

THE CIRCULAR BIOECONOMY: ITS ROLE FOR RECOVERY ECONOMIC, SOCIAL, HEALTH AND ENVIRONMENTAL OF THE COUNTRY

THE GLOBAL PANDEMIC HAS REVEALED THE GLOBAL FRAGILITIES OF THE CURRENT MODEL OF PRODUCTION AND CONSUMPTION, founded in prevalence of globalisation, poor management of natural resources, delocalisation of production, frequent disconnection with the territories and communities for the realization of short-range objectives, highlighting an approach to development that is based on the idea of a unlimited growth to the detriment of the quality of life and the natural and social capital of communities in a context of growing environmental impact.

BIOECONOMY IS ONE OF THE PILLARS OF THE ITALIAN ECONOMY (13% of national turnover and employment) and our country boasts a long experience of regenerating local resources through quality, low-impact agriculture, which enhances relational capital of communities, through virtuous collaborations and partnerships between entities from the public, private and civil society worlds for the creation of projects capable of regenerating degraded territories and soil. With an annual turnover of 330 billion euros and 2 million employees, the Bioeconomy Italian sustainable development is the third in Europe (after Germany and France), where the country is second for Research and Innovation in the sector (estimated as presence in competitive projects financed by the European Commission through Horizon2020 -SC2, Bioeconomy- and the Public-Private Biobased industry partnership) and first in terms of richness of biodiversity and number of quality products - food and biobased - certified. For better enhance the potential of the national bioeconomy, the Presidency of the Council of Ministers of the Renzi and Gentiloni Governments (2016 and 2017) has promoted the development of a national strategy for the Bioeconomy (BIT) and, more recently (2019, Conte 1 Government), its updating (BIT II), in order to more effectively integrate the sectors that compose it and facilitate cooperation between Ministries, Regions and autonomous Provinces of the country, for policies and regulations, R&I funding programs, infrastructure, etc. This national strategy, in progress implementation by the National Coordination Group for the Bioeconomy active at the CNBBSV of the Presidency of the Council¹, aim to guarantee a 15% increase in the current turnover and employment of the Italian sustainable bioeconomy by 2030.

ALTHOUGH IMPACTED BY THE HEALTH EMERGENCY FOR COVID19, THE BIOECONOMICAL MODEL AS UNDERSTOOD HAS PROVEN TO BE RESILIENT, because it produces quality food and bio-products that are indispensable and recognized throughout the world, because it converts civil wastewater and organic waste into biofuels and fertilizers but above all because it is intimately linked to the territory. The close connection with the territory, in fact, allows for enhance the adaptive and community spirit, rethinking the production logic in a timely manner, guaranteeing stability while giving absolute priority to the health and safety of people and leveraging a spirit of solidarity throughout the supply chain, as an essential force to overcome the emergency. In a context in which current models have demonstrated their limits and fragility and in which it is not possible to face future challenges with a simple return to “normality”. Examples of this are the rapid

¹ <http://cnbbsv.palazzochoigi.it/it/materie-di-competenza/bioeconomia/>; The National Bioeconomy Coordination Group sees the participation of representatives of the Ministries: i) Agricultural, food and forestry policies; ii) University and Research; iii) Economic development and iv) Environment and protection of the soil and sea; of the XI Commission of the Regions and autonomous provinces, the territorial cohesion agency, SVIMEZ and the national technological clusters agrifood (CLAN), green chemistry (SPRING) and blue growth (BIG).

reconfiguration of some players in the wine supply chain who have produced Alcohol as disinfectant and medical-health device for sanitization or 2G Bioethanol from possible surplus grapes.

