HARMONI

INDUSTRIAL COOPERATION ON REGULATION AND STANDARDISATION

List of priority topics within the challenging regulations and standardisation needs

D2.3

Project HARMONI "Harmonised assessment of regulatory bottlenecks and standardisation needs for the process industry"
Grant agreement: 768755
From August 2017 to October 2019

Prepared by: CIRCE

Date: 28/09/ 2018

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 768755

DELIVERABLE FACTSHEET

Project start date:	August 2017
Project end date:	October 2019
Project website:	www.spire2030.eu/harmoni
Deliverable number:	D.2.3
Deliverable title:	List of priority topics within the challenging regulations and standardisation needs
Lead Partner:	CIRCE
Work Package no. and title:	WP 2: Analysis of the regulatory bottlenecks and the standardisation needs
Task no. and title:	Task 2.3: Clustering and prioritization of the regulatory and standardisation issues detected
Version:	1
Version Date:	28/09/2018

Diffusion list

Dissemination level	
X	PU = Public
	PP = Restricted to other programme participants (including the EC)
	RE = Restricted to a group specified by the consortium (including the EC)
	CO = Confidential, only for members of the consortium (including the EC)

Authors and contributors

	Entity
Author/s	CIRCE
	CEFIC, CEMBUREAU, DIN, ECREF
Lead author	CIRCE
Reviewers	CEFIC and DIN

Documents history

Version	Date	Main modification	Entity
Draft 1	20/08/2018		CIRCE
Draft 2	27/08/2018	Corrections of legal topics	CEFIC
Consolidated	28/09/2018	Revision of fiches and update	CEFIC, CEMBUREAU, DIN, ECREF
Final Draft	28/09/2018	Remarks from reviewers	CEFIC, DIN
Final	28/09/2018	Final version of the priorities	CIRCE

DISCLAIMER OF WARRANTIES

"This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 768755"."

This document has been prepared by HARMONI project partners as an account of work carried out within the framework of the EC-GA contract no 768755.

Neither Project Coordinator, nor any signatory party of HARMONI Project, nor any person acting on behalf of any of them:

(a) makes any warranty or representation whatsoever, express or implied,
   (i). with respect to the use of any information, apparatus, method, process, or similar item disclosed in this document, including merchantability and fitness for a particular purpose, or
   (ii). that such use does not infringe on or interfere with privately owned rights, including any party's intellectual property, or
   (iii). that this document is suitable to any particular user's circumstance; or

(b) assumes responsibility for any damages or other liability whatsoever (including any consequential damages, even if Project Coordinator or any representative of a signatory party of the HARMONI Project, has been advised of the possibility of such damages) resulting from your selection or use of this document or any information, apparatus, method, process, or similar item disclosed in this document.

ABBREVIATIONS

CCMC: CEN-CENELEC Management Centre

CWA: CEN Workshop Agreement

DIN: German Institute for Standardization

EN: European Standard

ISO: International Organization for Standardization

LCA: Life Cycle Assessment

TC: Technical Committee

TRL: Technology Readiness Level

WFD: Waste Framework Directive

PARTNERS SHORT NAMES

CIRCE: Fundación CIRCE – Centro de Investigación de Recursos y Consumos Energéticos

CEFIC: Conseil Européen de l'Industrie Chimique

CEMBUREAU: Association Européenne du Ciment

A.SPIRE: SPIRE

DIN: DIN DEUTSCHES INSTITUT FUER NORMUNG E.V.

ECREF: EUROPEAN CENTRE FOR REFRACTORIES gGMBH

ECREF / FGF: Forschungsgemeinschaft Feuerfest e.V.

ECREF / VDFFI: German Refractory Association

FEHS: INSTITUT FUR BAUSTOFF-FORSCHUNG EV

PUBLISHABLE SUMMARY

The HARMONI project addresses the non-regulatory bottlenecks which hinder the transferability of available technologies as well as the potential of standardisation as an enable to it. To this end, the consortium is working on identifying the market entry barriers and the hurdles which pose some challenges to companies in innovation. The final goal is to set up and promote supportive regulatory and standardisation frameworks for the future supportive and investment-friendly regulatory and standardisation framework. All in all, towards a rapid technological implementation and large deployment. To this end, a selection of rules and regulatory items that are in most need of removal or is undertaken in this report, which will set-up the framework of the developments of the WP3, 4 and 5 of the project.

The prioritization exercise represents a significant step forward as it stablishes the working environment of all the project ahead. Therefore, a poll of indicators has been considered in the search of those priorities, from the environmental impact and the economic relevance to the job creation potential. Among them, it is especially remarkable the timeframe of directives, specially the life-span of those that are subject to revisions, update and potential amendments. At the end of the HARMONI project, it is expected that a large number of recommendations proposed would have evaluated by the on-going or close to be launched discussion and monitoring expert groups in the selected priorities. So, priorities in HARMONI are the ones that have the highest impact potential in the short and medium term timeframe in the search of being applicable as soon as possible, and then, maximize the overall impact.

The mapping of challenges is instrumental and complex, which lays the basis of the priorities to focus on in the upcoming activities. As such, the WP2 has collected so far all the elements and information needed to this exercise, such as, interviews to EU project coordinators (Deliverable D2.1), surveys to companies (deliverable D2.2), the mapping of most related Technical Committees and standards (deliverable D2.2), research desk activities of existing reports from industrial associations (deliverable D2.2).

The last action accomplished in this process was the Technical Workshop organized with the participation of 23 representatives and members of the HARMONI project. Among them, 11 speakers representing chemical, cement, ceramic, minerals, steel, copper, non-ferrous metals and engineering introduced their challenges and concerns.

The outcome of the analysis of the overall WP2 has resulted in the selection of six priorities to focus on along the project; two horizontal topics (Holistic approach and Public Funds) and 4 thematic priorities (Circular Economy Package, Waste Recycling, Plastic Recycling and CO_2 Valorisation). The 6 priorities have been summarized in structured and easy to understand fiches, including; general challenge description, list of related legislation, standardisation relation, potential solutions and real industrial cases. Lastly, the priorities have been developed taking into consideration other related legislation. The HARMONI project aims to promote policies which are not created in silos, with special attention to the Energy Package which impacts all the priorities identified.

TABLE OF CONTENTS

1 INTRODUCTION

The deliverable 2.3 pursues two main activities. Firstly, a Technical Workshop has been organized as a significant step forward in the collection of most problematic non-technical barriers for the transferability of technology in the process industries. This event has allowed to exchange new and very relevant information for the HARMONI project as a whole. Also, it is remarkable the cooperation and engagement of industrial individuals in the HARMONI project. For the sake of the project and its impact, the sustain and continuous collaboration with companies from all the sectors is key, in the spirit of proposing real and close to the market solutions at the end of the HARMONI project. This will guarantee the expected impacts and the alignment with other on-going initiatives as well as to facilitate further studies in future projects/actions. The experiences from the industrial participants from that technical workshop have enriched the data collected so far in deliverables D2.1 and D2.2.

Secondly, the deliverable has narrowed down the number of barriers and their complex interpretations to a total of 6 priorities summaries. This selection procedure has been based on several key elements so that the priorities cover a wide range of key hurdles for most of the sectors involved. The information that summarizes the 6 priorities selected are presented in a way to depict the challenges, to frame the difficulties that those barriers pose to the industries, the related information to further analyzed, a tentative list of potential solutions and examples from real industrial cases.

The outcome of this deliverable will be used as starting point for further discussions and work in WP3, 4 and 5.

2 TECHNICAL WORKSHOP

2.1 General description

The goal of the workshop was to collect detailed real industrial cases of regulatory or other non-technological barriers and potential standardisation needs that are underpinning technology transfer. The workshop addressed real industrial experiences presented and shared by the industrial representatives in each sector (from 1 to 3 real cases per sector), tackling the following items:

1. To know other sector´s challenges and potential solutions at mono-sectorial and multi-sectorial level
2. To exchange and share barriers and the impacts they cause on their businesses
3. To participate in the selection of the most urgent matters and their linked potential solutions to be further developed in the HARMONI project
4. To pave the way of the upcoming steps towards a more efficient regulation, standard procedures and other non-technological bottlenecks

Before the Workshop, industrial associations have identified, selected and analysed the most illustrative cases to be presented during the 26th of April´s event in Brussels. The participants in each sector have been contacted and debriefed at front so as to make the industrial representatives be aware and understand the aim of the event. Lastly, the general and most common messages from their respective sector haven been aligned in advance. This has facilitated the discussions so as to identify similarities, overlaps, and common challenges and solutions.

