Interreg Europe LCA4Regions Project

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A framework for the peer review

November 2021

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1 Transnational learning journey 6 – Lombardy

Lombardy is happy to host the partners in the first hybrid event after a long time.

The event will be held from November 22 to November 24, in Milan, Palazzo Pirelli. It will also be a pre-event of the *Sustainable development regional Forum 2021*.

The event will be focused on the use of LCA to evaluate and monitor policies.

On November 22, from 15:00 to 18:00 keynote speakers will provide an overview of the theme at European level and at national level. Then a panel discussion, chaired by ACR+, will dive the meeting into a lively discussion on resource efficiency and CO_2 policies.

On November 23, from 9:30 to 12:30, Partners' good practices will be presented and a first discussion on the design of actions will took place, starting from the presentation of previous experiences lived in other projects.

On November 24, it will be time for Peer review (9:30), an analysis and a discussion about how Lombardy region intends to steer its Policy instrument toward the use of LCA. A live Steering group will close the activities.

The current document is devoted to providing an overview of the region (chapter 2) and a reference document to allow Partner's effective participation to the peer review.

2 Lombardy Region's ID card

Lombardy has a surface area of almost 24,000 km^2 and a population of about 10 million inhabitants. The GDP per capita is among the highest in Europe and amounted up to €37,800 in 2017 (€28,400 in Italy and €29,500 in the EU). In the same year, with M€ 380.955,24, Lombardy has had the fifth largest GDP among European Regions, representing about 23% of the Italian GDP.

The economy of Lombardy, affected by an unemployment rate of 6% (compared to 10.6% for Italy and 6.9% for the EU) is characterised by a variety of activities in all the traditional sectors, such as farming (1.2% of the employees) and industry (31.5%). Services (67.3%) have also had a strong development in the recent post-industrial phase, especially in the capital city Milan.

SMEs, mostly family owned businesses, dominate the market.

In 2017, almost 40% of the total firms of the region are based in Milan and its province, and the main sectors are: mechanical, electronics, metallurgy, textiles, chemicals and petrochemicals, pharmaceuticals, food, publishing, footwear and furniture. The service sector is also very well developed and mostly related to international trade and financial services.

The economy of Lombardy is characterised by a wide variety of industries ranging from traditional sectors, such as agriculture and livestock to heavy and light industries. The service industry has also had a strong development in the recent decades. Lombardy's production system is still one of the most developed in Italy

and Europe: at the end of 2016 there were 74 enterprises per 1000 inhabitants, one of the highest rates of entrepreneurship in Europe.

The Lombardy region is the first manufacturing region in Italy in terms of turnover and added value, and the third one in Europe concerning the number of employees, after Bayern and Baden-Württemberg. The production system gathers approximately 110,000 enterprises employing more than 1 million persons. Lombardy is the leading manufacturing industry in Europe regarding some sub-industries such as manufacturing of metal products (excluding machinery and equipment), textile industries, production of base metals, manufacture of wearing apparel, printing and reproduction of recorded media, wood and products of wood and cork (except furniture).

With 14 universities and many more research centres, Lombardy is the first Italian Region by number of patents registered at the European Patent Register concerning manufacturing technologies.

Lombardy is also the first Italian region by number of patents registered at the European Patent Office (EPO) concerning manufacturing technologies (industrial technologies, metallurgy, mechanical engineering, chemicals, textile).

In the last five years, since circular economy (CE) has moved its first steps in the EU agenda, Lombardy has witnessed many initiatives involving policymakers, enterprises and research centres to especially enhance waste prevention and material recovery. These pioneering, often bottom-up initiatives have been recently framed into a first Roadmap focused on Research & Innovation in CE.

3 Policy instruments

Lombardy Region is responsible for the design, management and implementation of a high number of policies, programme and plan.

The Directorate Environment and Climate of the Regional Government, who has the responsibility for the LCA4Regions project, identified some of those policy instruments to work on during the project.

Moreover, LCA4Regions team produced an analysis of the typologies of policy tools producible under the regional responsibility and their hierarchical role in the local policy making.

Finally, Lombardy Region decided to focus on a general understanding of the use of LCA in its policies and is trying to carry out a specific focus on the energy efficiency and building sector, with the ambitious objective of internalising into energy efficiency policies the evaluation of other impacts, especially on resources use.

3.1 Hierarchy and Purpose of Regional Policy Instruments

The life cycle approach can play a role in supporting policies at different scales or hierarchies. This is the reason why we started analysing the peculiarities of the different kinds of policy instruments under the responsibility of the regional government. This analysis is just at a preliminary stage. Here below we present the first results of this analysis:

- Regional law. It is approved by the Regional Council. The contents can be policy direction, principles, aims, financial resources, competence.
- Regional regulation. It is approved by the Regional Council or by the Regional Government. The contents are methods and tools for implementing a law (e.g. funding methods).
- Plan or programme. It is approved by the Regional Council or by the Regional Government (as foreseen by the law). The contents are objectives, evaluations state of affairs, actions, monitoring.
- Resolution. It is approved by the Regional Government. The contents are: enforcement of a law; guidelines; approval of tender criteria (later implemented by decree); breakdown of loans; promotion and approval of agreements with other institutions, etc.
- Decree. It is approved by Director or Executive. The contents are: technical clarifications; project approval; approval of calls; resource distribution.

Potential use of LCA

We would like to understand which can be the role of LCA in supporting all this policy levels, in particular into the energy sector and into the circular economy sector.

