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**SYMBI**  
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Development Fund

# SUMMARY REPORT ON INDUSTRIAL SYMBIOSIS REPORTING & CERTIFICATION SYSTEMS

ACTIVITY 6 - SYMBI ADDITIONAL ACTIVITIES



SYMBI - INDUSTRIAL SYMBIOSIS FOR REGIONAL  
SUSTAINABLE GROWTH AND A RESOURCE EFFICIENT  
CIRCULAR ECONOMY

PREPARED BY:



**CAMERA DI COMMERCIO  
DEL MOLISE**



## Contents

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<b>EXECUTIVE SUMMARY.....</b>	<b>2</b>
<b>INTRODUCTION.....</b>	<b>3</b>
<b>Overview of SYMBI additional Activity 6 .....</b>	<b>3</b>
<b>Scope and objectives.....</b>	<b>3</b>
1.1. Partners' and stakeholders' involvement .....	4
<b>IS REPORTING SYSTEMS.....</b>	<b>7</b>
<b>The need for a reporting system in IS.....</b>	<b>7</b>
<b>Impact reporting: the CircLean project.....</b>	<b>8</b>
<b>Network reporting: Examples from Italy .....</b>	<b>11</b>
1.2. Methodology for Industrial Symbiosis .....	12
1.3. The Italian Circular Economy Platform .....	13
1.4. The SUN network .....	14
<b>IS CERTIFICATION SYSTEMS.....</b>	<b>15</b>
<b>Standardisation and relevant schemes .....</b>	<b>16</b>
<b>Conformity assessment .....</b>	<b>17</b>
<b>Towards IS certification.....</b>	<b>18</b>
<b>EXAMPLES AND BEST PRACTICES OF IS REPORTING AND CERTIFICATION SYSTEMS .....</b>	<b>19</b>
<b>Current Standards on Circular Economy.....</b>	<b>19</b>
<b>The Coralys Project: Assessing Industrial Symbiosis Readiness Level (ISRL) .....</b>	<b>21</b>
<b>EoW Management System – some case history involving ISO 14021.....</b>	<b>22</b>
<b>CONCLUSIONS.....</b>	<b>26</b>
<b>Lessons learnt from the workshop.....</b>	<b>26</b>
<b>Conclusions from SYMBI Covid-19 Call .....</b>	<b>27</b>

## EXECUTIVE SUMMARY

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This report presents the lessons learnt of the hybrid “Interregional workshop on Industrial Symbiosis (IS) reporting and certification systems” which was conducted at the Chamber of Commerce of Molise, in Isernia, Italy, in the context of Activity 6 of the SYMBI for additional activities project, financed under the “Interreg Europe Covid-19 Call”.

During the workshop partners’ and stakeholders’ representatives exchanged knowledge and experience on IS Reporting practices and Certification systems, identified key success factors in the implementation of IS and discussed issues hindering the development of IS. Lessons learnt include the lack of systematic data gathering procedures, the absence of harmonized frameworks for assessing performance of IS activities and the need to develop common European standards and certification systems.

Section 1 of this report provides an overview of Activity 6 of the SYMBI for additional activities project, offers information on IS Reporting and Certification Systems and outlines the partners’ and stakeholders’ involvement. Section 2 resumes the first thematic session of the workshop which focused on IS Reporting Systems and demonstrates two reporting schemes, “CirClean Impact Reporting System” and “ENEA Network Methodology”. Section 3 recaps the second thematic session of the workshop on IS Certification Systems and offers information on standardization and certification schemes already implemented in the partners’ regions (Britain, France, Italy and International Standards). Section 4 presents the third thematic session of the workshop which provided examples and best practices of IS Reporting and Certification systems, both from the Horizon 2020 project CORALIS and actual cases. Finally, section 5 delves into the lessons learnt both from the Interregional Workshop and the SYMBI for additional activities project which concluded its lifecycle after one year of activities.

This report aims to offer knowledge for the promotion and further integration of reporting and certification systems in IS transactions and policy recommendations.

## INTRODUCTION

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### Overview of SYMBI additional Activity 6

Activity 6 of the SYMBI Covid-19 Call for additional activities included an interregional workshop on "Reporting and certification systems for industrial symbiosis", organized, in Isernia, Italy, at the Council Chamber of Palazzo San Francesco, seat of the ancient Town Hall, on 29 September 2022. The workshop, which involved both in-person and remotely attendees, brought the partnership together to discuss IS reporting and certification systems already implemented in partnership territories, policy solutions and best practices and explore cooperation opportunities fostering Industrial Symbiosis.

Activity 6 was the final interregional workshop in a series of three additional SYMBI activities that were approved by the Interreg Europe programme, aiming to increase the knowledge capacities of SYMBI partners on how to respond to Covid-19 challenges. More specifically, under the 5th Covid-19 Call, SYMBI partners worked on addressing the impact of the pandemic on territorial supply chains, identified discrepancies in the implementation of circular economy and IS approaches, and developed crisis management capacities on how to foster the application of reporting and certification systems in times of crises.

The interregional workshop on "Reporting and certification systems for IS" concluded the thematic activities of the project after 6 years of implementation. The findings of the workshop will be used as a baseline to further elaborate on the new knowledge acquired and address policy gaps in order to support IS and align territorial policies with the circular economy package of the European Commission (EC).

### Scope and objectives

Industrial symbiosis delivers many environmental, economic, and social benefits. Nevertheless, the lack of common standards to measure and report on industrial symbiosis transactions hinders IS's uptake in the EU; in turn, this lack of evidence on the gains from industrial symbiosis discourages businesses in initiating industrial symbiosis activities. The development of IS Reporting and Certification systems may indeed play a decisive role stimulating the uptake of IS.

IS Reporting represents a potential mechanism to generate data and measure progress and the contribution of organizations towards sustainable development objectives. Through reporting, IS companies can communicate their performance and impacts on sustainability topics, spanning environmental, social and governance parameters. It enables IS companies to be more transparent about the risks and opportunities they face, to assess sustainability performance with respect to laws, norms, codes, performance standards and voluntary initiatives, to avoid publicized environmental failures and ensure transparency in the waste exchange process and quality of the secondary materials. Additionally, reporting benefits the organization by mitigating negative environmental issues and improving green and circular reputation.



Reporting is for the most part a voluntary activity with two main goals: the documentation and assessment of an organization’s environmental and social impact and the communication of the organization’s sustainability efforts and progress to stakeholders. The steps to achieve the aforementioned goals are to: a) define performance goals and metrics, b) measure performance (data collection), and c) evaluate and manage performance.

Certification on the other hand, is an important and growing component of reporting and accountability. A certification is a confirmation that a product or a service meets defined criteria of a standard. International Standards Organisation (ISO) defines certification as: "any activity concerned with determining directly or indirectly that relevant requirements are fulfilled". It certifies that a management system, manufacturing process, service, IS performance or documentation procedure has all the requirements for standardization and quality assurance.




Certification can be applied to the products, components and materials circulating within the circular value-chain, in order to increase the level of confidence for industries and consumers re-using these resources. Specific technologies, methods, procedures and policies should be developed to define the scope, the mechanisms, the characterization contents and the outcomes of certification, along with the business requirements, for different product categories, materials and sectors.


