

# Opportunities for substituting non-renewable resources with sustainable renewable resources - strategic approaches in Italy

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In the general context of the Bioeconomy, a key role is certainly played by chemistry from renewable sources, the green chemistry, one of the sectors where Italy is a leading player in a high-tech environment.

Thanks to the levels of innovation already achieved, the investments made and the range of products and value chains available, my Country occupies a leading role in this field.

There are several factors that have contributed to Italy's success in green chemistry:

- cutting-edge research which proposes original solutions with great potential for innovation;
- proven and effective collaboration between public and private sector research bodies and other stakeholders at local level;
- a network of large, medium and small-sized companies which work together;
- implementation of major investments by industrial companies, representing exemplary models at the global level
- integration within the local areas, involving both the agricultural and industrial spheres.

In the context described above, Italy, compared with other countries, has also a series of existing conditions which favour the transition towards the Bioeconomy according to a circular economy model.

These are connected with the geographical conditions, the organization of the agricultural sector, the industries, the infrastructures and the research know-how.

Moreover Italy is also already involved in projects of reconversion of industrial sites affected by the crisis, into biorefineries for the production of bioproducts and biochemicals from renewable sources, with positive impacts on employment and on environment.

Investments of over a billion euro have already been made in Italy in the area of green chemistry for the reindustrialisation of decommissioned or no longer competitive sites of national importance, and for the construction and launch of four flagship plants, the first of their kind in the world.

A further two hundred million euro from private-sector investments have been allocated to the research and development sector, in support of multidisciplinary projects involving universities and leading research centres.

In this context, following a Public Call promoted by the Italian Ministry for Education, University and Research in 2012, and aimed at the development of several National Technological Clusters, the SPRIG Cluster, (Sustainable Processes and Resources for Innovation and National Growth) has been launched by 4 Industrial Founding Fathers (Novamont, Biochemtex, Versalys, Federchimica).

It includes now 106 members, of which 43% are industrial companies, 29% public research bodies, the rest other type of organisations. 60% are located in the North, 24% in the Center, 28% in the South of Italy.

Moreover 8 Italian Regions support the Cluster activities: Basilicata, Emilia Romagna, Lombardia, Piemonte, Puglia, Sardegna, Umbria, Veneto.

The main technological trajectories for the development of chemistry from renewable sources in Italy has been configured by SPING by developing the following fundamental aspects:

### 1. Renewable resources as raw materials

- determination of the most suitable species and biomass at a local level (waste or dedicated low-impact crops) to be used in biorefinery processes, limiting climate altering gas emissions associated with use of the land
- identification and use of marginal and/or contaminated lands, avoiding the over-use of soil in line with international policies on climate change and biodiversity and in synergy with regional and local policies
- promotion of the efficient use of biomass (by extracting all possible value from renewable resources, starting from food and feed components, passing through the production of materials and recovering energy content from products at the end of their life cycle)
- construction of new supply chains with the agricultural world, ensuring competitive conditions in biomass production processes for all participants in the value chain

### 2. Biorefineries

- creation of integrated biorefineries to obtain high value-added products (biochemicals, biomaterials)
- development and optimisation of innovative technologies and efficient processes through R&D and scale-up activities aimed at favouring the construction of pilot plants and demonstrators
- reconversion of industrial areas decommissioned or affected by the crisis

### 3. Biobased products

- development of new biobased products, with a low environmental impact and with social and economic benefits;

### 4. New biobased markets

- development of new markets for biobased products by encouraging specific measures aimed at the productivity and efficiency of resources – such as increasing skills and employment opportunities in the agrifood and aquatic food products sectors, developing innovative technologies and promoting intra-sector collaboration among all the actors in the value chain, and creating a favourable environment for investments which facilitates access to available financing

### 5. Political and legislative framework

- development of reference standards for identifying biobased products, with reference to minimum environmental criteria
- introduction of clear biobased certification systems linked to sustainability criteria

I would like here to underline two fundamental priorities of SPRING strategy: R&D activities and Regional dimension.

As far as R&D activities are concerned, 9 focus areas has been identified through working session and questionnaires among the Cluster Members:

Three are focused on Feedstock:

- dedicated no food crops and aquatic biomass
- agricultural and forestry residues and agroindustrial byproducts
- organic fraction and bioproducts at the end of the life

Another three focus areas focuses on specific classes of bio-products:

- Introduction of bioproducts and biomaterials in "traditional" value chains of chemical industry
- Development of biopolymers, bioplastics, fibres and biocomposites
- Biofuels and liquid or gaseous energy car

One focus area is related to the development of enabling technologies.

And the last two are on the technical-economic optimisation of bio-based value chains, and on cross-cutting issues like training and education, economic analysis, regulations and standards, risk analysis.

The second major priority is the Regional dimension.

Regions are considered by the Cluster the fundamental actors for implementing a shared strategy towards a territorial regeneration able to multiply on a national level the skills and the excellence already existing at local level.

As I already said, 8 regions support the Cluster activity.

They are represented in a Standing working Group inside the Cluster governance with the aim of supporting mutual interactions, development of common policies and strategies, funding of joint programs between Regions and with national programmes, exchange of best practices.

Taking into account these two main priorities, SPRING has commissioned a very significant analysis of each Italian Region in terms of existing technical and industrial offer, and of regional development strategy and has developed a technological development roadmap.

Conclusions green chemistry and the SPRING Cluster are Italian cases of success thanks to:

- Strong focus on more promising areas selected on both a top down and a bottom up analysis.
- Strong synergies between industries, research centers and University both a national and regional level thanks to the activity of the SPRING Cluster and the linked regional clusters.
- possibility to cooperate at the right level (supranational, national and regional) thanks to the multi-layer governance.
- strong attention at collaboration, mainly at regional level.