Based on the preliminary analysis carried out within the LCA4Regions project so far, the following possible solutions have been identified for the introduction of life-cycle criteria in regional policies (regional laws, regulations, plans/programs, resolutions, decrees):

- selection / prioritization of policy options – e.g.: assessment in the life cycle of the environmental impacts avoided thanks to the adoption of various actions, with the aim of defining priority scales of the various options on the basis of the best cost / benefit ratio;
- introduction of eligibility requirements – e.g. access to regional planning incentives or implementation plans (e.g. in relation to buildings construction) only with an LCA analysis or if they are demonstrated through LCA-based indicators, minimum environmental and climate impacts in the life cycle;
- regulation on energy efficiency in buildings - extension of regulation to sustainable buildings with the introduction of requirements based on LCA-based indicators that consider the impacts of the supply chain, in terms of CO2 produced, consumption of fossil energy and other resources, etc.;
- procedures for evaluating plans (SEA) and projects (VIA) - integration of LCA-based criteria among those already provided for the authorization and evaluation measures;
- in the elaboration of new plans, the use of LCA-based tools can be proposed e.g. to characterize some actions, in particular those related to the refurbishment of the public building stock, to evaluate the effects of the plan action taking into account other impacts in addition to those already foreseen (CO2 emissions, reduction of energy consumption, increase in RES) and to correlate them with the elements of scenario and target;
- for monitoring of plans (PREAC, PRIA, POR FESR) - possible introduction of LCA-based indicators or methods to complement the monitoring indicators already provided; possible criticalities could be the application of these criteria to existing plans and the collection of the necessary data;
- as part of incentive measures for the refurbishment of the building stock - possible introduction of LCA-based criteria that must be satisfied by interventions encouraged in calls and measures such as

incentive access requirements or as reward criteria – e.g. threshold values that must be respected (synthetic and easily calculable and comparable), presence of LCA analysis to support projects alongside the energy diagnosis, presence of product certifications for individual components and materials, which is not already mandatorily provided for by the construction CAM and available on the market.

3.2 European Regional Development Fund – Regional Operating Programme (POR FESR)

This chapter, prepared by RINA for Regione Lombardia as part of the technical assistance in support of the LCA4Regions project, aims to present an initial analysis for the potential inclusion of Life-Cycle (LC) criteria in drafting the Regional Operational Plan for the European Regional Development Fund (POR FESR).

In the current version it is a working text to be shared and discussed with Regione Lombardia, project partners and stakeholders identified as being of interest; the final version will be the basis for drafting the end-of-project Action Plan, scheduled for mid-2022.

The analysis is divided into two sections, one related to the POR FESR for the period 2014-2020, based on the latest version (n.6) of the Plan approved by Regione Lombardia in September 2020, and one related to the document "Main challenges and priorities for the use of the European Regional Development Fund (ERDF) 2021-2027", approved by Regione Lombardia in February 2021 and on the POR FESR draft version (2.7) of the Programme dated October 2021.

3.2.1 POR FESR 2014-2020

The Lombardy Region's 2014 - 2020 Regional Operational Programme (ROP) under the European Regional Development Fund (ERDF) provides investment funds of nearly one billion euros (€970,474,516) with the priority objectives of the Region's economic growth and social development as well as the enhancement of its productive capabilities.

The ERDF ROP promotes a smart, sustainable and inclusive growth model in line with the objectives identified in the "Europe 2020" strategy and with the regional government's development policies promoting the competitiveness and sustainability of its businesses and the entire economy of the Region.

The ERDF ROP strategy lays emphasis on building an economy which uses resources efficiently, guides the development of new technologies and processes, and underpins Lombardy companies' competitive advantages by making use of EU-wide networks, in line with the flagship initiative entitled "A resource-efficient Europe".

Where LCA could have been used: some hints for the future programming period

The POR FESR 2014-2020 of Regione Lombardia is divided into 6 priority Axes, in turn made up of Specific Objectives; for each Specific Objective a series of Actions and Indicators are identified for monitoring the implementation of the Plan.

Axis I - Strengthen research, technological development and innovation

- in the specific objective "Support for the economic enhancement of innovation through the experimentation and adoption of innovative solutions in processes, products and organizational formulas", possibility of supporting research through LC tools especially aimed at increasing the degree of circularity and the reduction of environmental impacts in the production chains and in the production and use of energy with particular reference to residential / tertiary buildings;
- possibility of maximizing the exploitation of LC skills generated in R&D projects co-financed by the European Commission through other programs, e.g. Horizon 2020 in the period 2014-2020 and Horizon Europe for the period 2021-2027, in particular by facilitating the exchange of experiences especially among companies in Lombardia and Italy in general;
- in the specific objective "Creation and consolidation of micro, small and medium-sized enterprises", and in particular in the action focused on "emerging industries with high market potential (e.g. green economy, eco-innovation, low-carbon economy", possibility to focus the support to SMEs in the realization of LC analysis of organization / process / product aimed at the adoption of environmental management systems and at the realization of improvement interventions aimed at reducing the impacts;
- in the action "Support for the implementation of complex research and development projects on a few relevant thematic areas", potential inclusion of LC issues, circular economy and reduction of environmental impacts in the life cycle (possibly limited to key sectors for Regione Lombardia economy) among the relevant thematic areas;
- in the action "Strengthening and qualifying the PA demand for innovation through support for pre-commercial public procurement and innovation procurement actions", possible addition of actions aimed at public procurement with a reduced environmental impact in the life cycle, with the ''objective of stimulating PA supplier companies to carry out LC analyzes of their processes and implement improvements”; the final objective, in the medium-long term, could be the introduction of a reward (or even an obligation) for suppliers who intend to qualify as suppliers of the regional PA;
- possible additional indicators: n.a.

Axis II - Improving access to information and communication technologies, as well as their commitment and quality

- no particular potential for the introduction of LCA criteria, except for the possible introduction of minimum criteria relating to the materials used for the construction of the communication infrastructures;
- possible additional indicators: number of projects, assigned budget, avoided environmental impact (in terms of GHG emissions and other impact categories in the life cycle) thanks to the communication infrastructures with sustainable materials / solutions supported through this Axis.