The Interregional workshop on IS Reporting and Certification Systems aimed at highlighting the need for continuous monitoring and assessing the performance of IS activities and enhance the knowledge on IS through the exchange of experiences from reporting and certification systems already implemented or in the process of being established and stress the need for the development of harmonized frameworks for reporting and certification.

### 1.1. Partners’ and stakeholders’ involvement

The partnership of SYMBI COVID-19 Call for additional activities comprised 9 partners from Spain, Poland, Italy, Slovenia, Greece, Hungary, and Finland (see table 1).

Table 1. SYMBI Partners

	Foundation FUNDECYT Scientific and Technological Park of Extremadura (FUNDECYT)
	The Malopolska Region (MALOPOLSKA)
	Chamber of Commerce of Molise (CoC – Molise)

	Government Office for Development and European Cohesion Policy (SVRK)
	Regional Development Agency of the Ljubljana Urban Region (RRA-LUR)
	Municipality of Kozani, Development and Planning Bureau (KOZANI)
	Pannon Novum West-Transdanubian Regional Innovation Non-Profit Ltd (PA-NOV)
	Regional Council of Häme (HAME)
	Häme University of Applied Sciences Ltd (HAMK)

Representatives from all 9 partners participated in the workshop contributing with their own experiences and expertise. Additionally, representatives from key stakeholders, such as the Hungarian Ministry for Innovation and Technology and the Slovenian Ministry of Public Administration were also virtually present. The Chamber of Commerce of Molise was responsible for the organization of the workshop and chaired the event. More specifically, the session was opened by **Paolo Oriente**, member of **Molise Chamber of Commerce Council**. Then, **Maria-ioanna Pavlopoulou**, external expert from **INNOVELA SPRL** provided an overview of the project's activities and presented Activity 6 objectives. Three thematic sessions were dedicated to IS Reporting Systems, IS Certification Systems and Examples and Best Practices.

During the first thematic session, **Rachel Lombardi**, PhD, from **International Synergies Limited**, talked about Impact Reporting for Industrial Symbiosis in Europe. **Laura Cutaia** from the Sustainability Department of **ENEA**, presented the network reporting methodologies on Industrial Symbiosis from the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), the Italian Circular Economy and Sustainability Platform (ICESP), and the Industrial Symbiosis Users Network (SUN).

During the second thematic session, **Stefano Sibilio**, Deputy General Director Processes and Regulation of **UNI**, talked about "the Quality Infrastructure: Standardization & Certification". Then a followed a series of Q&A both from the people in the room and on-line.

Last thematic session offered numerous examples on IS Reporting and Certification Systems. First, **Nicola Bertolini** from **Ambiente S.p.A.**, consulting and engineering, talked about the British, the French and the Italian Standards as a way to “embark on a path of sustainability in a structured and organized manner”. **Eleonora Annunziata**, Associate Professor of the **Scuola Superiore Sant'Anna di Pisa** – Institute of Management, Sustainability Management Laboratory (SUM Lab) presented the CORALIS Project, which offers an effective framework for measuring and supporting an IS network. Lastly, **Luca Casale** from **Macroazienda** presented some case histories from Product and system environmental certification and labelling.

The workshop closed with a roundtable discussion, animated by **Andrea Minutolo**, National Scientific Director of **LEGAMBIENTE**.

The SYMBI 5<sup>th</sup> Call for additional activities closed with a presentation of the main conclusion and the project’s findings by Project Manager **Maika Diaz** and Project Coordinator **María Gracia Benitez**, from **Foundation Fundecyt Scientific and Technological Park of Extramadura**.

## IS REPORTING SYSTEMS

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Section 2 summarises the first thematic session of the workshop which was dedicated to IS Reporting Systems. Industrial symbiosis presents a systems approach to a more sustainable and integrated industrial economy which identifies business opportunities to improve resource utilisation. Reporting is a major step in implementing IS. It consists in generating data to assess the progress of a business toward a defined goal, in this case toward a circular and sustainable economy. Reporting is therefore intended to enable businesses to make accurate, data-driven decisions and identify waste streams that could be further valorised as input feed from other industries. Nevertheless, the lack of common standards to measure and report on Industrial Symbiosis hinder its implementation and development in many regions. During the workshop, SYMBI partners highlighted the need for a reporting system in IS, identified impact reporting schemes and discussed examples of reporting systems from the Italian IS territory.

### The need for a reporting system in IS

Many barriers in the uptake of IS exist due to absent or insufficient reporting, namely lack of evidence on the gains from IS, but also due to lack of common standards to assess IS transactions. In this respect, IS reporting represents a potential mechanism to generate data and measure the progress and the contribution of organisations towards sustainable development objectives.

The main goals of IS reporting are:

- Documentation and assessment of an organisation's environmental and social impact.
- Communication of the organisation's sustainability efforts and progress to stakeholders.

The steps to achieve the aforementioned goals are:

- Definition of performance goals and metrics.
- Measurement of performance.
- Evaluation and management of performance.

The organizations known for reporting frameworks and standards each provide their own approach to the reporting of sustainable value creation and disclosure of climate-related risks. This makes the decision on what reporting-related certification to pursue incredibly difficult.

5 of the leading reporting groups recently issued a statement of intent to work together to create a comprehensive global corporate reporting system:

- Climate Change Survey Certification (CDP)
- Climate Disclosure Standards Board (CDSB)
- Global Reporting Initiative Professional Certifications (GRI)
- Integrated Reporting (IR) Fundamentals of Integrated Reporting Certificate International Integrated Reporting Council (IIRC)



- Sustainability Accounting Standards Board Fundamentals of Sustainability Accounting Credential (SASB)

At EU level, IS continues to be acknowledged in a wide range of Directives, Regulations and Strategies, such as:

- DG ENV: European Waste Framework Directive (2009)
- DG Regions: Connecting Smart and Sustainable Growth through Smart Specialisation – exemplar (2012)
- DG Enterprise: Communique on Green Entrepreneurship (2013)
- European Resource Efficiency Platform – short-term recommendation (2014)
- DG Innovation & Research: Short guide to assessing environmental impacts of research and innovation policy (2014)
- EC Circular Economy Package (2015)
- European Environment Agency, Circular economy in Europe (2016)
- DG Energy Strategic Energy Technology Plan (2018)
- DG ENV Waste Framework Directive Amendment (2018)
- EC Circular Economy Action Plan (2020)

It is also believed to being able to achieve numerous SDGs, delivering many environmental, economic and social benefits. EC estimated that the cost reduction from IS implementation at 73 billion euros per year across EU. Nevertheless, the lack of common standards to measure and report on industrial symbiosis hinders IS uptake. And yet, during the thematic session on IS Reporting, it became abundantly clear that calculating the impact of IS on numerous sectors, while necessary, is particularly challenging.

The greatest difficulty lies in the diversity of goals that IS is supposed to reach. It is believed to achieve circular economy, have a positive impact on climate change, CO2 emissions, foster innovation, boost the economy, and so much more. However, the impact of IS on these agendas varies greatly from business to business, and achieving a goal does not necessarily mean achieving another.