In total, 23 participants (including HARMONI partners, representatives of industrial associations, representatives from the industry and one RTO on behalf of one sector) attended to the workshop and the event dealt with many topics of interest to HARMONI as regard to the agenda developed to it (ANNEX A). Among them, 11 speakers representing chemical, cement, ceramic, minerals, steel, copper, non-ferrous metals and engineering introduced their challenges and concerns. The approach of the workshops was more open exchange of discussions rather than lecture sessions´ oriented interventions. The minutes of the Workshop have been circulated among the sectorial experts so as to validate them. The main conclusions of the event are listed below:

Main concerns and challenges
The different Commission Services are not always fully aligned on policy proposals. In some cases, this creates difficulties in the implementation phase.
Member states sometimes interpret EU legislation in different ways. This means that international companies have to develop local solutions, then, this results in adapting products and technologies to local requirements. Even, potential solutions compete with the different national economic conditions. For example, due to different markets without the same playing field (e.g. due to local/governmental ownership of waste incinerators, power plants and landfills).
EU legislation leaves flexibility to Member States to determine the 'waste' or 'by-product' status of materials. Thus classification might vary from one country to another one, creating some difficulties for companies.
The EC is continuously promoting scientific understanding in policy-making (cf. Scientific Advice Mechanism), which is very much valued. Nevertheless, there is certain lack of knowledge of science in political institutions. Thus, it is encouraged to keep supporting actions towards a full scientific analysis to the legislation under study.
Waste definition: Materials which can be easily reintegrated in the production process are sometimes classified as waste, and further use of valuable materials may even be limited or prohibited. Furthermore, waste needs a lot of traceability, which may cause unnecessary costs and excessive administrative burden. Even, in some cases, it is a must to comply with both legislations, waste and product (sequentially). This situation affects a wide range of process/products, from Ferro-alloys slags to ceramic and chemical compounds.

The number of standards illustrates the applicability and interest of the industrial users. In some cases, the regulation does not accompany this industrial willingness, because there is no classification under the framework of related regulatory environments (e.g. in the case of slags, there is no classification despite the related and large number of on-going stardardisation TCs).
Circular Economy communication COM((2015) 614, represents a significant step forward in the integration of potential new business cases and industrial developments. However, it is invigorated to keep working on the plans to fully implement the priorities that are supported in its legal document.
Legislation in some cases is not meant to stimulate innovation mainly. It is remarkable in case of those technologies still not at fully marketable stage. For example, there is a drive towards circular economy and low carbon economy but legislation is not adapted to future implementations of innovative solutions. This is an innovation hurdle that could possibly delay market ready innovations.
Complexity of regulation in a sector is high. But extremely remarkable in those cases in which the implications for sector A might differ from sector B. In industrial symbiosis approaches, this scenario becomes very common, and both technological and non-technological challenges emerge from this multifactor complex analysis.

Potential solutions
The Waste Directive should be reviewed, so as to foster further use of materials without jeopardising established policy objectives.
To take into account three geographical dimension in the set-up of legislation; EU, national and regional. All in all, they must include the consequences and measures to support their development, implementation and update.
To facilitate and support better guidelines for public authorities.
To launch multidisciplinary expert teams to tackle a more holistic approach in the preparation, update and implementation of legislation.
To launch a more thorough set up of the regulatory environment in conjunction with technological roadmaps.

3 PRIORITIES

3.1 Background

This report (as final result of WP2) aims at building up HARMONI priorities based on;

- Interviews with EU Project Coordinators (Deliverable D2.1)
- Analysis of existing position papers developed by Industrial associations (Deliverable D2.2)
- Identification of Technical Committees of CEN/CENELEC and other related bodies linked to intensive industries (Deliverable D2.2)
- Direct opinions from companies through a survey dealing with non-technological barriers and standardisation (Deliverable D2.2)
- Technical Workshop with direct industrial participants jointly with the industrial associations (Deliverable D2.3)

3.2 Prioritization

In the collection of the barriers within the WP2, several coinciding and most impacting regulatory challenges have been identified. However, and due to the large number of challenges and industrial differences, a clear list of principles is required to select the most urgent elements to focus on in the HARMONI project. Therefore, the following most relevant elements have been used as the most important principles to select the priorities:

- Principle of representativeness: (when possible) those issues identified by more than one sectorial association involved in the project.
- Relevance of the bottleneck for the sector: the industrial associations have indicated the importance that a specific bottleneck has for their sectors.
- Most common hurdles from the different data sources: the most recurrent requests and commented barriers where clustered and classified. As a result, the most common barriers were prioritized.
- Timing: the prioritization process will also consider the EU standardization and regulatory cycles. Therefore, those bottlenecks concerning regulations that are under revision or which revision is scheduled for the near future have been ranked.
- Coherency of legislation: the priorities selected assume and the recommendations to come along the project pursue more coherent policy framework including circular economy, energy and funding, aspects that affect most of the priorities related to intensive industries.

As some complementary elements, indirect consequences of a regulatory bottleneck have been also considered in the selection procedure:

- Innovation driven initiatives are at the forefront of the project. Then, other indirect features like trade, security and many other very critical points, have been excluded.
- The economic value that those regulations have in the potential of technology transferability.

For instance, investment costs to increase circular economy in the field of packaging plastics was estimated in the range of billions of Euros. In general, if more plastic packaging would be recycled in European recycling facilities, less plastics waste would end up in incineration facilities or in landfills.

- Well-being of the European citizens: the regulation environment is aimed to prevent any harmful consequence to human-beings. The priorities identified and the potential solutions to come also address the preservation of the environmental and health principles those regulations pursue.
- Market uptake and reduction of uncertainties: the priorities selected are meant to boost sustainable markets, offering market opportunities to the larger number of different actors which would benefit, as their market share could be increased. The regulatory bottlenecks which hamper or risk investment plans have been also prioritized in the spirit of laying down the basis for building trust on investments for improving facilities and technology transfer solutions.
- Job creation: the barriers that most likely are impeding (or even reducing) high skills positions have also been part of the criteria in the selection process. For example, increasing circularity has been mentioned as having a positive impact on the job growth. In particular, the increase of job creation rates is greater when waste is treated (valorised) than sending waste to incineration or landfill.
- R+D activities as enablers to a better and complement to regulation: Also new jobs in the field of Research and Development (R&D) would be created in order to boost new technologies for the recycling of valuable wastes (e.g. multilayer packaging plastics as well as flexible packaging).

All in all, the selected priorities should not overlap with each other, but even more importantly, being tackled in a complementary way, in the search of the harmonization and clarity of all the priorities. The lack of harmonized approaches across the EU process industry can be a relevant barrier and causes missed opportunities to foster innovation and global competiveness. Consequently, the understanding and transposition of EU legislation can differ across sectors and countries within the EU – also allowing much room for interpretation. It is recommended to analyse and promote regulation and other policy-oriented measures taking into account a wide geographical dimension (EU, nationally and regionally).

Lastly, the commitment and engagement of the industrials associations is key in all the priorities selected. This will result in a very proactive follow up on those priorities in the future, even beyond the execution of the HARMONI project. Therefore, the developments under the umbrella of the HARMONI project are fully aligned with the activities the industrial associations are promoting. All the efforts, political will and industrial interests are as a result reinforced and aligned.

3.3 Presentation of the results

After the prioritization process, all the information gathered is summarized and clustered in a fiche developed to include all key elements. Each fiche (one per priority), illustrates and facilitates the understanding of the challenges and the first tentative solutions to overcome to be proposed in WP3,

4 and 5. The content of the fiches and the way data collected has been used for this purpose is indicated in the next figure below.

