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D5.2 POLICY RECOMMENDATION – MID PROJECT

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LIST OF ACRONYMS

Abbreviation	Explanation of abbreviation
RISERS consortium	
ENSPIRE	Enspire Science Ltd.
CEN	Comité Européen de Normalisation
DIN e. V.	DIN Deutsches Institut für Normung e.V.
EIT-RM	EIT RawMaterials GmbH
FhG	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
UGent	Universiteit Gent
IETU	Instytut Ekologii Terenów Uprzemysłowionych
ISQ	Instituto de Soldadura e Qualidade
ISL	International Synergies Ltd
Other	
BDE	Bundesverband der Deutschen Entsorgungs-, Wasser- und Kreis-laufwirtschaft e. V.
BF	Blast Furnace
BOF	Basic Oxygen Furnace
CE	Circular Economy
CEA	Circular Economy Act
CPR	Construction Products Regulation
D	Deliverable
DG	Directorate-General
DG ENV	DG Environment
DG GROW	DG for Internal Market, Industry, Entrepreneurship and SMEs
EAF	Electric Arc Furnace
EC	European Commission
EN	European Standard(s), sometimes called Euronorm
EoW	End of Waste
EPD	Environmental Product Declaration
ESPR	Ecodesign for Sustainable Products Regulation
ETS	Emission trading system
EWC	European Waste Catalogue
GHG	Greenhouse gases
GPP	Green Public Procurement
I-US	Industrial-urban symbiosis

Abbreviation	Explanation of abbreviation
IPCEI	Important Projects of Common European Interest
IS	Industrial symbiosis
ISO	International Organisation for Standardisation
LCA	Life cycle assessment
MS	Member State(s)
NACE	Nomenclature statistique des activités économiques dans la Communauté européenne
NUTS	Nomenclature des Unités territoriales statistiques
POP	Persistent Organic Pollutants
POP	Polluter Pays
RED	Renewable Energy Directive
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SDO	Standards Development Organizations
SME	Small and medium-sized enterprises
T	Task
TRL	Technology Readiness Level
VAT	value added tax
WG	Working Group
WP	Work Package

1 INTRODUCTION

1.1 INTRODUCTION TO THIS DOCUMENT

This report was developed in the RISERS project's Work Package (WP) 5, titled "Policy making for industrial symbiosis", specifically in its Tasks (T) 5.2 and 5.3.

"Industrial symbiosis" (IS) is defined by the CEN Workshop Agreement (CWA) 17354 as the use by one company or sector of underutilised resources broadly defined (including waste, by-products, residues, energy, water, logistics, capacity, expertise, equipment and materials) from another, with the result of keeping resources in productive use for longer.

RISERS aims to build a cohesive framework integrating practice, policy, and research and innovation (R&I) to promote the standardisation of industrial symbiosis (IS) focused on priority synergies and resources for high-impact EU resilience.

The project has five major objectives:

1. Map the landscape of IS-related standardisation to identify specific bottlenecks, gaps and opportunities for standardisation to advance the mainstream adoption of priority synergies.
2. Strengthen the uptake of R&I results to foster an adaptable environment for evidence-based and innovation-driven IS standardisation.
3. Develop new and contribute to the existing directions for IS standardisation promoting circularity of resources and make recommendations for the development of new standards.
4. Identify policy frameworks relevant for IS and engage with policymakers to advocate for policies and regulations fostering IS and their integration into a broader context of sustainability policies.
5. Increase stakeholders' engagement, establishing an active dialogue between the standardisation community and IS practitioners via the Hubs for Circularity Community of Practice and discuss the needs and challenges for bringing innovative technologies and solutions to the market.

This report addresses RISERS' 4th objective. Specifically, it aims to specify needs for policy measures based on the current results of RISERS in its WP5, particularly regarding regulation, incentives, subsidies, and public procurement.

The two RISERS tasks presented in this report last until Month 36. This deliverable shows the current state in Month 18, in particular related to the current state of the Policy Statement, developed in RISERS Task 5.2 and based on 10 exploration interviews in Task 5.3, which led to preliminary policy recommendations.

Task 5.2 "Standardisation support for policy frameworks promoting IS" aims to explore existing or new possibilities for policy frameworks that promote IS. Specifically, it analyses potential to refocus on standards/input specifications to replace regulations/outputs waste limitations. It reviews the policy framework to identify and evaluate policies and supporting activities that promote or hinder IS with the key objective of enabling waste or by-product as an input across sectors, and recommends ways to better support IS.

Relying on previous work in WP5, Task 5.3 "Policy recommendations" aims to specify recommendations for policy updates to support IS. The key methods to reach this goal are the completion of at least 20 targeted stakeholder interviews in two rounds and a survey among at least 100 industry representatives to identify policy gaps, needs for updates and the relevant public bodies linked with these gaps. The current state of the first interview round with 10 exploration interviews is described in detail in Chapter 3.

The interplay between standards and regulation and standards and public procurement, explained in section 1.2 below, is specifically considered in this context.

This report presents the implications of the first interview series and of additional learnings from internal and external sources, in particular of our policy review and RISERS WPs 3 and 6. Its creation was embedded in various interlinked activities, including also analyses of relevant literature and the current state in the project's WP5, WP3 ("Gaps and opportunities analysis for priority synergies"), and WP6 ("Roadmap for industrial symbiosis standardisation") regarding relevant topics.

The interview series as its key element was conducted with the representatives of specified priority sectors and additional societal dimensions such as public procurement and regional perspectives in the context of IS. Besides stakeholders relevant to IS in general, the main focus, from an industry point of view, is on the chemicals, steel, food and cement sector, which represent the highest numbers of documented IS cases in the process industry, along with the bio-based ecosystem, as an important additional IS segment. RISERS report D5.1 "Key policy stakeholders for industrial symbiosis" provides more information on their selection.

The exploratory interview series, together with the additional analytical measures, enabled a great deal of knowledge and the deduction of 13 preliminary sector-independent and 5 sets of sector-specific recommendations to support IS by policy measures. The interplay between standards and regulation played a key role in this context. Likewise, the interview series highlighted the importance of stimulating trust among IS market participants to stimulate market growth.

This document is structured as follows: Section 1.2 introduces the readers to policy instruments and tools. Chapter 2 provides a description of the current framework conditions and policy frameworks of IS. Chapter 3 describes the methods and results to develop policy recommendations to support IS. Chapter 4, focused on standardisation support for policy frameworks promoting IS, is structured in the same way. Chapter 5 presents preliminary recommendations for both areas, while Chapter 6 provides a summary and outlook on RISERS' next steps to support policy making for IS.

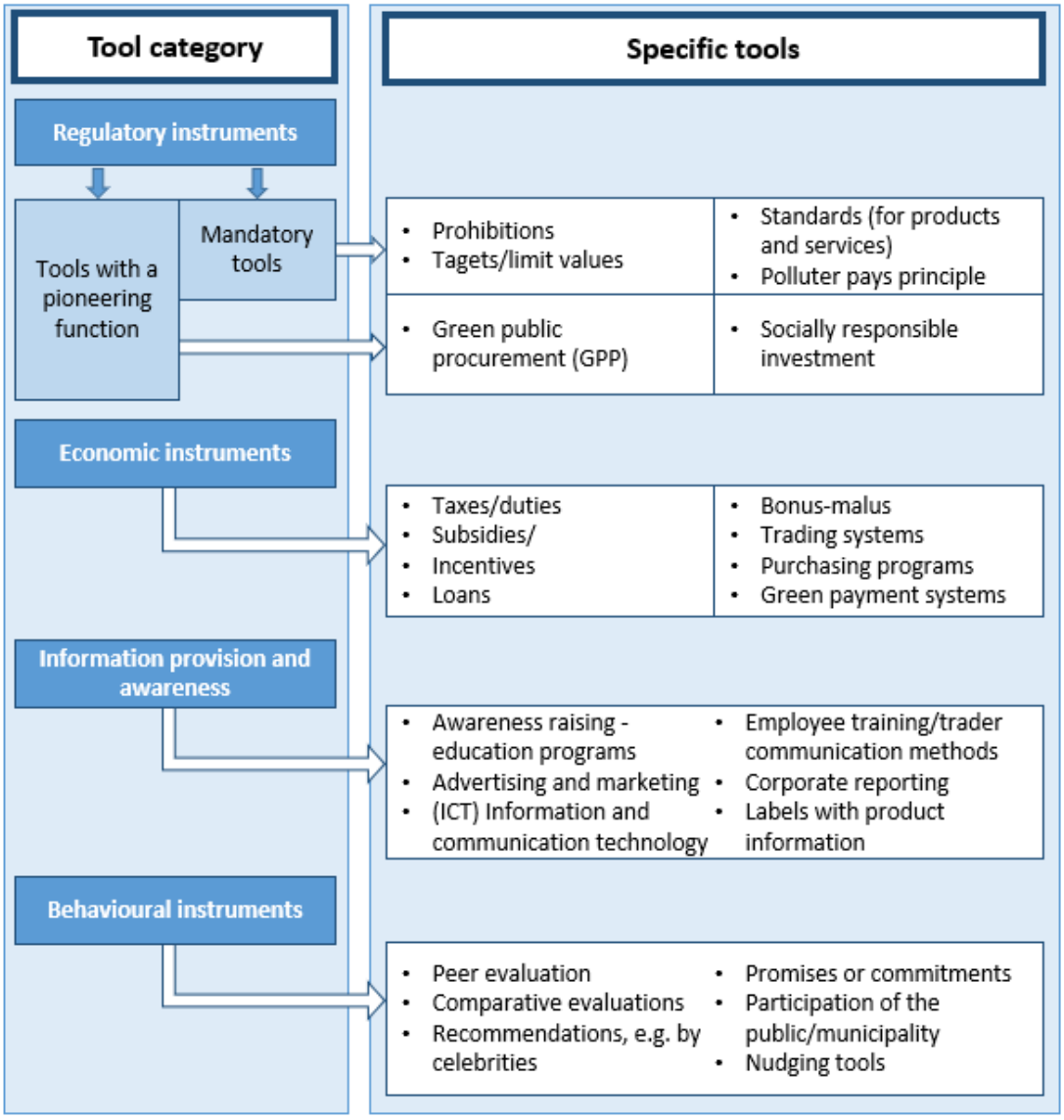
1.2 INTRODUCTION TO POLICY DOCUMENTS AND INSTRUMENTS

This section provides an overview of general policy concepts, which represent the foundation of our work. In this context, policy making relies on various tools and instruments. According to Figure 1, four policy tools are distinguished: regulatory instruments, also including those that require specific standards, economic instruments, information provision and awareness and behavioural instruments.

Task 5.2 considers specifically the interplay of standardisation and regulation. Task 5.3's work focuses on all the four tool categories in Figure 1: regulatory instruments such as regulations referencing standards, targets and green public procurement, economic instruments such as subsidies and incentives,

information provision and awareness instruments such as education, reporting, labels and supportive information technology and on behavioural instruments, for example in regional networks. According to RISERS' Grant Agreement, p. 69, its focus on standards is at least on standards specifically used in the regulatory context and for (green) public procurement.

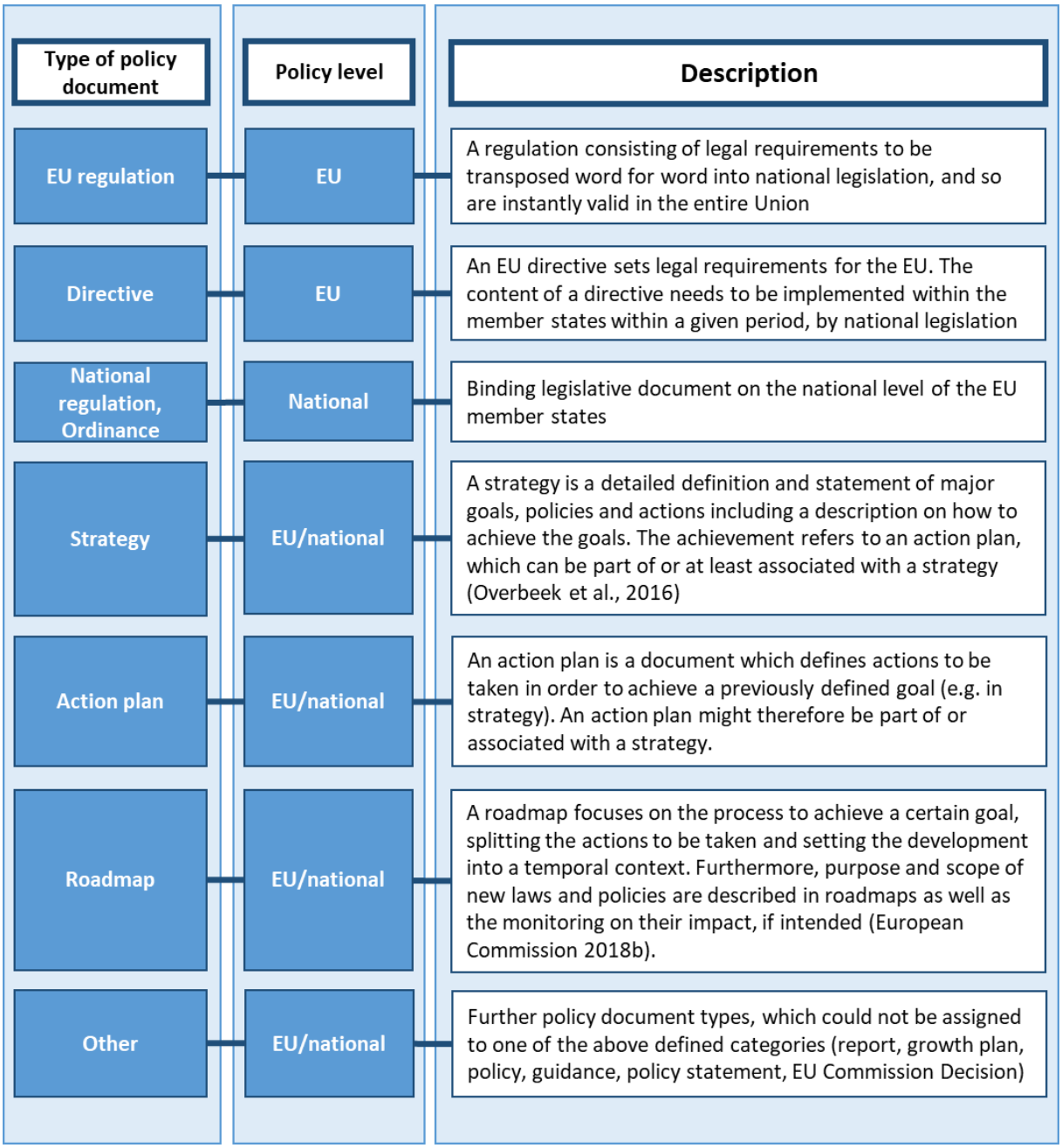
More specific standardisation aspects of RISERS are considered in WPs 6 and 7, in which the roadmap for IS standardisation is developed.



Source: based on Songigo et al. (2012)

Figure 1: Overview of policy tools

Figure 2 provides an overview of policy documents, of which regulations are the most important mandatory tools. The exertion of regulations is mandatory, while the adoption of formal standards is, in most cases, voluntary. Nevertheless, there are interdependencies between the two instruments. Specific concepts, such as the New Legislative Framework (NLF), will be described in Chapters 3 and 5.



Source: based on STAR-ProBio (2018), Table 2, modified

Figure 2: Overview of policy documents

Specific, already existing policy documents in the context of IS are described in Chapter 2.

2 CURRENT POLICY FRAMEWORK

2.1 GENERAL FRAMEWORK CONDITIONS

According to CWA 17354, underutilised resources and measures to keep resources in productive use for longer are key elements of IS. Within the current legislation of the European Union (EU), the term "Industrial Symbiosis" is rarely mentioned. The need for action is emphasised by European Parliament and the Council (2018). This document requires that "(t)he Commission should be empowered to adopt implementing acts in order to establish detailed criteria on the application of the by-product status, prioritising replicable practices of industrial symbiosis."

In addition, the concept is incorporated into several EU regulations, related to sustainability and the circular economy and resource management as a part of sustainable development in particular. Waste management, specifically considered in Section 2.2, and environmental protection also play an important role.

Elements of the current policy framework, which specify broader framework conditions, are the **Green Deal Industrial Plan** (European Commission, 2023a), the **EU Strategic Agenda 2024-2029** (European Council, 2024), the **New Clean Industrial Deal** (European Commission, 2025a) and the **upcoming New Circular Economy Act (CEA)**.

According to the European Commission (2025a), the EU is prioritising circularity as a core strategy to boost resource efficiency, reduce external dependencies, and enhance economic resilience. The source highlights that circular practices lower waste, CO_2 emissions, and production costs, while fostering sustainable industrial models. The Clean Industrial Deal aims to make the EU a global leader in the circular economy by 2030.

To achieve this, a shift from isolated solutions toward a value-chain perspective is focused on. Six key business drivers are identified: affordable energy, lead markets, financing, circularity and material access, global partnerships, and skills. These are supported by cross-cutting enablers such as reducing bureaucracy, scaling the Single Market, digitalisation, innovation deployment, quality employment, and better EU-national coordination.

National support, such as state aid and tax incentives, is regarded as playing a crucial role in facilitating decarbonisation and circularity, encouraging private investment, and improving project viability.

Strategically securing access to raw and secondary materials is regarded as vital in this context. Therefore, the EU plans to enhance its circular economy by extending material lifecycles through reuse, remanufacturing, and recycling.

To ensure access to critical raw materials, the EU will swiftly implement the Critical Raw Materials Act. This includes recognising strategic projects, providing financial support, and establishing mechanisms like demand aggregation and an EU-level purchasing centre. Further efforts will focus on supply chain monitoring, strategic stockpiles, and financial instruments to support upstream investments.

The EU plans to boost recycling capacity, including measures to discourage the export of critical raw materials, waste and divert landfill waste toward reuse. Cooperation with third countries and assessment of export fees are also considered to fund circular infrastructure.

Trans-Regional Circularity Hubs will be established to promote smart specialisation and pooling of recycling projects across regions, with support for potential IPCEIs (Important Projects of Common European Interest) [1]. Lastly, the Commission will initiate fact-finding and stakeholder dialogues, explore green VAT reforms for second-hand goods, and promote circularity through specific sectoral examples like fertilisers, which link circularity with supply security and emission reduction.

According to the European Commission (2025a), a Circular Economy Act, expected in 2026, will support free movement of circular products and materials, revise e-waste rules, mandate digitalisation in demolition processes, and promote the use of recycled and bio-based materials. It also aims to improve waste-to-resource transitions and strengthen public procurement standards.

2.2 SPECIFIC WASTE RELATED POLICIES

According to CWA 17354, waste and by-products are important topics of IS. This section provides information on the specific policy framework of both topics. According to the Waste Framework Directive (European Parliament and the Council, 2008, in the following: WFD), **waste** means "any substance or object which the holder discards or intends or is required to discard"; and "**waste management**" means "the collection, transport, recovery (including sorting), and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker."