Axis III - Promote the competitiveness of small and medium-sized enterprises

- in the specific objectives "to develop and implement new business models for SMEs" and "support the creation and expansion of advanced capacities for the development of products and services", possibility of including among the new business models and advanced skills also aspects related to the increase in the degree of circularity of the production context through life cycle analysis and improvement interventions following the analysis;
- in the action relating to the "relaunch of the investment propensity of the production system", possibility of inserting specific support for investments in plants / systems / machinery characterized by particularly high environmental performance in the life cycle or intrinsic in the production process or in the possible supply of services to third parties;
- in the action on "promotion and accompaniment for the use of innovative bond finance for SMEs", the possibility of also considering the potential support linked to "green bonds", "ESG-linked bonds" which provide for the execution of an environmental analysis in the life cycle for determining the level of sustainability, in compliance with the European Taxonomy for Sustainable Finance;
- possibility of supporting companies in the assessment and subsequent certification according to the applicable UNI-EN-ISO standards of the environmental impacts in the life cycle at the organization or product level with the aim of increasing both access to the "free" market and supply relationship to the PA for which reward criteria and/or obligations could potentially be introduced;
- possibility of supporting aggregation and integration among companies aimed at reducing environmental impacts in the life cycle, e.g. through industrial symbiosis solutions;
- possibility of also supporting the tourism supply chain by reducing the environmental impacts associated with accommodation facilities with their use of energy, water and resources and the means of transporting people;
- possible additional indicators: number of projects, assigned budget, avoided environmental impact (in terms of GHG emissions and other impact categories in the life cycle) thanks to the projects supported through this Axis.

<u>Axis IV - Support the transition to a low carbon economy in all sectors</u>

- the specific objectives "Reduction of energy consumption and emissions in companies and integration of renewable sources" and "Reduction of energy consumption in public buildings and structures or for public use" are among the most suitable ones for the inclusion of LC criteria in the entire POR FESR, given the environmental importance of the energy sector, throughout the supply chain, in terms of emissions into air, water and other receptors; the actions already envisaged by the Plan are therefore in principle all in agreement with a reduction of the environmental impacts in the life cycle of the company / building / sector of reference, but the adoption of LC criteria can be further extended and made explicit;
- possibility of inserting LC criteria among those of eligibility / evaluation / rewarding in the context of support for projects to reduce consumption and production of energy from renewable sources, in line with the criterion already present in the form "giving priority to the use of high efficiency "which could be extended to technologies / solutions with low environmental impact in the life cycle;

- in the energy refurbishment of buildings and in the possible construction of new buildings, possibility of requesting life cycle analyzes that assess the environmental impacts also in the construction and end-of-life phases of the building as well as in the use phase (e.g. energy consumption); this requirement could also be adopted in a simplified form through the request to use materials / systems characterized by low environmental impact in the life cycle and therefore able to maximize the environmental performance of the building;
- in the actions of sustainable mobility in urban areas, possibility of inserting LC criteria among those of eligibility / selection / reward (e.g. for electric mobility - execution of an LC assessment that considers the impacts of production / disposal of batteries, sources used for electricity production, etc.);
- this axis is closely linked with other regional plans such as PEAR/PREAC and the PRGR, as well as with Axis V of the POR FESR itself linked to “sustainable urban development”; there are therefore margins for the optimization of the actions of insertion of LC criteria according to the purpose, purpose, field of application and timing of each Plan;
- possible additional indicators: number of projects, assigned budget, avoided environmental impact (in terms of GHG emissions and other impact categories in the life cycle) thanks to the projects supported through this Axis, variation of the emission factors in the life cycle for the electricity production, change in total / non-renewable energy needs in buildings, change in total / non-renewable energy consumption in the life cycle of urban mobility systems, etc.

<u>Axis V - Sustainable urban development</u>

- in the specific objective "dissemination and strengthening of economic activities with a social content", the possibility of including among the supported activities those that provide products or services in a sustainable way in their life cycle or that are able to contribute to the reduction of impacts environmental aspects of its customers;
- in the specific objective “supporting the creation and expansion of advanced capacities for the development of products and services”, the possibility of including support for companies in the development of solutions aimed at reducing environmental impacts in the life cycle;
- this axis is closely linked with other regional plans such as the PEAR / PREAC and the PRGR, as well as with Axis IV of the POR FESR itself, linked to the “transition towards a low-carbon economy in all sectors”; there are therefore margins for the optimization of the actions of insertion of LC criteria according to the purpose, purpose, field of application and timing of each Plan;
- considering the previous point, most of the indications provided in the comments relating to Axis IV are also applicable to the corresponding actions in the context of Axis V;
- possible additional indicators: number of projects, assigned budget, avoided environmental impact (in terms of GHG emissions and other impact categories in the life cycle) thanks to the projects supported through this Axis, variation of the emission factors in the life cycle for the electricity production, change in total / non-renewable energy needs in buildings, change in total / non-renewable energy consumption in the life cycle of urban mobility systems, etc.

Axis VI - Tourism strategy of the Inner Areas

- No particular potential identified for introduction of LC criteria;
- Possible additional indicators: na

Axis VII - Technical assistance

- in the specific objective "supporting the execution of the POR", "evaluation and studies" action, possibility to include the provision of technical advice in the field of environmental assessments in the life cycle, in particular in the energy, water and waste sectors, industry, construction and mobility, with the aim of supporting the definition of eligibility, evaluation, selection and reward criteria in the calls published as part of the Plan, to identify the most appropriate LC indicators for monitoring the results and the methodology for their calculation according to the different types of projects as well as, if required, to quantitatively assess the LC impacts avoided thanks to the actions of the Plan;
- possible additional indicators: number of projects, assigned budget, consulting / training hours provided on LC issues, thanks to the projects supported through this Axis.

3.2.2 POR FESR 21-27

The development of the POR FESR for the period 2021-27 is currently ongoing, with an advanced draft (number 2.7) available. Being the Programme under development during LCA4Regions project activities, it has already absorbed some of the project ideas, thanks to the dialogue among the Regional Environmental Authority, its technical assistance and the project.

The following paragraphs present an overview of the Programme respectively based on the analysis of the “Main challenges and priorities” and of the current draft programme aimed at identifying the potential areas of insertion of life-cycle aspects; to conclude, a paragraph highlights where LCA is already present in the current draft of the Programme.