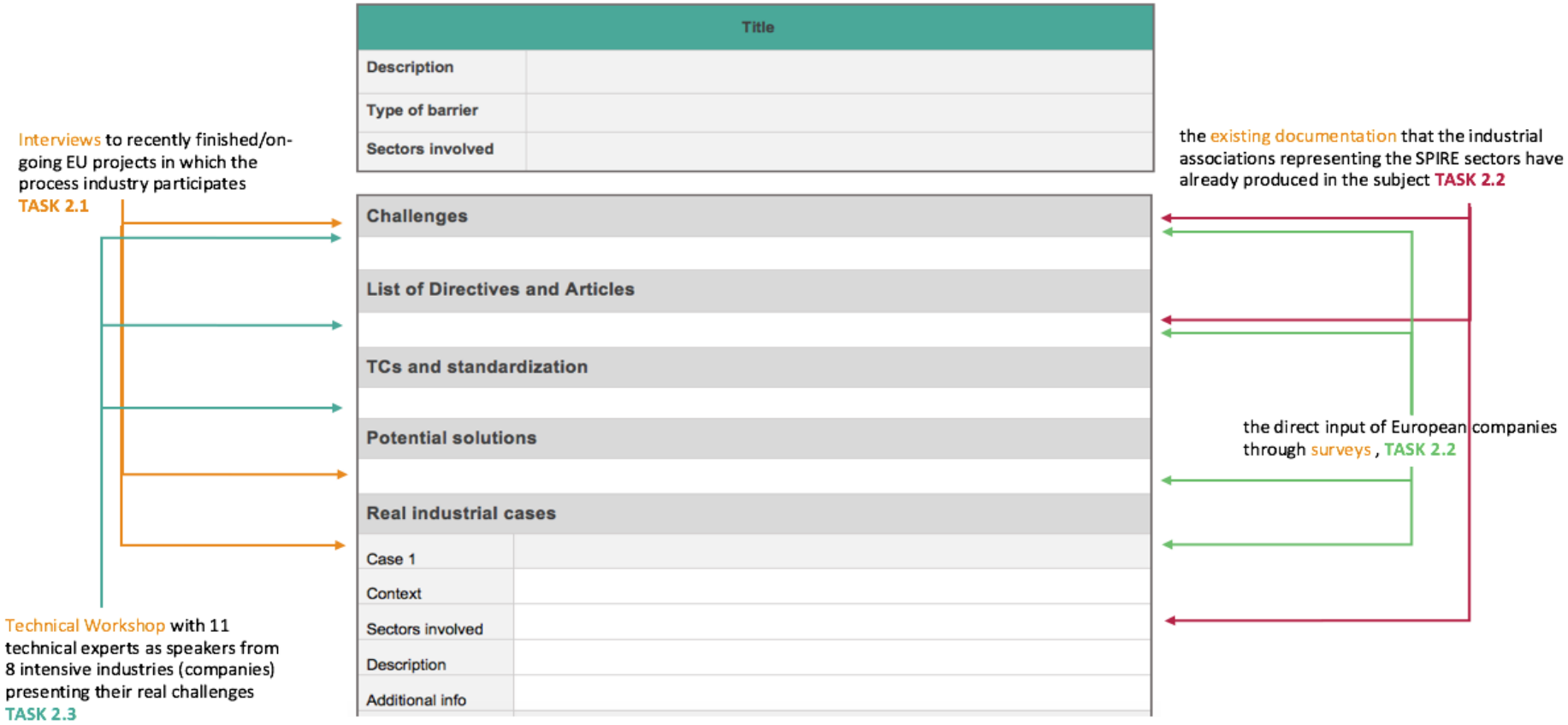

Figure 1: Template of the Priority Fiches: Sources of information from WP2 activities that feed the Priorities fiches which describe the main challenges and tentative solutions of the main priorities selected.

As a result, the fiches include relevant information to have a broad overview of all elements that affect and determine the framework of the selected priorities. Those fiches, as key elements of the D2.3, lay the basis for analysis of WP3, 4 and 5.

3.4 Selected Priorities

After considering all the information collected, the following six priorities are perceived as the most important ones.

Two kind of priorities have been identified. On the one hand, "procedural fiches", which aim at challenges neither subject nor linked to a particular technology/technical area. Therefore, it poses difficulties in the way policy makers and companies participate in the launch of directives and their implementation and deployment. On the other hand, the "thematic" fiches are more technical challenge driven. As a result, the barriers and difficulties are rather specific to their field of application. The combination of tackling both approaches at the same time is instrumental so as to better shape and launch robust and easy to implement directives and other legal documents.

The overall HARMONI priorities and their interconnections and interdependences are illustrated in the following picture:

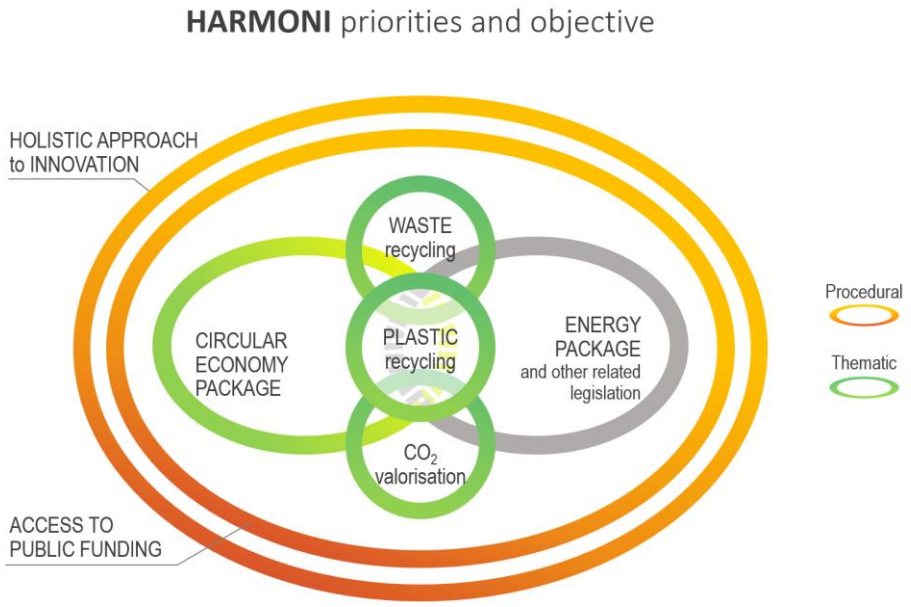

Figure 2: Graphic representation of HARMONI priorities and objective

Below, the 6 priorities are summarised. The full texts are included in the ANNEX C.

3.4.1 Holistic Approach:

The general term "holistic approach" means "taking care of or paying attention to something in all aspects". In the context of the HARMONI project, the "holistic approach to innovation" describes

how organizations can achieve a holistic perspective on their barriers to innovation and on solutions available in the market in order to improve their own competiveness and the competiveness of their industry.

3.4.2 Access to Public Funding:

Innovation projects often carry not only technical but also financial risks which make it difficult for companies to invest with a reasonable rate of return. This is where the role of public funding comes in. Access to a clear and transparent public funding framework is essential to further innovation in Europe. For the moment, there are still too many hurdles that impede that easy access.

3.4.3 Circular Economy Package:

The SPIRE sectors are at the heart of the material circularity concept. The European Commission Circular Economy Package is the main policy initiative to drive society towards a waste-to-a-resource thinking through reuse, recycling and recovery. Since its launch, the European Commission has been examining options and actions for a more coherent policy and regulatory framework in this direction. The Circular Economy Communication COM((2015) 614 lacks an implementation plan with clear priorities.

3.4.4 Waste recycling:

In order to reap the full benefits of industrial symbiosis, there is a need for waste legislation that provides clear and harmonized definitions and allows for a proper accounting of recycling activities. In concrete terms, the definition of “waste and by-products” poses many challenges from a regulatory point of view, with substantial industrial consequences. EU's rules on end-of-waste are not fully harmonised and leave a wide margin not only to Member States but also to regional authorities. Clarity about these definitions is essential to further the goals of the circular economy. In addition, some recycling activities by industry, such as the recycling of materials from waste streams for incorporation in the final product, are not taken into account for the calculation of national recycling targets.

3.4.5 Plastic Recycling:

Plastics are diverse and often product-specific, for a wide range of value chains. To recycle them requires a diverse mix of solutions, taking into account the environmental impact, existing alternatives, local and regional demands and ensuring that functional needs are met to its reuse. To this end, the regulation sets some challenges to boost its reuse and then, its valorisation potential.

3.4.6 CO_2 Valorisation:

Recycling carbon from CO2 and CO as an alternative carbon source can contribute to a more sustainable production of chemicals, materials, fuels, with significant CO2 emission avoidance compared to current production pathways. CO2 valorisation technologies can also provide solutions for large scale renewable energy storage. An appropriate, coherent and supportive policy and

regulatory framework is essential to enable the deployment of CO2 valorisation technologies that can effectively contribute to sustainable development in and from Europe.

Lastly, it is critical the need to harmonize the two most important EU Communication now-a-days, such as Circular Economy Package and Energy Package. For instance, industrial symbiosis includes energy flows exchange, and circularity of materials flow require (often significant) energy. Ignoring the Energy package in this overview means that we support a development of circularity policy and energy policy into silo. By nature, process industry uses directly energy in their process, thus the energy package is of instrumental importance to the process industry, and by extension to HARMONI. However, it has not been considered to have a fiche dealing with this theme in the HARMONI project. All the following developments from now on will take into account the energy package and will promote the interlinkage with this policy. In essence, the Energy Package is related to all the priorities of HARMONI, then it has been integrated accordingly (figure 2). To sum up, the HARMONI project purses to strengthen the interconnection between both instrumental policy initiatives, Circular Economy Package and Energy Package, which are for the time being, disconnected.

4 CONCLUSIONS

The information collected in WP2 is massive in quantity and very complex in content due to its diversity and vast number of non-regulatory bottlenecks intensive industries encounter. The number of documents and sources of information referred and used is extremely large and varied, involving the 8 SPIRE sectors and other intensive industries as well. As a last step to map the existing barriers, HARMONI has organized a very important technical meeting with industrial representatives to complement the information collected so far in the project. This exercise concluded with very urgent matters to tackle as they impede new investment plans linked to technology and claim the urge to a better regulation environment.

The next step was to set up the priorities to focus on along the HARMONI project. This exercise has resulted in 6 priorities which will be further elaborated in the search of recommendations and solutions in WP3, 4 and 5. The selected priorities are the most conflicting and urgent matters to be solved for the intensive industries.

The priorities have been classified in two categories, procedural and thematic. It is also clear that the complexity of the field requires a holistic analysis of the regulatory environment. In total, 2 procedural priorities ("Holistic Approach" and "Public Funding") and 4 thematic priorities ("Circular Economy Package", "Waste Recycling", "Plastic Recycling" and "CO2 valorisation" have been carried out.

The aforementioned 6 priorities have been described including the main elements in fiches (one per priority) to explain the challenges they pose. In addition, the reference documents to analyse in detail are mentioned. Also, real examples from companies and sectors in each of the cases illustrate the difficulties and picture the consequences of the challenges to be overcome. Lastly, some tentative solutions are briefly referenced in each of the priorities.

The fiches are expected to be assessed in parallel as they are designed in such a way that the solutions are complementary and will tackle one or more than one priority. The analysis of the WP3, 4 and 5 starts from the 6 priorities as reference documents as they frame the challenges and stablish the potential solutions to further explore in each respective WP.