The beginning of the policy framework on waste was shaped by fragmentation, with the first directive adopted by the EU in 1975. It dealt with the assessment of the possible impact of unmanaged waste in a quality manner on the environment and health and led to directives regulating waste, which can be divided into four groups:

1. Directives related to the waste management framework (e.g., WFD / Waste Framework Directive (2008/98/EC)
2. Directives related to special types of waste (Directive on packaging and packaging waste, 2000/53/EC on end-of-life vehicles, Directive on waste electrical and electronic equipment, Directives 2006/66/EC on batteries and accumulators and waste batteries and accumulators…)
3. Directives relating to shipments of waste and the import and export of waste (Regulations 1013/2006 on shipments of waste)
4. Directives related to buildings for the processing and disposal of waste (Council Directive 1999/31/EC on landfill of waste)

The waste topic is also considered by different newer EU communications such as "A New Industrial Strategy for Europe" and "A new Circular Economy Action Plan for a cleaner and more competitive Europe," both from 2020.

The former puts emphasis on the connection between future competitiveness and a greener and more circular industry with secure, clean and affordable energy and raw materials. European stakeholders are called upon for their entrepreneurial spirit to create lead markets in clean technologies. An integral part is the availability of energy and energy carriers which need to be used more effectively by linking

[1] See https://competition-policy.ec.europa.eu/state-aid/ipcei_en, these are projects with specific funding conditions, examples: batteries, hydrogen value chain

different sectors. The new European growth strategy includes the ecological transition, reducing carbon and materials footprint, and embedding circularity across the economy.

The new Circular Economy Action Plan puts emphasis on waste avoidance and transformation into high-quality secondary raw materials. In March 2022, the Commission announced the first package of measures to accelerate the transition to a circular economy. It included according to European Commission (2022):

1. The proposal for the **Regulation on Ecodesign for Sustainable Products** to make sustainable products the norm, boost circular business models and empower consumers for the green transition;
2. A **Textile Strategy** to **make textiles more durable, repairable, reusable and recyclable,** to tackle fast fashion, textile waste and the destruction of unsold textiles, and ensure their production takes place in full respect of social rights;
3. **New rules concerning construction products** to ensure that the built environment delivers on the EU's **sustainability and climate objectives;** and
4. **New rules** to **empower consumers in the green transition** with better information about the environmental sustainability of products and better protection against green washing.

The **Ecodesign for Sustainable Products Regulation** (ESPR), which is a key element of the EU's package to accelerate the transition to a circular economy for this report, entered into force on 18 July 2024. The **Construction Products Regulation** (CPR) was also issued in 2024. This Regulation (EU) 2024/3110 establishes harmonised rules for the marketing of construction products in the EU.

The WFD sets out the basic concept and definition of waste management. The most important part of the waste hierarchy set out in this framework is the prevention of waste. The waste is then divided into four categories, of which the first part is to be prepared for re-use, then recycling, and if this is not possible, recovery of certain materials or components. The rest has to be disposed of and deserves the name "waste".

This process is carried out without endangering human health, without harming the environment, without causing a nuisance through noise or odors, and additionally without adversely affecting the countryside or places of special interest.

Important topics are the by-product and end-of-waste (EoW) criteria.

Table 1 indicates how each is defined according to Articles 5 and 6 of the Directive.

The production of EoW is time-consuming and relatively few have been produced. EoW has been produced for iron/steel and aluminium scrap (Council of the European Union, 2011), glass cullet (European Commission, 2012, Orveillon et al., 2022) and copper scrap (European Commission, 2013), EoW for plastics, textiles and the mineral fraction of construction and demolition waste are also being developed. On an EU wide level, once the next three have been produced, bringing the total to six, there are no more planned. This limits the effectiveness of the EoW process.

Criterion	By-product criteria (Article 5 WFD)	EoW Criteria (Article 6 WFD)
Production Process	Produced as an integral part of the production process	-
Processing requirements	Can be used directly without any further processing other than normal industrial practice	It has undergone a recovery, including recycling, operation and complies with specific criteria
Certainty of Further Use	Further use of substance or object is certain	Commonly used for a specific purpose. Market demand exists
Legality of Use	Further use is lawful, i.e. the substance or object fulfills all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts	The use is lawful - The substance or object fulfills the technical requirements for the specific purpose referred to in (a) and meets the existing legislation and standards applicable to products.
Environmental and Health Impacts	Environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts	The use of the substance or object will not lead to overall adverse environmental or human health impacts

Table 1: Criteria for by-products and EoW as laid out in the WFD

The EC communication document "The Single Market: our European home market in an uncertain world" (European Commission, 2025b), highlights the situation where Member States are creating their own EoW criteria, which do not apply outside of the Member States, and on occasion, do not apply across the whole of the member state. This is leading to a confusing situation and fragmentation of the Single Market for waste, secondary materials, and by-products.

2.3 PREVIOUS RISERS FINDINGS

According to the RISERS survey, conducted jointly in RISERS Tasks 6.2 (Consultation of Technical Bodies) and 5.1 (Mapping of key Policy stakeholders), policies and regulations are seen as particularly important in 5 themes: energy recovery and utilisation, material reuse and recycling, circular economy practices, industrial ecosystems and collaboration models, and innovative applications, see RISERS (2024a, b) for additional results.

The survey revealed a list of changes needed to improve IS. In a condensed version, they can be summarised as follows: there is a need to streamline regulations and permits to speed up the permitting process for EOW status recognition, new procedures, materials and technologies. This includes more pragmatic definitions of by-products and waste within a standardised system across the EU, including reporting of resource flows to facilitate resource exchange. In addition, regulations on waste transport

and trade need to be simplified and harmonised, and outdated waste management laws need to be repealed to make this practicable. Regulations to promote IS were mentioned to encourage the use of recycled materials and cross-sector cooperation. Changes to taxation were also mentioned, increasing taxes on virgin materials while incentivising circular economy initiatives and removing subsidies for fossil industries. Supporting regulatory sandboxes/living labs to test circular economy policies plays a key role in the further development of IS regulations.

The survey led to 12 recommendations shown in Box 1.

Simplify regulations for defining waste and determining end-of-waste status.	Establish a unified database for tracking and analysing waste flows.	Reduce taxation to incentivise the use of secondary raw materials.
Harmonise waste classification rules across all EU member states.	Ease regulations on trading different energy carriers.	Provide financial incentives for recycling and reuse.
Support the development and recognition of by-product solutions.	Streamline the permitting process for IS projects.	Increase awareness of industrial symbiosis.
Facilitate the safe and efficient use of treated wastewater.	Designate regulatory sandbox areas to test innovative IS applications.	Promote IS education and establish dedicated IS facilitators.

Box 1: Recommendations in RISERS Deliverable D5.1

The ultimate goal of all of these recommendations is to enhance the efficiency and effectiveness of IS initiatives, ultimately contributing to a more sustainable and circular economy in the EU. This document will extend this view on stakeholders' needs by presenting specific sector perspectives.

3 PART A: DEVELOPMENT OF POLICY RECOMMENDATIONS TO SUPPORT IS

3.1 METHODS

3.1.1 OVERVIEW

As described in Chapter 1, RISERS' work on policy recommendations aims to:

- Specify needs for policy recommendations based on previous work in WP5
- Conduct at least 20 targeted interviews in two rounds with stakeholders to specify their needs
- Conduct a survey among at least 100 industry representatives to identify policy gaps, needs for updates and the relevant public bodies linked with these gaps

To fulfil its goals, priority sectors were specified based on the work in Task 5.1. Details are described in Section 3.1.2.

The implementation of the task and its interview series and survey is shown in Figure 3.

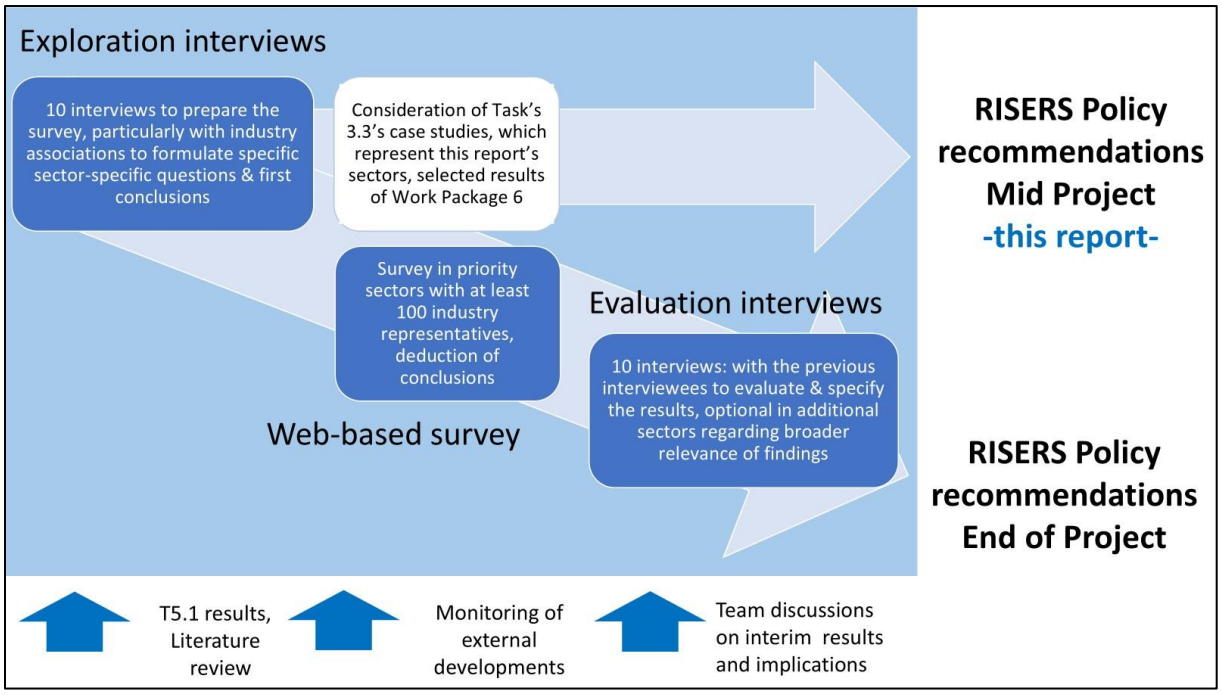


Figure 3: Process steps to develop policy recommendations to support IS

As we present in this figure, the task is divided into three key components: the interview series, which is grouped into two phases, and the web-based survey. The interview series consists of an exploration phase, including the first 10 interviews, the deduction of first conclusions and input for the web-based survey, and an evaluation phase after that survey.

The evaluation phase will provide the interviewees of the exploration phase with the opportunity to give additional sector-specific recommendations and confirm the results for their sectors. It is optionally added by additional interviews to describe further relevance. The interactions in this second phase shall also be used to get the industry associations' support for RISERS results as a whole.

Key target groups for the interviews are representatives of industry associations of WP5's priority sectors and stakeholders of overarching relevance. The addressees of the survey are the members of the industry associations above and all other stakeholders interested.

The analyses particularly consider the results of the case studies in RISERS Task T3.3 "Sector-specific data collection and analysis", specifically the legal framework conditions and the challenges the companies involved in the specific case face.

Another important methodological element was the interaction with the IS standardisation roadmapping initiatives in RISERS WP6. In particular, the initial findings of the roadmap's working groups (WGs) on the overarching topics End-of-Waste and Digitalisation & Data (WGs 02 and 03), as well as on Steel, Slag & Refractories and Biomass (WGs 04 and 10), provided valuable insights.

This report refers to the first exploratory interviews, while RISERS report D5.3 will present the specified results based on the web-based survey and the evaluation interviews, also presenting short, medium,and long-term policy recommendations.

3.1.2 SECTOR FOCUS

An important foundation for our sector focus was the concept of IS sink and source sectors of Mendez-Alva et al. (2021). Mendez-Alva et al. (2021) analysed binary IS synergy models, "in which each sector can have two roles for the other sector: either as a source or a sink for a specific stream" and in which "streams" can refer to energy, by-products, waste, and water. In this context, the "source" role represents "the supply of a stream to the other sector" and a "sink" role "receives a stream from the other sector."

RISERS' Deliverable D3.1 "Methodology for Gaps and Opportunities Analysis for Industrial Symbiosis in Priority Synergies" showed a **high frequency** of symbiosis occurrence as a **source** for the **chemicals**, minerals including **steel,** and the **food** sector in all documented IS cases. It also shows that **cement, chemicals** and minerals, including **steel**, are most common as **sinks sectors** in all documented IS cases. Additional analyses of the data unveiled the leading separate role of steel besides the chemical industry, justifying a split of the category of steel and minerals (see Table 2). Accordingly, we specified the first four priority sectors to be chemicals, steel, food and cement.

Sector	IS source		IS sink	
	(frequency)	(%)	(frequency)	(%)
Chemicals	124	23%	106	20%
Steel	116	22%	59	11%
Food	77	14%	54	10%
Refineries	34	6%	20	4%
Cement	33	6%	106	20%
Bio-based ecosystem	expert descriptions (no EU-wide data available)			

Table 2: Key sectors of T5.1 and their statistics as IS sinks and sources according to RISERS WP 3's literature review on reported IS cases

Regarding our two remaining priority sectors, RISERS' Deliverable D3.1 suggests that priority IS sectors in RISERS should cover "*process industries, added with 1-2 industries from the energy and/or bio-based sector and 1 emerging sector.*"

The first sectors outside the process industries in Table 2 are energy and refineries, while RISERS Deliverable D3.1 suggested the inclusion of the energy and/or the bio-based sector and one additional sector in RISERS' priority sectors. As energy is also a sector-independent topic on which we expect results within the framework of our already defined sectors, we selected the bio-based economy as an additional priority, which also aligned us with the scope of RISERS' Task 3.2. Our additional choice included refineries as the next most important IS sector outside the process industries.

As mentioned in Section 3.1.1, the analyses particularly consider inputs of the case studies in RISERS Task 3.3. "Sector-specific data collection and analysis", which finish in parallel with this report. Specifically the case studies' legal framework conditions and the challenges the companies involved in the specific cases were considered. Figure 4 shows the topics of the relevant case studies and their consideration for this report.

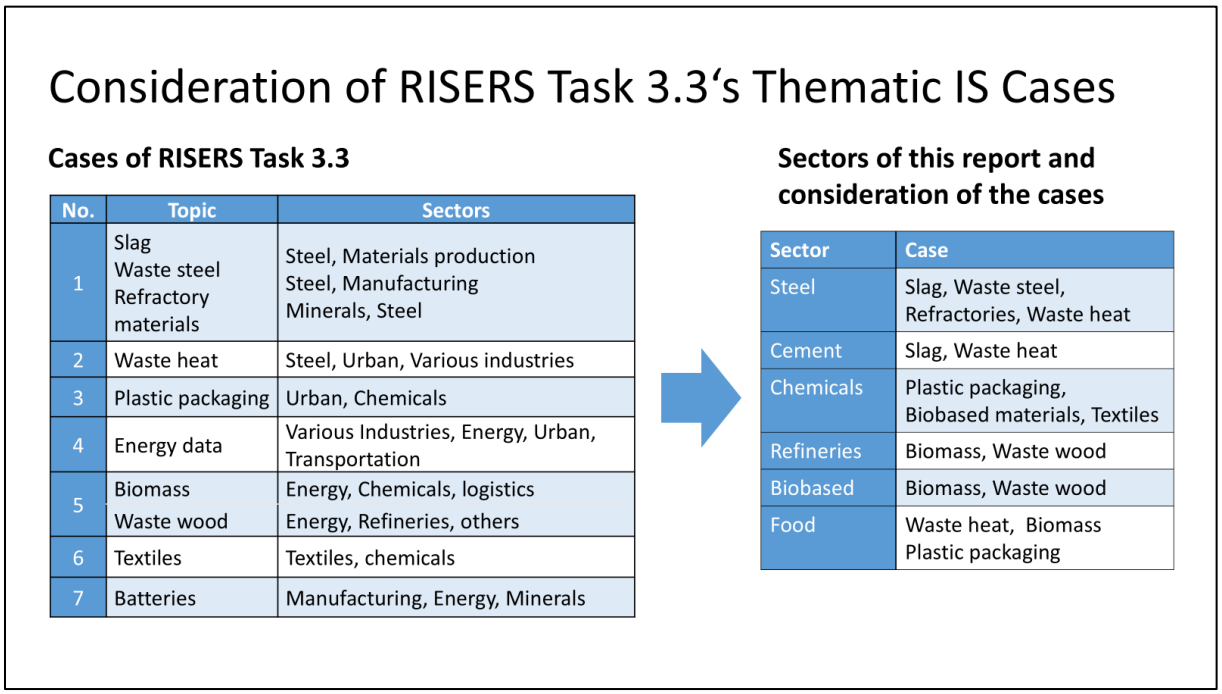


Figure 4: Relation between RISERS' Tasks 3.3 and 5.3 – relation of sectors and case studies

3.1.3 DETAILS ON THE SERIES OF EXPERT INTERVIEWS

Interview topics and interview guide

The interviews referred to eight topics, which were discussed by 14 questions as shown below.

1. Background of the interviewee (questions 1 and 2)
2. Current state of IS (question 3)
3. Needs for policy measures to support IS in general and in the interviewees' specific sector/field of activity (questions 4 and 5)

4. Needs for policy measures related to the use of by-products and End of Waste criteria (question 6)
5. Interplay between standards and regulation in the context of IS and options to better utilise standards for regulatory measures to support IS (questions 7 and 8)
6. Organisations that could address the needs mentioned (question 9)
7. Statistical information (questions 10 - 14)

The detailed interview guide is shown in Annex 1 of this document.

Creation and use of informed consent form

As a basis of the interviews, an informed consent form was created that guarantees that all interviews are kept confidential. Details are shown in Annex 2 of this document.

Interview focus on industry associations and Pan-European organisations

To consider the needs of big groups of stakeholders, the focus of the interviews was on industry associations and pan-European organisations. Details are shown in Table 3. All interviewees hold high hierarchical positions in their field of activity.

Based on the results of RISERS Deliverable D5.1, the focus of the work on policy recommendations is on 6 sectors and EU countries whose companies are particularly active in the IS context. The series of the 10 exploration interviews reflected this by 5 industry-specific and 5 industry-independent interviews.

During the period of the interview series, the refining industry faced numerous overarching challenges, and the dynamics made it difficult to draw conclusions at this time. With this in mind, we have included an additional industry-independent interview in the interview series to provide a broader perspective.

From a geographical perspective, the interviews were conducted with 6 pan-European organisations and 4 national organisations from the pilot country Germany, which according to D5.1, plays a special role for the European economy and IS.