3.2.2.1 Main Challenges and Priorities

The document "Main Challenges and Priorities for the POR FESR 2021-2027" of Regione Lombardia, following an analysis of the regional context of reference also in the light of the COVID-19 pandemic scenario, which includes interesting references to the topic of sustainability, presents three main challenges for Regione Lombardia: the promotion of equality and equity for citizens, the transition towards a model of sustainable development and growth, and the consolidation of the competitiveness and attractiveness of the regional system.

On the basis of these challenges and the priorities defined by Regione Lombardia and the European Commission within the ERDF, 3 Priorities are identified which are in turn divided into a complex of 11 Specific Objectives, in reference to which the following considerations are reported, which are add to those carried out in the previous section regarding the POR FESR 2014-2020. More accurate and detailed evaluations can be made on draft plans more advanced than in this document.

Priority OP1 - A more Competitive and Intelligent Europe

- in the specific objective "to develop and strengthen research and innovation capacities and the introduction of advanced technologies", the possibility of supporting specific activities aimed at increasing the level of sustainability in the life cycle of companies / processes / products / services / buildings, the degree of circularity of the regional economy and the development of products / services aimed at reducing environmental impacts from a life cycle perspective;
- in the specific objective "to strengthen sustainable growth and competitiveness and the creation of jobs in SMEs, also through productive investments", the possibility of including support for companies, especially SMEs, which make investments in plants / technologies / properties characterized by particularly high environmental performance in the life cycle;
- in assisting companies towards alignment with the European regulation 2020/852 on sustainable finance, mentioned in the introduction to the document, the possibility of providing particular support in determining the environmental impacts in the life cycle which, in addition to allowing to verify the alignment with the European taxonomy, it also makes it possible to identify opportunities for improving the degree of sustainability in the life cycle.

Priority OP2 - A Greener, Low Carbon Europe and in Transition Towards Decarbonization and Resilience

- the specific objectives of this Priority are among those most suited to the inclusion of LC criteria in the entire POR FESR, given the environmental importance of the energy sector, throughout the supply chain, in terms of emissions into air, water and other receptors; all the actions already preliminarily identified in the document are generally in line with a reduction of the environmental impacts in the life cycle of the interested party (company / site / building) but the presence of specific LC criteria and indicators can be strengthened;
- in the specific objective "promoting energy efficiency and reducing greenhouse gas emissions", possibility of including LC criteria among those of eligibility / selection / rewarding for projects, in order to obtain benefits not only in terms of energy and GHG emissions but more generally of overall reduction of environmental impacts, also located outside Lombardia in other phases of the life cycle or attributable to another category of impact with respect to climate change (e.g. in the building sector, also include relative analyzes the materials used for construction or energy requalification and the environmental impacts associated with them, as well as demolition / end of life instead of being limited exclusively to performance, mainly energy, in the use phase);
- in the specific objectives "promoting renewable energy" and "developing intelligent energy storage systems, networks and plants outside the TEN-E", similarly to the previous point, the possibility of supporting projects and actions aimed at an overall reduction of environmental impacts as a priority in the life cycle and not only to the energy and climate change aspects;
- in the specific objective "to promote the transition towards a circular and resource efficient economy", the possibility of providing assistance in identifying supply chain life cycle analyzes that allow the identification of opportunities for the reuse of co-products, by-products and waste as raw materials in other production processes; this support could be added to that already provided for the implementation of energy audits in production companies, to complement the analysis with

issues not exclusively related to energy and climate change aspects but more generally to the sustainability of the production process;

- in the specific objective "to promote sustainable multimodal urban mobility", as already mentioned in reference to the previous POR FESR, possibility of inserting LC criteria among those of eligibility / selection / reward (e.g. for electric mobility - execution of LC evaluations covering impacts relating to batteries, sources used for electricity production, etc.).

Priority OP5 - A Europe Closer to Citizens

- in the specific objectives "to promote integrated and inclusive social, economic and environmental development, culture, natural heritage, sustainable tourism and safety in urban areas" and "in areas other than urban ones", the possibility of supporting the tourism sector in reduction of environmental impacts in the life cycle thanks to the reduction of energy, water and material / resource uses and the reduction of waste production and increase in the sustainability of tourist transport.

3.2.2.2 Details on the contents

As mentioned above, the Programme is articulated into 3 Priorities and in turn into a set of 11 Specific Objectives:

- Priority OP1 - A more Competitive and Intelligent Europe;
- Priority OP2 - A Greener, Low Carbon Europe and in Transition Towards Decarbonisation and Resilience;
- Priority OP5 - A Europe Closer to Citizens.

Lombardy Region has selected a set of actions to focus the insertion of life-cycle aspects. The selected actions are listed below, grouped into main areas of interest:

- Actions on private companies capacities, where the potential inclusion of life-cycle aspects is related on one hand to the maximization of industrial symbiosis and circular economy among different companies, the exploitation of research and development activities being carried out by Lombard companies but also national and international consortia, the provision of support for companies willing to reduce their environmental impact through life-cycle instruments, certification and management schemes; the actions where these aspects could potentially be included are:
  - Action a.i.2. Support for technology transfer between the world of research and Lombard companies;
  - Action a.i.3. Support for the implementation of complex research, development and innovation projects;
  - Action a.i.4. Development and protection of the innovative capacity of the business system;
  - Action a.i.5. Support for the dissemination and consolidation actions of the Lombard Open Innovation approach in innovation ecosystems;
  - Action a.ii.3. Support for the acceleration of the digital transformation process of business models;
  - Action a.iii.1. Support for the development of the internationalization of Lombard SMEs and the attraction of foreign investments;

- Action a.iii.4. Support for strengthening networks and business combinations;
- Action a.iii.5. Support for strengthening the attractiveness of the territory;
- Action a.iv.1. Support for the development of skills for the transition and sustainability of businesses;
- Action b.vi.1. Support for the adoption of sustainable production models;
- Action b.vi.2. Industrial symbiosis and closure of the cycle;

