MAKING THE CIRCULAR ECONOMY WORK

MAKE IT WORK

IMPEL

European Union Network for the Implementation and Enforcement of Environmental Law

Guidance for regulators on enabling innovations for the circular economy (prevention and recycling of waste)

Contents

Executive summary

A crucial element in the transition to the Circular Economy are the innovations at production and recycling facilities that aim at resource efficiency, the prevention of waste and the use of production residues or materials recovered from waste as secondary raw materials. A key condition for making these *circular innovations* work is to better connect policy, law and regulation on the ground. This guidance was developed to support regulators, policy- and law-makers and businesses in enabling and carrying through such innovations and rise to some of the commonly shared challenges.

Regulators are the main audience for this guidance. The guidance aims to help regulators:

- understand the principles, the complexity as well as the opportunities in EU environmental law and its links to chemical and product laws;
- identify how they can organise themselves more effectively;
- work more effectively with policy and law makers;
- better understand the needs and concerns of innovative businesses and the links to sustainable production and consumption.

This guidance also aims to help policy- and law-makers:

- understand the challenges regulators and businesses face in implementing the circular economy;
- work more effectively in supporting and assisting regulators.

The guidance can be of use for businesses considering, developing or implementing circular innovations.

This guidance was developed by the Make it Work initiative and those involved in the IMPEL project "Waste Management and Circular Economy". The guidance is underpinned by an 18 month dialogue across a wide range of regulators, policy- and law-makers and businesses from many Member States on how to best implement a circular economy. We've sought to identify some of the key legislative, regulatory and governance challenges and in doing so shared and exchanged good practice, experiences, ideas and initiatives. This dialogue will certainly continue and the guidance has been devised as a living document to be updated when necessary.

Chapter 1 provides an introduction. Section 1.2 helps the reader navigate quickly to the sections most relevant to you.

Chapter 2 explores the interactions between EU waste, industrial emissions and chemicals legislation (Industrial Emissions Directive, Waste Framework Directive, Waste Shipment Regulation and REACH). It highlights hooks in the legislation to facilitate circular innovations. The chapter focuses on encouraging the production and use of secondary raw materials (by-products and end-of-waste) and the optimisation and redesigning of production and recycling processes. Attention is also given to Industrial symbiosis between co-located installations and businesses or a so called 'chain approach' following material flows. Annex A-D provide more in depth information regarding the EU legislative framework.

Chapter 3 outlines the organisational measures a regulator can take at strategic and operational level to enable circular innovations (permitting and compliance assurance). The chapter also explores how regulators can work proactively with businesses to help identify, develop

and facilitate circular innovations. Finally, pointers for the management of information, substitution and risk management within the regulator are explored.

Chapter 4 sets out ways in which policy and lawmakers particularly in the MS can support regulators in the above. This ranges from ensuring the legislative framework is fit for purpose drawing on feedback from regulators themselves, supporting regulators in the application of their duties and powers and providing a coherent, joined up policy framework. A key challenge is to develop the right mix of instruments (e.g. incentivising non-toxic production processes, supporting markets, public procurements, linking with waste management plans and prevention as well as substitution programmes) to allow circular innovations to be implemented.

Chapter 5 provides some important perspectives from businesses who were approached as part of this project and who are trying to innovate in this space. The chapter highlights a number of areas where regulators, often in cooperation with businesses could improve implementation practices while upholding the precautionary principle and existing protection standards. These include the exchange of good practice, the better provision of information in permitting processes, access to available information for the regulator and operator, providing more room for flexibility, for learning-by-doing and for experimentation, using all available instruments to their full potential and engaging industry at the right level.

Finally, in Chapter 6 and Annex E attention is given to plastics, applying where appropriate the findings of the previous chapters to this important issue in the context of the EU Plastics Strategy as well as various national initiatives.

We've also included two Practical tools at the end of the Guidance developed by IMPEL. Practical Tool 1, linked to Chapters 2 and 3, aims to help regulators and operators to assess if materials meet the conditions and requirements for end-of-waste (Part A). It also contains a proposal for a voluntary database to record the outcome of the case-by-case assessments (Part B). Practical Tool 2 is linked to Chapter 3 and provides practical information on where and how to undertake inspections of activities in the waste recovery and recycling chain (that recover end-of-waste materials) and on how the strategic part of the inspection cycle can be adjusted in view of the new challenges inspection authorities are facing.

Acknowledgements

The guidance was developed jointly by the Make it Work initiative (MiW), "Project Enabling eco-innovations for a circular economy" and the IMPEL "Waste management and Circular Economy Project", except for the Practical Tools 1 and 2, which were developed by the IMPEL "Waste management and Circular Economy Project" only.

Support was given by Foxgloves Consultancy (Ilia Neudecker) and the Institute for European Environmental Policy, IEEP (Andrew Farmer).

Input for this guidance was generated through a series of workshops and working sessions. This guidance could not have been made without the many contributions by experts active in Make it Work, IMPEL and the EPA-Network and other representatives from regulators, policy- and law-makers and businesses from Belgium, Czech Republic, Denmark, Germany, Estonia, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, United Kingdom.

The authors are grateful to the European Commission for providing feedback on a draft of this guidance.

This guidance is a living document which will be updated when necessary.

INTRODUCTION TO MAKE IT WORK

The Make it Work initiative serves as a platform for Member States to exchange experiences and ideas on the implementation of EU environmental legislation. MiW brings together MS law-makers, policy-makers and authorities implementing legislation to produce concrete suggestions for simpler, future-proof rules and smarter implementation practices. The approach is cross-sectoral, looking at horizontal themes, with an emphasis on strengthening consistency and coherence between directives and regulations. MiW has produced recommendations, the so-called MiW drafting principles, for uniform and smart environmental inspections (July 2015) and for improved environmental reporting (November 2016).

Information on MiW is also available through its website at *http://minisites.ieep.eu/work-areas/environmental-governance/better-regulation/make-it-work/*

INTRODUCTION TO IMPEL

The European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) is an international non-profit association of the environmental authorities of the EU Member States, acceding and candidate countries of the European Union and EEA countries. The association is registered in Belgium and its legal seat is in Brussels, Belgium.

IMPEL was set up in 1992 as an informal Network of European regulators and authorities concerned with the implementation and enforcement of environmental law. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. The core of the IMPEL activities concerns awareness raising, capacity building and exchange of information and experiences on implementation, enforcement and international enforcement collaboration as well as promoting and supporting the practicability and enforceability of European environmental legislation.

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on both technical and regulatory aspects of EU environmental legislation.

Information on the IMPEL Network is also available through its website at *www.impel.eu*

TITLE REPORT

Making the Circular Economy Work

Guidance for regulators on enabling innovations for the circular economy (prevention and recycling of waste)

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EXECUTIVE SUMMARY:

See page 4.

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List of abbreviations

IED
Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).

IMPEL
European Union Network for the Implementation and Enforcement of Environmental Law.

MiW
The Make it Work initiative, a Member States project to produce concrete recommendations for simpler, future-proof European environmental law and smarter implementation practices.

MS
Member State of the European Union.

REACH
Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

WFD
Waste Framework Directive.

WFD (2008)
Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

WFD (2018)
Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste. The Directive entered into forced on 4 July 2018. Member States shall transpose it in their national legal systems by 5 July 2020.

WSR
Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste.

List of terms

By-product
A production residue (a material that was not deliberately produced in a production process), which meets the cumulative conditions set out in the WFD or the detailed criteria established on the basis of these conditions and which is to be used as a secondary raw material or product and is not to be considered a waste.

Circular economy
An economy in which the value of products and materials is maintained for as long as possible. Waste, the use of harmful substances and resource use are minimised. When a product reaches the end of its life, it is re-used sustainably and safe for human health and the environment, creating further value.

Circular innovations
Innovations at production and recycling facilities (industrial installations) promoting:

- resource efficiency: using less primary raw materials;
- prevention of waste: reducing the production of waste;
- reducing the use and the phasing out of hazardous substances and achieving a non-toxic environment;
- the use of production residues as secondary raw materials;
- the recovery of materials from waste (recycling) and the use of these materials as secondary raw materials.

End-of-waste
A material recovered from waste, which meets the cumulative conditions and requirements set out in the WFD or the detailed criteria established on the basis of these conditions and requirements, and which is to be used as a secondary raw material or product and no longer be considered to be a waste.

Inspection
Activities of authorities aimed at assuring compliance with legislation, (permit) conditions etc., including compliance promotion, compliance monitoring and enforcement.

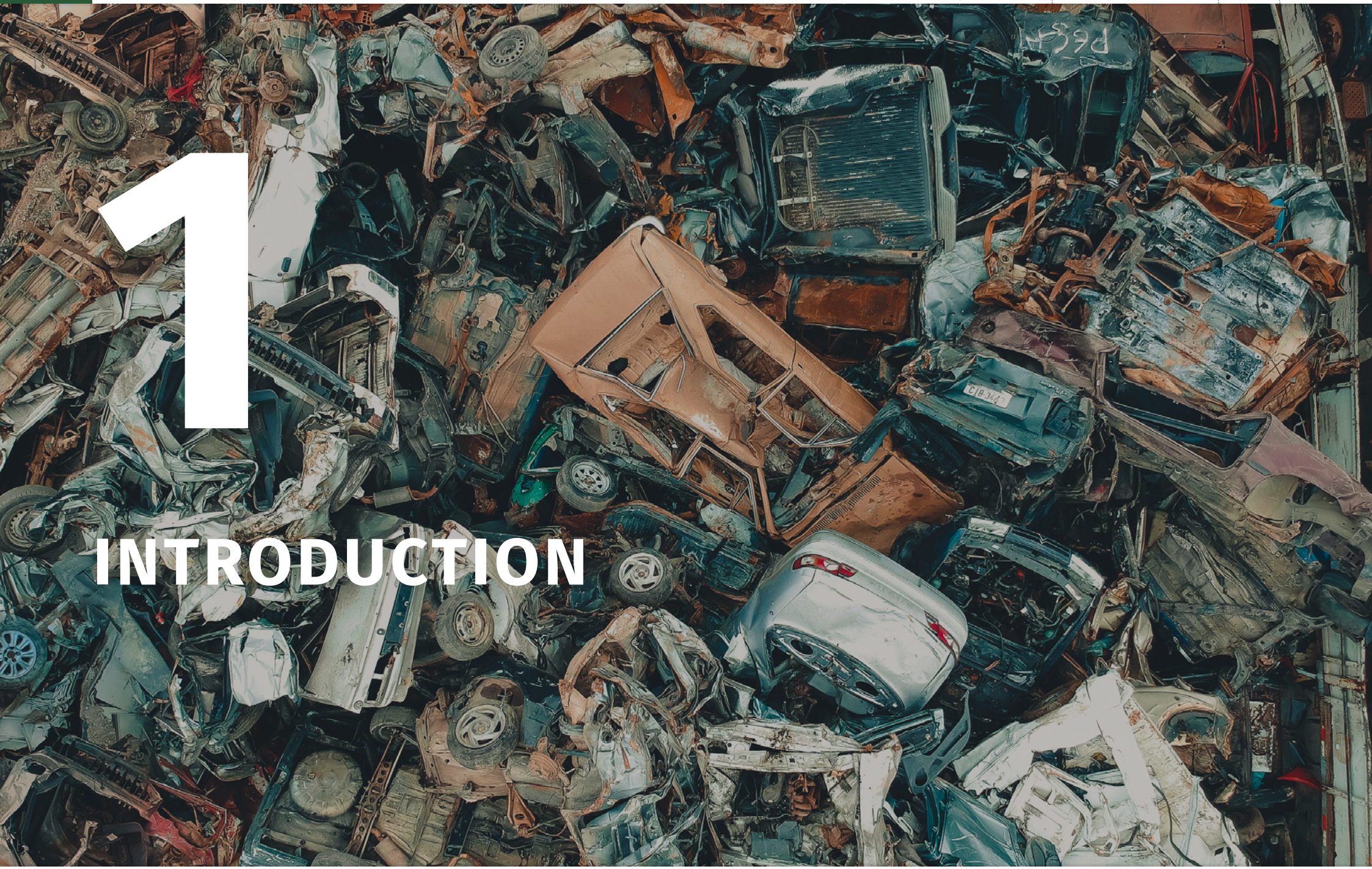
Operator
Legal or natural person who operates or controls an industrial installation or plant or, where this is provided for in national law, to whom decisive economic power over the functioning of the installation or plant has been delegated.