Sector	Type of organisation	Topics	Date	Partici-pants
Sector-inde-pendent	Industry association	Sector-independent: overarching topics on the regulatory framework -in-dustrial perspectives	2025-05-27	1
Sector-inde-pendent	Industry association	Sector-independent: overarching topics on the regulatory framework - policy and standardisa-tion policy perspectives	2025-05-27	1
Chemicals	Industry association	Chemicals	2025-03-04	1
Cement	Industry association	Cement	2025-03-25	1
Steel	Industry association	Steel	2025-02-21	1
Food	Industry association	Food	2025-04-10	1
Bio-based ecosystem	European umbrella or-ganisation for industrial activities and research	Bio-based ecosystem	2025-03-03	2
Public pro-curement	Public procurement agency	Public procurement	2025-02-27	1
Network of local authorities	International Associa-tion	Public waste and wastewater with indus-trial urban symbiosis pi-lots	2025-03-12	1
Environmental perspective	Environmental agency	Various - Steel and ce-ment topics were empha-sised	2025-03-21	1

Table 3: Overview of the exploratory interviews

Deduction of preliminary policy recommendations

As shown in Figure 3, mid-project policy recommendations were derived from the insights gained in the interviews. These sector independent and sector-specific results are presented in chapter 5.

3.2 RESULTS

3.2.1 OVERARCHING TOPICS ON THE REGULATORY FRAMEWOK

3.2.1.1 INDUSTRIAL PERSPECTIVES

As described in Chapter 2, this report presents the results of ten high-level interviews as a starting point for the policy recommendations and further analyses in RISERS Task T5.3. This sub-section provides the results of the RISERS interview on overarching industrial perspectives presented in Table 3, supplemented by background information and results from RISERS WPs 3 and 6 on the topics discussed by the interviewee. The policy recommendations developed on this basis are presented in Chapter 5, together with an outlook in Chapter 6.

At the beginning of the interview, regulatory developments were described. The interviewee emphasised that major legal frameworks, such as the EU Battery Regulation, the Ecodesign Regulation, and the Packaging Regulation have come into force in recent years.

In parallel, the interviewee described a shift from previous legal acts in environmental law to specifications via delegated acts and implementing acts, and a change from a focus on directives to regulations. The new legal acts define stringent requirements for companies and require close cooperation in order to fulfil recycling quotas. However, the interviewee highlighted the lack of coherence between these regulations, as they often place different requirements on the same material flows.

The **importance of standardisation** for IS was explicitly mentioned by the interviewee. The expert described standards as crucial for defining, for example, recyclability and the quality of recyclates.

In addition, the interviewee referred to the development of design requirements taking into account the recycling aspect, which is currently playing a greater role in the global context. Here, it is important to be quick and develop sensible standards. An international comparison was made in this context. The interviewee explained that China has very actively anchored this in its annual plan. The country is building a very ambitious recycling system with its own standards. Therefore, the expert explained the importance that the EU also develops competitive standards, perhaps even faster.

In addition, it was mentioned that materials from abroad labelled as recyclates are often not real recyclates, which demonstrate an additional need for standards in line with European needs.

As a key statement, the expert emphasised the importance of trust for market growth. Market participants need assurance that recyclates have the required quality. There is a clear need for **standardised methods** to calculate recycling rates and efficiency in order to ensure comparability of products.

The interviewee called for greater involvement of industry and relevant stakeholders in the standardisation process and pleads for more transparency in regulatory procedures. In particular, the expert emphasised the need for all relevant stakeholders, including small and medium-sized enterprises, to be involved in the development of standards. It is therefore important to provide **financial support to better integrate SMEs** from various countries in the standardisation process. In parallel, the expert mentioned that funding for standardisation requests is often not called up.

Another important topic discussed was the introduction of **Digital Product Passports**. The key points made about product passports are shown in Box 2. The interviewee highlighted that there are only a few standards that enable measurability for the product passport. Advancing measurability methods was regarded as very important.

Regulatory framework conditions: required in various legal acts.

Opportunities for IS: They can also be used to show the use of resources and material streams.

Need for action:

- Specification of methods to create the required data
- Need for expert rounds and a roadmap to specify the relevant development steps
- Need for support for SMEs to generate the relevant data and the passports
- Solutions for data protection and trade secrets:
  When implementing product passports, care must be taken to ensure that data protection and trade secrets are maintained. The balance between transparency and the protection of sensitive company data is crucial.

Enforcement and implementation:

The interviewee notes that enforcing the requirements for product passports is complex and must cover many levels. It is important that the various authorities and stakeholders in the different EU countries work well together in order to successfully implement the requirements.

Source: RISERS interview

Box 2: Industry's needs in the field of Digital Product Passports

Digital Product Passports were also considered in RISERS' roadmapping activities, particularly regarding the use of lifecycle data. An opportunity for additional standardisation to support their use was described.

As a specific topic, the **Ecodesign Forum** presented in Box 3 was discussed in the interview. The interviewee saw the Ecodesign Forum as a good practice approach to support the implementation of ecodesign requirements but emphasises the need for effective organisation and coordination. According to the interviewee, this platform could also be used to specify IS-relevant material streams.

In general, the expert highlighted the importance of coordination and appreciated the idea that led to the establishment of the High-Level Forum, which is described in more detail in Chapter 5.

The implementation of the Ecodesign for Sustainable Products Regulation and the role of the Ecodesign Forum

The Ecodesign for Sustainable Products Regulation (ESPR)'s intended success depends on a high level of transparency and an inclusive approach, in which the public and all relevant stakeholders are well-informed and have the chance to contribute.

The Ecodesign Forum is the main arena for consulting stakeholders on the development of rules under the ESPR.

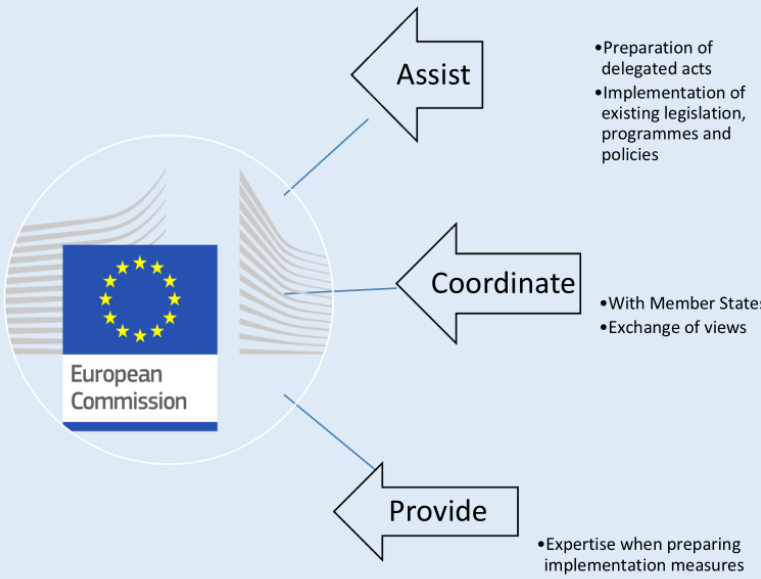
It brings together a broad range of stakeholders and key ecodesign actors to contribute to the preparation of ecodesign requirements and working plans, as well as examining other areas of relevance to the ESPR process. The Forum was established formally following the ESPR's entry into force.

Mission of the Ecodesign Forum: to assist the Commission in the conduct of its activities under Regulation (EU) 2024/1781 and Regulation (EU) 2017/1369

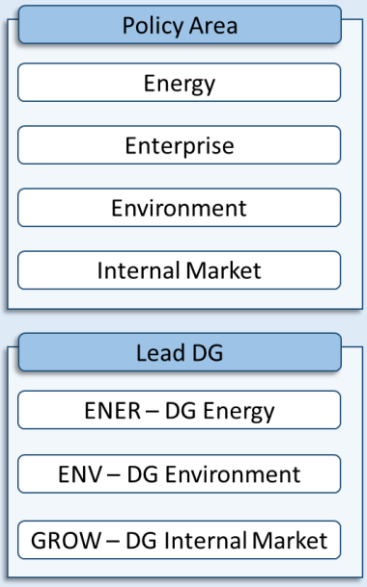
Type: Formal, permanent

Scope: Broad

Specific tasks



Further details



Source: own figure based on Green Forum (2025)

Box 3: Good practice: stakeholder dialogues via the Ecodesign Forum

Besides harmonised standards, Common Specifications of the EU were discussed briefly. The expert described challenges such as time pressure and capacities, which led to the application of these instruments and highlights that the industry would appreciate more transparency than is currently made possible in their development.

3.2.1.2 POLICY AND STANDARDISATION POLICY PERSPECTIVES

The interview on overarching policy and standardisation policy topics presented in Table 3 focused on specific elements of the regulatory framework of IS, which are also relevant for European industry as a whole. Like the entire interview series, the interview is summarised in Annex 3 of this report.

As a key framework condition, the role of standardisation in the policy framework of IS was emphasised.

Another core element of the interview concerned the EoW status of products and materials. In this context, the expert highlighted the importance of providing companies with certainty that they have left the waste regime and are back in the raw materials regime.

As another priority, the interviewee described regulatory challenges. Specifically, he expressed concerns about the coherence of current EU regulations and the large number of new legal acts and their requirements, which can lead to confusion and uncertainty. The expert called for a clear and consistent regulatory strategy that supports harmonised European standards.

In this context, he highlighted the central role of standardisation in the development of functioning IS. He sees standardisation as a crucial tool for creating trust and reliability in the markets, which is necessary for achieving, for example, higher recycling rates. Harmonised standards should form the basis for regulatory requirements, whereby industry expertise must be integrated into the relevant standardisation processes.

A specific topic for the interviewee's description was the New Legislative Framework (NLF). The need for its preservation was highlighted. The interviewee advocates the preservation of the NLF in its original form in order to promote the innovative strength and dynamism of the standardisation process. In this context, challenges of delayed listing harmonised European standards in the Official Journal of the EU (EUOJ) were described, see Box 4. The interviewee expressed concerns about these delays and the resulting uncertainty for companies.

The expert also mentioned EU plans to update the EU Standardisation Regulation. He expressed concern that current considerations to reform or change the NLF could lead to uncertainties. Specifically, he described the importance of maintaining the demarcation that standards are created based on the consensus of the industry and other stakeholders and not part of regulation. In addition, he explained that the introduction of common specifications instead of harmonised standards could compromise the suitability and acceptance of standards.

A central point in the discussion about the NLF was the need to involve industrial expertise in the standardisation processes. The interviewee emphasised that maintaining such processes is crucial for meeting the challenges of IS and the circular economy.

The link between the NLF and EUOJ publications which is central to standardisation and regulation in the EU visualized in Box 4 shows how regulatory processes and standardisation structures interact.

As another topic, the interviewee appreciated the work of the European **High-Level Forum for Standardisation**, which cooperates with national strategy committees. However, closer cooperation between these two levels was suggested. More information related to this recommendation will be provided in Chapter 5.

Framework condition described in the interview:

The New Legislative Framework (NLF) is a key legal framework to promote the harmonisation of standards and the safety of products within the European Union. In this context, harmonised European standards are listed in the Official Journal of the EU, which is central to standardisation and regulation in the Union. If a standard that has been developed over many years is not listed in the Official Journal, it is not officially a harmonised European standard.

Problem according to the interview:

There are considerable **delays** in the listing of these standards, which are caused by stricter controls by the European Commission's legal service following judgements by the European Court of Justice (ECJ). These delays are causing **uncertainty** for companies that rely on these standards to make their products legally compliant. Without an official listing in the Official Journal, companies cannot be sure that they are compliant with regulatory requirements, which brings legal risks.

Broader consequences according to the interview:

These difficulties can hinder technical progress and the innovative strength of the industry. The lack of timely recognition of standards makes it difficult for companies to develop new products and processes that meet current requirements.

Suggested solution according to the interview:

A clear regulation that defines harmonised European standards as not being part of European regulation. This should increase the dynamism and efficiency of the standardisation process.

Box 4: Current NLF challenge of listing harmonised standards in the Official Journal of the EU according to the RISERS interview on overarching policy needs to support IS

In line with the expert's statement on the EoW status, the work on RISERS' IS Standardisation Roadmap, particularly the Interim Plenary Session on 5 June 2025, highlighted the need for EU-wide harmonisation of EoW criteria. Specifically, its working groups on EoW and digitalisation emphasised the need for clear regulatory pathways, e.g., clarity on EoW status and by-product use.

3.2.1.3 ENVIRONMENTAL PERSPECTIVES

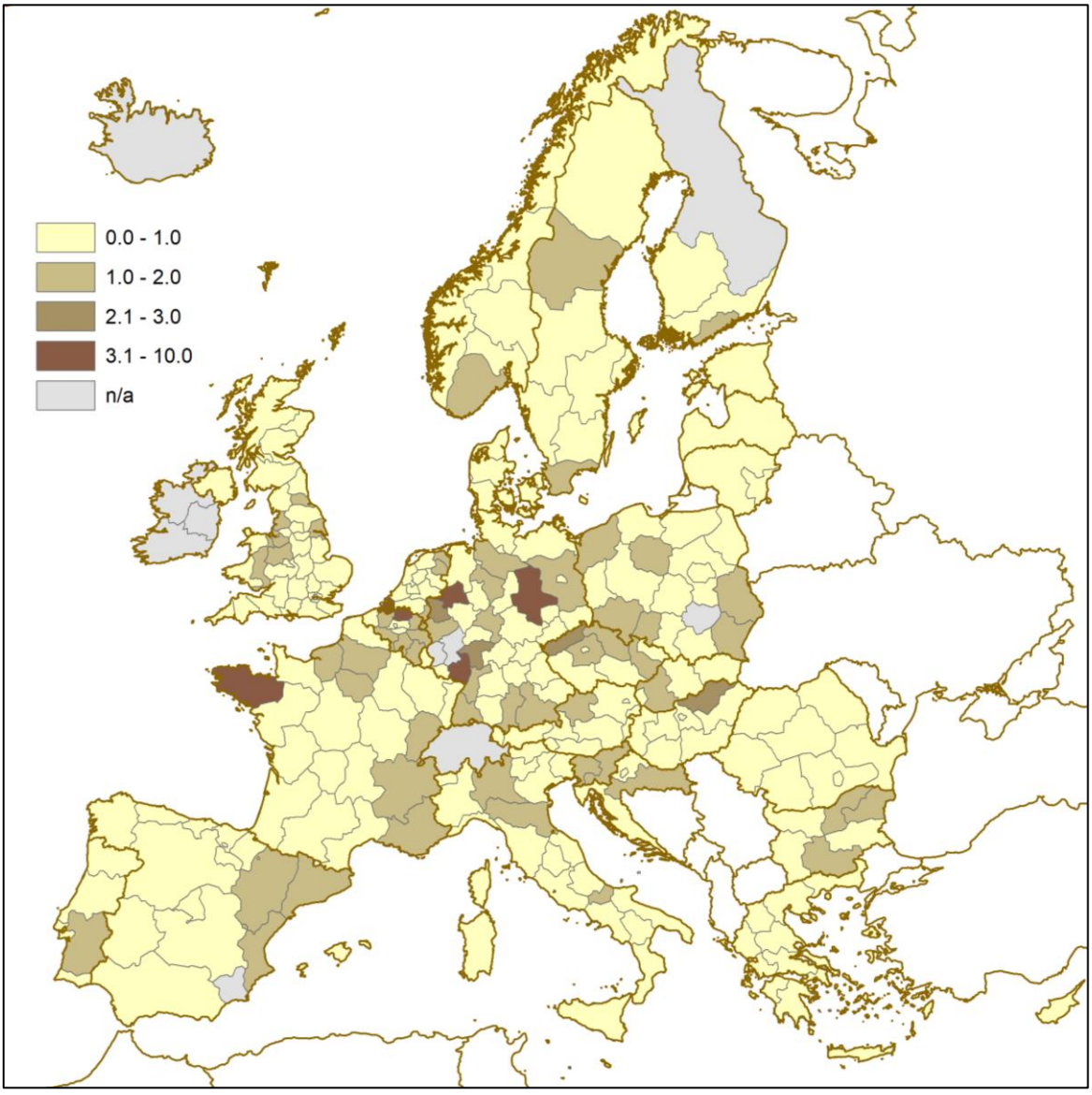
According to the interview on environmental perspectives presented in Table 3, IS in the EU is **underdeveloped, especially in the heavy industries** such as steel and cement. Some of the issues include policy restrictions, such as those stemming from the WFD, and a lack of strong incentives due to free emissions allowances under the EU Emissions Trading System (ETS), which reduce the urgency for industries to decarbonise and adopt circular practices and IS.

Since the main focus of the interview was on the steel and cement industry, the content was included in the sections of these two industries (see Sections 3.2.2.2 and 3.2.2.3).

3.2.2 SECTOR-SPECIFIC RESULTS

3.2.2.1 CHEMICAL INDUSTRY

The importance of the chemical industry for the European economy and its IS relevance was described in detail in RISERS Deliverable 5.1. In addition, Figure 5 shows its significance in Europe's region based on the sector's employment share per region.



Note: the figure shows the share of employees in the chemical industry (NUTS 2 level, C20) among employees in sections B-J, L-N (in %) for the year 2020 (UK 2018), own illustration and calculation by Fraunhofer ISI, data source: Eurostat (cartographic representation: ArcMap (ESRI))

Figure 5: Importance of the chemical industry in Europe's regions based on the share of employees

The figure refers to NACE[3] code C20 (Manufacture of chemicals and chemical products). A common economic view on the industry also includes the related NACE code C21 (Manufacture of basic pharmaceutical products and pharmaceutical preparations) and parts of code C22 (Manufacture of rubber and plastic products) when referring to this industry.[4] Therefore, this representation can be considered conservative, and it can be argued that the importance of the industry is even greater.

The industry representative of the interview on the chemical industry presented in Table 3 highlighted this industry's importance as the foundation for many products across various sectors. He explained that chemical production is highly energy-intensive, and that a transformation towards renewable energy is necessary for more sustainable operations. Political support is needed, particularly through the creation of a favorable energy mix, to secure the industry's competitiveness.

In addition, the interviewee emphasised that the chemical industry is currently facing significant challenges in its transformation efforts, particularly in relation to IS, chemical recycling, and the transition to sustainable electricity sources. While the industry has the potential to upcycle plastics, the process remains prohibitively expensive under current market conditions.

Regarding chemical recycling, which the interviewee referred to as a promising technology for recycling plastics, the challenges of its competitiveness compared to traditional recycling methods were described and the need for political frameworks that support and promote chemical recycling was stressed.

To facilitate the transition, there is also a pressing need for **innovation funding** that can support the development of new technologies and processes. Additionally, there is considerable interest in participating in **IPCEI projects**[5], which could provide valuable resources and collaborative opportunities for the sector. However, to effectively implement these initiatives, it is crucial to reduce **bureaucracy and streamline approval processes** for chemical recycling plants. The digitalisation of regulatory processes could significantly enhance efficiency and speed up the deployment of innovative solutions.

Moreover, the industry seeks to alleviate some of the burdens associated with **sustainability reporting requirements**, which can be cumbersome and time-consuming. It is also important to note that imposing quotas for chemical recycling at this stage could be detrimental to industry, as the method is not yet financially competitive. Finally, the chemical sector is characterised by its heterogeneity, making a green lead market undesirable at this time, as it may not adequately reflect the diverse capabilities and needs within the industry.

Addressing these challenges through targeted support and policy adjustments will be essential for the chemical industry to successfully navigate its transformation and contribute to a more sustainable future.