### Impact reporting: the CircLean project

During the first thematic session of the workshop, Rachel Lombardi presented the Impact reporting system applied by International Synergies, called CircLean. CircLean is the answer to the inconsistency prevailing in metrics around the world.

Indeed, sustainability reporting is for the most part a voluntary activity. As a result, it is up to each organization what indicators they will use to assess performance of IS transactions. As shown in the table below all over the world, different indicators are used to measure different sustainability goals. Some countries choose to measure only landfill diversion and cost savings while others choose to integrate more metrics such as water savings, CO2 emissions or even Haz waste avoidance.



Table 2. Inconsistent metrics in different regions

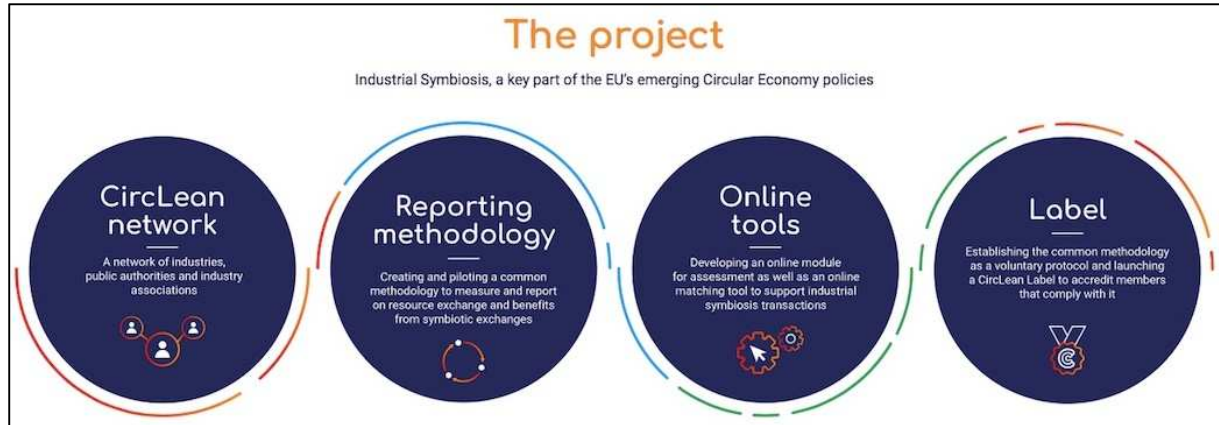
Metric	NISP UK	KICOX Korea	Kalundborg DK	INES NL	Devens USA
Landfill diversion	Yes	Yes (Solid waste)			Yes
Virgin raw material svgs	Yes		Yes	Yes	
Water saving	Yes	Yes	Yes	Yes	
CO2 reductions	Yes	Yes	Yes	Yes	
Emissions (SO <sub>x</sub> , PM, NO <sub>x</sub> , VOC/THC etc)		Yes			
Energy		Yes			
Haz waste avoidance	Yes				
Additional revenues	Yes	Yes	Yes	Calc only	
Cost savings for industry	Yes	Yes	Yes	Calc only	Yes
Net investment		Yes	Yes	yes	
Payback time			Yes	yes	
Jobs created safeguarded	Yes	Yes			
No. businesses engaged	Yes				Yes

Unfortunately, the industry-led CEN Workshop Agreement (CWA) has not addressed the need for a consistent reporting in metrics. As a result, the EC recognized that lack of consistency makes it highly difficult to advocate for the benefits of IS (DG Grow report, 2018) and partly due to that, commissioned the CircLean project to establish a European network of businesses and OMG specifications for IS.

Specifically, **CircLean** was asked to address the challenges of insufficient motivating framework conditions and the lack of standardized evidence base with the aim to create and promote a common reporting methodology to measure and report on impacts of IS transactions as well as point out the multiple and diverse nature of impacts that come from IS.

To that end, **CircLean** tasked with elaborating a common approach - participation in this common approach was incentivized through a label- and promoting the impact of this approach by industry (with workshops organized in 10 MS). The CircLean project concludes its three-year life in November 2022.

Figure 1. The four aspects of CircLean project: European Network of businesses and SMEs for IS.



The CircLean metrics are based on the idea that sustainability is measured through the impact on the process. It is therefore necessary to compare indicators before and after IS was implemented. This helps assess the impacts of IS on numerous aspects and fields, such as the change in cost, the change in the transportation of resources, the change in water use, and so forth.

The 38 metrics used in the CircLean reporting methodology are shown below. The majority of metrics are still user-entered, but there are also some others that are calculated afterwards, based on a combination of the user-entries.

Table 3. Metrics used in CircLean Impact Reporting System

Travel Distance when source is raw	Fraction of material input (excluding construction materials) sourced from IS
Travel Distance when source is IS	Fraction of material input (construction materials only) sourced from IS
Average unit price when source is raw	Average waste management fee per measurement unit
Average unit price when source is IS	Average unit price for the resource, when sold via an IS transaction
Total incoming flow for the resource, all sources	Total outgoing flow for the resource, all sources
Incoming flow for the resource, originated from IS	Outgoing flow for the resource, originated from IS
GHG emissions savings	Waste processing avoided
Energy savings	Landfill avoided
Fraction of energy input sourced from IS transactions	
Fraction of resource input sourced from IS	
Fraction of water input sourced from IS	



Toxic emissions avoided (per pollutant) in air and water	Investment required to process incoming flow from IS
Fraction of resource output re-used via IS	Investment by company to enable the processing of outgoing flows for IS use
Conformity indicator to the quality standard of output materials that will be exchanged to be used as secondary raw material to the applicable standard	Date of commissioning of the investment company
Fraction of energy output re-used via IS	Expected operational lifetime of the assets built during the investment project
Fraction of water output re-used via IS	Cost savings on procurement due to incoming flows obtained via IS
Fraction of material output (excluding construction materials) re-used via IS	Saved waste management fees
Fraction of construction material output re-used via IS	Turnover from the sale of outgoing resource flows
Staff permanently employed in the processing of incoming flows of resources obtained from IS (W)	Value added due to IS over the last reporting period
Staff permanently employed in the processing of outgoing flows of resources delivered via IS (H)	Potential for additional employment due to IS
	Internal Rate of Return of the investment project

The conclusion from the presentation of the impact reporting methodology of the CircLean project is that the metrics and KPIs relevant to EC objectives cannot be satisfied all at once.

During the Q&A that followed the presentation, Dr. Rachel Lombardi was asked about the imbalance observed in the different impacts of IS in practice. She then presented an example from her own experience from the field, and more precisely, the attempt to implement industrial symbiosis in two industrial plants in Costa Rica. In those cases, impact reporting on IS showed that an important reduction of pollutants was followed by an increase in CO<sub>2</sub> emissions. This is revealing of the great diversity of objectives that industrial symbiosis is called upon to achieve and further shows that it is likely that we will have to accept trade-offs along the way. According to the speaker, this is a reality that we would much prefer not to see, but we need to acknowledge it if we want to promote industrial symbiosis

### Network reporting: Examples from Italy

The transition to circular economy is gaining ground in Italy, which has adopted a National Strategy for the Circular Economy in June 2022. Industrial symbiosis represents a major part of this policy agenda since it fosters innovative strategies for more sustainable resource use, through engaging traditionally separate industries. During the workshop's first thematic session, Laura Cutaia presented a reporting methodology, based on a network approach and a resource audit, that is used by three Italian actors.