Policy-makers
Policy-makers are the governmental actors responsible for the policy environment. Regarding the circular economy, this includes the EU institutions for EU level policy and, at Member State level institutions at national, regional or local level (ministries, provincial or municipal administrations etc.). Policies to promote the circular economy are often developed across several Ministries, for example environment, finance and economic and industrial Ministries.

Regulation
Activities of competent authorities operating on the basis of EU environmental law to assess, authorise and set conditions for circular innovations and inspection.

Regulators
Authorities competent for permitting and inspection who are in charge of facilitating, assessing and authorising circular innovations. They give decisions or assess innovative recycling and industrial processes where new secondary raw materials are made and used, the by-product or end-of-waste status of these materials and carry out inspections to assure compliance with legislation, (permit) conditions etc. The term "regulator" can refer to the organisation itself or to its individual staff or to both.

Secondary raw materials
Materials that can be used in a manufacturing process instead of or alongside virgin raw materials, e.g. by-products, end-of-waste.



1 INTRODUCTION

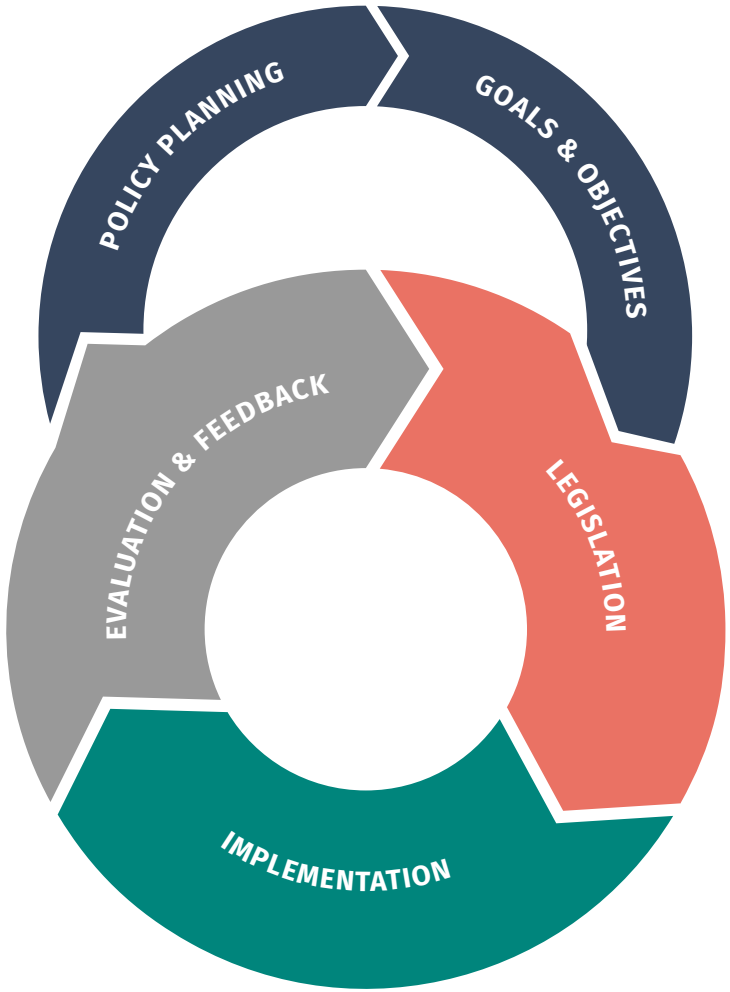


FIGURE 1
regulatory cycle – source IMPEL IED Guidance

1.1 Who is this guidance for?

Regulators are the main audience for this guidance. Policy- and law-makers and businesses may also find this guidance useful when performing their roles vis-à-vis circular innovations. In particular it can help them to better understand the needs of the regulators and how they can better interact with them.

Countries in Europe as well as the European Union are committed to moving from a linear economy which uses primary resources and produces waste, to a circular economy, which aims to keep materials and their value within the economic cycle.

Permitting and inspection authorities in Europe ('regulators') play an important role in making the circular economy work. Increasingly they are faced with the challenging task of encouraging industry to become more circular and facilitating circular innovations which promote resource efficiency, prevention of waste and the use of new secondary raw materials. This is not an easy job! Regulators implementing the transition to the Circular Economy have to protect human health, the environment, assure compliance with environmental law and prevent environmental crime. The pressure and profitability to recover more materials from waste and market and use these as non-waste to replace primary raw materials can trigger new fields of waste crimes, for instance illegal and unsafe recycling processes.

Engaging proactively with businesses, balancing different interests, applying the legislation accurately: these can be very demanding tasks for regulators. In addition, regulators are in many ways dependent on

a good interaction with the policy- and law-makers. Regulators operate at the stage where legislation needs to be implemented. In the regulatory cycle policies and legislation provide the framework for regulators, whereas feedback from regulators can help improve the policies and legislation.

MAKING CIRCULAR INNOVATIONS WORK

Delivering a circular economy will require circular innovations by businesses, introducing new production and recycling processes and new secondary raw materials that reduce the use of natural resources and keep materials in the economy. These innovations may raise economic, environmental and legal uncertainties and pose various challenges for regulators, businesses and policy- and lawmakers.

Regulators

Regulators who are asked to authorise or assess circular innovations, have to apply different, complex pieces of EU legislation (e.g. Waste Framework Directive, Industrial Emissions Directive). They may experience or perceive EU directives and regulations being not well attuned to each other (e.g. the interface between waste, chemicals and product legislation). They may need to take decisions or carry out assessments with limited information available or with little guidance or standards to fall back on. How they organise themselves and interact with the other actors, may not yet fully enable circular innovations. Suitable strategies may not be in place and attitudes and culture of management and staff to support innovations may fall short. On the other hand, regulators wanting to take proactive actions to encourage businesses to innovate may be seeking new approaches such as voluntary agreements or sector plans.

Businesses

Businesses respond to market constraints and opportunities and the regulatory environment in which they operate. That environment may constitute burdens and barriers for circular innovations. Some businesses who provided input to this guidance and who were introducing or using new secondary raw materials experienced that they were not provided with the necessary regulatory flexibility that allows room for experimentation. Businesses may not get the necessary regulatory certainty to give assurance to investors and manage financial risks. They may experience lack of support and engagement and lengthy decision making due to limited resources and competing priorities on the side of the regulators. And they may encounter obstacles when importing or exporting materials, because regulators as well as policymakers from different MS interpret and implement the EU waste legislation differently.

MS Policy- and lawmakers

Circular innovations take place in a changing EU legislative landscape. The Waste Framework Directive has recently been revised as part of the Circular Economy waste package. The Waste Shipment Regulation is under review and work related to the interface between chemicals and waste legislation is undergoing. The Industrial Emissions Directive will be reviewed in 2019. These reviews should seek to adapt the EU legislative framework to further support the circular economy. In transposing EU Environmental legislation and applying its instruments, national lawmakers and policymakers should make good use of the opportunities for circular thinking and decision making which EU law increasingly provides. They also need to be sensitive to feedback from the regulators who experience difficulties in the implementation of policies or legislation. They can try to ensure that legislation does not contain unnecessary constraints. They can provide support to regulators by issuing guidance, developing standards, establishing platforms for knowledge sharing etc. And they may help create favourable non-regulatory conditions, e.g. by enabling the right market conditions for secondary raw materials.

This document aims to support regulators in enabling circular innovations.

Circular innovations in this guidance are innovations at production and recycling facilities (industrial installations) promoting:

- resource efficiency, using less primary raw materials;
- prevention of waste, reducing the production of waste and the phasing out of hazardous substances;
- the use of production residues as secondary raw materials (by-products);
- the recovery of materials from waste (recycling) and the use of these materials as secondary raw materials (end-of-waste).

This guidance aims to help regulators:

- **understand the opportunities and barriers in EU environmental law;**
- **identify how they can organise themselves more effectively;**
- **determine the support they need from the policy- and law-makers;**
- **become more sensitive to the needs and concerns of innovative businesses.**

This guidance document is not to be considered prescriptive in any sense. It aims to draw attention to key issues and considerations relevant to making the circular economy work in practice. It highlights a range of suitable and smart ways of working for authorities, based on good practice identified across Member States. Regulators and policy- and law-makers will, of course, apply different approaches that best fit their own national or local circumstances to comply with EU environmental law and in supporting the transition to a circular economy.

Throughout this guidance brief concrete examples are given as illustration. Readers who are interested in knowing more about these examples are invited to contact the project leaders (jan.teekens@minienw.nl or rruggeri@arpa.sardegna.it).

1.2 Using this guidance

Chapters 2 to 5 of this guidance address the areas important for regulators facilitating and authorising circular innovations: the relevant (EU) legislative framework, organisation of the work, support by policy- and law-makers and the perspective of businesses. In Chapter 6 attention is given to plastics, applying where appropriate the findings of the previous chapters to this important issue. This chapter can be of use in relation to the EU Plastics Strategy as well as several national initiatives regarding the sustainable use of plastics.

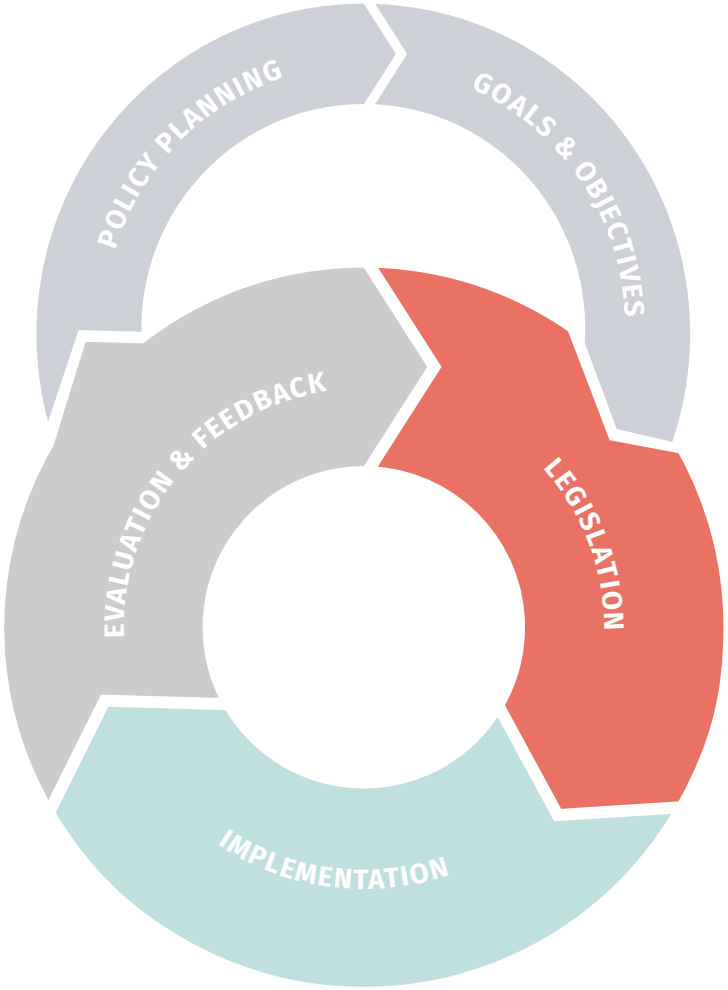
The following table explains how regulators can navigate and make best use of this guidance. The table also indicates which chapters are of particular interest for policy- and law-makers and businesses. We've also made a distinction between the 'management' and 'wider staff' within a regulator – all parts of the guidance may of course be of interest, but some parts may be particularly relevant for each audience. This is indicated in the table.