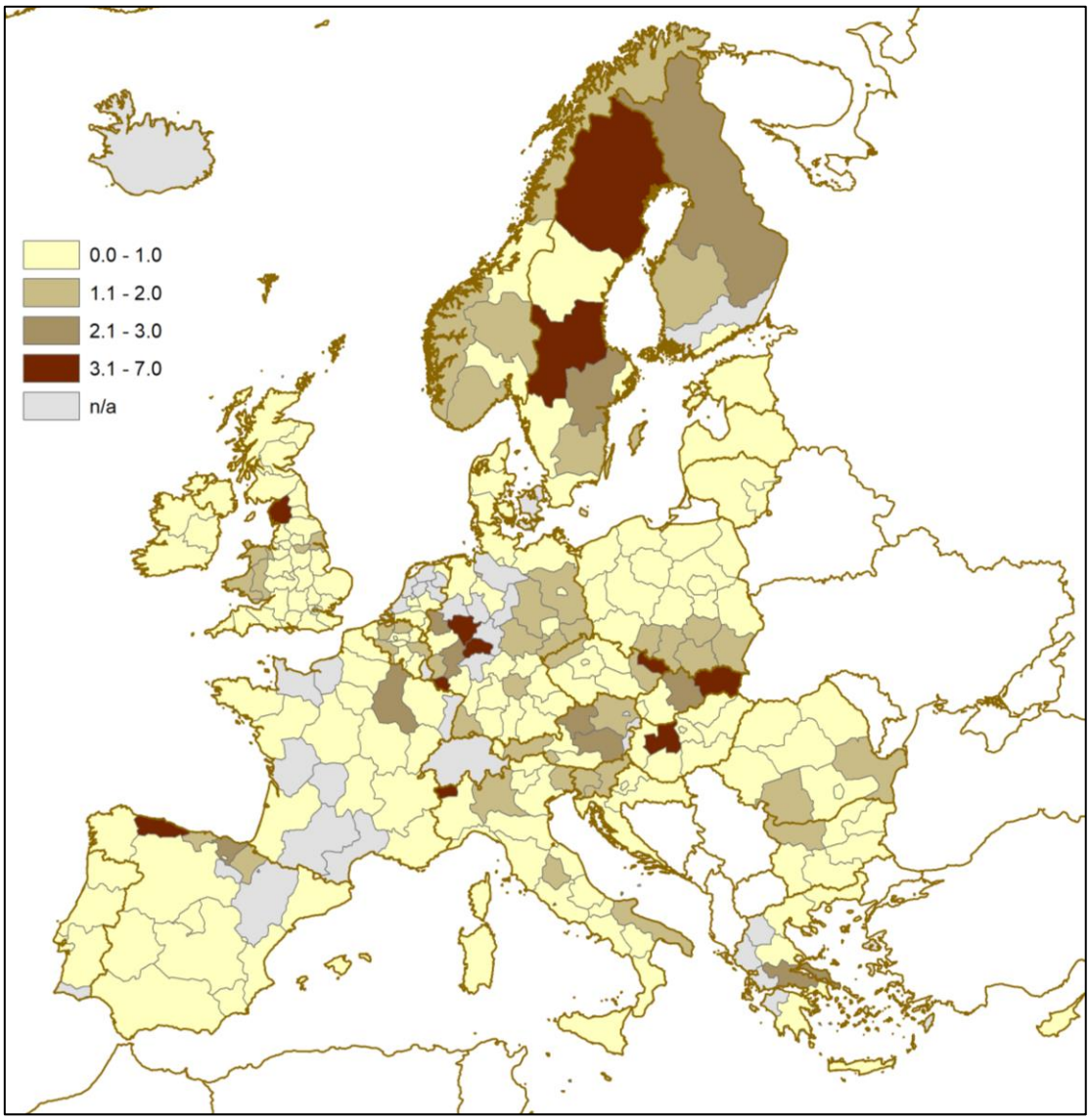
Analyses carried out in RISERS WP3 on plastic packaging have also shown that one problem with chemical recycling is that chemically recycled materials have not yet been included in the standards for recycled content. The need to address this problem is also highlighted by CIA (2024).

[3] See https://ec.europa.eu/competition/mergers/cases/index/nace_all.html
[4] See for example, VCI (no date) and RISERS (2024c)
[5] See section 2.1 of this document

In addition, the case study in WP3 demonstrated a major bottleneck in the cross-border transport of waste streams between Member States, as waste definitions are unclear and differ and transport authorisations and notifications are time-consuming. EU waste legislation is not coherently implemented, which creates challenges when crossing EU borders regarding the documents needed.

3.2.2.2 STEEL INDUSTRY

As mentioned in Section 3.1, steel represents another important IS sector in Europe. The following figure provides an indication of the sector's importance in European regions.



Note: the figure shows the share of employees in metal production and processing (NUTS 2 level, C24) among employees in sections B-J, L-N (in %) for the year 2020 (UK 2018), own illustration and calculation by Fraunhofer ISI, data source: Eurostat (cartographic representation: ArcMap (ESRI)), employment data is not available on more specific levels of the steel industry

Figure 6: Importance of the steel and metal industry in Europe's regions by the share of employees

As also mentioned in Section 3.1, two interviews introduced in Table 3 focused on the steel sector specifically. This section presents the results.

The interviewee who presented an environmental perspective on IS described IS as somewhat established in the steel sector, as many steel by-products already have markets. In this context, the **Ecodesign Regulation** was described as advancing, potentially introducing recycled content targets. Challenges were observed when new steel production technologies emerged (such as the Electric Arc Furnace - EAF - route). There are often no existing standards to accommodate their by-products, making it difficult for them to enter the market.

The other interviewee also describes the potential benefits of additional guidance for steel companies to better understand the needs of other sectors with which individual IS relationships could be established. Needs for policy support were particularly described in the fields of IS involving dust, slag and scrap. In this context, EAF slag and Blast Furnace-Basic Oxygen Furnace (BF-BOF) are distinguished. According to EUROFER,[6] over 40% of EU steel is produced via the EAF production route.

The specific needs for policy/regulatory measures are described in Table 4.

Topic	Current situation	Challenges
Dust	Blast furnaces (BF) and sinter plants efficiently recycle by-products like dust and small particles, i.e. by processing them in the sinter plant for reuse in the BF. Zinc from steel production dust can be recovered and sold as metal.	The shift to Electric Arc Furnace (EAF) production, driven by decarbonisation goals, creates challenges for the reutilisation of fine residues due to absence of sinter ovens in this process, potentially reducing circularity and increasing landfill disposal.
Slag	Slag, especially BF slag, is well established in uses like cement production and aggregates. BOF and EAF slag is also used in fertilisers. It offers carbon reduction potential there, but the market is still small due to strict regulations in some Member States.	Shifts to EAF production are linked with changes in slag chemistry, impacting current applications. Where BF is used, this shift in chemistry could raise costs and complicate sourcing low-cost slag. Conversely, EAF is more suitable for asphalt production than BF slag. The growing focus on extracting critical raw materials from by-products like slag based on the Critical Raw Materials Act could lead to changes in the chemistry, potentially reducing slag's suitability for IS. A balance between recovering critical materials without losing the benefits of slag in certain applications is needed.
Other	Non-integrated steelmaking offers waste recirculation opportunities, such as recycling pickling solutions to recover water and extract high-purity iron oxide for applications such as magnets.	

Table 4: Examples for IS options in the steel industry and their challenges

Two important IS options for slag are cement and fertilisers. Slag offers carbon emissions reduction

[6] https://www.eurofer.eu/about-steel/learn-about-steel/what-is-steel-and-how-is-steel-made

potential in fertilisers, representing the highest reduction potential followed by the cement industry, with lower savings for aggregates. However, by referencing research by the Institut für Baustoffforschung FEhS the expert describes that the market is still small due to strict regulations in some Member States.[7]

The cement industry representing important IS applications for the steel industry also needs further support. As the industry shifts to EAF production, changes in slag chemistry are impacting current applications. Therefore, researchers are exploring, for example, new ways to make EAF slag more suitable for cement production and in insulation applications. Specifically, the interviewee describes that research explores ways to make EAF slag more suitable for cement production and to support IS.

The following discussion had a specific focus on slag and ferrous scrap. According to Table 5, needs for policy measures were discussed regarding **the recognition of by-products as slag, a classification and EoW criteria for slag.** Likewise, the table describes the **need for maintaining the waste status of ferrous scrap** and a definition of recycling in the steel context.

In addition, the interviewee described ongoing discussion within the industry to **improve the quality of scrap shredding** because contaminated or mixed scrap can affect its usability in various products. The challenge remains how to enhance scrap quality without raising costs for steel producers, and the question is who will bear the cost of these improvements?

Another topic discussed considered the needs of the cement industry. It referred to EoW in waste-to-energy & emissions **reporting**. Clearer EoW criteria are needed, especially for materials used as fuel in waste-to-energy processes, to ensure proper emissions reporting. Currently, there is ongoing discussion in the cement industry about how emissions from burning waste, such as tires in cement kilns, are accounted for. The cement industry argues that burning tires is waste disposal, allowing them to shift emissions responsibility to the tire sector instead of cement production.

[7] Example countries were not discussed in the interview. However, further research by the authors on FEhS studies led, for example to this presentation: https://www.estep.eu/assets/Events/2025/Slag-WS/Presentations-to-share/2-1st-Session-A.-Sokol-FEhS.pdf. The topic is for example discussed on slide 17.

Slag	Ferrous scrap
• Need for **recognising by-products such as slag** alongside recycled content in regulatory frameworks such as the Construction Products Regulation and the Ecodesign for Sustainable Products Regulation (ESPR). The interviewee highlighted that industrial by-products have similar benefits as recycled content in that they displace primary production and contribute to a lower carbon footprint in products. • A unified framework is needed across the EU regarding the **classification of slag**, as different Member States view slag differently, e.g. as product, by-product, waste or even hazardous waste, which affects its movement between countries and creates regulatory uncertainty. There is a need for policy efforts that focus on achieving a common view across the EU to create a more integrated and functional market, but it is unclear what the best legislative framework is. • Discussions with the DG Environment Waste Unit have explored the potential for developing **EoW or by-product criteria for slag** in the construction sector, which could help standardise its status across the EU. However, this requires careful consideration as overly strict criteria (e.g. on metal leaching) may limit slag's use in various applications, while classifying slag as EoW could remove important environmental, social and safety controls that apply when materials classified as waste.	• Need for **maintaining the waste status** of ferrous scrap. This ensures that shipments out of the EU comply with the Waste Shipment Regulation. Around 20% of European scrap is already exported, so despite being classified as waste, there is actually no barrier to trade. • **EoW criteria are not particularly useful** for scrap, despite existing criteria for scrap classification. Scrap must undergo remelting, which is the final recycling step. If scrap were classified as EoW before remelting, it would be counted as recycled prematurely - potentially just by being sorted. • There should be a clearer **definition of recycling** in steel industry policies. Some stakeholders refer to collected, sorted and prepared scrap as "recycled steel," which is misleading, as steel is only truly recycled once it is remelted in a furnace and transformed into new steel. Additionally, there is interest in redefining recycling within the WFD to distinguish between high quality recycling which maintains material's properties and allows it to be reused without degradation (as is the case with steel and metals) and low-quality recycling (such as that of crushed concrete used as fill material). This distinction is important to address the goal of preserving the material's value.

Table 5: Needs for policy measures related to slag and ferrous scrap and related challenges

Specifying the interview results, RISERS Working Group 04 on Steel, Slag & Refractories identified the following needs for opportunities to support IS in **steel production & by-products** and presented them online in RISERS' Interim Plenary Session of the IS Standardisation Roadmap on 5 June 2025:

- A CPR revision
- The use of Digital Product Passports to enable better traceability and recognition of secondary materials and
- An expansion of harmonised standards and environmental reporting to support wider slag utilisation

On this basis, five requirements were formulated:

1. Clarify legal status of slag (waste vs. by-product) across the EU
2. Include EAF/BOF slags in harmonised standards (e.g. CPR)
3. Align REACH obligations with actual risk for low-hazard secondary materials
4. Harmonise environmental performance reporting incl. lifecycle assessments (LCA) under the CPR revision
5. Support R&D and demonstration projects for slag valorisation and critical raw material recovery

Items 1, 2, and 4 provide additional support for our findings and summarise them appropriately. Item 3 adds an additional dimension to the needs portfolio, while item 5 continues the reflections on research into slag valorisation, the added value of which was outlined in the interview.

3.2.2.3 CEMENT INDUSTRY

According to Table 3, two interviews focused on cement and complemented each other with their different perspectives on the topic. While one interview focused on the use of energy and residues from the cement industry, the other interview focused particularly on IS with the steel industry. Complementing the first interview, additional recommendations were given in an interview on IS in the steel industry in Section 3.2.2.2, with a specific focus on waste-to-energy and emissions reporting.

According to the first interview on the cement industry, the state of IS in the sector is advanced, but significant disparities between Member States (MS) exist. Northern MS are described as tending to be more advanced, while Southern MS face challenges such as high landfill rates and inadequate separate collection practices. There is a need for consistent implementation of the landfill directive, and improving separate waste management at the source is essential to enhance reuse options.

The use of IS has been established for many years, with targets for carbon neutrality driving progress. The sector is increasingly utilising biogenic waste for energy, which is viewed as a neutral CO_2 emission source. There is a clear differentiation between recycling processes and incineration, with a growing focus on alternative fuels to enhance energy independence and reduce reliance on fossil fuel imports.

Regarding policy and regulatory needs, the interview highlighted the necessity for the full implementation of the **Landfill Directive** and improvements in **separate waste collection**. It emphasised the importance of effectively executing existing policies and providing better guidance before first considering the introduction of new regulations.

According to the second interview with a stronger focus on IS with the steel sector, the sector is rigid due to **"recipe-based" standards**, which specify fixed chemical compositions, including clinker content and allowable substitutes like steel slag (vs. **performance-based standards in the steel industry**). Even if alternative by-products (e.g., steel slag or recycled glass) could technically replace clinker, they are often excluded from EU standards, making market entry difficult. Introducing new substitutes outside the listed standards is difficult due to a conservative market, requiring extensive testing and costly certification.

The interviewee also explained that the European cement industry only adjusts standards when it secures control over the supply chain. In contrast, countries like the US and UK have more flexible, performance-based standards, allowing greater innovation and the use of alternative materials. For example, the UK has recently allowed recycled glass in concrete, a material scientifically proven to substitute clinker but still restricted in the EU.

Responsible parties to the **CPR** plan to introduce ecodesign requirements for cement and concrete. According to the interview, it is important that this regulation, which actually states that standards should be **performance-based** and technology-neutral, is implemented correctly.

The ongoing revision of cement standards is expected to expand their scope, which is regarded as a positive development from the perspective of IS. However, a key issue is the lack of harmonisation of concrete standards across MS. Even if cement standards allow a certain material, national bodies can still restrict its use in concrete, leading to a fragmented internal market with limited competition. Greater market openness could improve by-product utilisation and drive decarbonisation.

The interviewee also referred to IS-supporting developments in public procurement. Public procurement policy aims to phase out clinker-intensive products, encouraging the use of alternative materials, including locally available by-products.

Introducing criteria on global warming potential and natural resource consumption could support circularity and the business case for by-products. For example, mandatory **thresholds for construction materials in public procurement** could help create lead markets for low-carbon materials and improve clarity around by-product use.

The Energy Performance for Buildings Directive aims to set targets for reducing global warming potential per square meter of new buildings, encouraging the use of low-carbon materials like steel, cement, and concrete. Ecodesign legislation can further incentivise low-carbon materials in construction projects.

Overall, there is a growing push in the construction industry for mandatory Environmental Product Declarations (EPDs) for materials like steel, cement, and concrete, requiring producers to report on environmental impacts, including global warming potential.

In terms of **LCAs,** there are challenges in applying consistent standards across countries. EN 15804 standard for EPDs for construction products is not yet harmonised across MS, and there is room for improvement in allocation methods and enforcement and oversight across MS. Improvements in the standards and clearer regulatory guidance are necessary to ensure better consistency and comparability across different regions and industries.

A key challenge is seen in the ongoing **debate between the cement and steel industries** over the valorisation of by-products like steel slags (see also the section on steel), with disagreements about the allocation methods. Clearer guidance from the EC is needed on allocation methods for both industries to resolve conflicts and prevent future disputes with other by-products like glass recyclates or paper ashes.

3.2.2.4 FOOD INDUSTRY

Based on the results of RISERS Deliverable D5.1, the interview in the food industry introduced in Table 3 had a specific focus on the sugar industry. According to the industry representative, the industry's by-products reused, mainly for the production of animal feed. Circular economy/IS is practiced and well-developed in the product value chain. The most important policy is the Bioeconomy Strategy in this context. It emphasises a circular economy and refers to processes for bio-based products, materials, and energy.

The sugar sector benefits also from a well-developed sustainability certification system; the International Sustainability & Carbon Certification (ISCC). The principles of this voluntary initiative are based on existing directives and regulations, which are of key importance in this respect. Nevertheless, needs to support IS specifically remained, e.g., to use the industry's by-products when no opportunities for use for animal feed production exist.

Resulting needs for policy support include, in particular, clear regulations regarding the use and management of various types of residues in the sugar sector in the context of the **WFD**. Clear and flexible guidelines for the **classification of residues** as waste or substrate are necessary for waste streams management decisions. The economic and environmental conditions for processing and use by products and residues are of key importance in this respect.

According to the interviewee, there is a need for a flexible approach to classifying residues as waste or as substrate. In this context, there is a need to update the **Renewable Energy Directive** (RED) III (European Parliament and the Council, 2023), regarding the inclusion of beet pulp as a substrate for biogas plants in cases where there is no local market for feed from pulp or the demand is limited. This is a more ecological and economical solution than putting it through an energy-intensive dehydration process to enable its transport and later use as animal feed or in other more advanced processing.

In addition, the RED III revision should ensure that carbon emissions from production of biogenic energy for heating based on waste and residues, such as beet pulp, are counted as zero emissions. This would enable meeting the requirements of decarbonisation of the sugar industry according to RED if the energy generated from residues is produced in sugar refineries.

An additional topic of food-related IS was discussed in the interview on the bio-based ecosystem. Regulatory gaps concerning food and food safety were described, which currently prevent industries from utilising various IS-based materials for food-related applications.

3.2.2.5 BIO-BASED ECOSYSTEM

As described in RISERS D5.1, bioeconomy gains increasing importance in the strategic focus of the European Union and has been identified as a key sector to achieve the Union's sustainability and climate targets. The EU's dedicated Bioeconomy Strategy focuses on developing a sustainable and circular bioeconomy to address societal challenges and enhance the competitiveness of bio-based industries.

Regarding IS, the bio-based economy faces various challenges according to RISERS' two interviewees from the bio-based ecosystem, who were GDPR-conformal briefly introduced in section 3.1.3.

Key issues include the need for a certain and constant quality of feedstock, the availability of specific quantities of feedstock, acceptable pricing, delivery guarantees, and the high costs associated with infrastructure development. To address these challenges, several suggestions have been made.