5 ANNEXES

ANNEX A: Agenda of the Thematic Workshop hold on the 26th of April

Workshop Agenda

SUBJECT	**HARMONI Project "Harmonised assessment of regulatory bottlenecks and standardisation needs for the process industry"** Grant Agreement: 768755
MEETING	WP2 Workshop (Task 2.3): Prioritization of the regulatory bottlenecks and standardization needs for the process industry.
DATE	April 26th 2018
VENUE	Eurofer, Avenue de Cortenbergh 172, 1000 Brussels, Belgium
STARTING TIME	10:00h
FINISHING TIME	17:00h

ATTENDANTS	
ENTITY	**COUNTRY**
CIRCE - Fundación CIRCE	HARMONI coordinator
CIRCE - Fundación CIRCE	HARMONI coordinator
CEFIC - Conseil Européen de l'Industrie Chimique	HARMONI partner
CEFIC - Conseil Européen de l'Industrie Chimique	HARMONI partner
CEFIC - Conseil Européen de l'Industrie Chimique	HARMONI partner
CEFIC - Conseil Européen de l'Industrie Chimique	HARMONI partner
CEFIC - Conseil Européen de l'Industrie Chimique	HARMONI partner
DIN - DIN Deutsches Institut Fuer Normung E.V.	HARMONI partner
Essenscia	Chemical sector
INEOS	Chemical sector
Instituto de Tecnología Cerámica	Ceramic sector
Kerneos	Ceramic and Mineral Sector
Euroalliages	NFM sector
Outotec Oyj	Engineering and Copper sector

ESTEP - European Steel Technology Platform	Steel sector
FEHS - Institut Fur Baustoff-Forschung EV	Steel Sector
CEMBUREAU - Association Européenne du Ciment	HARMONI partner
ECREF - European Centre For Refractories	HARMONI partner
ECREF - European Centre For Refractories	HARMONI partner
Arcelormittal CTO Technology Development	Steel sector
RHI Magnesita	Ceramic sector
HeidelbergCement	Cement Sector
Cerame-Unie	Ceramic Sector

AGENDA			
26th April 2018			
Item	Time	Subject	Speaker
1	**10:00 h**	Welcome, workshop overview, methodology and "tour de table"	Ignacio Martín, (CIRCE) and all
2	**10:10 h**	Case studies: examples of real non-technological barriers for each sector. All the presentations will be followed by Q&A so as to identify similarities, differences and gaps among the sectors involved in the workshop. Introduction of the issue. 1. **Cefic.** Waste legislation: a barrier to industrial symbiosis? (30´) 2. **Euroalliages** (European Ferro-Alloys and silicon producers) (20´) a. Case 1: Ferromolybdenum slag in Belgium and UK b. Case 2: Treatment of Mn Alloys residues for further reuse 3. **RHI Magnesita**: Non-harmonized national implementation of EU-regulation on waste and classification of raw material and products (20´): a. Case 1: Limited Recycling b. Case 2: Waste shipment across boarders c. Case 3: Classification of Eco toxicity (HP14) 4. **Cefic**: CO_2 valorisation, current policy framework and **Ilse Forrez – Essenscia:** ETS regulation (20´) 5. **Arcelormittal CTO Technology Development** (Steel sector): EU RED construction: regulatory requirements to allow the re-use of carbon from industrial processes (steel production and others) (30´) 6. **Kerneos** (20´): a. Harmonized and transparent low-carbon economy: Need for long term visibility of CO_2-certificate system. Incentives to move from fuel to electric industrial furnaces? (20´)	Moderator: Ignacio Martín (CIRCE) Experts per sector

		b. Harmonized approach on TiO2-dust, Boric Acid, etc – Concrete wish to be discussed during the workshop: when can final decisions be expected? how quick will they be implemented in the member states? what's next on the list of hot topics?. c. BREFs	
3	**12:30 h**	Lunch	
4	**13:10 h**	1. **Outotec Oyj** (35´) a. Non-Ferrous Metals Industries BREF: practical experience and recommendations b. Copper industrial case 2. **INEOS:** Enabling industrial symbiosis between sectors – the role of regulation and standardization (15´) 3. **Instituto de Tecnología Cerámica** (20´) a. Low acknowledgement and support from public authorities to implement circular economy actions related to waste valorization in current industrial practices. b. Non-harmonized quality standards applied to the ceramic tiles at international level (lack of acknowledge among countries) or standardization 4. **HeidelbergCement** (20´)	Moderator: Ignacio Martin (CIRCE) Experts per sector
5	**14:40 h**	Coffee break	
6	**14:55 h**	Criteria to select the main non-technological barriers: synergies, gaps and overlaps Summary of the discussions by the "representative of each group"	Moderators per case study (tbd)
7	**17:00 h**	Workshop closure and next steps	Ignacio Martín (CIRCE) and all

ANNEX B: Content of the industrial cases´ presentations

IMPACT OF NON-TECHNOLOGICAL BARRIERS IN THE INTENSIVE INDUSTRIES AND POTENTIAL OF STANDARDISATION

Workshop 26th of April, 2018, Brussels

CONTENT OF THE INDUSTRIAL CASES´ PRESENTATIONS

Company's data

- ✓ Name
- ✓ Sector of activity and subsector (if necessary)
- ✓ Country
- ✓ Company size (SME/Large Enterprise)

Real case

- ✓ Problem to address.
  - ✓ Is it due to an overlap, overregulation, underregulation, inconsistence in the law/standardization?
  - ✓ Classify it within a topic:
    - ✓ Energy consumption/Resources consumption.
    - ✓ Waste generation
    - ✓ Production.
    - ✓ Machinery.
    - ✓ LCA
    - ✓ Process design/performance
- ✓ How does this affect your business?
  - ✓ Production capacity
  - ✓ Positioning your business
  - ✓ Hampering investments
  - ✓ Accessibility of raw material
  - ✓ Quality /quantity of your products
  - ✓ Limiting the development of new products
  - ✓ .....
- ✓ Possible solutions and challenges to be considered

ANNEX C: 6 Priorities of HARMONI

HOLISTIC APPROACH TO INNOVATION	
Description of barriers identified	The general term "holistic approach" means "taking care of or paying attention to something in all aspects". In the context of the HARMONI project, the "holistic approach to innovation" describes how organizations can achieve a holistic perspective on their barriers to innovation and on solutions available in the market in order to improve their own competiveness and the competiveness of their industry.
Type of barrier	Procedural
Sectors involved	All SPIRE sectors

Challenges

Throughout HARMONI-related research, technical as well as procedural barriers to innovation have been collected. Some of these barriers decrease the potential for transferring innovations between sectors. As a result, these barriers can decrease potential cooperation activities and hamper the transfer of innovative solutions between sectors.

While this document can only provide an overview of challenges ("barriers") detected, a deeper analysis of potential solutions will be conducted in the HARMONI working packages 2 – 5. Aspects concerning innovation that will be focused and further discussed are:

- barriers caused by regulatory processes or regulatory output
- challenges caused by other technical or procedural barriers such as funding, financing and further social, environmental and economic aspects that hinder innovation
- "missed opportunities" such as
  - a lack of effective information management between regulatory bodies and companies or between standardization bodies and companies,
  - a lack of communication, ineffective communication,
  - a lack of collaboration across sectors or with research organizations,
  - a lack of skills required for innovation management or to apply new technologies, new tools, etc.
  - the consequent effective application of standardization as strategic tool
  - the ineffective utilization of digital tools

According to HARMONI interview and survey participants, some cases illustrate certain lack of transparency and clarity in some regulatory processes.

On the other hand, the cooperation across SPIRE sectors (Cement, Ceramic, Chemicals, Engineering, Non-Ferrous Metals, Minerals, Steel, Water) has also been low so far so that solutions that have been developed in one sector have not been communicated to other sectors facing the same barriers.

We believe that this can be achieved by fostering a holistic thinking and acting within the process industry in the form of cross-sectorial cooperation and an increased interchange of information between industry, regulatory bodies and standardization bodies.

List of related legislation

For regulation principles see Better Regulation Guidelines of the European Commission (https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en).