## 1.2. Methodology for Industrial Symbiosis

ENEA, the Italian Agency for New Technologies, Energy and Sustainable Economic Development is one of the major players in the field for a transition to circular economy. ENEA has launched a methodology based on network creation also known as network approach, which prioritizes:

- Language
- Communication and
- Knowledge

Its main goal is to establish a network of industries and identify possible matches to enable the implementation of IS. For that purpose, ENEA uses a reporting methodology, which consists in:

- A network approach, identifying potential origin-destination streams and suggesting possible matches. It uses input-output data sheets for the data collection which are then used for network implementation.
- A Resource audit. This comes as a response to the absence of regulation on efficiency for resources, and to the lack of an accountability system for resources. In that way, it aims to achieve input-output balance of resources on a company level, foster both internal and external implementation of resource efficiency and draft impact assessment scenarios according to the results of the audit.
- A web-based IS platform which aims at supporting companies and facilitators to manage data and find opportunities for industrial symbiosis.

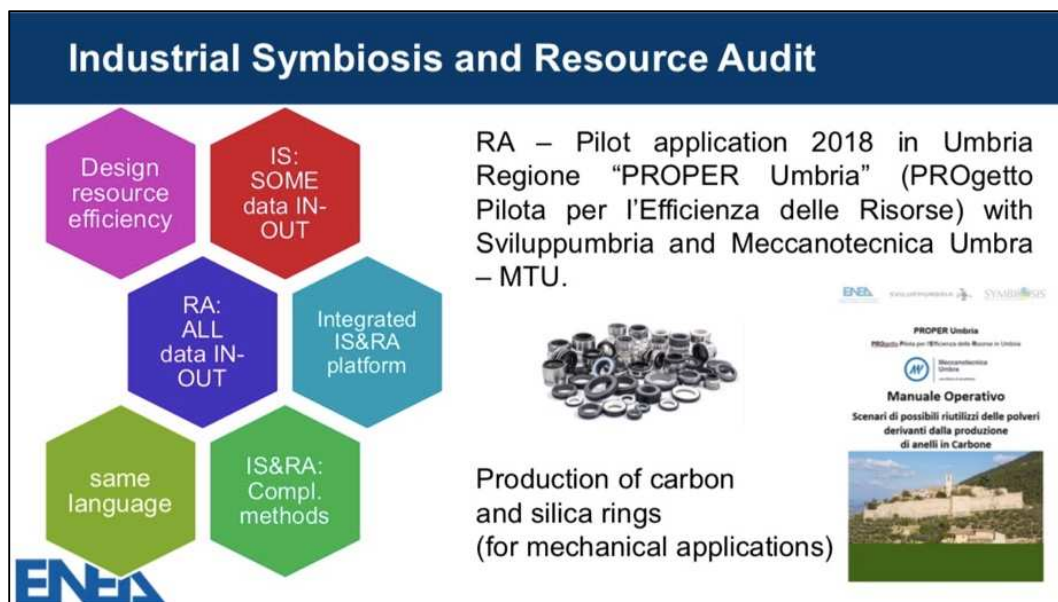
This allows ENEA at an initial stage, to:

- Collaborate with local authorities and stakeholders.
- Get in touch with companies directly.
- Request preliminary data from companies.

And at a later stage, to:

- Present first results to companies and as a whole.
- Select most suitable matches.
- Collaborate with involved companies.
- Offer guidance and relevant documentation on how to implement IS in the form of handbooks.
- Engage interested stakeholders.

Figure 2. ENEA Network Approach with RA



### 1.3. The Italian Circular Economy Platform

Italian Circular Economy Platform (ICESP) is the Italian version of European Circular Economy Platform (ECESP). It was founded in May 2018 as a forum bringing together initiatives and experiences and fostering circularity in Italy with specific actions. ICESP is coordinated by ENEA and its structures contains a committee of 14 WGs coordinators, a Good Practice Review Committee and a Members’ Assembly including 162 signatories.

More specifically, ICESP aims at:

- Promoting knowledge diffusion
- Mapping the Italian best practices
- Creating a permanent operational tool that can facilitate inter-sectorial dialogue and interactions
- Favoring initiatives integration at the Italian level
- Overcoming the fragmentation of Italian initiatives
- Promoting Italian excellence and the Italian way of making circular economy

Some of the topics of interest of ICESP are:

- Eco-innovation, research, development and technology transfer
- Regulatory, financial and market instruments
- Enterprises and supply chains 13organizational models
- Measurement tools and indicators
- Guidance and support to businesses
- Promotion of new cultural approaches and lifestyles
- The role of territories and cities in guiding the transition from global to local and vice-versa



To reach these aims and promote knowledge on the above-mentioned topics, ICESP uses the following tools:

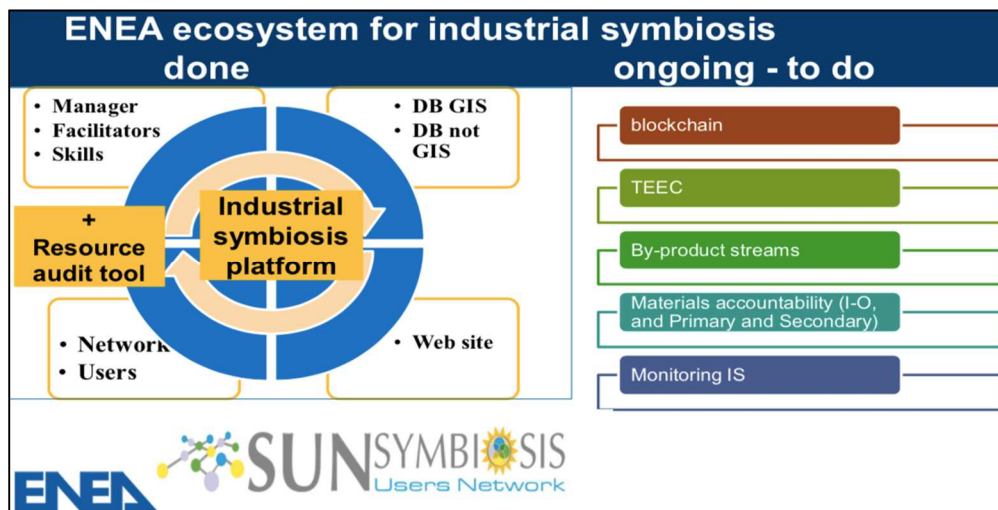
- A web platform, to facilitate exchange of information and best practices <http://www.icesp.it>
- Participation in the ECESP Leadership Group, supported also by the ICESP WGs activities
- Organisation of events dedicated to communication and dissemination.

### 1.4. The SUN network

The SUN network is an Italian symbiosis users network guided by ENEA that promotes the systematic application of IS, revealing operational issues that may concern regulations, technical standards and best practices. To that aim, it provides:

- Mapping and monitoring systems for measuring, certification and standardization for IS.
- Guidelines to users for implementing these systems (to be presented at Ecomondo 2022 in Rimini).