Firstly, the acceptance of the **term "waste"** should be reconsidered: avoiding this term could help increase general acceptance of by-products and recycled materials. Additionally, establishing **incentives** for the use of recycled materials instead of virgin materials whenever possible, or on a percentage basis, would encourage more sustainable practices.

Moreover, **procurement quotas** for governmental institutions could play a crucial role in establishing the bioeconomy, as these quotas would promote economies of scale and stimulate demand for bio-based products. Harmonised descriptions of **quality and purity levels for by-products** are also desired to ensure consistent standards across the industry.

Reducing **barriers to innovation** is regarded as essential. This includes minimising **bureaucratic hurdles and shortening approval processes** for new initiatives. Furthermore, **taxing** fossil-based products could provide the necessary revenue to subsidise the bioeconomy, making it a more competitive and viable alternative. Finally, policymaking should prioritise support for the bioeconomy, ensuring that regulations foster growth.

The **Interim Plenary Session of the IS Standardisation Roadmap** Working Groups also highlighted that regulatory issues hinder IS progress. In line with the interviewees who expressed the wish to have incentives for recycling or quota, the lack of recycling mandates was highlighted. In addition, insufficient green hydrogen incentives were described.

Regarding possible regulatory changes, five topics were emphasised: 1. implement an obligation to recycle biomass and waste to avoid landfill and incineration, 2. simplify the Guarantee of Origin to boost the markets, 3. improve the RED, 4. create incentives for green hydrogen for shipping and trucks and 5. provide financial and tax incentives for CO_2 trade and biomass valorisation.

On this basis, recommendations 1 and 5 emphasise and specify the recommendations of the interview, recommendation 3 addresses a topic that was already addressed in the interview in the food sector and recommendations 2 and 4 include additional contributions.

Responding to a request for this report, the requirements to update the RED described in recommendation 3 were summarised by the working group leader as follows: 1. tightening sustainability criteria for biomass (e.g. ban whole tree harvesting for energy), 2. encouraging cascading use of biomass before energy recovery (e.g. construction, furniture, bioplastics), 3. focus on bioenergy on hard-to-decarbonise sectors (biofuels to aviation and shipping, instead of passenger cars and home heating) and 4. providing tax incentives for carbon accounting.

Regarding regulatory barriers, the bioeconomy Case Study in WP3 has also shown complex permitting processes and varying waste transport regulations across countries.

3.2.3 PUBLIC PROCUREMENT

Valuable insights were shared by the expert from the public procurement sector regarding product standards in various product areas. Background information is presented in Table 3 and more details in Annex 3.

Representing an indirect link to its suppliers' IS activities, public procurement's opportunities to require IS practices in its tendering processes are mainly limited to demanding criteria that relate to specific products (or services), according to the interviewee. To attract appropriate numbers of companies applying to the relevant tenders, the tendering criteria must be formulated in a way that is practical and feasible for implementation. The more specific the relevant standards are, the easier it becomes for companies to implement them effectively. In this context, it is crucial that these criteria can be objectively assessed, such as through verification by a quality mark.

Furthermore, it is ideal for these criteria to align with existing regulations, for example the German Circular Economy Act (KrWG).

3.2.4 PERSPECTIVES OF LOCAL COMMUNITIES

The interview on the perspectives of local communities, introduced in Table 3, was focused on IS in cities and regions. The interviewee's organisation is currently engaged in several IS-related projects, particularly focusing on public wastewater management and the implementation of industrial urban symbiosis (I-US) pilots. Based on material shared by the interviewee, the concept and key strategic elements of I-US are described in Box 5.

> While IS focuses on resource-sharing among industries, Industrial-urban symbiosis (I-US) expands this idea to include urban areas, emphasising the symbiotic relationships between cities and industries to create more resilient and sustainable urban environments.
>
> Currently, the primary application of I-US is in the **energy sector**, where waste heat from incineration or industrial processes is used for district heating. Additionally, urban materials are partially reprocessed as feedstock for industrial requirements, such as recycling post-consumer items.
>
> Local and regional authorities can kick-start city ambitions for I(-U)S, **by embedding the concept into city strategies and urban planning documents**. Integrating I(-U)S initiatives into city circular economy, decarbonisation, business development or resource efficiency strategies, sets a long-term direction for I(-U)S developments as part of achieving key local sustainability goals.
>
> To help implement these ambitions, local and regional planners can embed I(-U)S principles into **land-use masterplans**, allowing the necessary proximal urban-industrial infrastructure.
>
> Additionally, local and regional authorities can leverage their purchasing power as **green public procurers**. By prioritising the procurement of products and services that are developed through I-US processes, they can drive demand for circular economy solutions and enhance the functioning of the I(-U)S ecosystem. This not only supports local businesses that are engaged in I(-U)S but also encourages innovation and the development of new, eco-friendly products and services.

Source: ICLEI (2024), selected sections of page 8, highlighted by the authors

Box 5: Industrial-urban symbiosis

Regarding policy support for IS, the need for closer cooperation and monitoring was also highlighted. The importance of establishing procedures to integrate IS and material stream management in the **planning of new infrastructure** and industrial parks was emphasised. In this context, the interviewee stressed the importance of specific I-US strategies described in ICLEI (2024) and Table 6.

Concept	Description
Mapping	Creation of a regional overview of potential IS participants and facilitation of their involvement, ideally with information on resource and waste streams. This allows for the identification of potential synergies and prioritising for the IS with the highest environmental and monetary benefits.
Coordinating	The coordination of stakeholders is best provided by local and regional authorities. These entities possess the capacity to influence the creation of relevant collaborations and offer various functions, including leadership and guidance. The coordination has various elements. Creating a **shared vision** about IS allows for alignment of strategic goals and should include both short-term and long-term goals. Having a person who is responsible for facilitating dialog and cooperation is also important, preferably someone who is already working with local companies on business development. IS requires a lot of **trust** between its participants, which builds slowly. Implementing IS can therefore take 3-4 years to establish. Starting with easy achievable tasks is helpful to lay the foundation.[1]
Funding and Incentivising	Many IS projects necessitate considerable investments at the outset, which may exceed the capacities or risk tolerance of the companies concerned. Programs such as the European Regional Development Fund (ERDF), are available to local or regional authorities. Likewise, local and regional authorities have the capacity to **incentivise** the implementation of IS in a variety of forms. One such strategy is the allocation of funds or the establishment of incubator programs.
Regulating	Local and regional authorities can design and implement policies that promote I(-U)S by prioritising waste reduction, reuse, and the efficient use of resources. This includes **setting local waste reduction targets, and developing regulations to promote the reuse of by-products and waste materials** within local industrial networks, thus reinforcing the incentives to engage in I(-U)S.
Dialoging	The time and financial investment required to meet licensing, standards and regulatory obligations to achieve secondary raw material status represents a barrier for companies to engage in symbiotic relations. To address this, local and regional authorities can **open a dialogue with regulatory bodies and industry, to streamline regulatory processes**. This might involve simplifying licensing and compliance procedures related to the use of secondary raw materials, or creating a unified regulatory framework that reduces the bureaucratic burden on companies seeking to engage in I(-U)S activities.
Awareness raising	The enhancement of **visibility and awareness** through the dissemination of success stories in conjunction with the establishment of stakeholder forums has been demonstrated to facilitate the development of additional initiatives involving IS. Furthermore, the adoption of IS can be further augmented by the influence on educational programs and participation in research projects.

[1] In addition to ICLEI's description of instruments that support trust in I(-U)S related processes, the RISERS consortium is convinced that formal standards can also play a big role in stimulating such trust.

Source: selected sections of ICLEI (2024), combined and highlighted by the authors

Table 6: Key strategic elements of Industrial-urban symbiosis for regional management

In terms of specific sectoral needs, better application and management of **wastewater** in irrigation, and the implementation of realistic municipal waste reduction targets in cities and regions are pointed out.

Further policy needs include clearer **definitions of** the terms **"by-product" and "waste"**, along with the reduction of regulatory complexity for strategic residues like wastewater. Relevant actors to support these efforts include industries experienced in material exchange, environmental public associations, waste management entities, and research institutes.

The interviewee stresses the necessity of aligning standards and regulations through technical committees and supports the development of standardisation methods that are applicable in real-life IS contexts. The expert also underlined the importance of refining regulatory measures through practical **standard** applications.

As mentioned at the beginning of Section 3.2.1.1, the interviews led to several sets of recommendations, which are presented in Chapter 5.

3.2.5 ADDITIONAL NEEDS IDENTIFIED IN OTHER WORK PACKAGES

In collaboration with RISERS WP6 and WP3's case studies, additional needs for policy measures were identified.

Besides the interim results of the roadmap discussions already described in the relevant chapters, inconsistent applications of the WFD, EoW criteria, and export rules under the Waste Shipment Regulation and bottlenecks in shipment were also highlighted. Therefore, harmonising the application of existing EoW criteria and Waste Shipment Regulation was suggested.

Additional topics of Task T3.3's case studies and the roadmap refer particularly to energy-related IS, battery recycling and textiles.

An important topic in this context is **energy flexibility** and the need to remove **regulatory barriers** (e.g. registration of energy communities and energy sharing). In this context various recommendations of DECIDE (no date) and FLEXindustries (no date) were also mentioned.

Concerning **batteries recycling,** rules on the calculation of recycling efficiency (technology neutrality: Umicore, 2024), LCA and mass balance approach instead of creating transport burden, see RECHARGE, 2025).

Regarding **textiles,** a need is seen to advocate for regulations that mandate the use of post-consumer recycled content in new textile products and support the development of eco-design standards.

4 PART B: STANDARDISATION SUPPORT FOR POLICY FRAMEWORKS PROMOTING IS

4.1 METHODS

EoW has a major influence on the application of IS. To understand how EoW has progressed, at EU and Member State level. An extensive literature review was undertaken to identify applications of EoW criteria across Europe, including methods of determination at EU level, national level and more local level. This allowed the identification of the different practices that were being implemented with particular interest incommonalities and where deviations occurred. This included articles produced by the Joint Research Centre, national governments such as the Irish EoW for pulverised fuel ash (see EPA, 2025) and the Romagna Region of Italy (see ER, no date). A complete picture of how EoW is being implemented better facilitates inputs to policy recommendations within RISERS' proposed IS Standardisation Roadmap.

Interviews were also conducted with representatives of Joint Research Centre, Standards Norway and DIN. The RISERS work has been presented to the COST LIAISE[8] project during its "Policy Frameworks for Industrial Symbiosis: Navigating Regulations and Incentives" webinar in January 2025, where feedback was sought from the participants. A meeting with DGs GROW and ENV took place in June 2025 where proposals were presented and feedback sought. Particular interest was shown regarding the priority resources that RISERS had identified. Further meetings have been sought with Bundesverband der Deutschen Entsorgungs-, Wasser- und Kreislaufwirtschaft (BDE), Federation of the German Waste, Water and Circular Economy Management Industry, Germany.

4.2 CURRENT RESULTS

A proposal for RISERS' IS Standardisation Roadmap based on the use of vertical and horizontal standards has been developed under task T6.3. From the discussions that have taken place, the proposals to use standards to address the shortcomings of the by-product/EoW situation have been broadly met with positive feedback. Issues relating to copyright and fees associated with standards have been acknowledged, and these will need to be addressed going forward.

While the activities continue, such as further discussions with organisations involved in the field, the findings have been presented in WP6 through the established working group WG02 – End-of-Waste which has enabled a wide range of participants to feedback into the process.

[8] See https://www.liaise-action.eu/driving-sustainable-industrial-practices-liaise-cost-action-kicks-off-with-a-vision-for-inclusive-industrial-symbiosis/ for details

5 PRELIMINARY RECOMMENDATIONS

5.1 RECOMMENDATIONS PART A

5.1.1 SUMMARY OF FINDINGS

This report aims to support IS by specifying needs for policy measures and formulating preliminary policy recommendations as a basis for further specification in RISERS Deliverable D5.3. To develop appropriate recommendations, the interview series, the case studies and the roadmapping activities consistently express various stakeholder needs, in particular regarding EoW criteria, product passports, and specific areas such as the CPR regarding steel and cement. According to Table 7, 13 overarching policy recommendations were derived, which are described afterwards. Additional recommendations for specific stakeholder groups are presented in sections 5.1.2 to 5.1.4.

Recommendation	Description
Harmonise resource definitions and specify EoW criteria	Establish clear, uniform definitions for waste and by-products across the EU to facilitate cross-border transport of waste streams, use the term “resource” or other suitable terms instead of “waste” whenever suitable.
Harmonise IS standards, in particular LCA and EPD standards and ensure fast publication	Ensure that RISERS’ roadmap gets support by key stakeholders in EU MS, improve harmonisation of standards like EN 15804 to ensure consistent LCAs and environmental reporting across MS and industries, improve the framework conditions for the publication in the EUOJ.
Develop standards on the characteristics of by-products	Stimulate the use of by-products in industry wherever possible to facilitate market access and enhance circularity.
Develop effective measurement methods to provide product passport data	Invest in the development and implementation of standardised measurement methods for product passports to improve traceability and compliance.
Analyse suitable options to promote harmonized Environmental Product Declarations (EPDs) for construction materials	Analyse suitable options to promote harmonized EPDs for construction materials such as steel, cement, and concrete to enhance transparency regarding environmental impacts and encourage producers to adopt more sustainable practices.
Maintain distinction between standards and regulations	Ensure the preservation of the NLF by clearly defining the boundaries between standards and regulations. (overarching recommendation, not limited to IS).
Reduce the bureaucratic burden of IS initiatives	Promote digitalisation to facilitate IS-related activities. Work on further measures to improve the administrative framework conditions of IS, harmonise requirements on cross-sector and MS levels to facilitate resource exchange and trade across MS.

(table continues)

Recommendation	Description
Address energy-related needs of IS appropriately	Pursue the goals of RISERS' roadmap related to Energy Data & Grids and hydrogen. Work on further measures to improve the energy-related framework conditions of IS.
Provide innovation funding and investment incentives	Provide innovation funding for chemical recycling and other transformative technologies.
Establish clear standards, also ensuring regulatory compliance to support IS in public procurement	Develop and enforce clear standards for public procurement processes to enhance the effectiveness of tender applications and support sustainability initiatives.
Intensify the coordination between regulation	Ensure clearer coordination between regulations, such as CPR, ESPR and the new CEA to avoid regulatory overlap and clarify IS requirements.
Provide support for local initiatives	Encourage local and regional authorities to coordinate and support IS projects to build trust among stakeholders.
Promote industry dialogues and education	Promote dialogues, educational programs and knowledge exchange to raise awareness of IS and its benefits.

Table 7: Overview of general RISERS recommendations to support IS

EU-wide **Harmonisation of Resource (including Waste) Definitions and specification of EoW criteria** was explicitly required by our interviewees. As described in Chapter 3, it is important to give companies certainty that they have left the waste regime and are back in the raw materials regime.

Specifically related to steel, regulatory challenges of inconsistent classification in MS (waste versus by-product) were described. Particular needs refer to harmonised assessment methodologies for slag properties, especially for BOF and EAF slags and the inclusion of EAF/BOF slags in harmonised standards (e.g. CPR). Likewise, a need to develop EU-level technical guidelines and harmonised EoW criteria for post-use refractories was mentioned. Furthermore, it is important to clearly define recycling in the steel industry, distinguishing between processed and remelted scrap to ensure accurate reporting and accountability. More recommendations regarding the definitions of by-products are described in a specific section below.

In the **sugar industry**, there is a need for clearer regulations regarding the classification of residues and an update to the RED III to enhance the use of by-products, such as beet pulp, in biogas production.

Needs for harmonised standards result, for example, in the lack of these standards for non-BF slags according to RISERS' roadmap work, while an expansion of harmonised standards and environmental reporting could support wider slag utilisation.

Analyse suitable options to promote harmonized of **Environmental Product Declarations (EPDs)** for construction materials such as **steel, cement**, and concrete is another recommendation. Mandating EPDs could enhance transparency regarding environmental impacts and encourage producers to adopt more sustainable practices. This analysis must also take into account that the positive effect of the

simplifications for companies as a result of this transparent provision of information is not relativised by inappropriate financial burdens.

Regarding **by-products,** RISERS' Interim Plenary Session of the IS Standardisation Roadmap on June 5, 2025 required a new paradigm for by-products, wastes and resources based on standards. Establishing clear and uniform definitions for waste and by-products across the EU is vital to facilitate the cross-border transport of waste streams, reducing bureaucratic hurdles and promoting a more integrated market. In line with our interview with the industry association, the roadmap event specifically linked by-product-related needs to steel. Developing standards for **slag treatment processes** for the use as by-product was required.

Another need refers to the development of **effective measurement methods to provide product passport data.** Complementing the descriptions in the interviews, RISERS' Interim Plenary Session of the IS Standardisation Roadmap highlighted the need to provide appropriate LCA data and additional standardisation support.

Regarding the **distinction between standards and regulations,** the preservation of the NLF is regarded as very important to maintain the demarcation that standards are not part of regulation. This need is explained in more detail in Section 5.1.2.

To reduce **bureaucratic burdens,** the need for digitalisation in the chemical industry reflected the needs description in European Commission (2025a) in a specific sector. Likewise, the need to reduce the burden of bureaucracy in general, highlighted in RISERS' interviews on the chemical industry, the bio-based ecosystem and regional needs emphasise another need for action described in European Commission (2025a). In this context, appropriate reduction measures are important, which ensure that security and safety stay untouched. Analytical work is needed to identify appropriate options for the bureaucracy reduction measures. In addition, it is important to harmonise requirements on cross-sector and MS levels to facilitate resource exchange and trade across MS. The section on by-products already described that clear and uniform definitions for waste and by-products across the EU are vital to facilitate the cross-border transport of waste streams and the reduction of bureaucratic hurdles.

The recommendation to **work on solutions to address energy-related needs is particularly** related to the chemical, steel, and cement industries. However, as mentioned in Section 3.1, energy is also an overarching IS topic.

As for chemicals and bio-based ecosystems, problems with permissions are an important challenge regarding waste heat. According to discussions in the Working Groups in RISERS WP6, there is still some uncertainty about permitting and regulatory issues about installations in the public domain (e.g. district heat-grids) and the competences of private partners, Distribution System Operators (DSOs) and public companies.

Innovation funding and investment incentives play a crucial role in this transformation. **Providing financial support** for chemical recycling and other transformative technologies, particularly in the chemical industry, will foster advancements that align with decarbonisation goals.

Public procurement needs clear and concrete standards with criteria that are practical and feasible for tender applications. More detailed recommendations are given in Section 5.1.3.

Another important recommendation is to intensify the **coordination between regulations**. It is important to ensure clearer coordination between regulations, such as CPR, ESPR and the upcoming CEA

to avoid regulatory overlapping and clarify IS requirements, e.g. for recycled content and ecodesign in construction.

As mentioned in Chapter 3, trust is a key pillar for the growth of IS markets. **Local and regional authorities** must be encouraged to **coordinate and support IS projects**, as their involvement will help build trust among stakeholders and facilitate collaboration.