THE CIRCULAR BIOECONOMY CAN THEREFORE REPRESENT THE TOOL FOR THE COUNTRY TO ACCELERATE THE POST COVID19 RESTART and, at the same time, build a carbon-neutral future in line with the goals of the Paris Agreement, to contribute to decarbonisation of the economy and the environment, in line with the aims of the European Green Deal, to counteract the degradation process of terrestrial and marine ecosystems, creating new jobs for SMEs and innovative start-ups and also in rural, marginal and coastal marine areas, in an *Open Innovation* logic. In particular, different assets of the circular bioeconomy model can be valorised in this particular critical period from a health and socioeconomic point of view:

- The bioeconomy supply chains produce food, materials, energy, chemical products, in a sustainable way, taking on the challenges arising from social, environmental and economic challenges and transforming them into development opportunities, developing real economy cases as a response to social, health, environmental and economic changes;
- The products of the bioeconomy not only feed Italians and make their daily activities possible, but they fuel everyone's businesses the Made in Italy manufacturing sectors, contributing to the consolidation of the recognized high quality of Italian products globally to the sustainability of production processes;
- To guarantee the above productions, the bioeconomy regenerates marginal, forestry, rural, coastal and abandoned industrial areas, promoting biodiversity and the production of local ecosystem services; this, as well as creating new and quality jobs in these areas now suffering, creates precious ecosystem conditions for the prevention and containment of future zoonoses and epidemics;
- The circular bioeconomy purifies wastewater, recovering organic nutrients, phosphorus, nitrogen and potassium, converting organic waste pollutants in bioenergy, bioplastics and compost and fixes CO₂ (through the metabolism of forests and the sea), improving quality of the environment, promoting the fertility and functionality of soils and seas and the re-entry of materials and carbon into biogeochemical cycles natural together with a significant increase in employment and turnover, in line with the European Green Deal;
- The Mediterranean dietary model is able to contribute to the prevention of non-communicable chronic-degenerative diseases have, even in this phase of the COVID emergency, a high negative impact on the state of health of the population and on the costs of the service healthcare;
- The strong know-how capital of the national chemical industry represents an ideal asset on which to base its development low impact chemistry based on the valorization of biomass in order to respond to the growing demand of global markets sustainable chemicals and plastics.

The strengthening of the Italian circular bioeconomy could be a driving force for innovation and sustainable growth, and therefore for greater political and social stability of the entire Mediterranean Basin, as well as for a more timely adoption of the European Green Deal, with its strategies on biodiversity, "farm to fork", and Circular Economy Action Plan, and therefore to make Italy one of the leading countries in the green transition.

To make this possible, thanks to a rapid **strengthening of the public-private partnership**, **IT IS NECESSARY TO IMPLEMENT A SERIES OF ACTIONS**² aimed at:

- promote the development / adoption of clear and stable regulatory framework, effective support policies, high quality standards and demand support measures that allow innovative and sustainable products to compete with existing ones. In this context, greater coordination between the launch of national plans and individual regional policies appears necessary;
- define appropriate investment policies linked to post-Covid 19 government interventions (Recovery Fund and other) and to the new SIE programming 2021-2027, both at national level and in its regional dimension;
- support with specific public policies the digitalisation of the production sectors of the circular bioeconomy both with a view to adoption of new organizational models both to strengthen the capacity to respond to the crisis imposed by Covid 19;
- develop investments at local level to support the national and rural bioeconomy and the circular bioeconomy in the sectors agri-food, forestry, maritime and urban;
- implement circular and regenerative approaches for agriculture and forests aimed at protecting ecosystems and reducing risks for biodiversity, and to bring clean organic matter back into the soil, closing the carbon cycle; similarly, promote approaches for the recovery of marine ecosystems, especially degraded ones, and of natural blue capital through area restoration actions coastal marinas impacted;
- promote the active involvement of citizens, the improvement of skills, education, training and entrepreneurship across the bioeconomy sector.