Figure 3. ENEA ecosystem designs for IS



## IS CERTIFICATION SYSTEMS

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This section sums up the second thematic session of the workshop which was about IS Certification Systems. Certification is another major step in the promotion and establishment of IS. Certification is defined as “any activity concerned with determining directly or indirectly that relevant requirements are fulfilled” (ISO, 2004).

The benefits of an IS certification are numerous. Mainly, it would:

- Ensure that products have an environmentally and socially sustainable life cycle.
- Introduce the systemic approach to circular economy management.
- Provide guarantees on the circularity of economy.
- Make businesses’ products / services more competitive.

A typical certification process, according to most certification bodies, include the steps below:

1. Establishing contact with the certification body: The organisation contacts the certification body to inform of their intention to apply for a certain type of certification.
2. Check compliance with criteria: The next step is to go through self-assessment using designated checklists. The documentation to prove that the criteria set by the certification body are fulfilled is prepared by the organisation and is available to the auditor.
3. Agreement with auditor: Once the auditor reviews and accepts the initial assessment of the compliance with the criteria, then there is an agreement.
4. Audit: The auditor and the organisation decide when the actual audit will occur. The certification procedure can include both a “desk” documentary analysis and an on-site audit. When the audit is finalised, the auditor sends a report with information about the organisation’s compliance with the criteria.
5. Certification: If the criteria are fulfilled, the certificate can be issued. Certification requires full compliance to all criteria. If the collector fails to comply with one or several of the criteria the collector is granted some extra time from the audit date to correct minor deviations. Furthermore, there is an annual surveillance audit, as well as recertification audit, usually every three years.

Certifications from respected third parties reinforce and amplify a company’s sustainability efforts and are clearly viewed as the most trustworthy source of green credibility for business. Nevertheless, the world of certifications is currently complicated because of the lack of a single agreed upon industry standard.

A list of available certification schemes is presented below:

- Circular economy certification - XP X30-901 standard certification
- End of waste (EoW) certification method, EC
- ISCC19 sustainability certification of circular and bio-based approaches



- SCS Recycled Content Certification
- Green Seal
- Cradle to Cradle CertifiedCM program
- Recycled Plastics Traceability Certification
- "flustix RECYCLED – DIN-Geprüft" seal, Germany
- PolyCert Europe certification schemes

## Standardization and relevant schemes

Standardization is the necessary step before certification. Standards are agreed definitions or specifications of units, methods, tests products, processes or services. They provide people and organizations a basis for mutual understanding. The issuing of sustainable standards can make an impact in all areas covered by standardization process and thus promote Sustainable Development Goals.

More specifically, standardization activities can:

- Ensure interoperability, quality and safety in international value chains
- Build trust with market
- Integrate responsible R&I approaches, social responsibility, risk & quality, innovation management
- Support compliance with regulations and normative framework
- Promote the use of the same language recognized by R&I and market players
- Grow an international and cross industry network
- Enhance sustainability

The issuing of standards is a complex process involving people from contexts as diverse as industry and commerce, government, consumers, academia, research bodies and NGOs.

Some standardization bodies and schemes are:

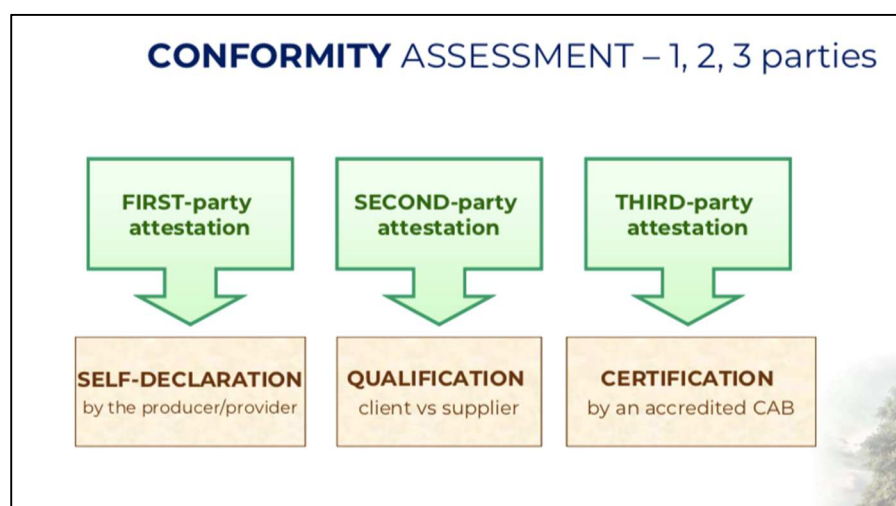
- **ISO:** One of the most well-known bodies that develops standards to ensure the quality, safety, and efficiency of products, services, and systems is the International Organisation for Standardization (ISO), an independent, non-governmental international organization with a membership of 167 National Standards Bodies (NSBs), having issued more than 24000 International Standards and containing more than 800 Technical Committees (ISO/TC).
- **CEN:** Cen is the European Committee for Standardization. It brings together the National Standards Bodies (NBSs) of 34 European countries. CEN comprises ~400 Technical Committees (CEN/TC) and has issued ~15000 European Standards.
- **UNI:** Uni is the Italian Standards body, a non-profit private association, founded 1921, tasked with drafting and publishing technical standards in each sector to define the "state-of-the-art". It assures a quality infrastructure

- **CWA:** The CWA is a document produced in a CEN Workshop and agreed by the participants, designed to meet an immediate need and form the basis for future standardization activity. It is officially published by CEN/CENELEC and has a validity period of a maximum 6 years (after a 3-year revision). CWA can be the basis for a future European or international future standardization.

## Conformity assessment

Standards are used in the conformity assessment of products and services. A conformity assessment is demonstration that specified requirements are fulfilled. However, it can take different forms according to the party making the attestation. As shown in the figure below, first and second-party attestations cannot be taken for a certification. Only a third-party attestation by an accredited CAB certifies the conformity of a product or service to the standards.

Figure 4. Conformity Assessment Variations



It is therefore crucial to distinguish between “declaration of conformity” and “certification of conformity”. A supplier can self-declare conformity but only an independent third-party can issue a certification of conformity.

Conformity Assessment is in reality a complex procedure which contains various activities. Some of them are:

- **Testing:** Determination of one or more characteristics of an object of conformity assessment such as a product, material or process according to a procedure.
- **Inspection:** Examination of a product design, product, process or installation and determination of its conformity with specific requirements, or on the basis of professional judgment with general requirements.
- **Validation:** Confirmation of claim, through the provision of objective evidence, that the requirements for a specific intended future use or application have been fulfilled.
- **Certification:** Third party attestation related to products, processes, systems or person.

- Accreditation: Third party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks.

Correspondingly, the conformity assessment can involve a standardization body, a conformity assessment body or an accreditation body according to the objective of the assessment activity. The most common practice is to assign marks of conformity in order to measure the quality of a product or a service. The owner of the mark can be a supplier, a scheme owner, a certification body or even a regulator. The ownership and the conditions of the use of the mark must be clearly stated, as to not mislead the consumer.