TCs and standardization	
ISO/TC 279 - Innovation management	
Potential solutions	
Industrial organizations but also regulatory bodies and standardization bodies should try to get as much information as possible and required on the barriers that they are facing in the industry in order to integrate those in a more holistic approach within and across different stakeholders of the process industry (including regulatory and standardization bodies). Besides the broader sharing of information and an increased cross-sectorial cooperation, potential solutions include the application of practically proven management tools to achieve a system fit and to identify synergies between organizations but also a bilateral understanding of processes (of other sectors as well as regulatory and standardization processes) along the value chain of the respective organizations. Further potential solutions to increase a holistic thinking and acting are annual cross-sectorial events and information platforms, leveraging the role of SPIRE, financial incentives for cross-sectorial cooperation by the regulatory bodies, a stronger and fair integration of industrial representatives during the development of regulatory processes (see standardization processes as an example) and so on. Communication schemes across SPIRE sectors could also be set up by working groups or multidisciplinary expert teams that cooperate on specific topics that concern more than one sector (e.g. waste, circular economy, emissions) or that identify (new) business models. We also assume that a stronger involvement of IT experts in projects of the process industry could help to increase the awareness and to identify skills for future technologies, to set up effective data management systems for better information management or to introduce platforms that improve the coordination of the regulation and standardization approach in order to support market penetration. A STAIR platform could be a solid foundation and a first step towards this ambition. A good interaction of standardization experts with policy makers are one aspect of a good operating environment for companies. We believe that investing in a holistic approach will increase the competitive and transient advantages of the European industry, i.e. competitiveness on EU- and global level as a result.	
Real industrial cases	
Case 1	New holistic collaboration scheme by the mining sector in Finland
Description	**Challenge**: The mining industry can be pollutant and has a bad reputation especially concerning people living close-by. Social, environmental and economic aspects have to be discussed in order to maintain the industry's success in that region on long-term. **Solution**: Enable holistic thinking and acting by involving all relevant stakeholders though setting up initial discussions and a round table in order to find a solution that fits to all needs and will realize a cleaner and a more sustainable mining industry in Finland. Also, working groups among different parties (with sometimes contradictory objectives) have been created to define a common objective and to then work collaboratively on the same issues but bringing in different perspectives. **Additional information:** The contribution of the academia was crucial in this process as an independent contributor of knowledge and evaluations. The initiative is still on-going and has seeded the industrial mining environment of the future.
Sectors involved	Mining

Case 2	Fostering industrial symbiosis by means of information exchange and a holistic stakeholder involvement
Description	Industrial Symbiosis describes how a network of different organisations can foster eco-innovation and long-term mutually profitable transactions by reusing, recovering and redirecting resources so that they remain productive for longer. Industrial Symbiosis can be introduced by means of multidisciplinary expert teams but also by Circular Economy (material and/or energy exchange). **Challenge**: Industrial symbiosis implies the exchange of streams by nature but is sometimes restricted by regulation, low funding interest of industrial symbiosis projects or a lack of information management and collaboration. Also barriers in one sector might delay the cross-sectorial implementation of industrial symbiosis in general (might be multiplied by the number of sectors). We assume many missed opportunities regarding industrial symbiosis and that, as a potential result, some eco-innovations are not transferred from lab scale to commercial scale. To give an example: CO2 emissions and their allowances is difficulty to be judged correctly. Companies that try hard to reduce their CO2 emissions through the use of industrial symbiosis are discouraged by the lack of support from the regulatory bodies and authorities. **Exemplary solutions** (transferable to other industries with similar issues): Setting up transparent communication channels and sustainable cooperation structures for all stakeholders identified as a potential synergy carrier - taking into account other industries than SPIRE sectors as well. Referring back to the CO2 example: some companies have redirected the CO2 emission into greenhouses and other farming installations, growing vegetables or shrimps, etc. Enabling discussions through regular cross-sectorial events, also inviting regulatory bodies and standardization bodies to reduce the uncertainties that regulation and standards can pose, e.g. leveraging the use of the STAIR-platform Fostering new business models regarding industrial symbiosis, bearing in mind that standardization bodies should be included in the discussions in order to help sharing experience and implementing these into practice. **Additional information:** Several funded SPIRE projects in the field of IS include deliverables tackling specific and real cases in this field.
Sectors involved	All SPIRE sectors

ACESS TO PUBLIC FUNDING	
Description	Innovation projects often carry not only technical but also financial risks which make it difficult for companies to invest with a reasonable rate of return. This is where the role of public funding comes in. Access to a clear and transparent public funding framework is essential to further innovation in Europe. For the moment, there are still too many hurdles that impede that easy access.
Type of barrier	Procedural
Sectors involved	All SPIRE sectors

Challenges

EU project funding has been particularly important for de-risking early stage research. As well as helping overcome technological challenges, EU R&I funding has financed innovations with strong market potential, which is vital if technologies are to achieve commercialisation, and could help improve the competitiveness of European industry. However, there are limited funding options for demonstration plants and first-of-a-kind plants in Europe while risk-sharing is essential to the deployment of breakthrough technologies in the process industry. In this regard, the EU should coordinate multiple sources of funding for First-of-a-Kind (FOAK) demonstrations. A particularly critical and challenging step for many projects is raising funding for a FOAK demonstration, which calls for a targeted policy response. To coordinate multiple sources of funding for FOAK demonstrations would support industries to align their investment plans better. A few options and their combination could facilitate the launch of projects with the industry, such as; loans, grants, and equity instruments on a first-loss basis to crowd-in private investment for projects. For example, the EU could provide grants through the ETS Phase IV Innovation Fund, loans through the recently established European Demonstration Projects facility (part of InnovFin), and equity through a new dedicated FOAK fund.

On the other hand, the bottom-line is that Boards of companies are looking at financial feasibility of projects on the basis of their own financial input and the public financing contribution: uncertainties about scope, timing and application procedures often makes these decisions needlessly complicated. To this end, there are several hurdles;

- Lack of clarity on the interplay between different funding instruments:

For instance, how funding under the Horizon program is coordinated with other funding mechanisms such as the Innovation Fund under the EU ETS Directive or regional funding and Cohesion Fund or Structural Funds; it needs to be clarified what funding is available for research and what for pre-commercial demonstrators and whether both funding sources can be combined;

- Different application procedures and different DG's in charge:

the lack of coordination in the design and implementation in silo of different instruments with their own objectives, programming, timing, application and selection procedures

- Coordination between European and national aid and the role of state aid:

Application procedures for EU funding are not aligned with the timing for possible complementary state aid which, if not block exempted, needs to go through a notification procedure with DG COMP. In addition, it is often not clear in advance whether EU and national aid can be combined. Often, it is at the stage of the state aid

assessment that a limitation is put on the level of national aid that can be given in combination with EU funding. That does not further legal certainty and transparency upfront.

List of related legislation

- Horizon 2020 and Horizon Europe
- State aid rules and more specifically the "Guidelines for State Aid on Environmental Protection and Energy 2014-2020", O.J. 2014, C 200, p. 1, the 'Framework for State aid for research and development and innovation', *OJ C 198, 27.6.2014, p. 1–29*, 'Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest' (2014/C 188/02)
- Directive 2003/87 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/CE, as amended in 2018, O.J. 2018

TCs and standardization

n/a

Potential solutions

Technological solutions to policy goals will only see the light of day if R&I projects succeed in scaling up their innovations, which is a considerable challenge. The EU is expected to provide smart R&I support, marshalling its financial resources and communication capabilities, to ensure that projects of relevance to policy challenges progress in their TRL journey and are proven at scale. In line with this, Demonstrating the industrial feasibility of system solutions with strategic potential, high impact and considering higher TRLs. Demonstrators are required to test technologies at scale and explore integration with existing processes to better understand the techno-economics which will help further de-risk future investment and set the right framework for competitive technology application in Europe. Some solutions are enumerated below:

- Create a one-stop shop for funding applications and align state aid assessments with EU funding assessments
- Provide upfront clarity about scope of funding and combination of funding opportunities
- Coordinate multiple sources of funding for key demonstration projects
- Flexible funding instruments able to finance demonstration activities (e.g. TRL8, or even TRL9) to meet the industry's leverage in cases where this may lead to achieving substantial impact and trigger faster deployment at real scale, for instance when pioneering a technology from Europe to ensure leadership in global markets.

Real industrial cases

Case 1	Funding for CCU demonstration projects ready to go pre-2020
Context	The current EU ETS Directive foresees in a funding mechanism (NER 300) for CCS projects but only for projects that cover the full chain, i.e. including transport and storage. CCU projects are therefore not eligible for funding under the current rules. The Innovation Fund under the revised EU ETS Directive will provide funding for CCS and CCU but implementing rules still need to be elaborated. Funding under HORIZON 2020 is also not possible (amounts are low; demonstration project has a higher TRL than Horizon 2020 projects (TRL 3 to 6).

	In addition, the funding is paid only when the CO_2 is effectively stored. This goes counter to a risk-financing approach but we understood this is also corrected post-2020.
Sectors involved	Several SPIRE sectors
Additional info	EPOS EU project

CIRCULAR ECONOMY PACKAGE	
Description	The SPIRE sectors are at the heart of the material circularity concept. The European Commission Circular Economy Package is the main policy initiative to drive society towards a waste-to-a-resource thinking through reuse, recycling and recovery. Since its launch, the European Commission has been examining options and actions for a more coherent policy and regulatory framework in this direction. The Circular Economy Communication COM((2015) 614 lacks an implementation plan with clear priorities.
Type of barrier	Thematic
Sectors involved	All SPIRE sectors

Challenges

The European Commission has proposed actions to support the circular economy in each step of the value chain – from production to consumption, repair and remanufacturing, waste management, and secondary raw materials that are fed back into the economy. However, the investments in waste management must have a payback and current market signals appear insufficient to boost the circular economy.

In order to improve this, policy should address, amongst others, the following issues:

- The waste legislation focuses, in many cases, on quantities (weight-based collection or recycling targets) and less so on the quality of recycled materials;
- Closed-loop recycling, although in many cases technically feasible, is not always the most sustainable and/or economical solution, e.g. due to the energy intensity of processing;
- Movement of waste across borders;
- Access to sorted waste material;
- Cost reduction of recycling, and technical performance of recycled products;
- The proposed Circular Economy Monitoring Framework does not address durability. A new indicator needs to be developed to measure this feature.