See table →

	WHAT IS COVERED?	FOR WHOM IS THIS PARTICULARLY RELEVANT?	HOW CAN IT HELP?
Chapter 2	Describes provisions in EU directives and regulations relevant to different circular innovations.	Staff of regulator	Explains what issues need to be considered when authorising circular innovations and highlights hooks in the legislation to encourage innovations.
Chapter 3	Describes organisational measures the regulator can take at strategic and operational level favourable to enabling circular innovations.	Management of regulator	Can be used to determine how the organisation of the regulator can be adapted to better enable circular innovations.
Chapter 4	Describes how policy and lawmakers can support regulators in enabling circular innovations.	Management of regulator Policy- and law-makers	Can be used to identify what actions by policy- and law-makers will help the regulator.
Chapter 5	Describes the perspective of innovative businesses.	Management of regulator Policy- and law-makers Businesses	Helps to understand the needs and concerns of businesses.
Chapter 6	Describes different areas of actions to achieve a more circular use of plastics, applying where relevant the previous chapters.	Management of regulator Policy- and law-makers Businesses	Helps to understand the broader range of circular interventions for plastics and highlights in particular for recycling of plastics specific points of attention for the regulator and policy-maker.
Annex A	Linked to Chapter 2 – gives more detailed info on the IED	Staff of regulator	Provides further explanation on how the IED can be applied
Annex B	Linked to Chapter 2 – gives more detailed info on the WFD	Staff of regulator	Provides further explanation on how to the WFD can be applied
Annex C	Linked to Chapter 2 – gives more detailed info on the WSR	Staff of regulator	Provides further explanation on how to the WSR can be applied
Annex D	Linked to Chapter 2 – gives more detailed info on the REACH regulation	Staff of regulator	Provides further explanation on how to the REACH can be applied
Annex E	Linked to Chapter 6 – describes EU and country policies on circular use of plastics (Part 1) and cases illustrating a more circular use of plastics (Part 2)	Management of regulator Policy- and law-makers Businesses	Provides background information regarding circular use of plastics
Practical Tool 1	Linked to Chapters 2 and 3 – describes tools to support regulators in assessing end-of-waste status (Part A) and contains a proposal for a database for case-by-case end-of-waste decisions (Part B)	Staff of regulator	Provides practical support to the regulator in assessing end-of-waste status
Practical Tool 2	Linked to Chapters 2 and 3 – describes tools for carrying out inspections to verify compliance with end-of-waste conditions	Staff of regulator	Provides practical support to the inspection authorities in assuring compliance with end-of-waste conditions

2 LEGISLATION

WHAT IS COVERED BY THIS CHAPTER?	FOR WHOM IS THIS CHAPTER PARTICULARLY RELEVANT?	HOW CAN THIS CHAPTER HELP?
This chapter describes provisions in EU directives and regulations relevant to different circular innovations.	Staff of regulator	This chapter explains what issues need to be considered when authorising circular innovations and highlights hooks in the legislation to encourage innovations.



2.1 Introduction

This chapter addresses the following circular innovations:

- producing and using secondary raw materials > see Section 2.2
- optimising or redesigning processes: making production processes more resource-efficient and preventing waste from production processes > see Section 2.3
- industrial symbiosis and chain approach > see Section 2.4

It guides regulators through the EU environmental legislation most relevant to these innovations. In particular:

- the Industrial Emissions Directive (IED), providing the framework for regulating (permitting and inspecting) the environmental impacts of (new innovative) production or recycling processes, including resource efficiency and the prevention and management of waste;
- the Waste Framework Directive (WFD), in particular the conditions that materials have to meet, to be used as by-product or end-of-waste. Please note that in 2018 amendments to the WFD have been agreed. In this chapter references are made to the WFD (WFD 2008) as well as the revised WFD (WFD 2018);
- the Waste Shipment Regulation (WSR), regulating cross-border movements of waste;
- The Regulation concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), which may be applicable to secondary raw materials (by-product or end-of-waste) applied in

production processes and which contain substances that require a REACH registration and possibly also a REACH authorisation[1].

The list above incudes two Directives which have been transposed into MS legislation. Where there is discretion for MS to choose how they transpose the directive beyond the basic principles and key provisions of the Directives (for instance the way they assess end-of-waste status) this guidance explores some of the choices MS have made.

In this chapter reference is made both to articles in EU directives and regulations as well as to recitals from that legislation. It should be noted that recitals in EU law are not binding on the Member States, but they give clarification on the intention and purpose of that law.

PLEASE NOTE:

- For further reading, references are made in this chapter to more detailed descriptions of key provisions in Annex A (for IED), Annex B (for WFD), Annex C (for WSR) and Annex D (for REACH).
- Annexes A-D can also be read stand alone to obtain an overview of the provisions in the particular directive or regulation particularly relevant to many circular innovations.
- For further practical guidance on end-of-waste, references are made in this chapter to Practical Tool 1 and Practical Tool 2.

[1] Other EU chemicals legislation, not discussed in this guidance, places restrictions on the use or inclusion of persistent organic pollutant chemicals in products or materials. Examples include chemicals such as polychlorinated biphenyls (PCBs), perfluorooctanesulfonic acid (PFOS) and decabromodiphenyl ether (decaBDE). Products manufactured in the past can include these chemicals and if not removed as part of a recycling process can contaminate the secondary (raw) materials being produced.

2.2 Producing and using secondary raw materials

At the end of 2015, the European Commission launched its ambitious policy to transform the economy of the EU from a linear to a circular economy[2]. The transition to a more circular economy, where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste is minimised, is an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy. A first step to achieving this is to recognising high quality and safe (waste) materials as valuable secondary raw materials that deserve to enjoy the same open market rules for use in products like their primary raw material counterparts. Without this, consumption of primary raw materials will continue at an unsustainable rate. The transition to a circular economy builds on the implementation of the waste hierarchy, supporting waste prevention, reuse and waste recovery. This reduces the waste that would be sent for disposal.

This section addresses innovations at production and recycling facilities where production residues or materials recovered from waste are produced and used as new secondary (raw) materials. An increase in the production and use of these secondary (raw) materials may lead to less diversion of these materials to waste. This may result in reduced disposal (e.g. landfilling and incineration) and energy recovery and reduced use of primary raw materials. Production residues and materials recovered from waste can serve as secondary (raw) materials with the status of non-waste if they meet the conditions set by the WFD for, respectively, by-products and end-of-waste.

[2] http://ec.europa.eu/environment/circular-economy/index_en.htm

LEGEND FOR FIGURES 2, 3 AND 4

- Primary raw material
- Production facility
- Product
- By-product (secondary raw material)
- Waste
- Recycling facility
- End-of-waste (secondary raw material)
- Input
- Output

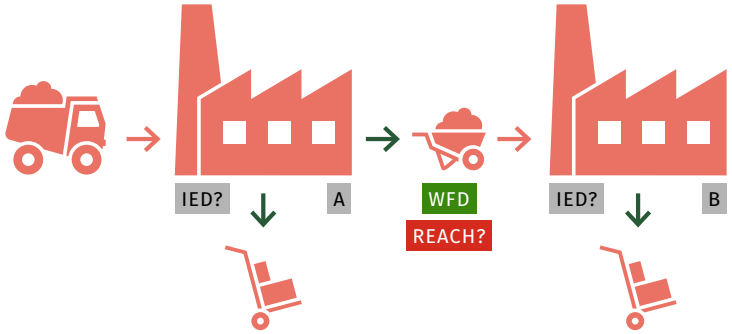


FIGURE 2
Production and use of by-products

By-products

A production residue from production facility A is used by production facility B as secondary raw material (or non-waste)[3]. The production residue can only be regarded as by-product under the WFD when it meets certain conditions. These conditions may involve the obligation to comply with REACH. Facilities A and B may fall under the IED in which case the production process and usage of by-products will be assessed against the IED requirements, e.g. the application of best available techniques (BAT) and they may be subject to certain IED permit conditions.

EXAMPLES OF INDIVIDUAL MEMBER STATE ASSESSMENTS FOR BY-PRODUCTS[4]

1	Tomato stems and leaves to be used for the production of solid board. NL
2	Nylon spill to be used for the production of yarn. IT
3	Calcium sulphate (CaSO4) and synthetic fluorite, are by-products of a chemical plant producing aluminium fluoride and cryolite; these by-products are sold to cement plants and in the construction sector. IT

[3] Production residues can also be used directly as finished material e.g. animal bedding, construction material etc. and not go on for further manufacture. Here we focus on by-products as secondary raw material.

[4] These are examples of case-by-case assessments taken by individual member states for particular production residues. These assessments are based on the facts and circumstances of each situation in each MS and may not be applicable to other MS's.

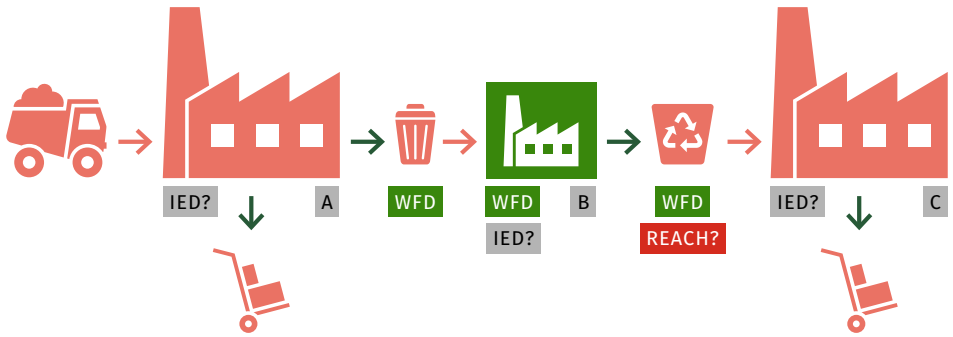


FIGURE 3
Waste from a production facility which after recycling can be used as end-of-waste by another production facility

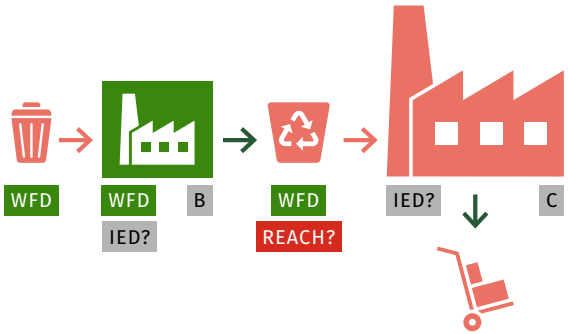


FIGURE 4
Collected waste which after recycling can be used as end-of-waste by a production facility.

End-of-waste

Waste from production facility A is used – after a waste recovery operation in recycling facility B, – by production facility C as secondary raw material[5]. The recycled material can be regarded as end-of-waste under the WFD when it meets certain conditions. As these conditions refer to relevant chemicals and product legislation this may involve the obligation to comply with REACH. Recycling facility B falls under the WFD. Facilities A, B and C may fall under the IED, in which case the recycling of waste and usage of end-of-waste will be assessed against the IED requirements, e.g. the application of best available techniques (BAT) and may be subject to certain IED permit conditions.

Collected waste (from used products etc.), is used – after recycling in recycling facility B, – by production facility C as secondary raw material[6]. The recycled material can be regarded as end-of-waste under the WFD when it meets certain conditions. As these conditions refer to relevant chemicals and product legislation this may involve the obligation to comply with REACH. Examples given below on potential end-of-waste therefore depend on full REACH compliance. Recycling facility B will fall under the WFD. Facilities B and C may fall under the IED, in which case the recycling of waste and usage of end-of-waste will be assessed against the IED requirements, e.g. the application of best available techniques (BAT) and they may be subject to certain IED permit conditions.

[5] An end-of-waste may also be a finished material in its own right e.g. fuel, construction material, fertiliser. Here we focus on end-of-waste as secondary raw material.

[6] An end-of-waste may also be a finished material in its own right e.g. fuel, construction material, fertiliser. Here we focus on end-of-waste as secondary raw material.

EXAMPLES OF INDIVIDUAL MEMBER STATE ASSESSMENTS FOR END-OF-WASTE STATUS[7]

1	Red mud is solid waste produced in the process of aluminium extraction from bauxite. Instead of landfilling red mud it can be treated (neutralised) and then used for the remediation of contaminated sites and treatment of contaminated liquid waste. IT
2	The incineration of household waste produces bottom ash. Instead of landfilling, the bottom ash is treated. From the bottom ash fine metal fractions are recovered which are fed into metal production. Subsequently mineral fractions are recovered which are used in construction, such as road foundation or in concrete production. NL
3	Used tyres are collected, granulated and then recycled. The granulates are used in anti-shock panels, acoustic screens etc. Larger particles are used directly as fuel in cement or steel plants, or treated through pyrolysis to produce fuel oil and carbon black. IT, NL, SE

[7] These are examples of case-by-case assessments taken by individual member states for particular waste materials. These assessments are based on the facts and circumstances of each situation in each MS and may not be applicable to other MS's.