- Actions on sustainable finance; linked to the previous actions for the support to Lombard private companies, there are actions more focused on the support in access to credit and investments for local companies, where the stream of activities needs to be aligned with the EU Taxonomy for Sustainable Finance; these actions include:
  - Action a.iii.2. Support for access to credit;
  - Action a.iii.3. Support for investments by SMEs;
- Actions on public assets and overall public sector, which impact either on the capacity of the Lombard Public Administration of supporting the regional economy, or in the increase of the efficiency and sustainability of public assets including mobility-related ones, with a life-cycle perspective; these actions include:
  - Action a.ii.1. Support for the acceleration of the digital transformation process of public services provided by the Public Administration;
  - Action b.i.1. Support for restructuring and redevelopment interventions for the energy efficiency of public facilities and facilities;
  - Action b.i.2. Support for the efficiency of public residential assets;
  - Action b.viii.1. Support for the development of an integrated urban mobility system;
  - Action b.viii.2. Support for the development of innovative information and accessibility systems;
  - Action b.viii.3. Support for sustainable mobility;
- Actions on energy transition, aimed at supporting private investments in the field of energy efficiency, renewable energy production, energy storage with the ultimate aim of reducing greenhouse gas emissions and other environmental impacts in the life cycle; these actions - which are assumed to be those with the largest potential for inclusion of LC aspects - include:
  - Action b.i.3. Support for the energy efficiency of buildings and production plants of companies;
  - Action b.ii.1. Increase in the production of energy from renewable sources;
  - Action b.ii.2. Support for the diffusion of energy communities;
  - Action b.iii.1. Development of energy accumulation and storage systems and district heating and cooling systems;
- Actions on territory cohesion, more focused on social topics but that can also include some references to environmental and life-cycle aspects; these actions include:
  - Action e.i.1. Support for living in urban areas also by enhancing / recovering green spaces and for socializing;
  - Action e.i.2. Support for economic and community development in urban areas;
  - Action e.i.3. Support for school inclusion in urban areas;
  - Action e.i.4. Strengthening and promotion of the social-health and social-assistance service in urban areas;
  - Action e.i.5. Support for the governance of the urban strategy;
  - Action e.ii.1. Support for the redesign of citizenship services in inland areas;

- Action e.ii.2. Support for the strengthening of local economic systems in inland areas;
- Action e.ii.3 Sustainable and integrated enhancement of the territory and of the building, natural, cultural and historical-artistic heritage of the internal areas.

3.2.2.3 Life cycle approach is already present into the current version

As mentioned above, being the new version of POR FESR 2021-27 under development during the LCA4Regions project activities, life-cycle criteria have already been included in some of the Priorities and Specific Objectives.

In particular, LCA is explicitly included in the current POR FESR draft in four actions, quoted below.

Priority - A Greener, Low Carbon Europe and in Transition Towards Decarbonization and Resilience

Specific objective:

- a.i) Promote energy efficiency and reduce greenhouse gas emissions
  - Action b.i.1. support to refurbishment interventions for public buildings and structures. The action can support:
    […] use of construction techniques, materials or components that in the Life Cycle allow the minimization of environmental impacts.

Priority - A more competitive and intelligent Europe

Specific objective:

- a.i) Develop and strengthen research and innovation capacities and the introduction of advanced technologies:
  - Action a.i.4. Development and protection of the innovative capacity of the business system
    The action can support:
    […] access to advanced services for innovation, such as […] Life Cycle Analysis.

Priority - A greener, low carbon emission Europe in transition towards decarbonization and resilience

Specific objective:

- b.vi) Promote the transition to a circular and resource efficient economy:
  - Action b.vi.1 Support to adoption of sustainable production models
    "realization of process innovations for the introduction of international green standards in all phases of the life cycle of products"
  - Action b.vi.2. Industrial symbiosis and closure of the cycle.
    The reduction of environmental impacts, from a production territorial system perspective, is supported with actions aimed at overcoming operational, system and supply chain barriers for the implementation of the circular economy in SMEs.
    Specifically, this action may consist of: the design and management of integrated supply chains and public-private partnerships that facilitate adherence to sustainable production and service processes, according to the **"Life Cycle Thinking"** approach.

3.3 Regional Programme Energy, Environment and Climate

This programme, named PREAC (Piano Regionale Energia Ambiente Clima) is currently under development and the related activity has just begun. It is one of the potential targets of the LCA4Regions project actions, in particular to integrate the positive contribution of LCA in definition and implementation of this policy tool.

The "Act of Addresses" for the redaction of the PREAC starting from the previous PEAR (Piano Energia Ambiente Regionale, Regional Energy Environmental Plan) has been approved by the Regional Council on November 24th 2020. Moreover, on August 9th, 2021 the DG for Environment and Climate has approved the the list of competent subjects in environmental matters and the territorially interested entities called to participate in the Environmental Assessment Conference (VAS) for the PREAC. The first evaluation conference based on the scoping document currently being drafted will be carried out by the end of 2021.

The PREAC will design the stages of a path that will lead Lombardy to be a region with net zero emissions by 2050, resulting from the reduction of GHG emissions and of the absorption of soil, forests, natural wells, etc. and in a leading position in the commitment to implement climate policies and in the development of a competitive and sustainable economic system.

Since the Italian national context is characterized by fiscal leverage and market dynamics far beyond regional competences, Lombardy Region actions will focus on an increase in the value of its territory based on four main guidelines:

- reduction of energy consumptions by increasing efficiency in the final use sectors;
- development of local renewable sources and promotion of self-consumption;
- growth of the production system, development and funding of research and innovation at the service of decarbonization and the circular economy;
- adaptive and resilient response of the Lombard system to climate change.