In general, conformity assessment provides consumers with confidence that a product or a person will perform as expected. It also provides assurance that what they provide will meet specifications and deliver on customer expectations or just meet market requirements. Last but not least, conformity assessment gives regulators the confidence that the requirements in regulations have been met.

### Towards IS certification

Standardization bodies have started to include circularity principles for implementation in their standardization procedure. The adoption of methods and indicators to assess circularity performance, as well as the establishment of guidelines on business models and value chains and the sharing of best practices are necessary steps to take towards sustainable development. ISO, UNI and other standardization bodies have already started to adopt measuring circularity frameworks. For instance, ISO 59020 document specifies a framework for organizations to measure and assess circularity, enabling them to contribute to sustainable development. This framework is applicable to multiple levels of the economic system and accounts for social, environmental and economic impacts by allowing inputs from a variety of methods.

Some other standards from which IS could benefit are environmental labels and metrics, such as ISO 14020s labels and declarations, ISO 14040s LCA, ISO 14060s measuring GHG and carbon footprint and ISO 14090s on climate change.

From the Italian territory, UNI is about to publish the first Standard for Circular Economy. As it was stated during the discussion that followed Stefano Sibilio's presentation, the UNI Standard will be published in the next few months. The most difficult part in the issuing of the standard was to reach consensus among stakeholders. However, now the UNI standard has passed the final stage of public inquiry and it will be made public in the form of a Technical Specification (UNI/TS), as it will be an experimental standard. Its importance is great as it will introduce for the first time Circular Economy Indicators and is expected to bring a lot of feedback from the market.

## EXAMPLES AND BEST PRACTICES OF IS REPORTING AND CERTIFICATION SYSTEMS

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This section presents the last thematic session of the workshop which offered concrete examples of reporting and certification systems. **Nicolas Bertolini** presented the British, French and Italian standards on Circular Economy, **Prof. Eleonora Annunziata** showcased the HORIZON 2020 Programme CORALIS, an effective framework for measuring and supporting an IS network and **Luca Casale** highlighted the importance of environmental certification and labeling through some real case stories.

### Current Standards on Circular Economy

#### 1. The Reference Standard - BS 8001:2017 (Britain, 2017)

BS 8001, a British standard published in 2017 by the British standards body BSI, is the first standard created explicitly to guide companies in their transition to more circular production models. Presented as a GUIDELINE, the standard provides guidance and recommendations, but cannot be defined as a set of requirements or good practice; for these reasons, declarations of conformity cannot be acceptable. According to the standard, organisations have varying levels of confidence and knowledge about the circular economy.

The BS 8001 standard identifies six factors that can be used to interpret the concept of the circular economy and bring it into business reality.

- Systematic approach
- Symbiosis
- Innovation
- Responsible management
- Value optimization
- Transparency

According to the British standard, organizations are likely to have varying levels of confidence and knowledge about the circular economy: from those just starting to approach the topic to those that are already at an advanced level of knowledge, but still want to review or check their approach

#### 2. The Management System for Circular Economy: The AFNOR XP X30-901 Standard (France, 2018)

The French standard AFNOR XP X30-901 (2018), which is voluntary and applicable to organizations of any size, type and nature, is so far the only international reference for the implementation of a management system for circular economy. The standard specifies the requirements of a management system for the initiation, planning, implementation and measurement of projects undertaken by an organisation to improve its environmental, economic and social performance in order to contribute to the development of a circular economy.

### AFNOR XP X30-901 Methodological framework

In addition to the requirements and recommendations on the use of a management system, the standard also provides organizations with a broader methodological framework based on a cross-sectoral analysis of the 3 above-mentioned dimensions and 7 action areas.

The 7 action areas are the following:

- Sustainable procurement
- Eco-design
- Industrial Symbiosis
- Service Economy
- Responsible consumption
- Product life extension
- Efficient end-of-life management of products and materials

The 3 (dimensions) x 7 (action areas) matrix is at the core of the circular economy project management system. In a context of continuous improvement, this 3 x 7 matrix allows users to systematically verify that action plans contribute positively to the circular economy.

### **3. UNI/TS 11820: Under definition (Italy, 2022)**

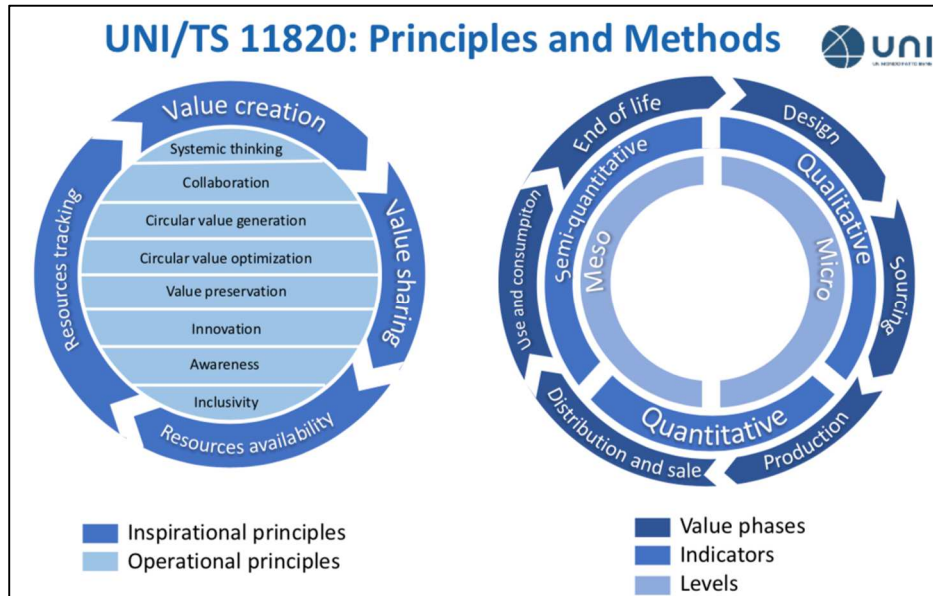
UNI/TS 11820 defines a set of circular economy indicators to assess, through a measurement system on a 100 basis (unrelated to sector benchmarks), the level of circularity of an organization or group of organizations, including public administrations.

The indicators are applicable at the following levels:

- Micro (single organisation)
- Meso (group of organisations, inter-organisations, industrial or territorial clusters, municipalities, cities, provinces).

The Technical Specification (TS) is an experimental document, the purpose of which is to gain the necessary experience from its application. Any comparisons between levels of circularity of different organisations should be made between organisations belonging to the same sector, in the same reference year. It is recommended to use the ATECO classification of economic activities on at least two levels (section and division).

Figure 5. UNI/TS 11820



#### UNI/TS 11820: Certification (CLAIM)

Each organization, once the level of circularity has been calculated, can assess the compliance of the level achieved, compared to what is required by the technical specification, by means of an assessment activity of:

- First part, i.e., a self-assessment by the organization itself.
- Second part, i.e., an evaluation by the organization's customer concerned with that level of circularity.
- Third part, i.e., an assessment by an independent body, operating in accordance with UNI CEI EN ISO/IEC 17029, this being the verification of an assertion of circularity.