2.2.1 Relevant provisions in WFD and REACH

By-products

Conditions for by-products

By-products are production residues that meet certain conditions in the WFD. A production residue is a substance or object resulting from a production process the primary aim of which is not the production of that substance or object. The conditions for by-products in the WFD are the following:

- its further use is certain;
- the material can be used directly without any further processing other than normal industrial practice;
- the material is produced as an integral part of a production process; and
- its further use is lawful, i.e. all relevant product, environmental and health protection requirements for the specific use are fulfilled and the use will not lead to overall adverse environmental or human health impacts.

Assessing by-product status

According to WFD 2018 (Article 5, Paragraph 1) 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 conditions are met mentioned above. WFD 2018 (Recital 16) states: "In order to promote sustainable use of resources and industrial symbiosis, Member States should take appropriate measures to facilitate the recognition as a by-product of a substance or an object resulting from

a production process the primary aim of which is not the production of that substance or object if the harmonised conditions established at Union level are respected." The regulator will need to assess whether a material is a by-product and therefore the waste legislation is not applicable. Unless at European or MS level detailed criteria have been established for certain types of production residues, the regulator has to decide or assess on the by-product status of each individual production residue on the basis of the abovementioned, general conditions. The form of its decision or assessment is not specified in the WFD and can take different forms, depending on the MS legislation. For instance it can be a prior authorisation or made as part of inspections. Producers should provide information that the conditions for by-product status are complied with. The burden of proof lies with the producer.

Applicability of REACH

One of the conditions in the WFD for a production residue to be used as a by-product is that the further use of the material is lawful, in other words that its use is in accordance with all applicable legislation. So a production residue which meets all of the other conditions of the WFD, may, before it can actually be used as a by-product, need to fulfil the requirements of REACH, i.e. to have a REACH registration and possibly an authorisation.

SEE FOR FURTHER DETAILS

On by-products: Annex B (WFD), Section 3

On REACH registration or authorisation: Annex D (REACH)

End-of-waste

Conditions for end-of-waste

End-of-waste is a recovered (recycled) waste that meets the conditions of the WFD for end-of-waste. The conditions for material to be considered end-of-waste are the following:

- the material is to be used for specific purposes;
- a market or demand exists for the material;
- the material fulfils all the technical requirements for the specific purposes and meets existing legislation and standards applicable to products; and
- the use will not lead to overall adverse environmental or human health impacts.

According to WFD 2018 regulators who decide on a case-by-case basis or verify that certain waste has ceased to be waste, where necessary, also pay attention to some more specific requirements regarding the quality of the inputs, the process and the outputs and take into account limit values for pollutants and any possible adverse environmental and human health impacts.

Assessing end-of-waste status

The Commission can establish detailed criteria on the uniform application of the conditions to certain types of waste. These criteria need to ensure a high level of protection of the environment and human health and facilitate the prudent and rational utilisation of natural resources. So far, EU end-of-waste criteria have been laid down for iron, steel and aluminium scrap (see Council Regulation (EU) No 333/2011), glass cullet (see Commission Regulation (EU) N° 1179/2012) and copper scrap (see Commission Regulation (EU) N° 715/2013). In the absence of end-of-waste criteria at EU level, MS

may establish such criteria with the same high standards. Where criteria have not been set at either Union or national level a MS may decide on a case-by-case basis, or take appropriate measures to verify, that certain waste has ceased to be waste.

Recital 17 of WFD 2018, first four sentences, states: "In order to provide operators in markets for secondary raw materials with more certainty as to the waste or non- waste status of substances or objects and to promote a level playing field, it is important that Member States take appropriate measures to ensure that waste that has undergone a recovery operation is considered to have ceased to be waste if it complies with all the conditions laid down in Article 6(1) of Directive 2008/98/EC as amended by this Directive. Such measures may include the adoption of legislation transposing those conditions supported by procedures for their implementation, such as the establishment of material and application-specific end-of-waste criteria, guidance documents, case-by-case decisions and other procedures for the ad hoc application of the harmonised conditions established at Union level. Such measures should include enforcement provisions to verify that waste that is considered to have ceased to be waste as a result of a recovery operation complies with the law of the Union on waste, chemicals and products, in particular prioritising waste streams that pose a higher risk to human health and the environment due to the nature and volume of those waste streams, waste that is subject to innovative recovery processes or waste that is recovered for subsequent further use in other Member States. Measures may also include the setting of a requirement on the operators recovering waste or holders of recovered waste materials to demonstrate compliance with the conditions laid down in Article 6(1) of Directive 2008/98/EC as amended by this Directive."

The MS may need to assess whether a recovered (recycled) material is an end-of-waste material and whether waste legislation is no longer applicable. Unless for certain types of waste end-of-waste detailed criteria have been established at EU or MS level, the regulator or courts may have to decide on the end-of-waste status of each individual material which is recovered from a waste on the basis of the general conditions mentioned above and taking into account applicable case law (case-by-case decision).

The form of its (case-by-case) decision or assessment is not specified in the WFD and can take different forms, depending on the MS legislation. For instance, it can be a prior authorisation or it can be a process afterwards by a competent authority. Producers should provide information that the conditions for end-of-waste product status are complied with. The burden of proof lies with the producer. WFD 2018 now also explicitly requires that the first user of an end-of-waste or the one who places the material on the market for the first time need to assure compliance with requirements under the applicable chemical and product legislation.

End-of-waste status in practice

When a case-by-case decision needs to be made regarding the end-of-waste status of a recovered material, regulators and businesses often experience barriers and uncertainties. For example, there may still be a waste 'stigma' attached to the material. Also, the determination of the environmental and technical standards for the use of the material may prove difficult. The same may apply to demonstrating that the use of the material does not cause greater environmental and health impacts than those produced by the use of equivalent primary raw materials. Therefore, in accordance with the precautionary principle, there needs to be clear rules and procedures for allowing waste to leave waste status to ensure

compliance with Article 13 WFD. If an operator has a thorough documentation to substantiate and support the argument that the waste has ceased to be waste according to the conditions in Article 6 WFD, this will substantially decrease the degree of uncertainty. However, in the cases when authorities from different MS or regions follow different approaches in assessing end-of-waste status, it may be difficult for an operator exporting his material to get his documentation right. The successful development of a European market for the material may be helped by a common, harmonized approach regarding the material across different European countries. As a result of all these difficulties the market may not accept the secondary raw material as alternative to the primary raw material.

Different practices and approaches in countries in Europe

To overcome some of these barriers an exchange of information between different regulators within and across the countries in Europe is crucial. An important first step is to get a better understanding of the different measures, procedures and approaches in the different countries. These were examined within the context of developing this guidance through a survey, interviews and document examination. From the information gathered it can be concluded that countries currently (under WFD 2008) use various ways to determine end-of-waste status.

WAYS IN WHICH (REGULATORS IN) COUNTRIES DETERMINE END-OF-WASTE STATUS (USE OF END-OF-WASTE CRITERIA OR CASE-BY-CASE DECISIONS) FOR THOSE SITUATIONS WHERE NO EU CRITERIA EXIST
Only national end-of-waste criteria are used. No case-by-case decisions.
Only case-by-case decisions. No national end-of-waste criteria apply.
A mix of national end-of-waste criteria and case-by-case decisions.

For the case-by-case decisions different forms and procedures are used in MS. These can be through prior authorisation via legally binding decisions or opinions or through a permit condition; or through a process or mechanism where a competent authority assesses and gives an opinion on end- of- waste status.

EXAMPLES OF DIFFERENT WAYS IN WHICH CASE-BY-CASE DECISIONS ON END-OF-WASTE STATUS ARE MADE		
Prior authorisation by regulator	As separate decision or separate mandatory and legally binding opinion	In case of a mandatory and legally binding decision or opinion the operator would have to apply for the legal opinion before starting the activity. The requirements established in the decision or opinion to meet the four conditions for end-of-waste, normally need to be implemented through a Quality Assurance System for the recovered material.
	As part of a WFD- or IED-permit	The requirements which the recovered material has to fulfil in order to meet the four conditions for end-of-waste, are laid down in the permit conditions. These can include requirements regarding a Quality Assurance System for the recovered material.
Through assessment afterwards by regulator	Operator assesses for the recovered material the compliance with four conditions for end-of-waste status (self-assessment by operator)	Compliance with four conditions for end-of-waste status is assessed by the regulator who is competent for compliance assurance (verification by regulator). Usually the regulator will ask the operator whether and how he has implemented a Quality Assurance System for the recovered material.
	Operator does self-assessment and then asks on a voluntary basis for a legally non-binding opinion from government. (ministry or regulator).	Compliance with four conditions for end-of-waste status is assessed by the regulator who is competent for compliance assurance (verification by regulator). The opinion can provide some certainty to the operator in advance. The opinion can be a letter agreeing to the application of the conditions proposed by the applicant. The opinion can function as guidance for the regulator who is competent for compliance assurance (verification by regulator) but ultimately the court will decide whether the recovered material can have the end-of-waste status.

In some countries some practical guidance been developed in order to support operator self-assessment (for example UK-England and the Netherlands) as well as to support enterprises to submit an application for national end-of-waste criteria (France) or, more at a local level, to grant a permit (Italy-Veneto Region). See for further information Practical Tool 1, Part A. The development of systems aiming to assign more responsibility to the operators is typical of northern countries (like Sweden, UK-England and the Netherlands), even if some differences exist in the procedure. In Sweden a highly decentralised approach is followed. In Flanders and England general procedures were issued and a centralised Agency guarantees a harmonised approach for the assessment of the end-of-waste status (as well as for the definition of by-products).

Equally important is the exchange of available technical and environmental expertise and of good practices that have been developed. These good practices include general actions and strategies for regulators and policy-makers (see Chapters 3 and 4) and practical tools for regulators and businesses (e.g. a list of documents that applicants should present to the authority, procedure to evaluate the fulfilment of end-of-waste conditions, etc.), see Practical Tool 1, Part A. Initiatives to encourage circular innovations involving end-of-waste can be further promoted by setting up specific procedures to allow both operators to start innovative recycling processes and the market (final users) to test new secondary raw materials during a specific permitting period and at a small scale, provided that all binding protection standards are met (experimental end of-waste), see also Practical Tool 1.

Applicability of REACH

One of the conditions in the WFD for a recycled waste to be used as an end-of-waste is that the further use of the material is lawful, in other words that its use is in accordance with all applicable legislation. So a recycled waste which meets all of the other conditions of the WFD, may, before it can actually be used as an end-of-waste, need to fulfil the requirements of REACH, i.e. to have a REACH registration and possibly an authorisation. There are some exemptions. For instance, materials produced through a recovery process in the EU which are already registered are exempted from the registration obligations. REACH also allows some exemptions for substances used in scientific research and development. A study carried out by the Swedish Chemicals Agency (KEMI, 2016) on how chemical legislation is applied in practice to recovered substances showed that "the companies' knowledge of both the chemical legislation and the chemical content in the recyclable products are poor". The suggestions in the report included the need for "an increased knowledge within the companies of chemical content in the recycled products" as well as a "better flow of information from the producing companies to the recycling companies regarding the chemical content in products".

Interface between WFD and REACH: when is a recovered material still a waste and when end-of-waste?

REACH does not apply to waste. However, to achieve an end-of-waste status, a recovered (recycled) material may require a REACH registration before it actually has ceased to be waste according to the WFD. In theory, therefore, it would not be possible to submit a recovered material for registration under REACH, as it should still be regarded as waste, since it does not yet have a REACH registration. As a consequence, the material would remain waste and could not get an end-of-waste status. In practice however, it is possible for a waste recycler to submit for REACH registration before the waste ceases to be waste. Another solution is to follow both procedures in parallel. For example, in the Netherlands, when a non-binding governmental declaratory opinion regarding the end-of-waste status of recovered material is prepared, the need for registration or authorisation is checked by looking at the technical data of the substance(s) in question. The end-of-waste status then is declared on the condition that the registration or authorisation will be completed.