Definition of Waste and lack of harmonized EU regulation: Inconsistencies between existing regulations, e.g. related to REACH or the end-of-waste criteria, underpin the use of certain potential secondary materials. Moreover, classifying some valuable materials as waste creates hurdles to circularity (see Waste Definition Fiche).

Innovation as a trigger for Circular Economy implementation: There is a drive towards the circular economy and low carbon economy, but legislation is not totally fit for the implementation of innovative solutions. This is a hurdle that risk to delay market deployment of innovative technologies, materials, and processes. In parallel,

regulation should also touch upon how the market embraces new circularity solutions. To this end, technology development and legislation must go hand in hand. A holistic legislative approach is necessary to cover all stages of technology developments (see the Holistic approach fiche).	
List of related legislation	
All legislation applying to waste and by-product are concerned (see WASTE FOR RECYCLING Fiche), as well as those applying to aspects such as design for reuse, repair or recycling. Also, additional regulations that have a link to the principles of the Circular Economy Package and might influence the final capacity of industry to use secondary materials.	
TCs and standardization	
All applying to waste and by-product definition (see Waste definition fiche). A holistic approach of standardization in order to align with the heterogeneous characteristic of Circular Economy is beneficial. STAIR platform might be a very powerful tool to support this transition.	
Potential solutions	
It is necessary to move towards a full product life cycle definition of circularity and focus on the interfaces between different steps of the value chain (extraction/production, production/production internal loops, production/use, collection, waste-management/recycling/production). On the other hand, it is clear that in view of the large number of regulations, the role of associations is instrumental, and so is the coordination between different stakeholders from different sectors. It is strongly encouraged to set up round tables in which authorities, technology providers and final users meet so as to shape the regulatory legal texts to the industrial reality.	
Real industrial cases:	
Case 1	Reuse of scrap: Potential interim incentives to complement the Waste Framework Directive and Circular Economy Package so as to boost cost-effective technologies supporting business cases in the EU.
Context	The current situation is that China is buying almost all the scrap produced in Europe, since they have not so tight regulations concerning pollutant impurities as the European Union. Thus, a lot of valuable material is being sent to Asian companies. Furthermore, a lot of companies want to buy REE (Rare Earth Elements) in Europe, but the price of the Chinese material is lower than the material coming from a recycled product in Europe. For the time being, there is no real scrap market in Europe as the prices for recycling are so high that no final users are going to use them. In addition, and in the case of REE, prices of those materials vary significantly, which underpins also economically feasible future applications.
Sectors involved	Non-Ferrous Metals
Description	Any efforts in the light of facilitating business cases is encouraged. In processes with high potential of recovery, the price of the final product from waste to feedstock always plays a major role. As an example, it is difficult to know the quality of the scrap for aluminium in terms of composition and properties so as to define its price at the end of the process. The absence of trustful information and classification of this material causes market uncertainties, and as a consequence, it is hampering the potential of this valuable waste.

Additional info	Circular economy and eco-design are very positive initiatives towards turning a high number and variety of wastes into new materials. However, the time to scale up the technologies to manage and process them is often too long, and at non-affordable prices, and in the end the market is not mature enough to receive the processed materials. It would thus be necessary to consider the global benefit for recovered materials (environmental, material savings, pricing etc.). It is worth exploring interim incentives to boost cost-effective technologies supporting business cases in the European Union.

WASTE RECYCLING	
Description	In order to reap the full benefits of industrial symbiosis, there is a need for waste legislation that provides clear and harmonized definitions and allows for a proper accounting of recycling activities. In concrete terms, the definition of "waste and by-products" poses many challenges from a regulatory point of view, with substantial industrial consequences. EU's rules on end-of-waste are not fully harmonised and leave a wide margin not only to Member States but also to regional authorities. Clarity about these definitions is essential to further the goals of the circular economy. In addition, some recycling activities by industry, such as the recycling of materials from waste streams for incorporation in the final product, are not taken into account for the calculation of national recycling targets.
Type of barrier	Thematic
Sectors involved	All SPIRE sectors

Challenges

One of the centrepieces of the circular economy is the possibility to use waste from one industry as a resource for another industry. While it is indeed essential that waste legislation requirements in terms of treatment and transport need to be fully complied with to ensure that the integrity and flow of processes that use the waste are not affected, there is room to address the following issues:

- in some Member States, well-defined by-products (such as Ground Granulated Blast Furnace slag) are not considered products and are therefore subject to double regulation, as they must comply with both the waste and the products requirements. This uneven application throughout the EU results in serious restrictions in the domestic and cross-border shipment of these materials in Europe. Furthermore, the glossaries of classification are overlapping and this constitutes a hindrance to the circular economy.
- Difficulties in applying EU waste classification methodologies and impact on the recyclability of materials which affects the use of secondary raw materials and leads to varying interpretations by national authorities. For instance, specific considerations of each waste stream and its management may allow wastes to be considered as non-hazardous even if the recovered material will be hazardous when placed on the market as secondary raw material (based on the content of hazardous substances, which may not be bioavailable/bioaccessible). The label "hazardous" in the current legislation adds significant costs to its treatment and reduces the options to recycle or reuse.

Another issue relates to the fact that material recycling whereby a secondary material from waste is recycled into an end-product, as in the cement industry, is counted towards national recycling targets.

List of related legislation

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance)

Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste. This Regulation specifies under which conditions waste can be shipped between countries.

Decision 2000/532/EC establishing a list of wastes. This Decision establishes the classification system for wastes, including a distinction between hazardous and non-hazardous wastes. It is closely linked to the list of the main characteristics which render waste hazardous contained in Annex III to the Waste Framework Directive above. Hazardousness of waste should be inspired by the classification of substances and mixtures under CLP, but not fully aligned with it. Hazard classification of waste legitimately follows a different reasoning than classification of chemicals which frequently have a much broader use and lead to greater exposure of a diverse population. Therefore, hazard classification of waste can only be inspired by the classification of substances and mixtures under CLP but should remain regulated separately as is the case today.

Commission Decision (EU) No 2014/955/EU of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council Text with EEA relevance (OJ L 370, 30.12.2014, p. 44–86)

Commission Regulation (EU) No 1357/2014 of 18 December 2014 replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives (OJ L 365, 19.12.2014, p. 89–96)

Directive 2008/851/EC of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste.

Articles:

Directive 2008/98/EC - Article 6: End-of-waste status.

Directive 2008/98/EC - Article 5: By-products.

Other related legislation:

COUNCIL REGULATION (EU) No 333/2011 establishing criteria determining when certain types of scrap metal cease to be waste.

COMMISSION REGULATION (EU) No 1179/2012 establishing criteria determining when glass cullet ceases to be waste.

COMMISSION REGULATION (EU) No 715/2013 establishing criteria determining when copper scrap ceases to be waste.

CIRCULAR ECONOMY PACKAGE (http://ec.europa.eu/environment/circular-economy/index_en.htm) which stablishes many linked potential applications for future reuse of waste.

TCs and standardization

CEN/TC 183 “Waste management” CEN/TC 292 “Characterization of Waste” ISO/TC 297 “Waste management, recycling and road operation service”
Potential solutions
• Harmonization at EU level of end-of-waste rules. • New concepts with high potential for the EU like Industrial symbiosis and Circular Economy as a whole, need better quality data dealing with waste but also an increase of trust in that data. • Create governance cooperation models between EU, national and local authorities to ensure smooth and efficient permitting procedures for industrial symbiosis projects • Allow material recycling of waste into the final product to count towards national recycling targets.
Real industrial cases

Case 1	Direct liquid waste stream valorisation between INEOS Hull and CEMEX South Ferriby
Context	The overall aim of the EPOS project is to enable cross-sectorial industrial symbiosis and provide a wide range of technological and organisational options for making business and operations more efficient, more cost-effective, more competitive & more sustainable across process sectors. The potential synergy was detected at the UK Hull cluster and involves CEMEX South Ferriby and INEOS Hull.
Sectors involved	Chemicals, cement.
Description	The business case concerns the possibility for INEOS to send one of its liquid waste streams to CEMEX for energy valorisation. It is anticipated that the synergy between CEMEX and INEOS can potentially reduce the global footprint of the local industrial activities. CEMEX has a permit to burn 100% waste as fuel in its cement kilns. Currently, already 80% of the fuels burned in the CEMEX kilns are based on waste. The liquid waste stream from INEOS can provide an opportunity for CEMEX to replace a portion of the remaining 20% of the energy needs currently provided by primary fuels; therefore, improving kiln operations by reducing costs and indirect emissions. In such a setting, INEOS will stop sending the stream to its current utility provider and could thus negotiate a more favourable price for steam. After proving the project to be feasible economically, legal considerations should be accounted for. In order to use the stream as a fuel, CEMEX requires a new licence due to its hazardous waste status. This procedure lasts at least 26 weeks and must be considered in the planning of the project.
Additional info	EPOS EU project
Case 2	Lack of harmonized regulation in the context of the **Waste Framework Directive in the Ceramic sector (**applicable to other SPIRE sectors)
Description	The European Waste Framework Directive (WFD) provides definitions on waste and waste treatment, sets out EU waste management targets and mentions methods to achieve those. This includes for example that 55% of municipal waste (by weight) has to be recycled by 2025, increasing during the following years. Using the Ceramic sector as an example, Article 6 (1) of the WFD (2008/98/EC) states that the final end of waste stage can be set by member stated (exemption: specific waste streams regulated under Community Law) but that the defined waste at least needs a