READY PROJECTS HAVE EMERGED as part of the consultation launched by the National Coordination Group for the Bioeconomy, **CONCRETE AND REPLICABLE** which, if appropriately catalyzed and supported by public-private investments, will contribute significantly to the new economic recovery of the country post health emergency. These projects involve overall investments of over €750 million and are aimed at:

1. the adaptation and development of infrastructures for the recovery and treatment of organic matter and other fundamental nutrients in flows liquids and solids of organic waste, purification water and industrial sludge;
2. the creation of territorial supply chains serving national multi-input and multi-product biorefineries capable of transforming waste and co-products destined to become waste, as well as biomass from marginal lands into sustainable products designed not to pollute the liquid and solid flows of the carbon;
3. the sustainable reconversion of industrial sites in crisis in connection with the agricultural sector and in line with the objectives of the Green Deal European;
4. to the regeneration of the Adriatic-Ionian marine macroregion, with increases in the production and quality of fish products, fishing and aquaculture, through its decontamination of plastic, waste and war residues;
5. to the integrated valorisation of the by-products and waste of Italian animal and vegetable agri-food production with the achievement of high added value products together with biofuel, digestate and fertiliser.

² Annex I.

There are several **ELEMENTS OF RESILIENCE ON WHICH THE PROJECTS PROPOSED** on the Italian national territory are **BASED**, and described below:

- Synergy between rural, coastal, industrial and urban areas, overcoming competition for resources: the proposed interventions are not designed to promote a single production sector or a single territory but rather to enhance the competitiveness of entire supply chains sustainable with value;
- The agricultural, food, forestry, fishing and aquaculture sectors, waste and waste management are involved upstream and downstream of both the supply chains as suppliers of bio-resources and as recipients of technologically advanced products necessary, for example, for the preservation of food and agricultural products, packaging, health aspects, etc.;
- Transformation of costs into value: the virtuous interconnection of different economically relevant national realities but which previously presented to the market as isolated and independent realities can allow the creation of long supply chains of actors in symbiosis with each other and therefore of transform costs (see disposal of waste, by-products, etc..) into value and maintain it on the national territory;
- Development and growth with the territory and not on the territory: the creation of local value chains catalyzed by incremental innovation that it allows for cohesive and sustainable development, also through coordination on transregional spatial, maritime and land planning which enhances the specificities of the individual territories put into a system. Guarantee the integrity of the supply chain through measures that strengthen the traceability, to avoid unjustified crises of confidence in food safety and strengthen quality controls;
- Restoration of the territory, the environment and the soil: the activities indicated make it possible to reduce environmental pollution, fixing CO₂ (seas and forests) and allowing the complete disposal of civil and industrial organic waste with the concomitant production of bioproducts biodegradable and compostable which do not accumulate in soil and water and which at the end of their life can be transformed into valuable compost for soil regeneration, contributing to the prevention and containment of future zoonoses and epidemics;
- Restoration of degraded marine ecosystems through environmental recovery and restoration actions.

The development of new flagship investments in synergy with overcoming regulatory bottlenecks can make it possible to implement field the best forces in the country to bring out from the crisis a generative, competitive and sustainable creativity as a distinctive element that makes Italy for the European Union and the world, an exemplary model of resilient development that integrates the economic, social and environmental dimensions to decarbonise the country, "regenerate" territories, infrastructures, skills and create new jobs along the entire supply chain with important implications for strategic sectors for Italy: food, textiles, automotive, cosmetics, packaging, paper, urban wastewater treatment.

Finally, it is important to underline and draw attention to the **EXISTING BARRIERS TO FULL DEVELOPMENT OF THE PRODUCTION SECTOR. CIRCULAR BIOECONOMY**. Despite all the actions implemented and investments in new plants and in some of the most important projects in Europe, There is still a lack of a clear regulatory framework capable of leveraging strong points and high quality standards. Both at the European level and at the national level nationally, one of the main obstacles to the development of the Circular Economy is linked to the existence of a clear and stable legislative framework, an element essential to encourage investments. Among the barriers we can mention the not yet sufficient diffusion of high quality standards for circular and

bio-based products, demand support measures that allow innovative and sustainable products to compete with those already existing, of measures aimed at highlighting and limiting negative environmental costs and externalities, promoting the circularity of the economy and the reduction of environmental impacts (e.g.: incentives for activities that contribute to increasing carbon sequestration in the soil, such as production and use of quality compost). Other obstacles concern the incomplete application of laws already in force and related sanctions and the lack of homogeneity in the authorization approach regarding End of Waste due to the lack of updated state regulations and the discretion on the part of the various Regional Administrations. In particular, among the urgent legislative needs we can mention:

- Homogeneity of authorization approach on the subject of End of Waste by providing updated state reference standards (e.g. revision of the legislation on the use of sewage sludge) and overcoming the discretion of the various Regions;
- Transposition of Directive EU/2019/904 relating to single use plastics;
- Regulations aimed at promoting the development of efficient organic waste collection systems and the modernization of existing plants for treatment, in order to expand the collection and treatment capacity of this fraction;
- Regulations aimed at encouraging the production and use of quality compost obtained from the treatment of organic waste;
- Quality standards and demand support measures, starting from compliance with Minimum Environmental Criteria and the promotion of tenders green public sectors, with particular reference to waste treatment, recovery and disposal systems;
- Actions aimed at promoting the culture and market of sustainable biobased products;
- Benefits, such as tax relief measures, tax relief, etc., for companies with quality levels above innovation standards such as "tax action/plan" aimed at deflating less than virtuous behaviour.

ANNEX I	
Actions	Sub-Actions
<p>ACTION 1- Promote the development / adoption of policies, norms, labels and actions and incentives aimed at promoting low-cost biobased products impact in socio-environmental terms and cheap</p>	<p>Promote the recovery of a Mediterranean-type diet by raising awareness particularly the new generations and collective catering, adopting a shared policy between the different institutions;</p> <p>Promote standards and labels for biobased products; Promote more systematic use of biobased products in the public sector, hospitals and schools through Green Procurement mechanisms;</p> <p>Provide adequate support to companies that intend to engage in collection, conservation and transformation of agricultural and food industry by-products for the production of semi-finished products to be used in the food, cosmetics, pharmaceutical;</p> <p>Facilitate, through concerted regulatory actions, the dissemination of certifications process and product of the goods produced by the agri-food supply chains in the</p>

	<p>territories that allow us to face the new post-pandemic emergency markets, and sustainability for the production of woody and non-woody forest products, and their chain of custody;</p> <p>Review fossil fuel subsidies and strengthen environmental subsidies low impact products, in line with the European Energy Directive 2001/2018</p> <p>Renewable;</p> <p>Promote synergy between funds including the use of structural funds to finance initiatives bioeconomy in accordance with the regional strategies (S3), the CAP, the InvestEU programme, the Fund ETS innovation, the thematic investment platform on the circular bioeconomy;</p> <p>Encourage investors to provide financing in sustainable bioeconomy sectors (e.g. banks, business angels, insurers, pension funds, investment funds, schemes of crowdfunding), increasing awareness of the contribution of the bioeconomy to climate change mitigation and environmental sustainability;</p> <p>Promote the diffusion of innovation and digital technologies in the bioeconomy where there are often strong specificities and numerous structural obstacles in enabling entrepreneurs to enter the transformation process.</p>
<p>ACTION 2- Develop level investments local to support the circular bioeconomy in the agri-food, organic, forestry, maritime and urban.</p>	<p>Rural economy: Develop, test and replicate "living labs" and "lighthouses" projects as local infrastructures rooted in the territories where multiple disciplines and stakeholders they can exchange ideas, co-create, test and replicate low-energy farming and forestry practices impact and use of bioproducts, sharing the exchange of good practices through actions targeted training.</p> <p>Agrifood: Defend and enhance the excellence of the Mediterranean diet in the world, based on its cultural and health relaunch, also through the formulation of new ones food products that combine nutritional value and sensory pleasure with a increase in their safety and shelf life.</p> <p>Agrifood: Develop biorefineries and extraction/purification/separation technologies for greater valorisation of the by-products of agri-food production through a cascade approach in obtaining ingredients with high nutritional, health and of protection from alterations and contamination of food products along their supply chain production and distribution.</p> <p>Agrifood: Develop new production and catering processes and new technologies packaging to improve/extend quality and conservation (important requirement in times of</p>