Often operators want to avoid the perception of their secondary raw material as 'waste'. Those receiving the secondary raw material do not want to be perceived as waste treatment operators, or prefer substances that fulfil REACH requirements as inputs for their production processes. In other sectors it may not be necessary or desirable for a recovered material to acquire end-of-waste status, as there is not such a negative waste image or operators using the recovered material may prefer the certainty of applying the waste regime to the burden of proving REACH compliance (which might prove difficult or even impossible).

EXAMPLES OF RECOVERY PROCESSES WHERE REACH IS AN ISSUE[8]	
1	Waste tyres to granulate. SE, IT
2	Recovery of carbon black from tyres. SE, NL
3	Distillation of basic oil from waste oil. SE
4	Waste plastic to granulate for packaging. SE
5	Cardboard waste into new cardboard – straight into new products, which is the easiest way to comply with chemicals legislation. SE
6	Cleaning of ethylene glycol. SE
7	Sintered metal scrap into metal powder. SE
8	Recycling of PVC electric cords. Electric cords with a PVC-sleeve, typically contain DEHP, a plasticiser (which renders the PVC more flexible). DEHP has been banned in the EU from use in toys and childcare articles. Large volumes of this waste are coming back for recycling. The recycling process is separation of metal and PVC followed by granulation of the PVC. A REACH authorisation has been applied for and granted by the EC for use in a number of restricted applications under certain conditions. This authorisation is being contested; a decision has to be taken by the ECJ. IT

SEE FOR FURTHER DETAILS:

On the provisions on end-of-waste: Annex B (WFD), Section 4
On assessing end-of-waste status in practice: Practical Tool 1
On inspecting and verifying if end-of-waste conditions are met: Practical Tool 2
On REACH registration or authorisation: Annex D (REACH)

[8] Examples from Sweden are drawn from: Recovered Substances, Report on an enforcement project, Swedish Chemicals Agency, Stockholm 2016. *https://www.kemi.se/global/tillsyns-pm/2016/enforcemnet-13-16-recovered-substances.pdf*

See Figure 5 →

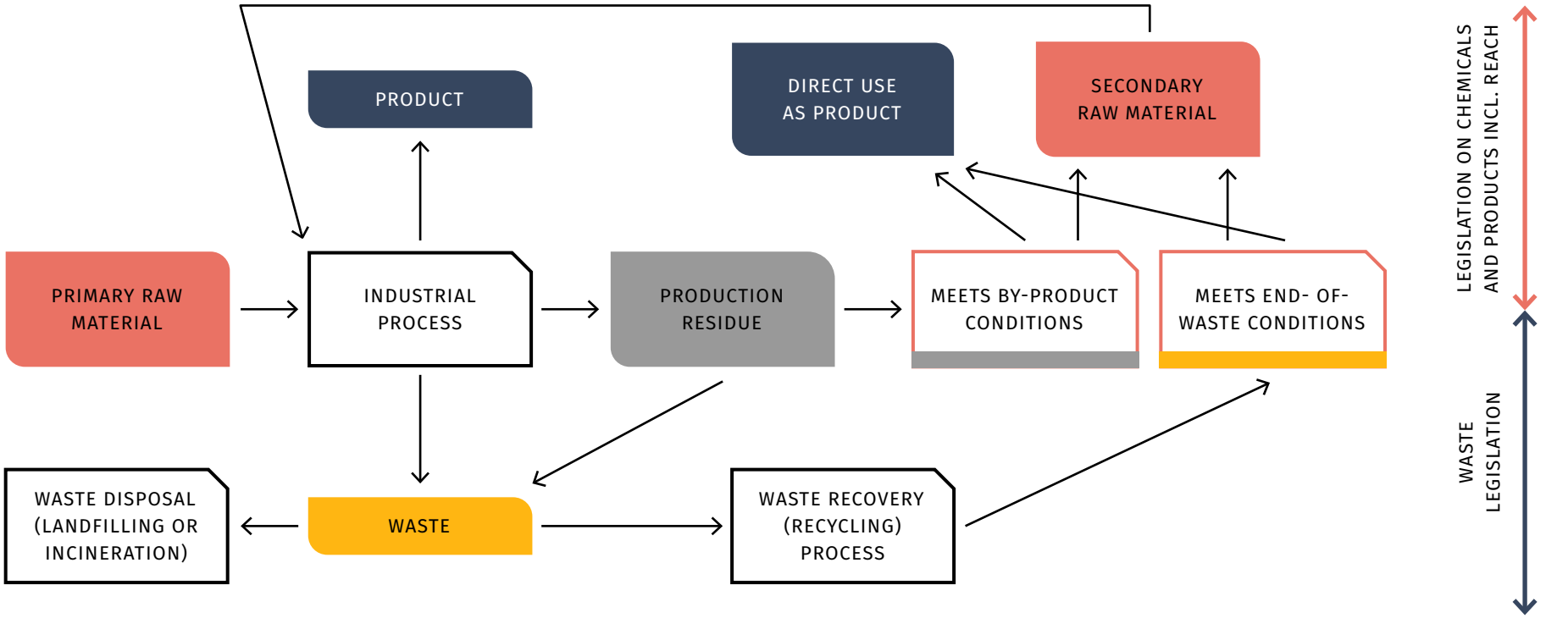


FIGURE 5
This figure shows for one single industrial process the streams of primary and secondary raw materials, products and wastes and the interface between waste, product and chemicals legislation.

2.2.2 Relevant provisions in IED

Circular innovations involving the production or the use of new by-products or end-of-waste in production or recycling facilities will often require an IED permit. Annex I of the IED sets out the categories of (industrial) activities which fall under the Directive and require a permit. It is sometimes difficult to determine under what category an innovative waste recovery process falls.

In case the IED is applicable, the regulator then has to assess these innovations against the conclusions on Best Available Techniques (BAT conclusions) described in the BAT Reference Documents (BREFs). The BAT conclusions for waste treatment (Commission Implementing Decision (EU) 2018/1147) were published on 10 August 2018. This document outlines what is considered to be BAT for waste treatment activities under the IED and is a useful referencing point to help identify or benchmark emerging techniques. For the determination of BAT in the BREFs twelve criteria apply – particularly relevant for the circular economy are the criteria with regard to the use of low-waste technology, the use of less hazardous substances and the furthering of recovery and recycling of substances generated and used in the process and of waste. Regulators may set permit conditions on the basis of innovative techniques that are not described in any of the relevant BAT conclusions, as long as these techniques represent BAT. They should then apply the same criteria for determining BAT as are used for drawing up the BREFs. The IED also explicitly allows setting more stringent permit conditions which enable a better performance than the best available techniques described in the BAT conclusions. This may provide flexibility to include innovations in permit conditions.

Resource efficiency and proper waste prevention and management are core IED requirements for operators of all IED installations. Therefore, regulators can take a proactive approach and trigger a discussion with the operator on possibilities to produce or use more or new by-products or end-of-waste. The BAT conclusions include the obligation for operators to have environmental management systems (EMS) in place. Regulators may discuss with the operators to what extent their EMSs actively aim to improve environmental performance and trigger or foster circular innovations, for instance in terms of turning waste streams into new secondary raw materials or using such materials to replace primary raw materials. According to the IED, Member States should encourage the development and application of emerging techniques (ETs). They should in particular support the development and application of the ETs identified in the BREFs, but not necessarily limit themselves to these. This general obligation for MS can support regulators in MS who want to push for or at least proactively enable innovative processes. In this context, regulators may want to include conditions in the permit which oblige the operator to study the feasibility of applying an ET. The IED also contains a provision which allows a nine-month exemption period of BAT to test ETs.

SEE FOR FURTHER DETAILS ON THESE IED ASPECTS:

Annex A (IED)

2.2.3 Relevant provisions in WSR

Regulators in the MS competent for the WSR (issuing permits and performing inspections) may need to assess or verify whether a material shipped across borders, is waste or a by-product or end-of-waste. And if it is a waste, what procedure should be followed. The last aspect is particularly relevant when the waste is transported to another country where it will be recycled, since certain types of waste mentioned on the green list (Annex III of WSR) which are destined for recovery, are exempted from the procedure of prior notification.

Authorities of different MS (country of dispatch versus receiving country) might disagree on the waste character of a shipment. The development of an internal market for secondary raw materials could be further facilitated by creating more clarity on by-product and end-of-waste status of materials and by agreeing to accept other MS' decisions. This however depends on whether MS are informed, understand and agree how these decisions are made. In this respect recital 17 of WFD 2018 is also relevant: "In order to prevent illegal shipments of waste and to raise awareness among Member States and economic operators, there should be greater transparency about Member State approaches to end-of-waste status, in particular with regard to their case-by-case decisions and the result of verification by competent authorities, as well as the specific concerns of Member States and competent authorities about certain waste streams."

SEE FOR FURTHER DETAILS ON THE WSR:

Annex C (WSR)

On inspecting and verifying if a material can be regarded as end-of-waste:
Practical Tool 2

2.3 Optimising and redesigning production and recycling processes

Circular innovations at production and recycling facilities can specifically aim for the use of fewer resources per unit produced and a reduction of the waste produced. There are different ways to deliver this:

- to change the production process so that the proportion of the input material included in the final product is increased;
- to change the production process so that production residues can be used elsewhere as by-product or – after recovery – as end-of-waste;
- to reduce the use of hazardous substances and consequently the hazardousness of the residues that could be reused as by-products or end-of-waste.

Note that production processes can contribute to overall resource efficiency in society by using secondary raw materials, etc., as inputs. However, while this is important and should be encouraged by regulators, this does not contribute to the resource efficiency of the production process itself.

EXAMPLE OF OPTIMISING OF PRODUCTION PROCESS (IT)

A paper mill recovers waste paper. The waste paper comes from a separate collection process. The separated collected paper may contain impurities such as plastics. At the present, these impurities are considered as discards and there are two different routes of treatment: final disposal or sent to an energy recovery plant as fuel. Optimising the process of selection of the different waste streams may lead to the discards (which have high calorific value) being considered as fuel for internal use in the paper mill. The former unwanted impurities are no longer discarded, but is used to replace virgin fuels.

A more fundamental innovative approach is where the whole installation is strategically viewed for its potential to create a more circular business case. The installation looks at its whole value chain, moving from a focus on one product, with several waste streams, to producing a range of products and by-products optimising resource use and minimising waste production. A suitable moment to do so is when substantial new investments are contemplated or when market trends require a reorientation.

EXAMPLES REDESIGNING OF PRODUCTION PROCESS (NL)

1 A bio refinery plant uses wood chippings to develop a variety of products. Previously, the wood chippings would have been used as fuel in a co-incineration installation. Through a chemical process, the lignine, cellulose and hemi-cellulose components are separated from the wood. The cellulose and hemi-celluslose (sugars) are transformed into new monomers and from there into plastics (PET). The lignine is used as fuel for the process.

2 Chemical recovery of textile waste is newly designed treatment process where waste textiles are dissolved and new fibres are created from the solution.

2.3.1 Relevant provisions in IED

Circular innovations in production and recycling processes are often subject to IED permitting. In particular the use of emerging techniques can be challenging for the regulator as there is little experience with these techniques. The use of emerging techniques not mentioned in the BREFs, may be even more problematic. Issues that may arise are determining what IED category of activities a new recovery process should fall under and the limited possibilities to grant temporary derogations from for instance BAT based emission limit values for the testing and use of emerging techniques.

SEE FOR FURTHER DETAILS ON THESE IED ASPECTS:

Annex A (IED)

2.4 Industrial symbiosis and chain approach

In the context of this guidance, industrial symbiosis is an association between two or more industrial facilities or companies in which the (end-of-) wastes or by-products of one are the secondary raw materials for another. These can include solid materials, liquids (including waste water) and other elements, such as heat (which is a 'pollutant' under IED). The assumption for industrial symbiosis is that the facilities are relatively close to each other. This could be two businesses closely located to each other, it could be relationships within industrial zones or in Eco-industrial parks or it could be in large areas designed to facilitate industrial symbiosis. Each will have its practical opportunities and constraints for the movement of material between businesses, but many of the regulatory questions that arise from such relationships apply whether these sites are small and easily understood or whether they are large and complex.