	treatment for reutilization (recycling) to reach the end of waste status. Due to the long lifespan of ceramic products and the fact that in some sectors over a third of the production is exported outside the EU, the quantity of secondary material available after the end-of-life stage is often insufficient. Austrian legislation (§ 5 Abs 1 AWG 2002) states that the end of waste status is reached when being reused (not just after the treatment). This is critical to the industry because it causes increased effort and costs compared to competitors, especially outside the EU. Another challenge caused by Article 7 of the WFD (2008/98/EC) is the definition of hazardous waste. European member states are enabled to set criteria of their own. As a result national lists of waste differ and material that is not defined as "hazardous waste" in one country, might be defined as "hazardous" as soon as crossing the border to another country. The transport and treatment of waste within or to some European member states is heavily handicapped. The European Commission published an amendment in May 2018 (2018/18/01), stating that they will only interfere and narrow down criteria for hazardous waste if the national classification fails. Until then, cross-border transport is costly and linked to a high bureaucratic effort.
Case 3	Unharmonized waste treatment in the Cement sector
Context	Replacing traditional natural raw materials and fossil fuels by alternatives (such as being drawn from different waste streams) will decrease a company's carbon footprint and negative environmental impact of the sector in total. For example, the cement sector constantly innovates in the fields of waste treatment and sorting in order to process the waste in its kilns. An easy access to waste is inhibited by EU regulation though, the instalment of a landfill ban and national regulation (permitting; taxes; public acceptance). Since national authorities are not harmonized, confusion regarding regulatory obligations and investment opportunities on plants can occur. The example is not fully applicable to all sectors, since refractories (Ceramic) require a certain type and quality of flame to achieve product quality (e.g. high temperature resistance). A lower application range of the key technology refractories has a severe impact for the production processes of other sectors in the process industry.

PLASTIC RECYCLING	
Description	Plastics are diverse and often product-specific, for a wide range of value chains. To recycle them requires a diverse mix of solutions, taking into account the environmental impact, existing alternatives, local and regional demands and ensuring that functional needs are met to its reuse. To this end, the regulation sets some challenges to boost its reuse and then, its valorisation potential.
Type of barrier	Thematic
Sectors involved	Several SPIRE sectors and downstream value chain sectors

Challenges

Plastic recycling still offers a huge potential of recovery, reused and valorisation. In overall the following issues should be considered;

- The quality of sorting, handling multi layers packaging and insufficient recycling technologies which upgrade the value of recyclates are regarded to represent main technological barriers. To overcome these barriers, more research and innovation is needed.
- High costs for collection, sorting and recycling of plastics. The recycling of plastics cannot be financially upheld by itself as for example the value of the recycled plastics are of lower value than the collection and recycling process itself.
- It is desirable to increase the commitment of the Member States at the local /regional level to address the challenges around waste collection and sorting. Member States might make use of economic instruments (avoiding market distortion) and other measures to provide incentives for the application of the waste hierarchy. All efforts should aim to manage the plastic waste according to the WFD.

In the particular case of existing plastic stocks which may contain substances of concern and legacy substances such as some heavy metals, plasticisers or flame-retardants, a broader analysis is encouraged with case by case approach and enlighting the second use of the recyclate. The European substances policy focuses on phasing out substances of very high concern (SVHCs) out, on the one hand by banning these substances from the market and on the other hand by processing waste streams containing these substances, in a controlled way, for example inchemical recycling removing those substances and in energy recovery . However, this processing releases the carbon in plastic waste as CO2; and the production of new plastics also consumes energy and produces CO2 emissions, even the overall life cycle balance is positive compared the non-recycled material.

On the other hand, Packaging Waste Directive is extremely relevant. It takes into account the relative properties of different packaging materials on the basis of life-cycle assessments, addressing in particular prevention, and design for circularity. In this respect, it is necessary to support clear, implementable and effective requirements, including "reusable and recyclable plastic packaging in a cost-effective manner", and on excessive packaging. This initiative is promoted by the EP and strongly supported by the industry. Lastly, the industry is very keen on contributing to setting up the framework and implementation guidelines in this respect.

List of related legislation

All applying to Waste and by-product definition (see Waste definition fiche)

Waste Framework Directive: CELEX 02008L0098 20180705 (EN)
Packaging and Packaging Waste Directive: CELEX 01994L0062 20180704 (EN)
Landfill Directive: CELEX 01999L0031 20180704 (EN)

The Landfill Directive also affects targets of landfilling plastics. The Packaging and Packaging Waste Directive**,** contributes towards reuse, recovery and recycling. Both to be considered in the analysis of potential related regulatory bottlenecks.

On the other hand, it is needed to foster clear linkages between the Union's waste, chemicals and product policies to this end, including by the development of non-toxic material cycles as laid down in the 7th Environmental Action Programme.

TCs and standardization

CEN TC 249 and ISO/TC 61 are the main references in this field.

Potential solutions

- Further investments in regional/local recycling capacities and technologies, which are now very heterogeneously spread over Europe. Continuous R&I in new technology routes, waste management systems and methods (mechanical and chemical recycling, improved sorting techniques, improved analytical methods, improved collection (reverse logistics) …) are required
- Before making any changes on the legislation, the sources of insufficiencies/inefficiencies need to be identified. Drafted legislation could give the legal framework for the implementation of a better and more efficient collection system by defining mandatory collection targets, of specific waste streams and possibly incentivize it.
- To analyse and categorize the waste streams on case-by-case for specific large-scale applications of complex plastics (in particular when they will be used as a feedstock to produce new plastics).
- Legislation that would allow the collection and pre-treatment of homogenous waste streams. Without specific legislation, many waste streams end up as mixed waste where high-quality recycling costs are higher than the income from its recycled materials, which is the case of the plastic packaging
- Launch of value chain platforms, including the recyclers, facilitated via the channels of sectorial associations to exchange information. E.g. EuCertPlast (https://www.eucertplast.eu) and New Plastics Economy Initiative of the Ellen McArthur Foundation to promote the QA-CER certification scheme set up by BQA.

Real industrial cases

Case 1	Lack of life-cycle thinking of recycled plastics potentially containing legacy additives
Context	The feasibility of recycling plastics which may contain pollutants is very low. This complex waste streams are then underused due to the difficulties in the legislation. Three types of legislation often intersect in the case for plastics recycling, for substances, for products and for waste, with a different focus in their respective domains. In some cases, despite their potential in both, size of the market of the final applications and the enormous amount of available sorted plastic sources. The current regulatory environment only allows transformation in certain cases. The different legislation routes (REACH, CLP and product specific legislation) are each based on different risk assessment methods for hazardous substances. Thus, principles from different forms of legislation are not necessarily the same.
Sectors involved	Chemicals , polymers producers, converters and recyclers
Description	This results in only temporary exceptions being made, per substance and application, so that plastics that contain legacy substances can be recycled in order to reduce the consumption of primary raw materials. Successful examples of this are the use of

	cadmium-containing recycled plastic in construction applications such as cable ducts, window frames and intermediate layers in new PVC pipes. It has been demonstrated that a broader interpretation is permissible because the risks for people and the environment remain limited, including for the reason that these products are reused wherever possible in the same product groups ('closed loop'), as a result of which contaminants do not diffusely disappear into other products.
Additional info	Plastics that contain hazardous substances: recycle or incinerate?, RIVM Letter report 2016-0025, M.P.M. Janssen et al. CleaR - Clean material Recycling project (2018-2019) : Study for the development of an evidence-based approach as support to regulators when assessing how to manage the presence of substances of concern in recycled materials

CO_2 VALORISATION	
Description	The utilisation of CO_2 and CO as an alternative carbon source can contribute to a more sustainable production of chemicals, materials, fuels, with significant CO_2 emission avoidance compared to current production pathways. CO_2 valorisation technologies can also provide solutions for large scale renewable energy storage. An appropriate, coherent and supportive policy and regulatory framework is essential to enable the deployment of CO_2 valorisation technologies that can effectively contribute to sustainable development in and from Europe.
Type of barrier	Thematic
Sectors involved	Chemicals, Cement, Lime, Steel

Challenge
CO_2 valorisation is recognised in a number of Communications from the European Commission as an innovative process with potential to contribute to the circular economy. It is also referred to in some regulations such as the revised EU ETS directive. Although the utilisation of CO_2 as an alternative feedstock in the process industry is mentioned in the Circular Economy Communication from 2015 and in the European Strategy for Plastics, from 2018, CO_2 valorisation is currently not incentivised by any specific policy measure as part of the Circular Economy package. In the framework of the revision of the Directive on the promotion of the use of energy from renewable source, CO_2 /CO valorisation options are considered for the production of two types of fuels for transport: 'renewable liquid and gaseous transport fuels of non-biological origin' and 'recycled carbon fuels'. For both types of fuels, the Commission shall adopt delegated acts by 31 December 2021, to specify the methodology for assessing

greenhouse gas emission (GHG) savings, which shall ensure that no credit for avoided emissions be given for carbon dioxide whose capture already received an emission credit under other legal provisions. Appropriate minimum threshold for GHG savings of recycled carbon fuels shall be defined by the Commission at the latest by 1 January 2021, by means of delegated act. For carbon recycled fuels which cannot be counted towards the overall EU target for energy from renewable sources Member States will have the option to consider them or not in the obligation of fuel suppliers. For the production of renewable fuels of non-biological origin, if the electricity is taken from the grid, a methodology will also be developed by the European Commission to ensure that there is a temporal and geographical correlation between the electricity production unit, which the producer has a bilateral renewables power purchase agreement with, and the fuel production.