In the frame of the above listed priorities and in line with the indications of the Integrated National Plan for Energy and Climate, the technologies expected to provide the most significant contribution to the Plan objectives are:

- in the residential and tertiary sector (public and private), the energy refurbishment of existing buildings and the construction of new buildings according to the NZEB concept, the increase in heat pump air conditioning, the efficiency of electrical users and lighting systems/existing air conditioning, but also the creation of energy communities customized to local needs and resources;
- in the industrial sector, the efficiency of production processes in line with the Best Available Techniques, the recovery of waste heat, the use of high-efficiency electric motors, the spread of cogeneration in production contexts, the construction of industrial parks according to criteria of industrial symbiosis, as well as the greater diffusion of energy audits and environmental/energy management systems pursuant to ISO 14001 and 50001;
- in the transport sector, the increase in the number of electric vehicles or vehicles working with alternative fuels (biofuels, hydrogen) and the enhancement of public transport and alternative modes of transport;
- in the agricultural sector, the valorization of wastes and by-products, the rationalized use of fertilizers and agricultural practices characterized by lower greenhouse gas emissions;

- in energy infrastructures, the development of low-enthalpy district heating systems, the requalification/expansion of the electricity transmission and distribution networks, the construction of energy storage systems, the installation of electric vehicle charging infrastructures and alternative fuel distribution networks;
- in the field of renewable energy sources, the increase in the production of energy from solar, wind, hydroelectric, geothermal and biomass.

In this context, the preliminarily identified opportunities for inclusion of life-cycle aspects are:

- potential use of LC-based criteria to compare different plan actions and/or to monitor their effects after implementation;
- introduction of minimum LC-based thresholds for selected technologies (e.g. referring to the unit of energy produced in case of power generation, to distance travelled in case of mobility, for unit of area in case of buildings, etc.)
- introduction of minimum LC-based requirements for access to selected public tenders (linked to green public procurement topic) or for certain business categories.

3.4 Waste Management Regional Programme

The Waste management regional programme is under development in these days. The new version of the programme will be delivered at the beginning of spring 2022.

This new programme is also called Toward Circular Economy Plan, because it presents new approaches and contents, such as sections dedicated to special waste, waste prevention, packaging, asbestos and because it doesn't intend just to deal with waste management, but also with different crucial activities in doing circular economy, across all the value chain.

A summary of the current version of the programme and of the parts of major interest for potential use of LCA is presented below.

Introduction

- Regulatory framework;
- Summary of the previous programme monitoring reports;
- Analysis of the current regional situation of Municipal waste and special/industrial waste;
- The analysis of special waste is more complex in relation to the large quantities produced and the fact that their management is subject to the rules of the "free market". The evaluation of special waste must pay particular attention to waste that is still destined for disposal and which, due to their characteristics, can be recovered. The objectives of the regional programming and policy action involving special waste should be aimed at boosting a waste management which complies with the EU hierarchy. Moreover, the analysis will also evaluate the objective of a self-sufficiency in treatment, possibly highlighting the system deficiencies for particular categories of waste. The programme would also like to identify specific actions for prevention, such as the widespread use of by-products, and specific production sectors on which it is possible to intervene to reduce production and the dangerousness of the waste produced.

Planning proposal

Definition of the variables on which to build future management scenarios - urban waste:

- Production of Urban waste:
  - Separate collection objectives;
  - Criteria for defining the new collection and recycling objectives;
  - Minimum standards for the provision of services and results to be achieved;
- The expected waste streams;
- Plant scenarios:
  - Inertial scenario;
  - Objective scenario;
  - Optimized scenario.

Definition of the variables on which to build future management scenarios - special waste:

- The production scenarios;
- The management scenarios:
  - Identification of treatment needs for special waste for which the regional treatment system is deficient;
  - Development of management scenarios.

Focus on particular categories of waste and management guidelines - urban waste:

- Organic waste;
- Bioplastics;
- WEEE;
- Plastic;
- Textiles;
- Bulky waste;
- Vegetable oils.

Focus on particular categories of waste and management guidelines - special waste:

- End of life vehicles, in particular car fluff and tires;
- Medical waste;
- Mineral oils used;
- Construction and demolition waste;
- Decaying waste from incineration plants;
- Slag from smelting processes (steel mills and foundries).

The waste prevention program

Urban waste - Waste prevention from a circular economy perspective:

- The waste prevention actions promoted by the Lombardy Region in the 2014-20 planning;
- The areas of action of the 2022-27 regional prevention program;

- The Regional Food Waste Prevention Plan 2022-27;
- The regional plan for reuse, prevention of single use and microplastics 2022-27;
- Reuse and Repair Centers and Network.

Special Waste: Management and prevention of special waste and circular economy policy:

- Framework and state of the art;
- What strategies for the circular economy?;
- European strategic and legislative framework;

Tools and Actions:

- Actions for training and communication;
- Actions in support of prevention;
- Actions to maximize recovery and recycling;
- Actions for the optimization of plant management;
- Actions to minimize landfill disposal;
- Actions to support governance and regulatory aspects;
- Actions to support research and innovation.

Sludge management program

Indications for correct management and possible minimization activities.

Sludge management technologies aimed at material and energy recovery:

- Agronomic use:
  - Spreading on agricultural soil;
  - Composting;
  - Anaerobic co-digestion;
  - Production of corrective products;
- Technological options based on heat treatments:
  - Mono-incineration and co-incineration;
  - Other heat treatment options.

Packaging waste management program

The management of packaging waste:

- Packaging prevention;
- Regional objectives:
  - Objectives for prevention;
  - Objectives for collection and related optimization:
    - Intercepted quantities;
    - Improving the quality of collections;
  - Recycling targets;
- Evaluations on the need for new systems for the recovery of packaging;

- Tools and actions for achieving these objectives.

4 LCA Experience

4.1 Waste management programme

The Life Cycle Approach in Lombardy Region policy making was applied mainly to support the Waste management regional Programme, in particular to support the development of the version of the programme currently in force:

- to evaluate the environmental performance of the municipal solid waste (MSW) management system implemented in Lombardy (see a good practice presented in Semester 3).
- to evaluate the environmental and economic performance of the construction and demolition waste (CDW) management system in Lombardy, to identify recommendations for the regional government in order to maximize resource-efficiency (see a good practice presented in Semester 3).

