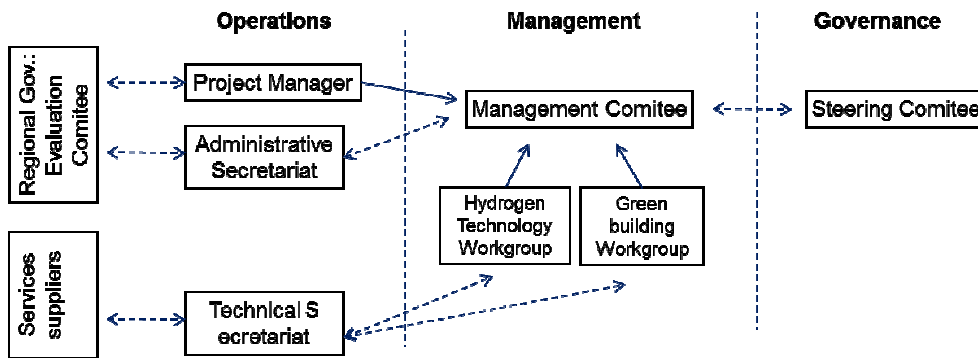
The coordination of the innovation cluster is carried out by Environment Park through the following activities:

- Animation technology, consisting of:
 - Technology Audit
 - organization of technological study workshops and seminars
 - Organization of meetings and events aimed to encourage contacts with potential project partners for R&I activities
- Communication and networking
- support of cluster members in the construction of R&I activities and the collection and processing of project ideas

POLIGHT Innovation Cluster aggregates 104 members in the two areas of research, mainly located in the Province of Turin, as follows:

- SMEs (82)
- Industries (14)
- Private research centers (3)
- Public research centers (2)
- University departments (3)

The organizational model



The activities

Below is a description of activities under the research program of the *POLIGHT* innovation cluster for each of the two technology domains.

Technological domain: Sustainable Building

Sustainable building is an economic sector in which products and services from different technological fields are applied.

The surveys conducted have identified about the theme of innovation and product development some major critical factors:

- Competition delay: in Piedmont the range of products for sustainable construction developed late and is mainly characterized by technologies developed in other economic areas
- Technological adolescence: technological systems as applied to buildings have great opportunities to improve the performances, particularly in relation to the problem of integration in the built of different energy sources
- Types of buildings: the integration of new technologies in existing buildings, creates technical and economic problems
- Standards and regulations: it must be determined how the materials, technologies and techniques are able to help to meet the requirements set by the energy and environmental assessment systems that have accompanied the evolution of regulations

The demand for a careful and open to the introduction of new eco-efficient solutions market is the focus of the research program, recognizing that on the development of a model of ecological construction are based both economic, employment and sustainable energy and environmental expectations.

| Design trajectories | Lines of development |
|--|---|
| Eco-efficient building plants | <ul style="list-style-type: none"> • eco-efficient solar energy systems and thermodynamics • Integration of renewable energy in existing buildings • Building automation |
| Eco-efficient materials and components | <ul style="list-style-type: none"> • eco-efficient fixtures, fittings and insulation systems |

| | |
|--|---|
| | <ul style="list-style-type: none"> • Windows • Nanomaterials in Construction • Materials recycling and by-products of local supply chains |
| Eco-efficient building systems | <ul style="list-style-type: none"> • Enclosures and structures in natural materials • eco-efficient components and cladding facades • prefabricated housing modules |
| Eco-efficiency, safety and environmental comfort | <ul style="list-style-type: none"> • Environmental sustainability in health buildings • Environmental sustainability in industrial buildings • Environmental sustainability in residential buildings |
| Efficiency of the construction process | <ul style="list-style-type: none"> • Support to environmental energy analysis of buildings • Eco-efficient dies and building processes |