On the other hand, the revised EU ETS Directive, which sets the framework for the next trading period 2021-2030, provides for the establishment of the ETS Innovation Fund. Through this Innovation Fund, 400 million allowances will be reserved from 2021 onwards to accelerate the commercialisation of low-carbon technologies. This includes to support innovation in low-carbon technologies and processes in sectors listed in Annex I of the EU ETS Directive, and environmentally safe carbon capture and utilisation ("CCU") that contributes substantially to mitigating climate change. The Delegated Act defining the rules on the operation of the Innovation Fund are currently under preparation by the EC and should be adopted by the end of 2018.

While the deployment Carbon Capture and Utilisation could benefit from the Innovation Fund in the future, the issue of ETS allowances for CO_2 emissions which are avoided through CO_2 valorisation technologies still needs to be addressed. Currently, the ETS system does not foresee a clear mechanism enabling companies investing in CCU not to surrender CO_2 emissions that have been avoided. Such mechanism expected to be developed under the upcoming revision of the ETS Monitoring and Reporting Regulation would be an important incentive for the market deployment of these technologies.

Overall, in order to ensure that CO_2 valorisation technology developments can be transformed into real benefits for Europe, it is critical to develop a common understanding of how the impact of CO_2 valorisation technologies should be evaluated, and ensure this potential impact is considered in the development of all relevant policies and regulations.

List of related legislation

Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC – last modified by Directive (EU) 2018/410

Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council

Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments
Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC

- Renewable Energy:

Interinstitutional File: 2016/0382 (COD) - COM/2016/0767
Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources

Article 2 - Definitions

(gg) 'recycled carbon fuels' means liquid and gaseous fuels that are produced from liquid or solid waste streams of non-renewable origin which are not suited for material recovery in line with Article 4 of Directive 2008/98/EC and waste processing gases and exhaust gases of non-renewable origin which are produced as an unavoidable and not intentional consequence of the production process in industrial installations;

(t) 'renewable liquid and gaseous transport fuels of non-biological origin' means liquid or gaseous fuels which are used in transport other than biofuels whose energy content comes from renewable energy sources other than biomass

Article 7 - Calculation of the share of energy from renewable sources

Article 15 - Administrative procedures, regulations and codes

Article 25 - Mainstreaming renewable energy in the transport sector

Article 27 - Verification of compliance with the sustainability and greenhouse gas emissions saving criteria

Status: Approval in committee of the text agreed at 1st reading interinstitutional negotiations (10 July 2018).

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance)

While CO_2 has often been referred to as a waste, the '*gaseous effluents emitted into the atmosphere'* are actually excluded from the scope of this directive as specified in Article 2.

- Relevant Communications include:

COM(2015) 614/2 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions

Closing the loop - An EU action plan for the Circular Economy includes: 'The reuse of gaseous effluents[1] is another example of innovative process.' [1]*In particular* CO_2.'

COM(2018)28 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions
A European Strategy for Plastics in a Circular Economy includes 'Alternative feedstocks, including bio-based feedstocks and gaseous effluents (e.g. carbon dioxide or methane) can also be developed to avoid using fossil resources.'

Commission Regulation (EU) No 601/2012 -ETS Monitoring and Reporting Regulation MRR, expected to be modified via Implementation Act on the basis of Article 14 and 22 of the revised ETS Directive:

- Phase 1 to end by the end of 2018 (with 4 weeks stakeholder's consultation)
Phase 2 to end in 2020

- ETS

Directive (EU) 2018/410 - *Article 1* Amendments to Directive 2003/87/EC

in particular Amendment (22): In Article 14, paragraph 1 is replaced by the following: '1.The Commission shall adopt implementing acts concerning the detailed arrangements for the monitoring and reporting of emissions and, where relevant, activity data, from the activities listed in Annex I, for the monitoring and reporting of tonne-kilometre data for the purpose of an application under Article 3e or 3f, which shall be based on the principles for monitoring and reporting set out in Annex IV and the requirements set out in paragraph 2 of this Article. Those implementing acts shall also specify the global warming potential of each greenhouse gas in the

requirements for monitoring and reporting emissions for that gas. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 22a(2).'

TCs and standardization

ISO/TC 265 Carbon dioxide capture, transportation, and geological storage

Potential solutions

As with any other technology, the environmental impact of CO_2 valorisation technologies requires an appropriate evaluation based on a qualified Life Cycle Analysis. All contributions to the carbon footprint have to be taken into account in order to quantify avoided CO_2 emissions by conversion of CO_2 as an alternative carbon source as compared to conventional production pathways. System boundaries for the evaluation have to be carefully defined for each case. Furthermore, the environmental impact of technologies goes beyond climate mitigation potential, it includes the utilisation of sustainable raw materials and energy services. Finally, in addition to a suitable evaluation of the environmental impact, economic and social aspects of these technologies should also be considered.

For a chemical product, the net CO_2 emissions avoidance can be evaluated on a cradle-to-gate basis by comparison of CO_2-based production to the standard production, since the emissions during the use phase and end-of life of the product is independent from the source of carbon feedstock.

Last but not least, the storage potential of mineralisation and recarbonation should be acknowledged.

To sum up, major solutions to be adopted include:

- Define common methodology and guidelines to evaluate the impact of CO_2 valorisation technologies based on an appropriate life-cycle approach
- Recognize the environmental benefits of CO_2 valorisation technologies including in the revised EU ETS Directive -which will apply for the period 2021-2030- through an appropriate revision of the Monitoring and Reporting Rules.
- Risk sharing options to enable deployment of CO_2 valorisation with net GHG emission reduction, through appropriate funding measures at higher TRL (TRL>6)

Real industrial cases *

Case 1	Judgment of the Court (First Chamber) - 19 January 2017 - Case C-460/15 Schaefer Kalk GmbH & Co. KG
Context	Transfer of CO2 from an installation for the calcination of lime to an installation for the production of PCC Directive 2003/87/EC and Commission Regulation (EU) No 601/2012
Sectors involved	Lime, PCC
Description	Company: Schaefer Kalk GmbH & Co. KG: - operates an installation for the calcination of lime whose operation is subject to the scheme for greenhouse gas emission allowance trading. - applied for authorisation to subtract from the amount of greenhouse gas emissions referred to in the emissions report the CO_2 transferred for the production of PCC to an installation not subject to the EU-ETS. It considers that the CO_2 thereby transferred is chemically bound in the PCC and that, not being emitted into the

	atmosphere, it should not be regarded as 'emissions' as defined in Article 3(b) of Directive 2003/87. In connection with the procedure for the approval of a monitoring plan of its installation initiated before the Deutsche Emissionshandelsstelle im Umweltbundesamt (German Emissions Trading Authority at the Federal Environment Agency, 'the DEHSt'), Schaefer Kalk applied for authorisation to subtract from the amount of greenhouse gas emissions referred to in the emissions report the CO_2 transferred for the production of PCC to an installation not subject to the EU-ETS. The DEHSt took the view that such subtraction was not possible under Article 49 of Regulation No 601/2012 and Annex IV thereto. Schaefer Kalk appealed the authority's decision before a German administrative court who referred the following questions to the EU Court of Justice for a preliminary ruling: (1) Is Regulation [No 601/2012] invalid and does it infringe the aims of Directive 2003/87/EC in so far as the second sentence of Article 49(1) provides that CO2 that is not transferred within the meaning of the first sentence of Article 49(1) is to be considered emitted by the installation producing the CO2? (2) Is Regulation [No 601/2012] invalid and does it infringe the aims of Directive 2003/87 in so far as point 10 of Annex IV provides that CO2 that is transferred to another plant for the production of [PCC] is to be considered emitted by the installation producing the CO2?' The EU Court of Justice ruled: *The second sentence of Article 49(1) of Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and point 10(B) of Annex IV to that regulation are invalid in so far as they systematically include the carbon dioxide (CO_2) transferred to another installation for the production of precipitated calcium carbonate in the emissions of the lime combustion installation, regardless of whether or not that CO_2 is released into the atmosphere*. The Court also found that the Commission, in adopting Article 49(1) of Regulation 601/2012 and point 10(B) of Annex IV, amended an essential element of the ETS Directive and went beyond the objective of ETS (cf. §37-42; and §44). For there to be an emission within the meaning of the ETS Directive, a greenhouse gas must be released into the atmosphere. Hence the Monitoring and Reporting arrangement should ensure that when GHG are not released into the atmosphere, the CO_2 is not regarded as being emitted by the installation.
Additional info	-