4.2 Call for Projects on Circular Economy

In 2021, Unioncamere Lombardia (the association of the regional Chambers of Commerce) and the Regional Government designed a Call for project to boost circular economy transition, called “Call for innovation of circular economy value chains in Lombardy”.

This call was devoted to support the SMEs transition to Circular Economy.

Among the criteria set to evaluate the projects presented, one LCA based criterion was introduced: the scoring system to be used in the evaluation of the projects, awarded projects which were supported by a LCA study or a PEF study, coherent with the official “Category Rules”, capable of proving the positive impact of the project on the environmental performances of the activity run.

5 The Regional Strategy for Sustainable Development

Lombardy's “Regional Strategy for Sustainable Development” (hereinafter “Strategy”) aims to outline the commitments of the institutions and the socio-economic system, from now to 2030 and then to 2050, in pursuing the aims and objectives of the United Nations 2030 Agenda on Sustainable Development, according to the articulation proposed in the National Strategy for Sustainable Development document. The Strategy contains a series of elements referring to the 17 goals (SDGs) of the 2030 Agenda which refer to future scenarios of regional development in a logic that is as integrated as possible, with a medium-term (2030) and

long-term (2050) time horizon. The perspective, the concept is not just to make investments in certain sectors or to allocate more efficient or green resources: it is about changing ways of thinking, behaviours, approaches, systems of values, starting first from individual ones, but with a strong triggering role played by the public administration that, even before proposing financial or regulatory interventions, can act as a forerunner with its own strategic choices towards a new "culture of sustainability". The projection of the Strategy covers a period of thirty years and intends to identify a vision for the future that can resist (and adapt) to changes, to transformations and any discontinuities that may occur in the coming years. It is a question of trying to draw a long-term perspective for a Region, such as Lombardy, which has always wanted to look ahead: some lines of action and, above all, some investments indeed need a really broad scope in order to generate the widest effects.

The Strategy, while deriving - in the state legislative provision - from the Decree Legislative 152/2006 “Environmental regulations” does not refer only to environmental objectives: sustainability, as has been clarified on several occasions both at the level regional and national level, concerns the life of citizens as a whole and considers fully the three economic, social and environmental dimensions. The goals of the Agenda 2030 have the characteristic of being strongly interrelated one another and their respective targets, to be achieved, therefore require a global and transversal commitment.

The starting point remains the positioning of the regional territory, even in a competitive and benchmark logic, with the photography of Lombardy as is, in his current territorial policies and with its current strategic plans and programs, also projected forward, with medium-long term time horizons.

The Strategy is the result of a process of sharing and dialogue with stakeholders, which led to its elaboration starting from the initial document proposal Strategic, formulated by the Regional Council and presented at the 1st Regional Forum for the sustainable development (November 2020): in addition to integrating and better aligning the document, taking into account the contributions gradually transmitted, an attempt was made to construct the conditions so that the Strategy can unfold its effects concretely, thus contributing to also provide significant references for the progressive updating of the documents of regional programming, both of general significance (Regional development program and regional financial planning documents), and of sectoral value (Plans e regional sector programs).

5.1 Reference Framework and Strategic Objectives

The Strategy identifies 5 strategic Macro-areas. The Macro-area closest to the project topics is area n. 4 *Mitigation of climate change, energy, production and consumption*. Each area collects several local/regional objectives, coherent with the Agenda 2030 ones and with the National Sustainable Development Strategy ones. The Strategy provides also a reference framework for each area and objective.

Below, we propose a list of the objectives belonging to the strategic Macro-area 4, which could be in many cases supported by LCA based tools:

- Mitigation of climate change:
    - Reduce the consumption of energy produced according to new models;
    - Territorialization and monitoring of policies;
    - Promote decarbonisation.
- Reduction of emissions in the civil sector, in production activities and in transport:

  - Reduce energy consumption in the civil sector;
  - Increase the energy efficiency of the production system;
  - Decarbonising mobility.
- Development of renewable energy sources;
  - Increase the percentage of RES;
  - Identify suitable areas and evaluate the production potential of RES;
  - Developing renewable energy communities;
- Circular economy and sustainable production models:
  - Promote the circular transformation of supply chains;
  - Promote eco-innovation processes;
  - Prepare new implementation and knowledge tools;
  - Coordinate interventions between different sectors;
- Sustainable consumption models for citizens and the public administration:
  - Educating for sustainable lifestyles and behaviours;
  - Developing new tools and best practices.

6 National Recovery and Resilience Plan

Although not referring directly to a Programme or other policy instrument of competence of Lombardy Region, in the current situation it is not possible to avoid reference to the most important plan under development at Italian national level in the context of the most important programme at EU level, i.e. the National Recovery and Resilience Plan (Piano Nazionale di Ripresa e Resilienza, PNRR or NRPP), part of the Next Generation EU (NGEU) programme.

As widely known the NGEU programme is the € 750 billion package – of which about half is in the form of grants – that the European Union negotiated in response to the COVID-19 pandemic crisis: its main component is the Recovery and Resilience Facility (RRF), which has a duration of six years – from 2021 to 2026 – and a total size of € 672.5 billion – of which € 312.5 billion is in the form of grants, and the remaining € 360 billion in form of low-interest loans.

Based on the documents available from the Italian Government, the Recovery and Resilience Plan presented by Italy envisages investments and a consistent reform package, with € 191.5 billion in resources being allocated through the Recovery and Resilience Facility and € 30.6 billion being funded through the Complementary Fund established by the Italian Government. The total amount of funds envisaged amounts therefore to € 222.1 billion. In addition, a further € 26 billion has been earmarked for the implementation of specific works and for replenishing the resources of the Development and Cohesion Fund by 2032: a total of € 248 billion will thus be available. In addition to these resources, there are also those made available by the REACT-EU programme, which will be spent in the years 2021-2023 in accordance with EU regulations. These funds amount to further € 13 billion.