The recommendation to promote industry dialogues as in the HLF, **educational programs** and knowledge exchange is also vital to raise awareness of IS and its benefits. This is further described in Section 5.1.2.

5.1.2 INTERPLAY BETWEEN STANDARDS AND REGULATIONS

According to the IS interview with a specific focus on standardisation policy, preservation of the NLF is very important as a foundation of standardisation and regulation considerations on IS. Specifically, it was described as essential to maintain the demarcation that standards are not part of regulation. The NLF is presented in detail in Box 6.

The New Legislative Framework (NLF)

Adopted in **2008** by the European Union, the NLF is a comprehensive system designed to improve the **market surveillance** and **conformity of products** within the EU's internal market. It builds on the **New Approach** (1985) to harmonisation and sets out general principles for the placing of products on the market, especially those subject to CE marking.

Core objectives:

- Strengthen product safety and compliance
- Enhance the consistency and clarity of EU product legislation
- Improve market surveillance and enforcement mechanisms
- Clarify roles and responsibilities of **economic operators**

The package reinforces the application and enforcement of internal market legislation by:

- Improving market surveillance rules to better protect both consumers and professionals from unsafe products, including those imported from outside the EU;
- Setting clear and transparent rules for the accreditation of conformity assessment bodies;
- Boosting the quality of and confidence in the conformity assessment of products through stronger and clearer rules on the requirements for conformity assessment bodies;
- Clarifying the meaning of CE marking and enhancing its credibility;
- Establishing a common legal framework for industrial products by a toolbox of measures for use in future legislation to allow future sectorial legislation to become more consistent and easier to implement.

The new legislative framework consists of:

- Regulation (EC) 765/2008 setting out the requirements for accreditation and the market surveillance of products
- Decision 768/2008_on a common framework for the marketing of products, which includes reference provisions to incorporate in product legislation revisions. In effect, it is a template for future product harmonisation legislation
- Regulation (EU) 2019/1020 on market surveillance and compliance of products

Source: based on European Commission (no date a)

Box 6: The New Legislative Framework

The need to support the interrelation between standardisation and regulation was specifically highlighted in the context of the cement sector. In this context, this interplay is particularly crucial for ensuring the safe and effective use of by-products like blast furnace slag. Standards define specific characteristics of cement products, ensuring that any mixed materials maintain necessary strength and quality. The process to develop these standards is exhaustive, requiring thorough classification of inputs as by-products based on their use and hazardous properties. Importantly, standards must also address environmental handling and human health impacts.

As a good example of dialogues between standardisation and regulation, the High-Level Forum on European Standardisation was discussed. It is presented in Figure 7.

The High-Level Forum on European Standardisation is an expert group of the European Commission. It was set up in January 2023 as requested by the EU Strategy on Standardisation.
The purpose of the forum is to identify standardisation priorities in support of EU policies and legislation, and to discuss horizontal issues such as international leadership and education and skills, in a multi-stakeholder setting.

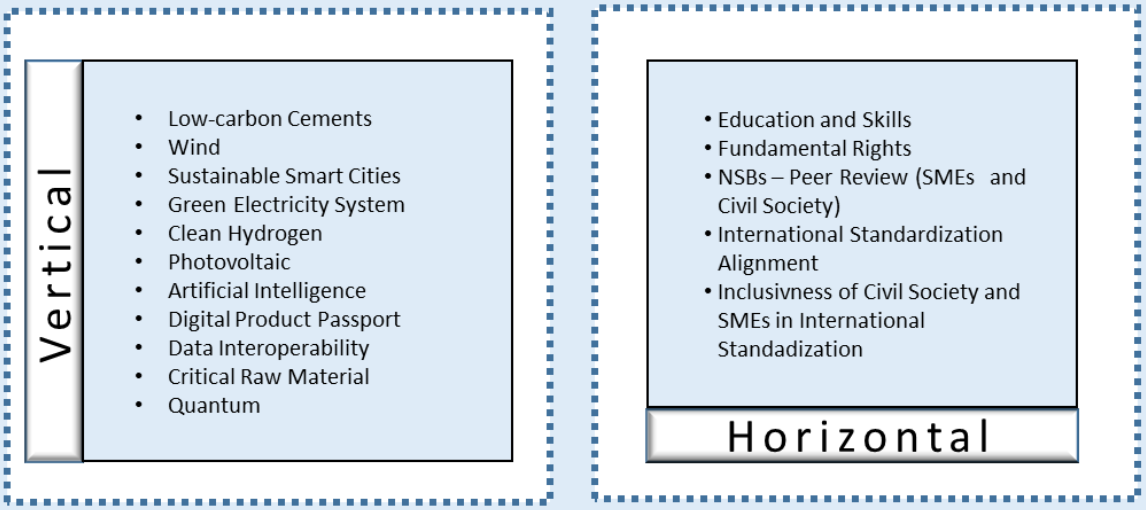
The forum serves 3 main objectives:

- to support a green, digital and more resilient single market by identifying the related standardisation priorities and agreeing on avenues for common action
- to bring more alignment between European policy priorities, industrial innovation and investment activities and standardisation actions
- to discuss possible work strands in support of the implementation of the EU Strategy on Standardisation in a multi-stakeholder set-up

Composition

High-level representatives of up to 60 members consisting of stakeholders from EU/EEA countries, European standardisation organisations, industry, civil society and academia. The current forum comprises 55 members.

Organization of work – workstreams



Source: own figure based on: CEN-CENELEC (2025)

Figure 7: The High-Level Form HLF on European Standardisation

According to the figure, cement, product passports and sustainable smart cities are specific elements of HLF's activities and provide potential for the inclusion of IS topics.

To enhance the utility of standards for regulatory measures supporting IS, three recommendations were formulated, which are shown in Table 8.

Recommendation	Details
Keep the distinction between standards and regulations	Maintain the demarcation that standards are not part of regulation must be ensured.
Deepen industry collaboration	Further encourage and promote collaboration between regulators, industry stakeholders, and standardisation bodies on different levels to ensure that criteria are objectively assessable and compatible with existing regulations.
Ensure continuous updates of standards	Standards must reflect the latest developments and innovations in materials and processes to remain relevant and effective. European standardisation bodies have established standardiszed processes in this context. Likewise, fast inclusion in the Official Journal of the EU is important.

Table 8: Specific recommendations for the interplay of IS standardisation and regulation

As an additional challenge, there is ambiguity in certain regulations, particularly regarding recycled content and secondary materials. Conflicts may arise between the **CPR** and the **ESPR,** which focus on different aspects of sustainability. The proliferation of sustainability labels can further complicate matters, leading to confusion over what qualifies as "green." In this context, RISERS learned in the interview series about stakeholders' needs for a critical evaluation of these labels by regulators to ensure their validity and effectiveness.

5.1.3 PUBLIC PROCUREMENT

Various perspectives were shared regarding the role and needs of public procurement.

Regarding the **cement industry,** IS-supporting developments in public procurement were noticed. Public procurement policy aims to phase out clinker-intensive products, encouraging the use of alternative materials, including locally available by-products. Beyond this, additional options to support IS were identified.

Introducing criteria on Global Warming Potential and natural resource consumption could support circularity and the business case for by-products, for example by thresholds for construction materials in public procurement. In this context, the **Energy Performance for Buildings Directive** aims to set targets encouraging the use of low-carbon materials like steel, cement, and concrete. **Ecodesign legislation** can further incentivise low-carbon materials in construction projects.

According to the representatives of the **bio-based ecosystem**, **procurement quotas** for governmental institutions could play a crucial role in establishing the bioeconomy, as these quotas would promote economies of scale and stimulate demand for bio-based products.

In the interview on **regional perspectives**, it was highlighted that local and regional authorities can leverage their purchasing power as **green public procurers**. Through procurement of products and services that are developed through I-US processes, they can drive demand and enhance the functioning of the I(-U)S ecosystem.

Regarding concrete implementation, the representative of public procurement offices pointed out that procurement bodies are limited to demanding criteria that directly relate to specific products. Their reliance on companies applying for tenders means that the criteria must be formulated in a way that is practical and feasible for implementation. Consequently, it is crucial that these criteria can be objectively assessed, such as through verification by a quality mark.

Furthermore, it is ideal for these criteria to align with existing regulations. Such compatibility would not only facilitate adherence to the standards but also promote sustainable practices across the industry. By focusing on clear, assessable, and compatible criteria, stakeholders can enhance the effectiveness of procurement processes while supporting broader sustainability goals.

Based on the various perspectives, the recommendations shown in Table 9 were derived.

Recommendations	Details
Establish clear standards ensuring objective assessment and regulatory compatibility	Develop appropriate product standards with IS-related criteria aligned with existing regulations to facilitate their practical application in public procurement.
Create criteria that can be objectively assessed, such as through verification by a quality mark.	The more detailed these standards are, the easier it will be for procurement bodies to incorporate them into their processes. Likewise, the level of detail has to ensure that these criteria are feasible for companies to implement to encourage them to participate in the relevant tendering processes.
Continue with setting targets for the quota of IS-related products	In this context, consider various procurement levels (national procurement offices, local and regional procurement) in appropriate areas such as steel and cement.

Table 9: RISERS specific recommendations for IS-related public procurement

5.1.4 SECTOR-SPECIFIC RECOMMENDATIONS

RISERS Deliverable D5.1 has shown the importance of selected sectors not only in the IS context, but also for the European economy as a whole. Based on the sector-level interviews, this section summarises the recommendations to support IS in the chemical, steel, cement, food, and bio-based industries. In line with our interviews on the needs of these industries, the recommendations' main goal is to support these industries and facilitate the growth of IS-related markets. All recommendations are presented in Table 10.

Chemical industry	1. **Work on solutions to address the energy-related needs of IS initiatives.** This issue also discussed as a general need in section 5.1.1 has specific importance in the energy-intensive chemical sector. 2. **Enhance Innovation Funding for chemical recycling**: Increase funding opportunities for innovation in chemical recycling technologies and processes. This support should focus on making upcycling of plastics more economically viable, helping to reduce costs and encourage adoption. 3. **Streamline regulatory processes**: Reduce bureaucratic barriers and expedite approval processes for chemical recycling plants. This can be achieved through digitalisation of regulatory processes, allowing for more efficient operations and quicker implementation of new technologies. 4. **Support IPCEI participation**: Foster interest and participation in Important Projects of Common European Interest to drive collaboration and investment in chemical recycling initiatives. This can help leverage resources and expertise across the EU, accelerating the transition to sustainable practices.
Steel industry	1. **Include by-products in regulation**: Industrial by-products like slag should be recognised alongside recycled content in regulations, as they displace primary production and reduce carbon footprints. 2. **Harmonise slag classification**: A unified EU framework is needed, as differing classifications across Member States cause regulatory uncertainty and restrict cross-border movement. 3. **Define slag status clearly**: Clear criteria are required for classifying slag as end-of-waste or by-product, balancing standardisation with environmental and safety controls to maintain its usability. 4. **Maintain ferrous scrap status as waste**: Retaining the waste status of ferrous scrap is important to ensure oversight under the Waste Shipment Regulation and prevent environmental burdens from being shifted to less regulated countries. 5. **Maintain current EoW conditions for ferrous scrap**: Policy should maintain that EoW status must only be granted after remelting, to avoid premature recycling claims, ensure full material transformation, and maintain environmental oversight. 6. **Clarify recycling definitions**: Steel industry policies should define recycling strictly as remelting, and the WFD should distinguish between high- and low-quality recycling (e.g. steel and metals vs. crushed concrete used as fill material) to support circular economy goals. 7. **Clarify EoW in waste-to-energy:** End-of-waste criteria for fuels used in waste-to-energy processes must be clarified to ensure accurate emissions reporting and avoid shifting accountability, as seen in current debates within the cement industry.
Cement industry	1. **Advocate for performance-based standards**: Push for the adoption of performance-based standards across the EU, allowing for greater flexibility in using alternative materials like steel slag. 2. **Enhance regulatory clarity and harmonisation**: Provide clearer guidance from the European Commission on allocation methods and harmonise standards across MS to reduce fragmentation. 3. **Strengthen public procurement policies:** Create thresholds for global warming potential in public procurement to encourage the use of low-carbon materials and drive market demand.

Food industry	1. **Clarify residue classification**: Establish clear and flexible guidelines for classifying residues as either waste or substrate. This will streamline decision-making for the management of waste streams and facilitate the reuse of by-products. 2. **Update Renewable Energy Directive (RED III)**: Revise the RED III to include beet pulp as a substrate for bio-gas plants, particularly in areas with limited demand for animal feed. This will promote more sustainable practices by reducing energy-intensive processes. 3. **Focus on Zero Emissions Accounting**: Ensure that carbon emissions from the production of biogenic energy from residues, such as beet pulp, are recogniszed as zero emissions. This adjustment will support the decarbonisation goals of the sugar industry and encourage the use of waste for energy generation.
Bio-based ecosystems	1. **Reframe waste terminology**: Encourage the avoidance of the term "waste" in industry discussions to enhance the general acceptance of by-products and recycled materials, promoting a more positive perception of these resources. 2. **Implement incentives for recycled materials**: Establish incentives that encourage the use of recycled materials instead of virgin materials whenever feasible, or on a percentage basis, to promote sustainable practices and reduce dependency on non-renewable resources. 3. **Set procurement quotas**: Introduce procurement quotas for governmental institutions aimed at fostering the bioeconomy, which would create economies of scale and stimulate demand for bio-based products. 4. **Streamline innovation processes**: Reduce bureaucratic barriers and implement faster approval processes for innovative projects in the bioeconomy, facilitating the development and deployment of new technologies and practices.

Table 10: RISERS Sector-specific recommendations

5.2 RECOMMENDATIONS PART B

Current RISERS proposals centre on the development of two forms of standards to address by-products and EoW. Annex 4 provides more details.

A horizontal standard would prescribe the process for producing vertical standards that would be material specific. This standard would state what should be included in a material standard such as the source according to the European Waste Catalogue (EWC), treatment process, what could the material be used for, what existing standards should the material meet – such as standards of the International Organisation for Standardisation (ISO), European Standards, sometimes called Euronorm (EN), Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Persistent Organic Pollutants (POP) etc. The contents could potentially be similar to the ”End of waste criteria for pulverised fuel ash and furnace bottom ash", published by the Irish Environmental Protection Agency, see EPA (2019).

Vertical standards could then be developed using this horizontal standard as a template and be specific for materials and their uses, based on existing standards for processing feedstock and product requirements.

The complexities of using standards in this manner have been raised, particularly regarding the issues relating to standards being copyrighted material for which fees are charged for their use. Discussions regarding these will form part of the ongoing work by RISERS in this area.

6 CONCLUSIONS AND NEXT STEPS

6.1 CONCLUSIONS AND NEXT STEPS - PART A

Launched by the European Commission in February 2025, the Clean Industrial Deal is the EU's plan to boost clean energy, create quality jobs, and make sure European companies can thrive in the rapidly changing global economy. RISERS aims to contribute to the realisation of this plan in the specific context of IS. Applying policy instruments such as regulation and standardisation is of great importance in this context, also to keep a level playing field with regions such as China, which has, for example, annual plans to make standards faster to generate competitive advantages.

The exploratory interview series together with additional analytical measures enabled a great deal of knowledge and the deduction of 13 preliminary sector-independent and 5 specific sets of sector-specific recommendations to support IS by policy measures. The interplay between standards and regulation played a key role in this context. Likewise, the interview series highlighted the importance of stimulating trust among IS market participants to stimulate market growth.

Our analysis was embedded in an existing multidimensional policy framework. From the waste regulations mentioned in Chapter 2, three of four areas were specifically addressed: directives related to the waste management framework (e.g., the WFD (2008/98/EC)), directives relating to shipments of waste and the import and export of waste (Regulation 1013/2006 on shipments of waste), directives related to buildings for the processing and disposal of waste (Council Directive 1999/31/EC on landfill of waste) and various others such as the ESPR and the CPR. Likewise, the results extend the findings of RISERS' Deliverable D5.1, which is summarised in the following sentences.

The first recommendation of D5.1 was to **simplify regulations for defining waste and determining end-of-waste status.** Giving companies more guidance is a key goal in this context. In our analysis, needs related to resource definitions were particularly mentioned regarding steel, cement, and sugar for energy related IS applications.

The next recommendation was to h**armonise waste classification rules across all EU member states.** This need was particularly visible in the steel, cement, and sugar industry. The desired improvements shall facilitate cross-border transport and exports. New observations of RISERS have shown the need for new vocabulary. The attractiveness of broader **resource classifications** to avoid problems related to the waste term became clear as the need to support the use of resources in the EoW status.

The recommendation to **support the development and recognition of by-product solutions** was particularly visible in the steel industry while the need to **streamline the permitting process for IS projects** was particularly stressed in the chemical industry.

The need to **reduce taxation to incentivise the use of secondary raw materials** was reflected in the recommendation to mandate or incentivise the use of secondary raw material in the areas of steel and cement and also regarding I-US, which shows that specific potential exists in this context.

The need to provide financial incentives for recycling and reuse, increase awareness of IS, promote IS education and establish dedicated IS facilitators were particularly mentioned in the context of I-US. This applies also to the need to **facilitate the safe and efficient use of treated wastewater.**

In the area of D5.1's recommendation **to establish a database for tracking and analysing waste flows,** RISERS' roadmapping team works on recommendations to promote matchmaking platforms. Likewise,

the need to support the implementation of product passports, LCA analyses and sustainability reporting were specified in the interview series, which require appropriate integration in the relevant database solutions.

The interviews in the chemical and steel industry highlighted the importance of an appropriate energy supply for IS in both sectors. D5.1's recommendation **to ease regulations on trading different energy carriers** addresses key goals of the "New Industrial Strategy for Europe". In this context, the roadmapping activities are also focused on specifying various recommendations in the context of Energy Data & Grids and hydrogen.

Additional discussions in the project team have shown that various resource matching software solutions exist already. A key challenge lies in the fact that the European MS prefer their own solutions and in their own language instead of a new common European solution.

Although existing databases provide a solid foundation, simply investing in new systems will not resolve current challenges. What's needed are standardized data exchange interfaces to ensure seamless interoperability. Moreover, effective coordination and dialogue between platform providers are essential to align systems and avoid fragmentation. A continuation of WG03 of RISERS' roadmap with a specified scope could address this need.

Modifying the results of D5.1, this report provided also various new insights**.** While D5.1 suggested, for example, designating **regulatory sandbox areas to test innovative IS applications**, the new interviews also showed the importance of keeping appropriate, solid framework conditions of the **fundamental policy framework and the preservation of the NLF.**

Needs to update the regulatory framework also refer to an update of the **Renewable Energy Directive** (RED III) to include beet pulp as a substrate for biogas plants in cases where there is no local market for feed from pulp or the demand is limited.

Likewise, the interviews confirm the findings of earlier analyses, specify them in specific contexts and offer new, more in-depth insights. In this regard, they reveal, for example, specific needs for **reducing bureaucracy**, simplifying **environmental reporting** and **IPCEI projects**.