| Lines of development | Technologies |
|---|---|
| Eco-efficient solar and thermodynamics energy systems | <ul style="list-style-type: none"> • Solar cooling • Scale down Systems for refrigerating power of existing technologies • Sun-assisted heating pumps • Plastic solar panels • Storage of solar thermal energy |
| Integration of renewable energy in existing buildings | <ul style="list-style-type: none"> • Innovative solutions to hook solar systems • Systems integration between insulation and solar • Components for the integration of solar systems in plant of existing buildings |
| Building automation | <ul style="list-style-type: none"> • Development of sensors • wireless transmission systems • Active systems to regulate consumption • Accounting, data storage and analysis systems for energy management • Building Automation Systems |
| Eco-efficient fixtures, fittings and insulation systems | <ul style="list-style-type: none"> • Thermo-based plasters of natural materials • Insulation panels made from natural fibers • Insulating Systems based on nanotechnology materials and phase change • Innovative Technical assistance to thermal bridges on the existing buildings |
| Windows | <ul style="list-style-type: none"> • high-performance insulation windows • High thermal insulation materials in the |

| | |
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| | transparent elements |
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Identification of the main lines of development and technologies focused by POLIGHT cluster of innovation

Technological domain: Hydrogen

The European Strategic Energy Technology Plan (SET-Plan) sets out a joint strategy for reducing emissions and a new industrial development, identifying among the technological challenges to bring to market by the year 2020 conversion and energy management systems more efficient in construction, transport and industry such as poly-generation and fuel cells powered by hydrogen.

The EU also urged the national and local governments to implement programs to support research and innovation in the sector and identified the regions as key players in implementing the overall plan. Particular attention is paid by POLIGHT for technological applications that are able to anticipate the market in the short term ("early markets"). The action therefore turns on the one hand to collect instances of firms already engaged in local business and industry to explore together with other companies, not yet engaged in this field, possible opportunities arising from the adoption of new technologies.

| Design trajectories | Lines of development |
|--------------------------------------|--|
| Mobility, transport and distribution | <ul style="list-style-type: none"> Automotive applications Aerospace applications Distribution infrastructures |
| Production and storage | <ul style="list-style-type: none"> solid phase storage Hydrogen production from biomasses development of high-efficiency electrolytic systems |
| stationary power generation systems | <ul style="list-style-type: none"> high temperature electrochemical cogeneration systems |
| Early markets | <ul style="list-style-type: none"> Fuel cells powered UPS Fuel cell powered portable generators |

| Lines of development | Technologies |
|------------------------------------|--|
| Automotive applications | <ul style="list-style-type: none"> Core components development (fuel cell stack, membranes) Auxiliary components development Power electronics development (DC/DC, high efficiency inverters, ...) Power train (electric motors for traction, ...) |
| Aerospace applications | <ul style="list-style-type: none"> Systems for the supply of tools onboard Fuel cell systems for the management of airport facilities |
| Distribution infrastructures | <ul style="list-style-type: none"> Integration of supply systems with in-vehicle devices |
| Solid phase storage | <ul style="list-style-type: none"> low-pressure metal hydrides Auxiliary Components |
| Hydrogen production from biomasses | <ul style="list-style-type: none"> Pyrolysis and gasification |

| | |
|---|--|
| | <ul style="list-style-type: none"> • Multi-stage anaerobic fermentation • Reforming of fermented substances |
| Development of high-efficiency electrolytic systems | <ul style="list-style-type: none"> • High Temperature Electrolysis (THE) |
| High temperature electrochemical cogeneration systems | <ul style="list-style-type: none"> • Protone exchange membrane cells (PEM) • Solid Oxid Fuel cells (SOFC) • Molten carbon fuel cells (MCFC) |

In 2010, 48 companies in the research and innovation center for innovation in Sustainable Building and hydrogen received financial assistance for projects and services, for a total of 14 projects included in the Strategic agenda and a contribution of 6.2 million euros as follows:

- Domain Sustainable Building Technology
 - o 9 research and / or experimental development projects
 - o 3 services for intellectual property management (IPR)
 - o 2 intelligence technology services
 - o 2 services for support the use of design
- Hydrogen technology domain
 - o 5 research and / or industrial development projects
 - o 1 service for intellectual property management (IPR)
 - o 1 intelligence technology service
 - o 1 support service for the market introduction of new products / services