#### The Coralis Project: Assessing Industrial Symbiosis Readiness Level (ISRL)

Coralis (Creation of value chain relations through novel approaches facilitating long-term Industrial Symbiosis) is a 4-year Horizon 2020 project that aimed at addressing the need for enhancing the knowledge base for IS in Europe, especially in regards to the implementation and operation phases, which must follow harmonized frameworks and data reporting systems. Prior to the deployment of an IS initiative, there are indeed a number of factors that must be considered in order to reach agreement among stakeholders involved and ensure the continuity of a win-win situation both for the industries and the ecosystem.

To that end, CORALIS has been designed as a demonstration project for the generation of real experiences on the deployment of Industrial Symbiosis (IS) solutions and the overcoming of the barriers faced by these initiatives, developing the IS readiness level concept by addressing three factors:

- Technological factors (TRL)-decarbonization of industrial areas, transition to circular economy

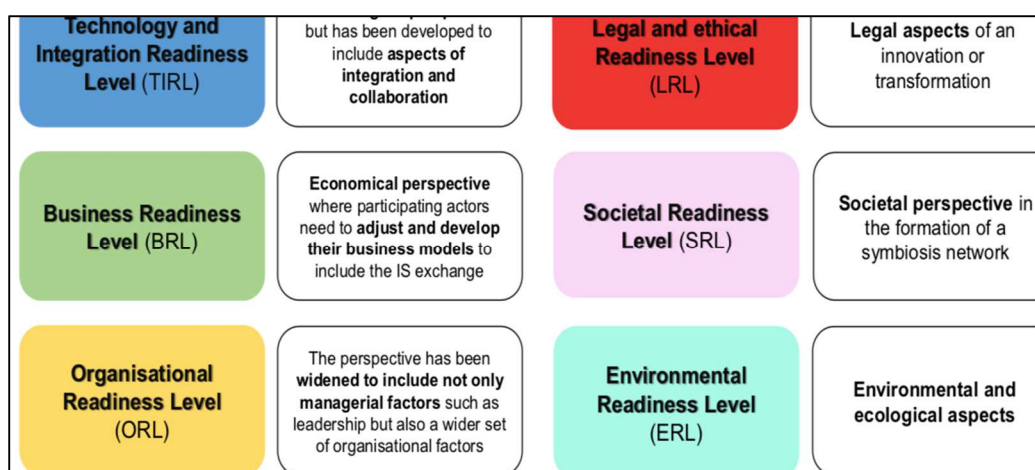
- Managerial factors (MRL)-tools and procedures
- Economic factors (ERL)-business models

The Coralis project is based on an Industrial Symbiosis readiness level (ISRL) Matrix. Its purpose is to:

- Evaluate and support the progress of the IS network
- Generate an absolute measure but to help evaluating the readiness of the actors and the symbiosis as a whole and create awareness of potential risk exposure.

By analyzing the ISRL Matrix, potential risks can be discovered and defined in an early stage. Consequently, these can be monitored and corrected in the further development of the IS network.

Figure 6. The 6 perspectives of the ISRL Matrix



#### ISRL Matrix: An application guide

- The ISRL Matrix can be used to identify areas in which the IS network is strong or weak to identify synergies, or potential risk exposure.
- The ISRL Matrix can be used to evaluate the discrepancy regarding different actors' readiness to initiate an IS network.

The ISRL Matrix should be used to create awareness of possible opportunities as well as issues and risk prevention and mitigation measures. It should also be coupled with a methodology to measure and help the IS actors to predict and react to potential risks. It is also important that the indicators are well-established within the whole network and are known by each actor. SYMBI Partners were particularly interested in the disclosure and the potential uses of the ISRL Matrix framework of the Coralis Project which shows that there is already a belief that such a framework could facilitate IS replication.

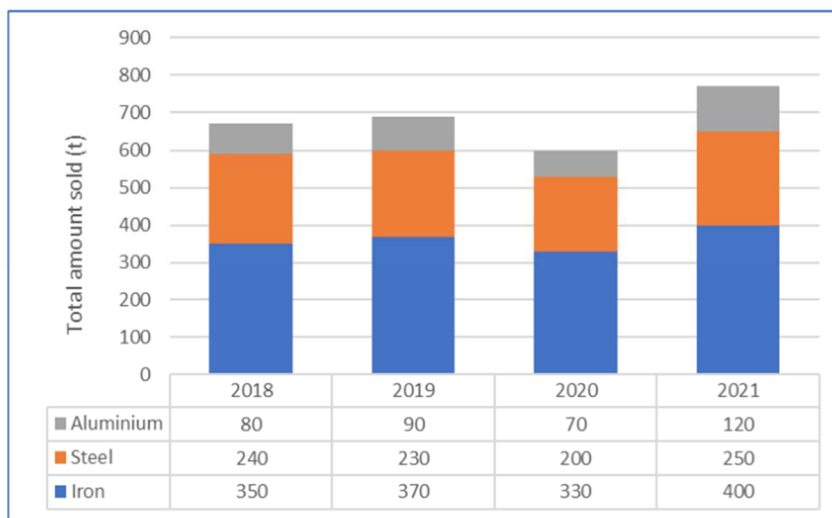
#### EoW Management System – some case history involving ISO 14021

During the last presentation of the workshop **Luca Casale** illustrated the importance of environmental certification and labeling building the following case histories.



**CASE 1.** A company specializing in waste recovery (iron, steel, aluminum and aluminum scrap), located in the province of Cassino and employing around 30 workers, has implemented a Management System that provides for the acceptance control of the waste used, the monitoring of treatment processes and techniques, the monitoring of the quality of the scrap obtained and the effectiveness of the monitoring. It has also implemented a qualification process for the personnel responsible for checking and evaluating the characteristics of the scrap. The following figure shows the trend of the last three years in the quantities of materials that came out of the waste supply chain and merged into the EoW category, and therefore declared "secondary raw material".

Figure 7. EoW metal sales trend







Therefore, the company's interest in environmental labelling is high. However, there are different types of environmental labelling:

Table 4. Types of environmental labelling.

<b>Type I labels</b>
They declare an environmental superiority of the product, through compliance with pre-established criteria (e.g. European ECOLABEL).
<b>Type II labels</b>
They refer to a specific feature of the product. They do not require a third-party verification of the information reported (self-declarations).
<b>Type III labels</b>
Environmental Product Declaration, describes the environmental aspects related to the life cycle of the product, to allow comparison between similar products.
<b>Industry environmental labels</b>



Figure 8. Types of Environmental labels

	Type I labels 	Type II labels 	Type III labels 	Other industry labels 
<b>Reference standard</b>	ISO 14024	ISO 14021	ISO 14025 ISO 14064	ISO 17065 or other equivalents
<b>Purpose</b>	Selective	Informative	Declarative	Selective ore declarative
<b>Characteristic</b>	Products with characteristics exceeding the established requirements	Information self-declared by the manufacturer	Environmental characteristics based on the product life cycle	Specific characteristics of each label
<b>Verification of an accredited third party</b>	Required	Not required	Required	Required

#### ISO 14021 - self-declared environmental claims

- The standard specifies the requirements for self-declared **environmental claims**, including product claims, symbols and graphics.
- It describes the terms selected and generally used in environmental claims and indicates the **requirements** for their use.
- It also describes a general **assessment and verification methodology** for self-declared environmental claims and specific assessment and verification methods that must be implemented for the assertions selected in the standard.
- The ISO 14021 standard is not a system certification but provides reliability to **self-declared environmental claims**, i.e. made by manufacturers, importers, distributors, retailers on the environmental requirements of their products.