The findings will be specified by a web-based RISERS survey, particularly focused on the selected sectors, followed by the deduction of conclusions, evaluation interviews, and targeted work on the specified **recommendations** for policy updates.

Connecting the activities with external developments is an important goal in this context. An example is public procurement.

According to the European Commission (no date b), the Commission will review the **public procurement framework** in 2026 to introduce sustainability, resilience and European preference criteria in public procurement for strategic sectors.

6.2 CONCLUSIONS AND NEXT STEPS - PART B

The current situation regarding by-products and EoW is not seen as being fit for purpose and is likely to hinder the widespread uptake of IS A proposal to use vertical and horizontal standards has been developed that would allow existing material standards to be used to ensure specifications for materials are met while also protecting human health and the environment.

These proposals described in Section 5.2 require further discussion, particularly with EU DGs and also need to be refined with regard to other developments such as “The Single Market: our European home market in an uncertain world” (European Commission, 2025b), the Circular Economy Action Plan (European Commission, 2023), the standard ”ISO 59004:2024 - Circular economy — Vocabulary, principles and guidance for implementation” (ISO, 2024), the work of European CEN Technical Committee (TC) on Sustainable Cities and Communities to advance a new European standard on IS for sustainable cities and other recent developments.

Meetings with interested parties already mentioned and with the various parties associated with the above developments will be progressed to ensure feedback from and alignment with the proposals. The results from the WP6 WG02 will also be considered. The final proposals will be incorporated into the RISERS Roadmap.

As mentioned in Chapter 2, the European Commission plans to publish a Circular Economy Act in 2026. Currently, a public consultation for this Act is in preparation. RISERS aims to actively participate in this process and share its insights gained for the creation of this report and related project activities.

This report finishes with good news. Chapter 5 contained several recommendations to address energy-related needs of IS and energy provision at appropriate costs, especially for the chemical industry. When this report was in its final editing stage, three working days prior to publication, these needs had already been addressed.

On 25 June 2025 the EC adopted a new State aid framework accompanying the Clean Industrial Deal (CISAF), which helps MS to easily support the development of clean energy, industrial decarbonisation and clean technology. One of its goals is the implementation of measures providing support for electricity costs for energy-intensive users, see European Commission (2025c). These energy-intensive industries include, for example this report’s industries chemicals, steel, cement, and refineries (see European Commission, 2021). It is now important to utilise these opportunities in the best possible way to support IS in these sectors.

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ANNEX 1: INTERVIEW GUIDE OF RISERS TASK 5.3

Interview on policy recommendations to support Industrial Symbiosis

This interview is conducted in the EU-funded RISERS project https://risers-project.eu/. Started in January 2024, this three-year initiative supports symbiotic collaborations among industries and sectors that allow keeping resources in productive use for longer.

In the context of this interview, Industrial Symbiosis (IS) is defined as the use by one company or sector of underutilised resources broadly defined (including waste, by-products, residues, energy, water, logistics, capacity, expertise, equipment and materials) by another stakeholder, with the result of keeping resources in productive use for longer (Definition of IS from CEN Workshop Agreement 17354).

This interview aims to specify the needs for policy measures to support IS based on the needs of various stakeholders and industries. Its specific goal is to identify policy gaps, needs for updates, and the relevant public bodies linked with the specific needs. Relevant policy measures may refer, for example, to European regulations and directives, national regulations, and public procurement rules.

Questions

1. Please describe your expertise and activities related to IS briefly.

2. Please specify a sector or field of activity to which you feel closest related regarding IS:
   o Chemicals
   o Steel
   o Cement
   o Food
   o Refineries
   o Bio-based economy
   o Public procurement
   o Sustainability and societal needs
   o Other, please specify:

3. How would you describe the current state of IS in the EU?
   a. In general?
   b. In your field of activity/sector?

4. To what extent are there needs for policy/regulatory measures to support IS in general?
   a. Needs for policy/regulatory updates? - Please specify concrete measures!
   b. Needs for new policy/regulatory measures? - Please specify concrete measures!

5. To what extent are there needs for policy/regulatory measures to support IS in your specific sector/field of activity?
   a. Needs for policy/regulatory updates? - Please specify concrete measures!
   b. Needs for new policy/regulatory measures? - Please specify concrete measures!

6. To what extent do you think is there a need for policy/regulatory measures related to:
   a. The use of by-products?
   b. End of waste criteria?
   c. Other topics?

7. Which organisations (e.g. European, regional, national) could address the needs mentioned? Please discuss relevant organisations for each need you mentioned.

8. How do you perceive the interplay between standards and regulation in the context of IS?

9. How could standards be better utilised for regulatory measures to support IS?

10. To what type of organisation do you belong to:
    o Company
    o If company, SME?
    o Industry association
    o Public research organization
    o Governmental organization
    o Higher education institution
    o Public organization

11. In which country is your organisation located?

12. What is your current occupation?
    o Self-employed
    o Manager
    o Professional (e.g. in the engineering, science, teaching, legal or social area)
    o Technician or associate professional
    o Other, please specify:

13. Do you have additional comments or suggestions for our project?

o Yes o No

14. If yes: Please share your thoughts.

Thank you very much for your time!

ANNEX 2: INFORMED CONSENT FORM

Informed Consent Form

I consent to participate in the European Union-funded RISERS project conducted by an interviewee of the organisation >…<. I am aware that the purpose of this research is to support the European Commission in improving the framework conditions for Industrial Symbiosis (IS), defined as the use by one company or sector of underutilised resources broadly defined (including waste, by-products, residues, energy, water, logistics, capacity, expertise, equipment and materials) by another stakeholder, with the result of keeping resources in productive use for longer (Definition of IS from CEN Workshop Agreement 17354). The research results will furthermore be disseminated more widely, e.g. in academic papers, briefing papers, media, etc.

This research will involve an interview lasting up to 1 hour, during where I will be invited to discuss my knowledge about this area.

I understand that I am participating in this research voluntarily and that I am free to terminate the interview at any time. I am also aware that I am free to refuse to answer any questions that I feel are commercially or institutionally sensitive or relate to topics that I do not wish to discuss. I understand that I have the right to ask questions and receive understandable answers before making any decision.

I understand that I will only be asked to provide professional, not personal, information and that if I wish, the record of my involvement in the research will be kept confidential. I have been informed that everything I say will be anonymous and if I wish, I can remain anonymous in future published material. The interview data will be recorded via digital, or paper notes/tape recorder, and I understand that I can request a copy of the notes/transcript to review if I wish. I understand that I am also allowed to delete or make any changes to the notes/transcript if I feel my answers could be improved or clarified. I understand that this research will be used to derive policy recommendations to support IS.

I understand that should the research team consider making the anonymised data from this interview available by open access, I will be contacted for second informed consent regarding this step.

I understand that this research conforms to European Commission guidelines and that it has been approved by the Ethics Committee in the Cooperation theme of the Horizon Programme. Finally, I have been given the contact details of the research team, and I have been informed that I am free to contact them about any queries relating to my data or the project itself.

Interview Participant Consent Form

Lead researchers: Insert the name of the person conducting the research activity

Participant's legal name:

1. I confirm that I have read and understand the information sheet dated *27 January 2025* explaining the above research project and I have had the opportunity questions about the project. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
   In addition, should I not wish to answer any particular question or questions, I am free to decline and can contact RISERS' data manager Abi Glaser, email address: abi.glaser@enspire-science.com. ☐

3. I understand that my responses will be kept strictly confidential ☐

4. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. ☐

5. I agree for the data collected from me to be used in future research ☐

6. I agree to take part in the above research project. ☐

_____	_____	_____
Name of Participant (*or legal representative*)	Date	Signature
_____	_____	_____
Name of person taking consent (*if different from the lead researcher*)	Date	Signature
_____	_____	_____
Lead Researcher	Date	Signature

Copies: *Once this has been signed by all parties, the participant should receive a copy of the signed and dated participant consent form, the letter/pre-written script/information sheet and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project's main record (e.g. a site file), which must be kept in a secure location.*

Information Sheet form

RISERS (A Roadmap for Industrial Symbiosis Standardisation for Efficient Resource Sharing) is committed to guiding the standardisation of industrial symbiosis to enhance resource efficiency across Europe. This initiative, launched under the European Union's Horizon Europe Programme, offers a solution to fill in standardisation gaps and address the significant barriers hindering the establishment of standards for efficient resource sharing. By collaborating with experts and practitioners from various sectors including industry, policy, academia, and standardisation bodies, conducting thorough mapping of the IS standardisation landscape and identification of opportunities for intra- and inter-sectoral synergies, RISERS will provide a comprehensive Roadmap that will steer IS standardisation efforts in Europe toward greater efficiency and sustainability.

RISERS' mission is to establish clear pathways and actions aimed at developing essential standards conducive to high-impact synergies for Europe's economy. RISERS is committed to facilitating a cohesive strategy for integrating Research and Innovation (R&I) into standardisation processes. Through collaborative efforts with stakeholders, RISERS seeks to develop a robust standardisation framework that enhances industrial symbiosis, fostering interoperability and compatibility. This streamlined approach optimises resource utilisation, benefiting industry, the environment, and society at large.

The RISERS project was launched in January 2024 with a duration of 3 years.

Coordinated by Enspire Science, the consortium unites 9 partners from 6 countries.

Partners in detail (participant organisation name and country):

- Enspire Science - Israel
- European Committee for Standardization (CEN) - Belgium
- German Institute for Standardization (DIN) – Germany
- EIT RawMaterials – Germany
- University of Ghent – Belgium
- Fraunhofer Institute for Systems and Innovation Research ISI – Germany
- International Synergies Limited (ISL) – UK
- Institute for Ecology of Industrial Areas (IETU) – Poland
- Instituto de Soldadura e Qualidade (ISQ) – Portugal

ANNEX 3: OVERVIEW OF INTERVIEW RESULTS

Tables 11 - 14 provide an overview of the interview results:

- Table 11: Overview of interview results – sector-independent aspects and chemical industry
- Table 12: Overview of interview results - steel and cement industry
- Table 13: Overview of interview results – food and bio-based ecosystem
- Table 14: Overview of interview results – regional needs and public procurement

Interview / question Sector / field of activity	Sector-independent 1	Sector-independent 2	Chemicals
Current state of IS			
a. In general	Advanced, but disjointed legal acts. Increasing pressure to cooperate, but also increasing the defensive attitude; not many standards exist to measure the quality of recyclated products but are highly requested	Industry-independent challenge, not only related to IS: slow adaptation of new standards on EU level after two court judgements	Regulations play a big role, Energy-intensive sector, energy cost as key challenge, need for renewable energy for the sector's transformation. Technology for chemical recycling exists, but currently too expensive, no support for the introduction of chemical recycling, need for economies of scale for IS activities
b. In the specific field of activity/sector		High demand for consensus-based standards and an overflow of legal acts	
Needs for policy measures to support IS in general			
a. Needs for policy updates	Regulatory coherence in the EU on a consensus basis	Regulatory coherence in the EU on a consensus basis, not too many changes at once; faster introduction process for standards	Ensured lower energy prices to ensure the future of the chemical industry in Germany and thereby encourage further investment in IS; financial support for R&D, less bureaucracy, faster confirmation processes
b. Needs for new policy measures	Methods to calculate the ratio of recyclate in a product to make them more comparable		
Needs for policy measures in the specific field of activity			In general: support for transformation towards electrification and for chemical recycling
a. Needs for policy updates	Harmonization of regulations of recyclates on EU level; question the feasibility of quotas in recyclates regarding PET recyclates' supply	Harmonization of regulations of recyclate on EU level	Harmonized taxation internationally, no Act on corporate due diligence obligations in supply chains; change sustainability reporting; less barriers for innovation; faster approval processes; more digitalization
b. Needs for new policy measures	High demand for standardization of packaging recyclability values	Standards for the quality of recyclate and a defined level of acceptable contamination	Ensured lower energy prices, Interest in IPCEI projects, Tax reduction for chemical recycling

(Table continues)

Interview / question Sector / field of activity	Sector-independent 1	Sector-independent 2	Chemicals
Need for policy measures related to:			
a. The use of by-products	Big topic for this initiative and its stakeholders, two workshops were conducted. Across the various sectors represented by the organisation, there are different perspectives that make it difficult to make an overarching statement. On the one hand, there are stakeholders who benefit from a lack of specification; on the other hand, there is uncertainty with a desire for more certainty, e.g. with regard to chemical recycling.	Rules/standards for labels for by-products	n.a.
b. End of waste criteria		Need for more clarity in regulations to provide more certainty for stakeholders; Less barriers for the use of waste labeled products in particular for recyclates, simple, clear rules, e.g. for chemical products, solutions for building material, appropriate EoW criteria for cross-border trade	n.a.
b. Other topics	Better cooperation with the industry; more chances for SMEs to get involved; the point of view of the industry has to be considered. Needs related to product passports	To make the standardisation process faster, easier and more transparent, and to allow for better cooperation with industry, EU standards should not be part of the EU legal framework. This should be accomplished with the NLF	n.a.
Organisations, which could address the needs mentioned	EU-level organisations	High Level Forum on EU level with improved feedback loops in the collaboration with national counterparts	EU/German government
Interplay between standards and regulation in the context of IS	Good practice at HLF, Ecodesign forum	Should not contradict each other, but be created in different frameworks	n.a.
Better utilization of standards for regulatory measures to support IS	Better communication and integration of industry stakeholders	Keeping the NLF	n.a.
Additional comments	Depending on the sector and stakeholder is a higher need for freedom and independence or a higher need for regulations and certainty desired	Standardization needs a better legislation framework with improved feedback loops that allow the participation of a variety of stakeholders to increase the industrial viability of regulatory measures.	No green lead market in the chemical industry desired (industry is too heterogeneous) Quota for chemical recycling would not work.

Table 11: Overview of interview results – sector-independent aspects and chemical industry

Interview / question Sector / field of activity	Steel	Steel & cement	Cement
Current state of IS			
a. In general	Progressing well with strong policy support but still needs better data and impact measurement.	IS in the EU is underdeveloped, especially in heavy industries like steel and cement. Barriers include policy restrictions (e.g. WFD) and weak incentives due to free EU ETS allowances.	Advanced but depends on the country – some MS in Northern are more advanced. South – landfill rate is high, separate collection is not so good. Incentives – policy measures – things that would help the sector. Landfill directive implementation – in line with EU commission. Some MS are lacking implementation. The same goes for separate waste management – separate at source. Would increase options for reuse. When mixed – more difficult.
b. In the specific field of activity/sector	IS is well integrated in steel for by-product reuse, but the shift to EAF raises challenges for residue and slag utilization, requiring adaptation to maintain circularity.	In steel, IS is somewhat established through existing by-product markets, but new production technologies face gaps in standardization. In cement, rigid, recipe-based standards limit the uptake of alternative by-products. Market entry for new materials is difficult due to costly certification and a risk-averse, concentrated industry structure. The EU lags behind more flexible, performance-based systems seen in countries like the UK and US.	Advanced – used for many years. Targets, ambitions for carbon neutrality. Use waste with biogenic content – CO_2 emitted classed as neutral – already happening for years, but more necessary with the decarbonization driver. Looking to expand this area. Recognition of the recycling aspect for wastes as fuels – energy and recycling – mineral part incorporated. Therefore, recycling process – clearly differentiates the cement process from incineration process. The use of alternative fuels – renewables help become energy independent – eases the requirement to import fossil fuels.

(Table continues)

Interview / question Sector / field of activity	Steel	Steel & cement	Cement
Needs for policy measures to support IS in general			
a. Needs for policy updates			Landfill directive to be fully implemented Waste separate collection
b. Needs for new policy measures	Clearer EoW criteria are needed for fuels used in waste-to-energy, to ensure transparent emissions reporting and avoid regulatory loopholes.	Strong need for policy measures that mandate or incentivize the use of secondary raw materials and by-products (e.g. through the Circular Economy Act). By-products should be included in recycled content targets to boost circularity across multiple industries.	More about properly implementing what is already there – better guidance Get what we have operating correctly and THEN look for new policies.
Needs for policy measures in the specific field of activity			
a. Needs for policy updates	A unified EU framework is needed to classify slag consistently to reduce cross-border regulatory uncertainty. The definition of recycling in steel industry policies should be clarified to distinguish high-quality (e.g. remelted steel) from low-quality recycling (e.g. crushed concrete).	In cement, CPR (Construction Products Regulation) revision should ensure performance-based, technology-neutral standards, need for to harmonise concrete standards across MS to reduce market fragmentation and enable wider use of alternative materials and by-products in construction.	Recycling recognition of co-processing – differentiate between incineration and cement manufacture. Specific article in WFD
b. Needs for new policy measures	Include by-products such as slag in key regulatory frameworks (e.g. CPR, ESPR) alongside recycled content.	In steel, Ecodesign Regulation could introduce recycled content targets.	None mentioned

(Table continues)

Interview / question Sector / field of activity	Steel	Steel & cement	Cement
Need for policy measures related to:			
a. The use of by-products	Clarify whether slag in construction should be treated as a by-product or EoW material; overly strict criteria may hinder its reuse, while EoW status could remove critical safeguards. Recognize industrial by-products like slag as equivalent to recycled content in sustainability regulations. Harmonised EU classification would support more consistent use of by-products across sectors and borders.	Strong need for recognition and valorisation of by-products (e.g. steel slag) in regulation and procurement. Conflicts exist over how to allocate environmental benefits, requiring clearer EC guidance.	Cembureau do not have a specific demand although there are discussions for C&D waste – Cement sector has the advantage that the materials are used as fuel – high temperature. The contaminated part is fully destroyed at 1,400 C. So it is not an issue if classified as a waste. Some by-products used now such as fly ash, blast furnace slag that will reduce due to changes in these production process. Cement plants often have waste management licences anyway as they treat such a wide range of resources/wastes.
b. End of waste criteria	Maintain the waste status of ferrous scrap to ensure proper oversight during exports under the Waste Shipment Regulation. No new policy is needed.	Rigid classification of by-products limits their uptake; more clarity is needed, especially across MS.	No comment
b. Other topics		Introduce criteria like global warming potential and resource consumption in public procurement. Mandatory EPDs and LCAs need harmonisation and stronger enforcement. EN 15804 for EPDs is inconsistently applied across MS; improvements in allocation methods and oversight are needed.	EAF slags – switch to cleaner steel production. Needs to be a treatment of the EAF slags and thus need to see how these could be used in the cement industry. Made will be known after May.
Organisations, which could address the needs mentioned	Member States; EC - DG Envi, DG Grow, DG Energy for waste heat topics	EC, especially DG GROW.	More the EU commission at this stage

(Table continues)

Interview / question Sector / field of activity	Steel	Steel & cement	Cement
Interplay between standards and regulation in the context of IS	Standards are a useful starting point, but often too general to support effective regulation, especially across diverse materials. Regulations should be more specific and stringent than standards to ensure clarity and enforceability.	There is regulatory ambiguity, especially between frameworks like CPR and ESPR. The proliferation of eco-labels should be critically assessed. Regulation should rely on robust LCA/EPD data instead. The Circular Economy Act may bring new sustainability requirements, but its interaction with existing regulation is unclear.	Standards – specific for cement products. Define exactly the characteristics of the components. EG slag from steel sector is defined in that standard. Need to ensure that whatever you mix will not hamper the strength and quality characteristics. Exhaustive process to develop these standards. The standard should be able to enable the inputs to be classified as a by-product. EG Blast furnace slag is classified as a by-product. Other inputs could be reclassified as such depending on the use and hazardous properties they have. Would need to cover the handling/leaching to environment (in final construction) would also need to be included in the standard. Human health also needs to be included.
Better utilization of standards for regulatory measures to support IS	Standards should be more precise and harmonised to support regulation. For multi-material products and cross-sector use, regulation must fill gaps to ensure clarity and consistency.	Standards are important for regulatory compliance (e.g. CE marking in construction). Harmonised standards simplify market access and ensure consistent product assessment. Standards for LCA/EPDs must be correctly implemented. Standards should reflect innovation and feed into public procurement and building codes. Regulations should remain broad, with standards providing technical depth. EC intervention in standard-setting should remain a last resort due to limited resources.	Specifically for the cement sector, better harmonization across Europe for concrete.