A different, though related area of regulation to consider is where movement of material may take place through a chain of two or more businesses when these are not necessarily located in the same industrial zone or park. Regulators may have different rules when material is shipped to another operator in another region. This presents challenges as to what is in a permit for the original site operation, what requirements may be placed on the materials that are moved, whether links can be made with the permit conditions of a receiving operator and, also, how much can be included in any formal contractual arrangements between operators.

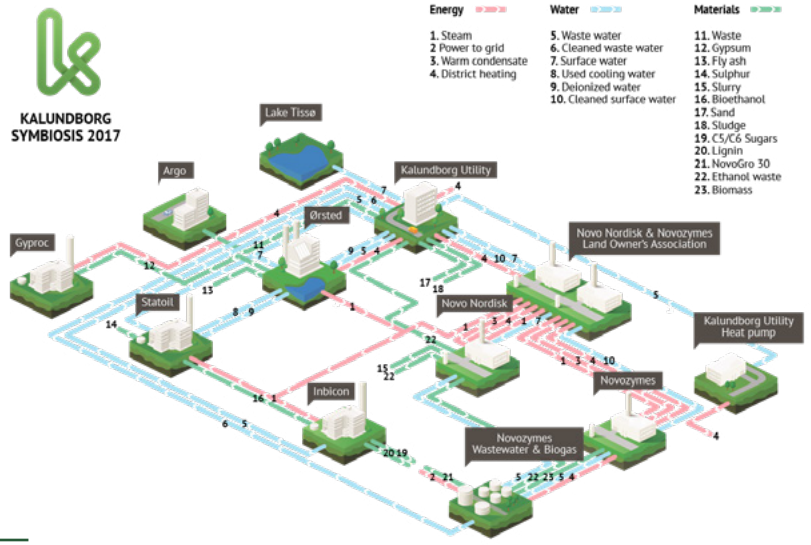


FIGURE 6
Example of the exchange of material, water and energy flows between sites, at Kalundborg, Denmark. Source: www.symbiosecenter.dk

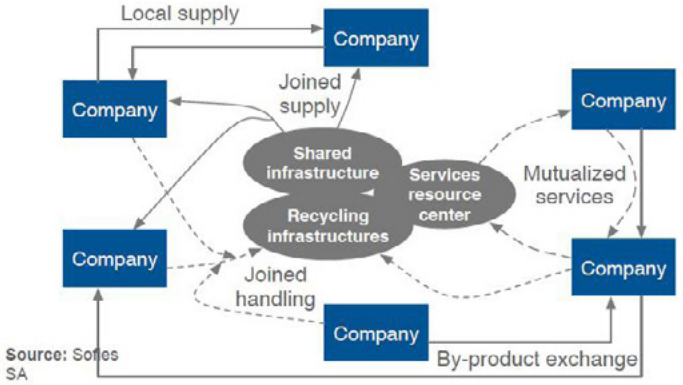


FIGURE 7
Example of an Eco park, as existing in Italy (http://www.regione.toscana.it/-/il-modello-toscano-delle-apea-aree-produttive-ecologicamente-attrezzate).

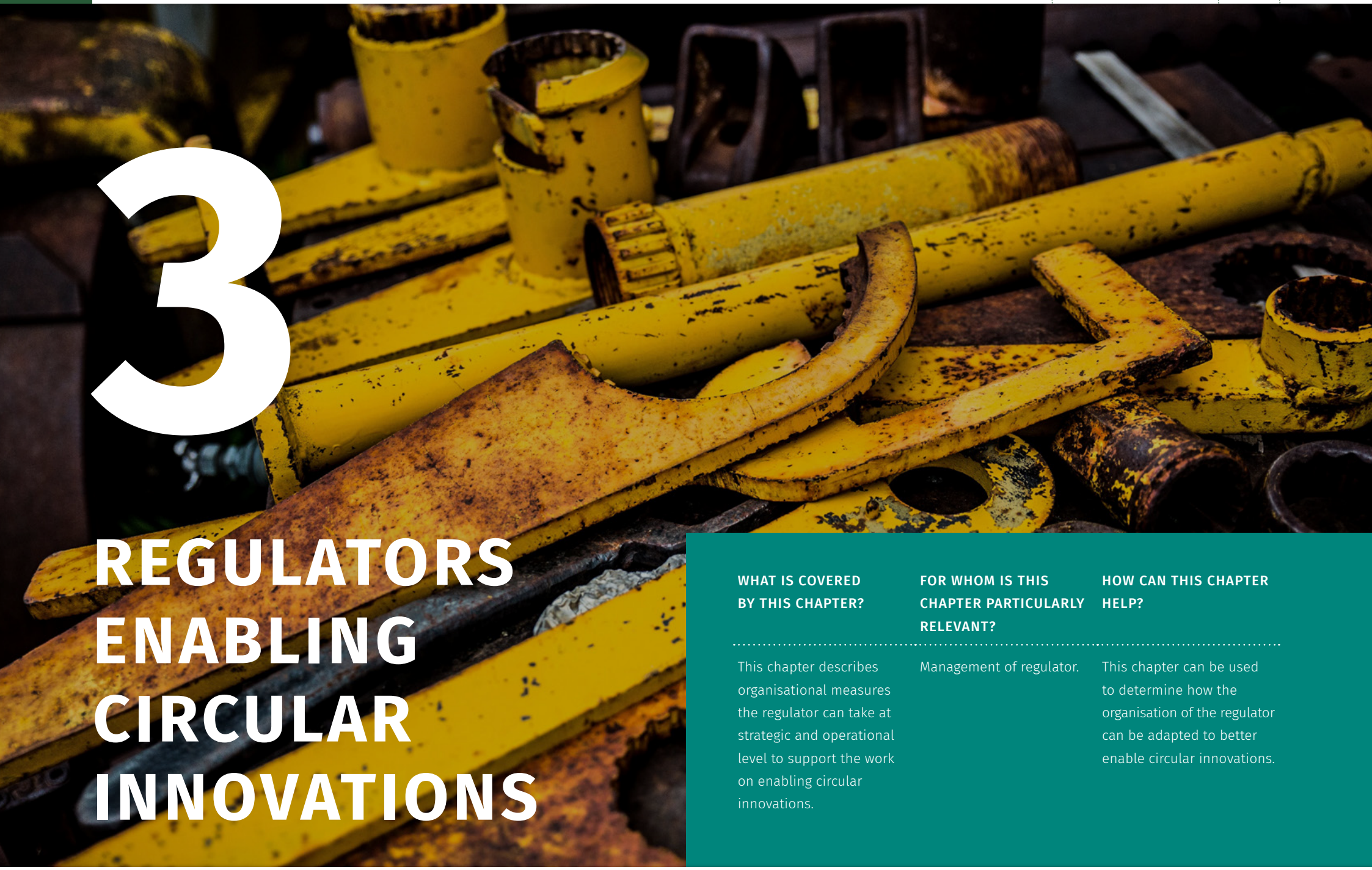
2.4.1 Relevant provisions in IED and WFD

A regulator could, ideally, understand the symbiosis and discuss the relationships with the different operators. In doing this, a regulator will not only understand the material flows in relation to IED, WFD, etc., but can also indicate where new opportunities might be sought out (e.g. for materials that are not yet used as a by-product in another activity).

In making regulatory decisions, it is important to examine the flexibility in the IED. IED has the primary objective of protecting the environment as a whole. While it in principle requires individual installations to operate according to BAT, the decision on what BAT is, may be taken at the level of a group of installations connected through industrial symbiosis. Including as much as possible within the scope of a permit may be desirable, but there may be constraints on this:

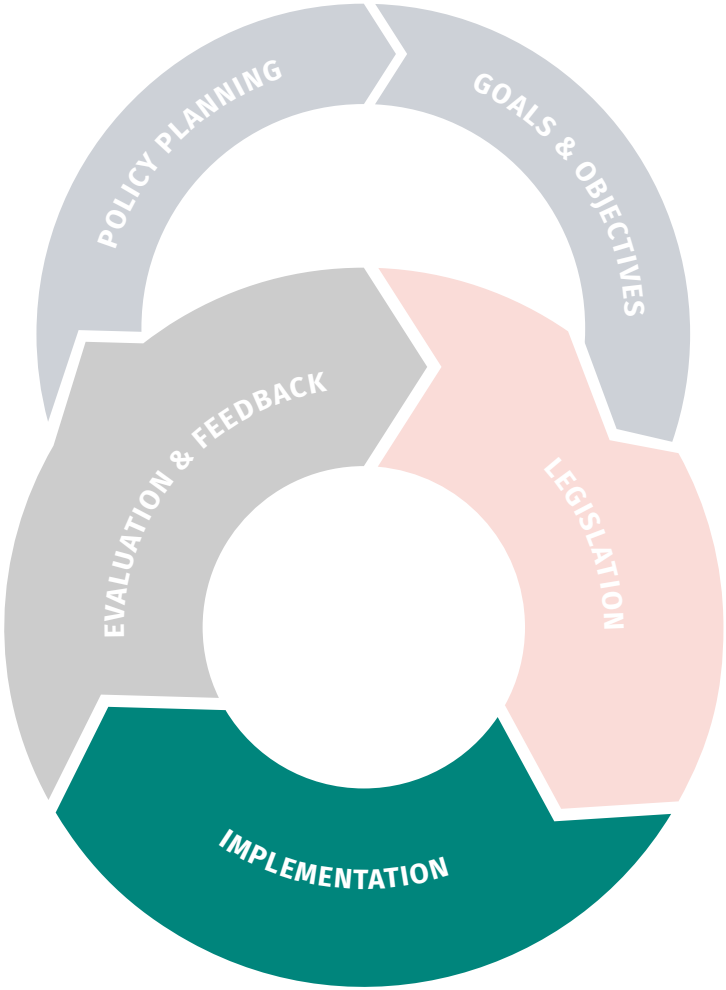
- neighbouring facilities, installations or activities within a symbiosis may have different operators and be different legal entities;
- combining activities may capture non-IED activities and operators may consider this undesirable;
- with multiple operators, it might be difficult to assign responsibility for non-compliance;
- a 'dome' permit or umbrella permit is a possibility in some regulatory regimes, but this is something developed at national level. Such permitting approaches are developed at Member State level.

Concerning the WFD 2018, certain provisions seem clear within industrial symbiosis. Production residues which are used within symbiosis can be regarded a by-product if they meet the conditions for by-products, see Section 2.2.1 If the production residue is a by-product under the WFD, it is not a waste and will have the same classification under IED, as IED defines waste simply by reference to the WFD.



3 REGULATORS ENABLING CIRCULAR INNOVATIONS

WHAT IS COVERED BY THIS CHAPTER?	FOR WHOM IS THIS CHAPTER PARTICULARLY RELEVANT?	HOW CAN THIS CHAPTER HELP?
This chapter describes organisational measures the regulator can take at strategic and operational level to support the work on enabling circular innovations.	Management of regulator.	This chapter can be used to determine how the organisation of the regulator can be adapted to better enable circular innovations.



3.1 Introduction

The following sections set out measures that regulators can take regarding:

- cooperation with other regulators > see Section 3.2;
- developing circular strategies > see Section 3.3;
- developing circular permitting and inspections > see Section 3.4;
- proactive working with business > see Section 3.5;
- information and risk management > see Section 3.6.

When considering these measures, regulators may make different choices, as they differ throughout Europe. They may be national, regional or local authorities and they may vary across MS in their mandate, tasks, capacity and budgets. For example, some may set broad targets (e.g. for recycling) which set the context for individual regulatory decisions, whereas for others such targets are set by others.

3.2 Cooperation between regulators

When regulating circular innovations different regulators may be responsible for permitting of production or recycling facilities, checking the legal status of secondary raw materials which these facilities use or produce and the compliance of these materials with legislation such as REACH. The success of these innovations is often dependant on joined-up thinking and co-operation between all environmental and other regulators concerned. For instance mutually aligned inspection plans can contribute to a consistent approach regarding certain circular innovations.