The Plan is developed around three strategic axes shared at a European level: digitisation and innovation, ecological transition, and social inclusion. It is an intervention that aims at repairing the economic and social damage caused by the pandemic crisis, contributing to addressing the structural weaknesses of the Italian

economy, and leading the country along a path of ecological and environmental transition. The NRRP will substantially contribute to reducing territorial, generational and gender gaps.

The Plan has six missions.

- 'Digitisation, Innovation, Competitiveness, Culture' allocates a total of € 49.2 billion (of which € 40.7 billion from the Recovery and Resilience Facility and € 8.5 billion from the Complementary Fund) with the aim of promoting the country's digital transformation, supporting innovation in the production system, and investing in two key sectors for Italy, namely tourism and culture;
- 'Green Revolution and Ecological Transition' allocates a total of € 68.6 billion (€ 59.3 billion from the RRF Facility and € 9.3 billion from the Fund) with the main goals of improving the sustainability and resilience of the economic system and ensuring a fair and inclusive environmental transition;
- 'Infrastructure for Sustainable Mobility' allocates a total amount of € 31.4 billion (€ 25.1 billion from the RRF Facility and € 6.3 billion from the Fund). Its primary objective is the development of a modern, sustainable transport infrastructure extended to all areas of the country;
- 'Education and Research' allocates a total of € 31.9 billion (€ 30.9 billion from the RRF Facility and € 1 billion from the Fund) with the aim of strengthening the education system, digital and technical-scientific skills, research and technology transfer;
- 'Inclusion and Cohesion' provides for a total allocation of € 22.4 billion (of which € 19.8 billion from the RRF Facility and € 2.6 billion from the Fund) to facilitate labor market participation, including through training, strengthen active labor market policies and foster social inclusion. 'Health' allocates a total of € 18.5 billion (€ 15.6 billion from the RRF Facility and € 2.9 billion from the Fund) with the aim of strengthening local prevention and health services, modernizing and digitalizing the health system and ensuring equal access to care.

The Plan also includes an ambitious program of reforms to facilitate the implementation phase and, more generally, to contribute to the modernization of the country and make the economic environment more favorable to the development of business activities:

- a Public Administration reform to provide better services, encourage the recruitment of young people, invest in human capital and increase the level of digitalization.
- a justice reform to reduce the length of legal proceedings, especially civil proceedings, and the heavy burden of backlogs.
- simplification measures horizontal to the Plan, e.g., in matters of permits and authorizations and public procurement, to ensure the implementation and maximum impact of investments.
- reforms to promote competition as an instrument of social cohesion and economic growth.

The NRRP will have a significant impact on economic and productivity growth. According to the Italian Government, 2026 will see GDP rise 3.6 percentage points higher than in a baseline scenario that does not include the introduction of the Plan.

The governance of the Plan envisages direct responsibility of Italian Ministries and Local Governments (including Lombardy Region) for carrying out the investments and reforms that they are to implement within the agreed timeframe, and for the regular, proper and effective management of resources. It is estimated

that Local Authorities will be responsible for investments for more than € 87 billion in the context of the NRPP.

7 The Team behind the Lombardy Region

Rina Consulting, our technical assistance

Giorgio Bonvicini

Energy Engineer with around ten years of work experience in climate change and energy transition topics, he is a Certified Energy Management Expert according to the Italian regulations, lecturer of "Carbon Footprinting and Carbon Trading" for the Master in Climate Change at Politecnico di Torino, Co-Chair of the RHC-ETIP HWG on Districts endorsed by the European Commission to support renewables in heating and cooling sector.

He contributes to many EU co-funded R&D projects in the field of energy transition, supports private companies, financial institutions and public authorities with studies and technical assistance for climate change-related programmes, policies and strategies and investments in energy/resource efficiency and climate change mitigation and adaptation.

Federica Rosasco

Federica Rosasco is a junior sustainability and climate change expert with three years of experience and a Master Degree in Civil and Environmental Engineering. During her work experience at the Joint Research Center of the European Commission, she has contributed to projects in the field of energy efficiency in buildings, renewables and energy infrastructures.

Moreover, in the engineering consulting field, Ms. Rosasco has delivered projects related to corporate sustainability reporting (e.g.: materiality matrix definition, benchmark analysis with peers, application of GRI Standards, preparation of data collection and consolidation tools), quantification of GHG emissions and life-cycle modeling, non-financial disclosures ex Directive 2014/95/EU and ESG and HSE due diligences.

Our Policy officers

Alessandra Norcini (Project Responsible)

Environmental engineer, in Lombardy Region administration since 1997, worked in territorial planning, environmental strategic and impact assessment, environmental information systems and social housing; now, in DG Environment and Climate, head of Unit Nature and Biodiversity and representative in the National Committee for sustainable development. Involved in many territorial projects and in teams of regional plans on waste management, energy and climate, regional territorial and landscape planning, regional Strategy for sustainable development and regional Strategy for Biodiversity

Alessandro Dacomo (Project Manager)

Environmental Scientist, born in Suna, on the shores of the Lago Maggiore, after having worked in remote sensing, cartography, landscape ecology, environmental information systems and fair trade, landed on Lombardy Region DG Environment, where supported the Environmental Impact Assessment Unit for some years, before focusing on Circular Economy and Sustainable Development, in particular managing European projects and supporting the regional Environmental Authority.

Olga Chiaramonte (technical support)

Architect, active for 15 years in the field of housing, exhibition, landscape and urban design, she's working in Lombardy Region DG Environment and Climate for a few months. Absolute beginner in the field of European Projects, hopes to bring her previous experience in this new professional area.

Valentina Sachero (Technical support)

Environmental Engineer, joined Lombardy Region – DG Climate and Environmental in 2008, after ten years of professional collaborations with private companies, Universities and Public bodies (Regional Agency for Environmental Protection). Energy Efficiency and RES development in civil sector is the main issue dealed with in the last decade, a challenging item happily approached after a walking through air quality modelling, noise impact simulation and sustainable water management.