Some self-declared environmental claims:

- Compostable
- Degradable
- Designed for disassembly
- Product with extended lifespan
- Energy recovered
- Recyclable
- Recycled Content
- Reduced energy consumption
- Reduced use of resources
- Reduced water consumption
- Reusable and refillable
- Waste reduction
- Renewable material
- Renewable energy
- Sustainable
- Greenhouse Gas Emissions Claims

#### Assertion assessment and verification requirements

- The assertions can be applied, when relevant, to the stages of production and distribution, use of the product and disposal of the product.

- All assertions must be made following evaluation measures to obtain reliable and reproducible results necessary for verification.
- Some statements are defined as comparative because they are evaluated in relation to previous processes or products, or to other processes or products of the organization. For example, statements regarding extended lifespan, or reduced energy or water consumption are comparative.

**CASE 2.** A company located in the province of Milan, specializing in the production of high-performance motorcycle exhaust systems, decided, due to the German market demand in 2021, to produce an environmental product declaration, requesting certification from an accredited body, according to ISO 14021.

In this case, the reference frame of the document system is constituted by the “Rules for the environmental product declaration”. The specification describes the organization, the products subject to the assertions, their production cycle and the selected assertions. For each of the selected assertions, an explanatory statement was drawn up which contains the methods and assessments used to make the assertion. Finally, for each product, an environmental product self-declaration was drawn up which contains the technical characteristics and the self-declared environmental characteristics of the selected statements.

Both cases are indicative of the need for standards and labels to promote the products and services of industrial symbiosis. Through environmental certifications and labeling, IS companies can communicate their performance and impacts on sustainability and make their products and services more attractive in the market.

## CONCLUSIONS

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The interregional workshop on IS Reporting and Certification Systems was successfully wrapped up, offering useful lessons to the partners and all participants to the event. During the first session dedicated to IS Reporting, two reporting schemes have been demonstrated. The first, called CircLean, is based on an impact reporting methodology which uses different metrics to assess the situation relevant to business, the community and the ecosystem before and after the implementation of IS. The second, used by the Italian Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), is based on a network methodology which uses resource audit to trace potential streams and to suggest possible matches between businesses. Both systems attracted the interest of the participants and were found to be useful in further promoting and consolidating industrial symbiosis.

The second session focused on IS Certification systems. The emphasis was put on standards and the standardization process. The various stages of certification were outlined and the benefits of its stage were demonstrated. The standards of England, France and Italy as well as the International Standard were discussed.

During the third session, partners learned about a new system for evaluating the potential for implementing IS through the ISRL Matrix. Some case histories from the business world helped deepen the understanding of the increasing need for standards and certification.

Finally, the representatives of the Chamber of Commerce of Molise who were the organizers of the event summarized the conclusions of the workshop, which was considered successful by all the attendees. Finally, representatives of FUNDECYT, declared the end of the SYMBI Covid-19 call activities, summarizing the project's objectives achieved, challenges addressed, and lessons learned from the partners' collaboration throughout the last year.

### Lessons learnt from the workshop

The most important lesson learned from the workshop is that reporting and assessing the environmental performance of products and services is a highly complex and challenging activity. This is due to the following reasons:

- There is no EU-wide reporting system. Moreover, there is no consensus among actors involved in IS transactions as to what needs to be measured. KPI's are often incomplete and data inconsistent. This hinders both the assessment process and the transferability of successful experience.
- Indicators used to assess environmental performance are numerous and highly diverse. Different stakeholders employ divergent reporting methodologies, each focusing on different areas. This makes it difficult to make comparisons between different IS implementation cases.
- Measuring environmental performance using many different indicators often shows that good performance towards one environmental objective does not necessarily go hand in hand with meeting another. Hence the need to accept trade-offs between different environmental objectives.

Regarding certification, it was made clear that while there is a strong need for certification systems, as it can stimulate the outflow of IS products and services to the market, there are numerous difficulties that still need to be by-passed. These concern the following aspects:

- Setting standards is a long process that involves many different stakeholders, such as experts, businesses and end-users. The hardest part on the path to consolidating a standard is reaching consensus among them.
- The consolidation of standards is a long and time-consuming process. While it has long-term benefits, it cannot address the increased certification needs in the short term.
- Despite the common European legislation and the efforts made to transpose the European directives into national law, national legislations remain highly divergent. Many Member States have not issued technical specifications and standards concerning by-products that derive from industrial symbiosis activities (for example, the End-of-Waste status). The absence of a homogeneous legislative framework makes it extremely difficult to consolidate common certification systems.

To conclude, IS is still in need for harmonized and targeted measures in order to take off. Some of them, as demonstrated by the workshop's participants, include:

- The adoption of a common approach for the monitoring and reporting of IS transactions as well as the promotion of the uptake of this approach by industry.
- The harmonization of relevant regulations across EU.
- The development of specific policies for IS.
- The provision of fiscal and economic incentives.
- Customized design for the implementation of IS at company level.
- The existence of economies of scale (from single to community).
- Commitment that the value chain from the implementation of IS will remain at a local level.
- The creation of new networks and business opportunities.
- The promotion of future collaboration between IS hubs, regional agencies and the academic world.
- The creation of new jobs along with new professional skills and qualifications.

## Conclusions from SYMBI Covid-19 Call

This workshop concluded the activities of SYMBI Covid-19 Call. The main objectives set at the beginning of the project have been achieved. During the project's lifecycle, partners identified disruptions in industry, manufacturing and waste management businesses as a result of the pandemic. They shared best practices of industrial symbiosis in partner regions and explored opportunities on how to strengthen the economic recovery and resilience of SYMBI regions through industrial symbiosis practices. Finally, they managed to address crucial issues experienced by different organisations in different contexts, regions and cities.

Moreover, partners looked for ways to achieve economic recovery after the crisis using circular economy and IS as a means to increase the resilience of the economy. These ways include:

- Ensuring supply chain diversity.
- Achieving supply chain agility.
- Adopting localization strategies and creating shorter supply chains.
- Increasing cooperation between actors involved.

The general conclusions from the conclusion of the project as recorded by the partners themselves were the following:

- The impact of the pandemic was not severe on IS activities. On the contrary, circular and symbiotic initiatives contributed to regional resilience.
- Future policy development (and in particular crisis management) could incorporate key aspects of industrial symbiosis.
- In addition, investment pauses, delays in IS/circular projects and disruptions in the transport of materials were important factors.
- Circular waste management activities were strongly affected by the increase in the volume of waste generated
- The recovery and resilience of the regional economy and companies were strengthened by examples of industrial symbiosis and circular economy, together with innovation of related companies.

Upon the conclusion of this last SYMBI event, which was also the first event organized with the physical presence due to the pandemic, partners thanked each other for their mutual contributions and renewed their appointment for future collaborations in other projects to come.