Table 12: Overview of interview results – steel and cement industry

Interview / question Sector / field of activity	Food (sugar)	Bio-based ecosystem
Current state of IS		
a. In general	(not discussed)	There are large gaps in regulations, in particular in regard to food. Regulation and processes are hampering progress instead of accelerating it. They are too slow and complicated.
b. In the specific field of activity/sector	Circular economy (CE)/IS is practiced. Good cooperation between farmers, processing plants, and drying plants. By-products and residues are used.	Somewhat active but very limited. The hurdles to initiate successful cooperation are very high.
Needs for policy measures to support IS in general		
a. Needs for policy updates	(not discussed)	Incentives and/or legislations for Industries to encourage IS (Incentivize the use of recycled materials in place of virgin materials whenever possible or on a percentage basis) Quotas in procurement
b. Needs for new policy measures	There is no need.	
Needs for policy measures in the specific field of activity		In general: need for less bureaucracy; less regulations; regulatory/financial support (procurement/quotas); cross-subsidization, taxation of fossil-based products
a. Needs for policy updates	There are needs for clear regulations regarding the use and management of various types of residues in the sugar sector related to Waste Framework Directive. Provide to the authorities clear and flexible guidelines for classification of residues as waste or substrate, taking into account the economic and environmental conditions for preparation and use by products and residues. Need to update the Renewable Energy Directive (RED III) in the aspect of the inclusion of beet pulp as a substrate for biogas plants and on ensuring that emissions from waste and residues, such as beet pulp for the production of biogenic energy for heating, continue to be counted as zero-emission.	Less barriers for innovation; faster approval process; less/more standardization (innovation hindrance, access to bigger markets)
b. Needs for new policy measures	There is no need to create new policies dedicated to IS. The Bioeconomy Strategy is an important policy for the sector.	

(Table continues)

Interview / question Sector / field of activity	Food (sugar)	Bio-based ecosystem
Need for policy measures related to:		
a. The use of by-products	There is a need for policy measures enabling more flexible use of the by-products: to update the Renewable Energy Directive (RED III) in the aspect of the inclusion of beet pulp as a substrate for biogas plants.	More flexibility, less gaps in regulations
b. End of waste criteria	Need for a flexible approach to classifying residues as waste or as substrate - limiting discretion in the related decision process.	More flexibility, less gaps in regulations
b. Other topics		n.a.
Organisations, which could address the needs mentioned	European Commission	
Interplay between standards and regulation in the context of IS	There is full clarity and consistency in terms of interplay between standards and regulation in the context of CE/IS implementation. The sugar sector benefits from the well-developed system: the International Sustainability & Carbon Certification (ISCC). The principles of this voluntary initiative are based on existing directives and regulations, which are of key importance in this respect.	
Better utilization of standards for regulatory measures to support IS	The International Sustainability & Carbon Certification (ISCC) system and the national regulation practical implementation depend on the end of waste criteria.	
Additional comments		

Table 13: Overview of interview results – food and bio-based ecosystem

Interview / question Sector / field of activity	Regional needs	Public procurement
Current state of IS		
a. In general	Working on several IS projects involving cities and regions.	N/A
b. In the specific field of activity/sector	Public waste and wastewater with I-US pilots.	N/A
Needs for policy measures to support IS in general		
a. Needs for policy updates	Closer interaction and monitorization with the policy bodies.	Overall, no cases of application are known from practice that would indicate a need for additional regulations.
b. Needs for new policy measures	Include procedures to include IS and other material streams in the creation of new infrastructure and industrial parks.	
Needs for policy measures in the specific field of activity		
a. Needs for policy updates	A better application and management of wastewater in certain irrigation fields.	See needs for policy measures to support IS in general
b. Needs for new policy measures	Implement in cities and regions concrete and realistic municipal waste targets reductions.	See above
Need for policy measures related to:		
a. The use of by-products	More clarity in the definition and the criteria of the terms “by-product” and “waste”.	See needs for policy measures to support IS in general
b. End of waste criteria	A reduction of regulation and bureaucracy for certain strategic residues (e.g., w**astewate**r and urban residues).	
b. Other topics		
Organisations, which could address the needs mentioned	Industries with the habit of exchanging materials, environmental public associations, waste management entities, research Institutes.	Does not apply
Interplay between standards and regulation in the context of IS	The need to create technical committees to link a common strategy for standards and regulations.	Standards with precise requirements are needed. Procurement bodies may only demand characteristics that relate to a product. They are dependent on companies applying for tenders, which is why criteria are formulated that can also be implemented. Importance that the criteria can be objectively assessed, e. g. verified by a quality mark. Ideally, these criteria are also compatible with regulations.
Better utilization of standards for regulatory measures to support IS	Intensify the approach of standardization for refining methods which can be applied in real live IS situations in the industry context.	

Table 14: Overview of interview results – regional needs and public procurement

ANNEX 4:

POSITION DOCUMENT ON END-OF-WASTE ROADMAP

27/06/2025

RESPONSIBLE PARTNER: ISL

Funded by
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DOCUMENT DETAILS

DOCUMENT TITLE:	POSITION DOCUMENT ON END-OF-WASTE ROADMAP							
TYPE*:	R:	X	DMP:		DATA:		DEC:	
DISSEMINATION LEVEL:**	PU:	X	SEN:		EU CLASSIFIED:			
LEAD BENEFICIARY:	ISL							
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***) R** — Document, report; **DMP** — Data Management Plan; **DATA** — data sets, microdata, etc; **DEC** —Websites, patent filings, videos, etc

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LIST OF ACRONYMS

Abbreviation	Explanation of abbreviation
ENSPIRE	ENSPIRE SCIENCE LTD
CEN	COMITE EUROPEEN DE NORMALISATION
DIN e.V.	DIN DEUTSCHES INSTITUT FUER NORMUNG EV
EIT-RM	EIT RAW MATERIALS GMBH
Fraunhofer	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
UGent	UNIVERSITEIT GENT
IETU	INSTYTUT EKOLOGII TERENOW UPRZEMYSLOWIONYCH
ISQ	INSTITUTO DE SOLDADURA E QUALIDADE
ISL	INTERNATIONAL SYNERGIES LTD
BAT	Best Available Technique
BREF	Best Available Technique Reference Document
EC	European Commission
EN	European Standard(s), sometimes called Euronorm
EOW	End of Waste
ETS	Emissions Trading System
EU	European Union
EWC	European Waste Catalogue
hEN	Horizontal European Standard(s)
IED	Industry and Livestock Rearing Emissions Directive
IPTS	Institute for Prospective Technological Studies
IS	Industrial symbiosis
JRC	Joint Research Centre
M	Month
POP	Persistent Organic Pollutant
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
WFD	Waste Framework Directive
WP	Work Package

1 INTRODUCTION

This position document is part of the RISERS EU-funded project and its WP5 work that covers policy framework and is the result of research into policies affecting the uptake of industrial symbiosis. The Waste Framework Directive is of particular importance to the subject due to Article 5, by-products and Article 6, end-of-waste. Thus, this document seeks to clarify the role and outline the next steps within the project with regards to EOW.

2 DEFINITION OF THE TASK

Task T5.2: Standardisation support for policy frameworks promoting IS This RISERS project task explores existing or new possibilities for policy frameworks that promote IS.

Building on findings from within the RISERS project, where **policies are identified as barriers**, especially where **policies and their implementation specify technologies and processes**, explore potential to refocus on standards/input specifications to replace regulations/outputs waste limitations. This task reviews the policy framework to **identify and evaluate policies,** and supporting activities, that promote or hinder IS substitutions. The **key objective is enabling waste or byproduct as an input** across sectors, and recommend ways to better support IS: BAT Reference Documents, guidance for valorising waste types/harmonising EOW protocols as these differ significantly across EU.

Work with IED, WFD, ETS, BREF stakeholders.

Due to its central role in IS, **the process of producing the EOW criteria will be evaluated for potential adaptation to IS**: which wastes are in line for an EOW criterion, does the EOW criteria list align to priority resources and synergies in development or deployment, what are the timescales for production and implementation. The ultimate aim is to **inform the IS standardisation roadmap that is being developed under RISERS project regarding the potential to adapt the methodology of EOW criteria production** such that it more effectively supports IS adoption.

3 CURRENT STATE

The end-of-waste (EOW) criteria stems from the Waste Framework Directive (WFD).

The Waste Framework Directive (2008/98/EC):[9]

Introduced a new procedure for defining EOW criteria, which are criteria that a given waste stream has to fulfil in order to cease to be waste.

Waste streams that are candidates for this procedure must have **undergone a recovery operation** and **comply with a set of specific criteria presented below**.

Article 6 states:

'Certain specified waste shall cease to be waste when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions:

a) The substance or object is commonly used for a specific purpose;

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008L0098-20180705

b) A market or demand exists for such a substance or object;

c) The use is lawful - The substance or object fulfils the technical requirements for the specific purpose referred to in (a) and meets the existing legislation and standards applicable to products*; and*

d) The use of the substance or object will not lead to overall adverse environmental or human health impacts.

Thus, Articles 5 and 6 provide a framework, where arisings from a production process can be classified through one of three routes:

- **Product** is material deliberately created in a production process. There can be more than one.
- **Production residue** is material not deliberately produced. It automatically arises during the process and can be a by-product or waste.
- **By-product** is not waste but must meet specific criteria.

By-Products vs. Waste from Article 5 of the WFD point of view

Member States shall take appropriate measures to ensure that a substance or object resulting from a production process, the primary aim of which is not the production of that substance or object, is considered not to be waste, but to be a by-product, if the following conditions are met:

(a) Further use of the substance or object is certain;

(b) The substance or object can be used directly without any further processing other than normal industrial practice;

(c) The substance or object is produced as an integral part of a production process; and

(d) Further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

Areas to consider regarding by-products:

- Not intentionally sought
- Inevitable arising from the process
- But where a genuine use can be found
- That use must be:
    - Not a mere possibility but a certainty
    - **Without further processing prior to re-use**
    - As an integral part of the production process

2018 WFD amendment introduced:

The WFD was amended in 2018, highlighting the importance of, and the desire to promote, industrial symbiosis. The specific sections are:

"Waste management in the [EU] should be improved and transformed into sustainable material management … promoting the principles of the circular economy … in a way that preserves resources and closes loops"

"… the Commission should be empowered to adopt implementing acts in order to establish detailed criteria … prioritising replicable practices of industrial symbiosis."

However, although industrial symbiosis was included, and recognition was given to the need to increase its uptake, no steps were included to facilitate this uptake.

4 ISSUES RELATING TO THE WFD BY-PRODUCT AND EOW DEFINITIONS

The default position is that a substance or object is a waste and must prove that it is not.

The production of EOW[10] is time consuming and relatively few have been produced. Current EOW are:

- iron, steel and aluminium scrap[11];
- glass cullet[12];
- copper scrap[13]

with plastics, textiles and the materials fraction of construction and demolition waste under development[14]. On an EU wide level, once the next three have been produced, bringing the total to six, there are no more planned. This limits the effectiveness of the EOW process.

RISRERS proposes that to address these shortcomings within the WFD and EOW criteria, thus promoting IS, the default position needs to shift to where a substance or object is a product or by-product and not be classified as a waste. If it fails the criteria, then the classification becomes one of waste. This would remove the need for specific EOW process for each substance or object, while also allowing flexibility in the use of the substance or object for new IS related activities.

This does, of course, produce risk that must be minimised. Resources could be deliberately mis-classified, used in processes they are not suitable for, have levels of contamination that poses risk to the environment or health being some examples of that risk. Therefore, any alternative to the current situation must prevent such situations from occurring.

The table below specifies the criteria to which by-products and EOW are subject. The third column presents a starting point for amending these criteria – which will be refined following the discussions to take part as outlined within the final section of this document.

[10] https://publications.jrc.ec.europa.eu/repository/handle/JRC53238
[11] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32011R0333
[12] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R1179
[13] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0715
[14] https://publications.jrc.ec.europa.eu/repository/handle/JRC128647

Criterion	By-product criteria (Article 5 WFD)	EOW Criteria (Article 6 WFD)	Proposed amendment criteria – to be refined
Production Process	Produced as an integral part of the production process	-	Product is unavoidable
Processing requirements	Can be used directly without any further processing other than normal industrial practice	It has undergone a recovery, including recycling, operation and complies with specific criteria Complies with specific criteria	Meets technical specifications for another use (with or without further treatment). Standards support/provide this evidence base
Certainty of Further Use	Further use of substance or object is certain	Commonly used for a specific purpose Market demand exists	Start with the assumption that it is a resource until such time as no use can be identified and disposal is necessary – then it becomes a waste
Legality of use Environmental and health impacts	Further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts	The use is lawful, i.e. the substance or object fulfils the technical requirements for the specific purpose referred to in (a) and meets the existing legislation and standards applicable to products; and The use of the substance or object will not lead to overall adverse environmental or human health impacts	The use is lawful, i.e. the substance or object fulfils the technical requirements for the specific purpose it is being used for and meets the existing legislation and standards applicable to products; and The use of the substance or object will not lead to overall adverse environmental or human health impacts

Table 1: The distinction between by-products and EOW criteria

5 PROCESS FOR EOW PRODUCTION

The Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS) produced a methodology guideline to develop EOW criteria, the 'End-of-Waste Criteria Report'.[15]

The European Commission, through DG Environment, prepared proposals for EOW criteria for specific waste streams

- According to the legal conditions.
- Following the JRC methodology guidelines.

For each candidate waste stream:

[15] https://publications.jrc.ec.europa.eu/repository/handle/JRC53238

- IPTS prepared studies with technical information to support the proposals for EOW criteria.
- Studies included all necessary background information for ensuring conformity with the conditions of Article 6 of the Directive.
- Initially three EOW were produced:
    - Iron, steel and aluminium scrap (2011)[16]
    - Glass cullet (2012)[17]
    - Copper scrap (2013)[18]

In 2022, the JRC published a review 'Scoping possible further EU-wide end-of-waste and by-product criteria'[19] which:

- Identified list of priority waste or by-product streams for which to develop further EU-wide EOW or by-product criteria.
- Derived a short list of top candidate streams from the above.

Three new EOW are being produced based on the 2022 review:

- Plastics
- Textiles – reuse and recycling
- Mineral fractions of construction and demolition waste

From discussions with representatives from the JRC, it is understood that no further EOW are planned at present.

In addition to EU-wide EOW, there are a host of other mechanisms relating to enabling wastes to be used productively. These include:

- Low risk waste positions
- Regulatory position statements
- National EOW criteria
- Regional EOW criteria

Thus, different levels of EOW can be seen:

- Case by case – applies to a specific resource in a specific instance. Usually limited in scope and geographical area it applies. An example being the use of apricot pits in the Emilia Romagna region of Italy[20]
- National level - country develops own EOW, similar to EU level but country specific, other MS have right to not recognise. An example being the use of pulverised fuel ash in Ireland[21]

[16] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32011R0333
[17] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R1179
[18] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0715
[19] https://publications.jrc.ec.europa.eu/repository/handle/JRC128647
[20] https://www.ermesservizi.it/sottoprodotti/
[21] https://www.epa.ie/publications/compliance--enforcement/waste/ART28-0014-FINAL-DECISION-EoW-Criteria-for-Ash---ESB.pdf

- EU level - as above but wider EU market.

This can lead to different situations for companies depending on where they are located. What might be possible in one country may not be possible in another. What may be able to be used without a waste management licence in one country, due to the presence of localised EOW criteria, probably would not be able to be used without a waste management licence in another country that does not have the same EOW criteria.

6 PROPOSAL

The default position within the WFD, is that a substance or object is a waste and must prove that it is not by meeting certain criteria, be that by-product or the limited EOW. The RISERS proposal would be to investigate moving to a position where a substance or object is not a waste, and only becomes such if it fails certain criteria. Standards are an appropriate method for measuring that criteria as they state requirements, with thresholds, that an input must meet for it to be used in the process the standard covers.

Companies cannot just develop standards and declare a waste no longer a waste. Were they able to, without scrutiny, exploitation and risk to the environment and human health could be compromised. This must be taken into account within the future IS standardisation roadmap.

The IS Roadmap would include a review of Articles 5 and 6 based on Table 1.

The RISERS proposal is to create a two tier standardisation process:

- Create a horizontal standard for IS which would prescribe the process for producing standards that would be material specific (vertical standards). This horizontal standard would state what should be included in a material standard such as source EWC, treatment process, what could the material be used for, what existing standards should the material meet (e.g. IS EN, REACH, POP, etc.)
- Look at regional, national and EU EOW processes, such as the examples for Emilia Romagna and Ireland referenced earlier, and take the best from these in the development.
- Potentially use the CWA method to progress – further investigation would be needed regarding this process and whether it could be used as a stepping stone (if one were needed) in the development of the eventual standards.

The RISERS project proposal for providing legal status to standards to replace EOW:

- Create a horizontal standard for IS. These horizontal standards will not be material specific, but rather will prescribe the process for producing material-specific standards (vertical standards). The horizontal standard would state the required content in the vertical standard (source EWC, treatment process, potential use for the material, etc.)
- The vertical standards should also refer to existing standards that should be of reference. The horizontal standard should provide the guide toward finding and selecting the relevant existing standards. The emphasis would be that the horizontal standard would be a ‘how to’ rather than contain the actual references, which would be contained in the vertical standards.

- The horizontal standard could be a Harmonised Standard[22]. Complying with this hEN and the vertical material-specific standard could provide presumption of conformity with the WFD. The hEN could be referenced in the WFD as has been done with the Machinery Directive Article 20 [23] in an implementing act to the directive. Vertical standards could be cited as well in appropriate.

Withing the framework of RISERS, specifically in the context of Task 6.3 we have started the process of developing the Roadmap for EOW horizontal standard. However, further work should be done both in terms of legislation and standard development once the roadmap is completed by the end of RISERS project.

[22] https://single-market-economy.ec.europa.eu/single-market/goods/european-standards/harmonised-standards_en
[23] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:157:0024:0086:EN:PDF