	<p>emergency), reducing losses, post-use waste, food waste, waste and impact environmental, also through packaging based on compostable bioplastics. Thus it will be food waste that cannot be avoided in composting processes for regeneration is also valorised of organic carbon on soils and the reversal of the trend of biodiversity loss as called for by the European “Farm to Fork” Strategy.</p> <p>Biobased Industry: Develop new multi-product biorefineries that enhance by-products and low-input crops in marginal areas, revitalizing abandoned industrial sites and/or no longer competitive, also in line with the European Energy Directive 2001/2018 renewable.</p> <p>Municipal wastewater: Exploit the full potential of municipal organic waste and wastewater in through a multi-product biorefinery approach, with the production of chemicals, bio-based materials and energy and in line with the European Directive 2001/2018 on renewable energies, together with precious and critical materials such as nitrogen, phosphorus and potassium.</p> <p>Blue bioeconomy: Valorisation of underused and discarded fishery products fishing in bioeconomy supply chains for the production of new bioproducts (e.g. functional cosmetics, value-added ingredients, nutraceuticals, functional foods, aquaculture foods, etc.) and materials (e.g. natural polymers for packaging or the biomedical market). To promote aquaculture in offshore sites, through the reuse of existing decommissioned offshore platforms in Italy. Promote a systemic development of aquaculture that reconciles respect for the environment, of animal welfare and human health, through the development of technologies and digitalisation of farms, product diversification, feed development and coming from a circular economy, minimizing the impact on the environment. Create templates assessment of the vulnerability of national coastal areas, improving the preparedness of agricultural and fishing companies to disasters, increasing resilience to change climate and <i>marine litter</i>. Promote <i>marine litter</i> recovery and valorization chains.</p>
<p>ACTION 3- Implement circular approaches e regenerative measures aimed at protecting ecosystems, al restoration of biodiversity, and to increase the clean organic matter in soils (SOM), closing the carbon cycle</p>	<p>Strengthen understanding, resilience and status of biodiversity and ecosystems terrestrial and marine-coastal, including related ecosystem services and related costs and benefits socio-economic, with their adequate remuneration, in harmony with the national strategy on natural capital.</p>

	<p>Strengthen measures aimed at reducing land consumption.</p> <p>Monitoring the restoration of degraded areas and lands at risk of impacts of changes climates such as desertification, for quantitative and qualitative consumption of neutral soil and to support restoration actions in these areas through circular bioeconomy activities that bring clean organic matter back to the soil.</p> <p>Agrifood: Develop crops, genetic improvements and agronomic approaches to optimize soil productivity, maintenance of biodiversity and reduction of products plant protection in agriculture.</p>
<p>ACTION 4- Promote the involvement of citizenship, the improvement of skills, education, training and entrepreneurship across the industry bioeconomy.</p>	<p>Citizen awareness campaigns also through the organization of show cases regional scope and organization of <i>Open Days</i> in collaboration with businesses.</p> <p>Establish a national bioeconomy portal to collect information, virtuous examples and good practices on sustainable bioeconomy products and their applications.</p> <p>Improve the level of training and education in the bioeconomy, developing a class of professionals, with multidisciplinary, management and intersectoral skills.</p> <p>Periodically adapt the ways in which knowledge is transferred in a coherent and consistent manner flexible to the evolution of unstoppable technological progress.</p> <p>Stimulate the development of talented entrepreneurs and innovators, thus promoting a mindset entrepreneurship and a culture for sustainable bioeconomy, in line with the Taxonomy European Union for Investment.</p> <p>Use innovative technologies, and in particular those resulting from digitalisation. The The potential of digital in agri-food is many - verified and made current by pandemic - and have a significant impact on the environmental sustainability of agribusiness industrial, on the economic one of companies and the sector in general, on the quality of product.</p> <p>Implement distance learning methods (tele-learning), alongside, or as an alternative, particularly during possible emergency periods, to training activities provided in frontal classroom mode.</p> <p>Develop skills on advanced technologies and new sensors and diagnostic systems and monitoring; process modeling; smart-technologies; fingerprint; markers of quality; mild technology; management of electronic platforms and innovative systems traceability; consumer's behaviour; risk assessment, management and communication.</p>

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