The staff in some authorities may not have the necessary knowledge and skills, especially where techniques, materials, and terminology are "new". This makes the dissemination of knowledge and experience a key to success. Exchanging and aligning information and decisions across administrative boundaries can further boost the broader uptake of circular innovations – whether this is between regions and regional authorities or across national boundaries (e.g. on sharing of documents on end-of-waste status).

3.3 "Circular" strategies

It is good practice for regulators to adopt strategies or operational frameworks and, based on these, develop plans to deliver their core legal roles and wider tasks. To address circular innovations properly regulators can develop specific regulatory strategies or make existing strategies more circular economy proof. The following figure describes the cyclic nature of strategic planning by regulators. It explains how context, priorities, goals and strategies and plans relate to each other and how the strategic planning is linked with the operational planning.

See Figure 8 →

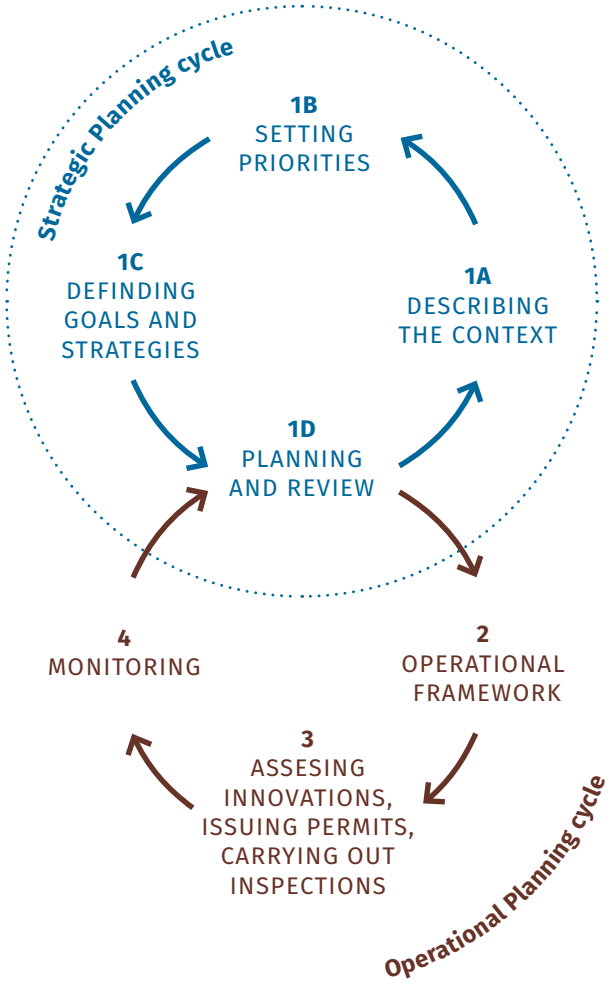


FIGURE 8
Strategic and operational planning

STRATEGIC PLANNING CYCLE

- The strategic planning cycle starts with determining the specific context in which the regulator operates: legislative obligations, facts and figures on relevant production or recycling facilities, on waste prevented, produced or treated etc. and wider contextual issues like policy objectives on the circular economy.
- The information about the context is the basis for setting priorities, e.g. to reduce waste or increase use of secondary raw materials.
- The priorities then need to be translated into goals (e.g. reduction in certain waste) and "circular" strategies which can be applied to achieve these goals.
- From the strategy arises the plan with specific actions and responsibilities identified. The actions identified need to take account of the available resources of the regulator and the level of knowledge on the circular economy of the staff (although an action may be to train staff, etc.).

OPERATIONAL PLANNING CYCLE

- The identified actions in the plan form the interface with the operational cycle where the regulator carries out its tasks regarding permitting and inspections.
- A proper operational framework is needed to carry out the tasks. Such a framework would include for instance guidance on how to assess end-of-waste status of secondary raw materials (see also Practical Tool 1, Part A of this guidance). Another useful instrument can be a voluntary database for secondary raw materials or end-of-waste decisions. Currently the IMPEL Waste Management and Circular Economy Project is exploring the feasibility of such a database. A first proposal for a case-by-case end-of-waste database is presented in the Practical Tool 1, Part B.
- Permitting and inspections are carried on the basis of the plan and with the use of the operational framework. This is usually supported by a monitoring to check if the planned work is carried out and evaluate progress towards the goals (e.g. levels of reuse). Feedback from both of these is then used to improve the plan and its actions.

Regulators can consider different types of strategies for enabling circular innovations ("circular strategies"). A regulator may have more than one strategy. General and overall organisational or regulatory strategies which address the transition to a circular economy can help to steer the organisation in the right direction and identify what aspects need change in order to support circular economy outcomes. Some include a specific focus on particular sectors, materials, companies and waste streams or specific regulatory regimes like IED or Waste legislation.

FIGURE 9
Different types of strategies of regulators supporting the transition to a circular economy

An organisation strategy

A regulator may adopt a strategy for its organisation as a whole covering all of its statutory obligations, tasks and roles. Within this overall strategy the particular objectives and actions to support the circular economy and circular innovations can be included as far as it is in the power of the regulator to deliver these. Where there are already such strategies, a regulator can revisit them regularly to determine if they are still appropriate in setting out how the organisation can work most effectively in delivering a circular economy.

EXAMPLE: SEPA'S NEW ORGANISATIONAL STRATEGY

The Scottish Environmental Protection Agency (SEPA), has recently launched its new organisational strategy: 'One Planet Prosperity' to reflect the challenge all nations face of reducing the over-use of the planet's natural resources. SEPA must clearly continue to develop significantly smarter ways of reducing industrial and other forms of traditional pollution. However, the challenges of the 21st century mean that SEPA should also increasingly help to tackle diffuse sources of pollution, over-use of natural resources and major environmental challenges, such as climate change. SEPA must find innovative and more powerful ways of regulating, if it is to rise to these challenges and play its role in tackling it.

In the early days of environmental regulation, the sole, or at least main, influence on the environmental performance of a business was the regulatory standards and the activities of the environmental regulator. SEPA finds that there are now multiple influences on the environmental performance of a business, including consumer demand for environmental credentials and investor and supply-chain requirements for environmental performance. The key challenge for SEPA is to combine the things it can do to influence the behaviour of a business with all the other influences on the behaviour of that business. This will be the most effective way to deliver full compliance and help as many businesses as possible move beyond compliance. In doing so, regulatory work will be carried out in accordance with new organisational characteristics including inter alia:

- helping people implement successful innovation, not minor improvements on 'business-as-usual';
- routinely interacting with regulated businesses through their boardrooms and executive teams and owners;
- using partnerships as principal way of delivering outcomes.

EXAMPLE: PROSPERITY AGREEMENTS IN NORTHERN IRELAND

Prosperity Agreements were initiated by the Northern Ireland Environment Agency (NIEA) as a means of working in partnership with regulated businesses, in an innovative way to find opportunities for step change in environmental performance above and beyond the regulatory baseline and secure positive business growth and development. Prosperity Agreements are voluntary agreements, signed by the Chief Executives of NIEA and the partner company or organisation, and help to ensure environmental considerations are at the heart of business decision-making. They contain commitments from both NIEA and the company or organisation which will deliver environmental benefits, beyond legal requirements, develop a more strategic approach between business and regulator and to help business realise environmental gains which will increase their competiveness.

An example commitment might be *'The Prosperity Agreement holder and NIEA will work together to explore opportunities for trials of new technology and sustainable working practices'* which provides a broad framework to discuss commercial proposals and business strategy, whilst looking for alignment with policy drivers and environmental outcomes. There are more detailed and specific actions in an action plan shared only between the company and NIEA, to avoid issues of commercial confidentiality. Through the agreements NIEA have sought to find opportunities for partnerships between the different agreement holders and build on existing relationships. A large dairy cooperative provides off-spec products to an anaerobic digestor operator, who uses that material to produce high quality biogas. The gas is then tankered back to the Dairy's processing plant to fuel the onsite combined heat and power unit providing energy for the plant's operations. Similarly the same AD operator was in discussions with a soft drinks manufacturer regarding the potential for producing food grade Carbon Dioxide, currently a waste product from AD, which could be used in the bottling of sparkling drinks. NIEA's role in building these relationships has been relatively small, with the business benefits driving the outcomes, however, the signing of the agreements with NIEA has prompted each of the companies involved to continue looking for innovation and new opportunities to improve environmental performance. Companies are perhaps more willing to come forward with new ideas and discuss them with the regulator, knowing they have a positive relationship and that there can be a dialogue to address regulatory barriers, while maintaining the highest standards of compliance.

Sectoral strategies, partnerships with individual companies

Some regulators have developed strategies for particular business sectors or even partnerships with individual companies. These strategies or partnerships aim for the joined-up application of requirements from different origins (waste, chemicals, products, etc.). They enable the regulator(s) to work more closely with sectors or individual companies to explore their particular opportunities and barriers. They also can help regulators to understand the role that front runners may play.

In developing an approach to sectors, a regulator could begin with one sector to learn the best ways to identify issues and how to work with business on this approach. In moving to new sectors, it is important to demonstrate how earlier sectoral strategies have resulted in benefits to business. However, every sector is different, so the regulator needs to be responsive to business.

Regulators that have worked with business have indicated significant benefits in ensuring buy-in from senior management, such as signing agreements between the CEO of a business and the CEO of a regulator. Environment managers or waste managers in companies may not be sufficiently senior to drive forward the necessary transformational change. If a clear case is made, senior management is likely to be more receptive and drive organisation-wide change that delivers the necessary regulatory decisions to be made at operational and installation level.

A material strategy

A regulator could consider producing a strategy for particular types of material, such as plastics or construction waste. The advantage of such strategies is that they allow an exploration of the roles, challenges and opportunities of different businesses (from large to small) and they examine the overlaps, gaps, limitations and opportunities in different relevant regulatory regimes. They may also provide the basis for identifying needs for working relationships with other public bodies, etc. (which could result in a joint strategy).

When developing material strategies links can be explored with waste management and prevention plans and how they can contribute to such strategies.

A regulatory regime strategy

For some major regulatory regimes, a separate strategy may be developed. For example, a regime for waste regulation or for delivery of IED. Such strategies are useful in that they allow the regulator to stand back from the specific details of issuing a permit, etc., to consider what the regulatory regime is trying to achieve. For example, IED aims to protect the environment as a whole and a strategy enables a regulator to consider if its day to day approach to IED is contributing to this objective as much as it could. It also allows regulators to consider new issues relating to such objectives. The importance of the circular economy in contributing to protection of the environment as a whole is such an example. Is the thinking adopted 20 years ago when the Integrated Pollution Prevention and Control (IPPC) Directive[9] came into force the same thinking for society's needs today even if the regulatory processes are largely unchanged? Where strategies or plans for specific regulatory regimes have been in place for some time, a regulator can revisit them to determine if they are still fit for purpose in delivering a circular economy. Chapter 2 and the Annexes A-D of this guidance describe opportunities in the different Directives and Regulations for better enabling and encouraging circular innovations at production and recycling facilities.

Taking into account the wider regulatory context

Innovative businesses are also subject to other regulatory or planning regimes, like spatial or land use plans. Spatial planning, often the responsibility of local government, will influence decisions on where activities may take place, which in turn influences the potential for industrial parks and industrial symbiosis, as well as wider exchange of secondary raw materials. Environmental regulators can work with planning authorities to identify opportunities to enhance circular economy opportunities at the local level. In doing this a regulator can help encourage a planning authority to introduce requirements for environmental or circular economy performance for new activities requiring planning decisions if they would have the mandate to do so. Such close working with planning authorities can be addressed in the strategic planning cycle as well as during individual regulatory decisions in the operational cycle.

[9] Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control.

3.4 "Circular" permitting and inspection

Permitting, inspection and monitoring are the key elements of the operational cycle of regulators. They implement the plans developed in the strategic cycle and their implementation informs the revision of these plans. It is in the decisions that are made here that regulators may facilitate businesses in their transition to a circular economy or they may inhibit it.

Permitting

Permitting activity by regulators is driven by several regulatory regimes, such as those of IED and of waste management. Chapter 2 has explored the legal constraints but also opportunities and flexibility of these regimes in the EU law. It is clear that there are some potential flexibilities and "hooks" in legislation that regulators can take advantage of.

IED

In the case of industrial symbiosis materials move between installations and IED provides flexibility to issue a permit covering all installations involved. IED allows for permits to contain improvement conditions for an installation, so a permit can stimulate future change, such as on the quantity or quality of secondary raw materials produced or used.
The experimental clause in IED (on emerging techniques) can be considered. This allows for the temporary testing of new techniques, so that monitoring can be undertaken to determine if predicted impacts occur in practice. The limited time available to apply this clause (see Chapter 2) may be a constraint, however.

Regulators can try and go further by considering a 'circular' permit – one that promotes circularity of materials within the economy, such as 'closing the material loop' and looking at the chain of producers and users of a material. Regulators might experiment with different types and scope of permits as far as they are able. It is likely that there will be legal constraints on what is possible, but a clear regulatory strategy can identify what flexibilities are available and what permitting experiments might be tested.

EXAMPLE: SOUTH-HOLLAND EXPLORING CIRCULAR ECOMOMY IN PERMITS

In The Netherlands the Province of South-Holland is exploring the possibilities of introducing circular economy within the present environmental permits or using connections with other regulations. It will lead to some pilot permitting processes in which different approaches may be tested. An approach may be to add a section on circular economy in the permit or to require additional attention to closing loops within the installation or between at least two installations.

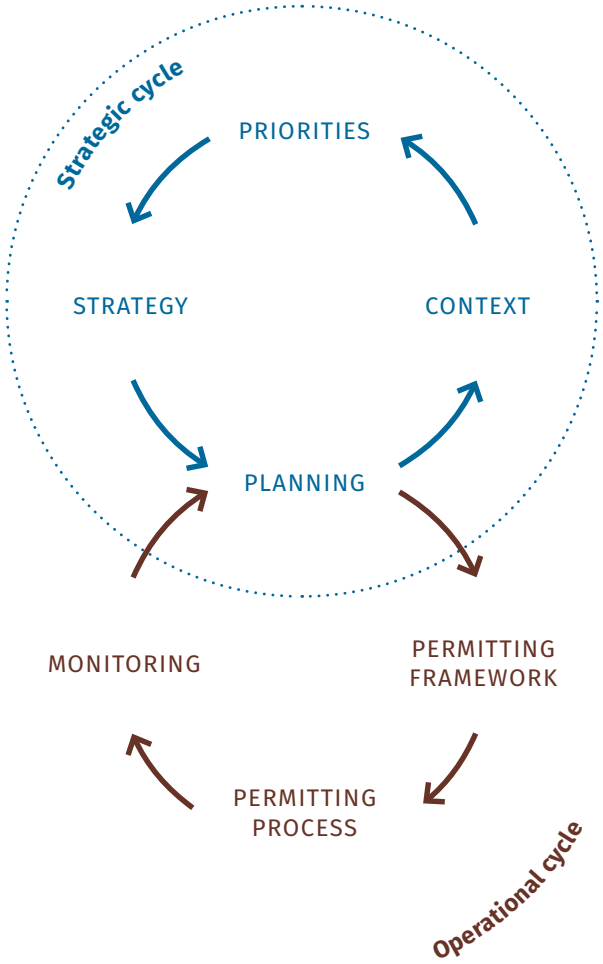


FIGURE 10
Strategic and operational planning for permitting

Addressing circular innovations in strategic and operational planning of permitting

In the area of permitting, for instance IED permitting or issuing permits giving end-of-waste status to secondary raw materials, a regulator can use the strategic and operational planning cycles as described earlier.
In all phases of the two cycles particular attention can be given to encouraging and enabling circular innovations at production and recycling plants.

Inspection

Inspection is undertaken to assure compliance with, for example, IED permit conditions. Inspection is also necessary to promote, check and enforce conditions relating to end-of-waste status.
Where regulators are adopting new decisions to facilitate circular innovations, inspections are important to examine the consequences of these decisions. For example, if an installation is allowed to take forward an experimental activity with few demonstrated environmental consequences, inspection is important to ensure the predicted outcomes are what is delivered (and feedback to the permitting decisions). Similarly, where secondary material chains are emerging, initial regulatory decisions need to be checked if they are practical and enforceable.

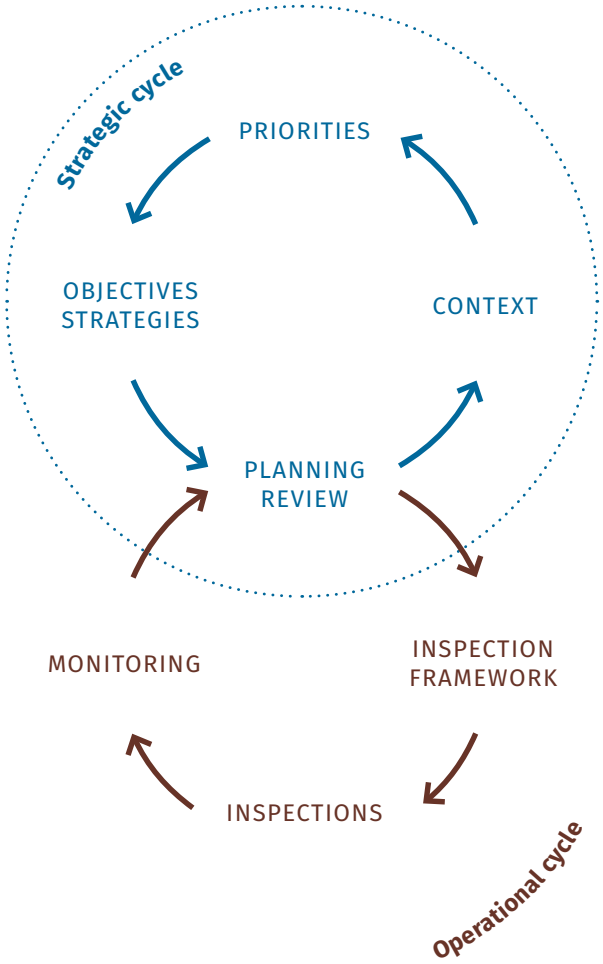


FIGURE 11
Strategic and operational planning of inspections

Addressing circular innovations in strategic and operational planning of inspections

In the area of inspections, for instance checking compliance with IED/WFD permit requirements, with the conditions for end-of-waste status in the WFD and national criteria for end-of-waste, the regulator can again use the strategic and operational planning cycles as described earlier. Inspections should be planned to target issues where there are significant risks from non-compliance to the environment. Results of inspection activities feed back into the planning cycle of regulators, so that the regulator learns from its experience with innovation and how to improve its permitting, inspection and other activities to support the circular economy year on year. Practical Tool 2 gives practical guidance for inspections regarding end-of-waste status.

3.5 Proactive working with business

Proactive support of businesses

Regulators can work proactively with businesses to help identify, develop and facilitate circular innovations. Being proactive sends an important signal that regulators want to encourage and support new solutions and goes beyond the routine communication with businesses during permitting and inspection activities. Proactive support by the regulator can be in different contexts, such as working with business, policy-makers and others to:

- explore the potential for circular innovations in the area concerned by examining possible new markets for secondary new materials, identifying and matching suppliers and users;
- support the development of new circular economy ideas and business models and encouraging businesses to develop new thinking for their own contexts;
- identify regulatory barriers to innovation for the circular economy.

Tools

A variety of tools can be used to provide support to businesses – some individual and some collective. Many build on experience of working with businesses to explain regulatory changes and, therefore, are not necessarily radical changes for regulators. Examples that can be considered include:

- individual meetings to explore business development, new ideas, regulatory issues, etc.;
- meetings with industrial sectors;
- group meetings with different businesses with relationships around, for example, particular materials;
- dissemination of information, e.g. guidance;
- help-desks;
- use of “key account holders” in the regulator for some businesses;
- encouraging links with researchers and technology centres.

Role of environmental management systems

A further instrument that regulators can use to encourage circular thinking by business is environmental management systems (whether EMAS, ISO or other). These all encourage a holistic approach to thinking about the environmental performance of a business and regulators could encourage businesses to include analysis of the materials they use and the materials (waste/secondary raw materials) they produce to stimulate change and improvement in the future. This is especially important where businesses are legally compliant, but where improvements in resource efficiency and prevention of waste can clearly occur. Regulators can, therefore, work with companies that act as certifiers/verifiers for environmental management systems to encourage them to stimulate companies into circular thinking.

Other support

In the context of proactive support to businesses regulators may want to build new working relationships with other governmental bodies. For example, as industry develops secondary raw materials instead of waste, there may be a need to work with an industrial or business ministry to facilitate the development. Regulators can support the circular economy through green public procurement (GPP), which could, for example, stimulate market demand and eco-design for products using secondary (raw) materials.

Limitations

It is acknowledged that while close working relationships with business are often useful, there can be limitations to this. For example, in exploring a problem together, a regulator may be hesitant to propose (too strongly) a technology as a business may hold them responsible if problems arise with compliance, etc. It is, therefore, good practice for a regulator to highlight the challenge or problem that business faces (e.g. to reuse more waste) and encourage the business to suggest its own solutions to this. At the same time, it is necessary to clearly communicate, that compliance with minimum legal requirements is a base line for further developments.

Culture and budget

In order for regulators to support businesses, they may need to change how they relate to businesses. They need to work with business to understand what they are doing, their constraints and opportunities to be more circular. They need to explain to businesses what is or is not possible within the legal framework in place. All of this is, for many regulators, a culture change. It requires buy-in from top management in a regulator. For individual staff there is also a need for training, as well as improved systems for exchange of information and experience as the staff learn from the business relationships that develop and the decisions that they make. In setting the direction regulatory strategies of authorities should include a clear message about their relationship with business – not just what it is, but what the regulator wants it to be. As these strategies are translated into operational plans actions can be identified which enhance the culture of the staff of the regulator to help inform their day to day decision making and interactions with business.

Of course, building such relationships with businesses, exploring new ideas and options within permitting, etc., takes time and, therefore, has an impact on a regulatory budget. This is a constraint, but regulators could seek to make as many positive steps forwards as is possible with the resources they have, prioritising actions that will bring the most benefits.

3.6 Information and risk management

Identifying and managing uncertainties and risks

In regulatory decisions concerned with innovation, regulators (and businesses) are likely to be making decisions where there is incomplete information. New techniques may not be fully tested, so it may not be clear if they deliver what is expected. With limited monitoring information, their predicted emissions will be uncertain. Where businesses develop new relationships for material flows, the stability of those relationships will be uncertain. Where secondary raw materials are produced, their composition may be unclear and the consequences of the presences of substances in them may be uncertain. Overall, there is a challenge to the character of a regulator (as an organisation, but also individuals) – how risk adverse is the regulator? Avoiding risks to ensure no potential legal challenge or no unknown environment impact, usually means not trying new options to deliver potentially greater environmental and social outcomes. This, therefore, challenges the purposes of a regulator. A transparent and understood strategy in an organisation to risk assessment and innovation can avoid too much responsibility falling on the shoulders of a single individual permitting officer. Therefore, strategic plans should make clear how the regulator should consider risk in relation to facilitating different aspects of innovation (including how this translates into different regulatory regimes, such as IED permitting and end-of-waste decisions). As a principle, innovation should lower the overall risk for human health and the environment. In any case legally binding protection standards have to be complied with.

Organising professional expertise

In exploring new ideas with businesses within a permitting context, staff are likely to be challenged with regard to what they know about the business, its techniques, about the nature of secondary raw materials and even about what is legally possible in a given situation. Regulators can consider establishing technical and legal expert teams to support permitting decisions. They can ask universities or research institutes for advice. And they can build systems to collect and exchange information to support decision making.

Precautionary principle

In case of possible, uncertain risks, the precautionary principle is the basis for all assessments. This does not always need to be interpreted as doing nothing that has uncertainty. The Proportionality of risks needs to be judged in as informed a way as possible. Each case will be different, but a sensible examination of possible risks is needed. Use of approaches such as life cycle analysis and risk analysis are well known tools and can avoid over-emphasis on the unknown and, therefore, stopping anything new. However, the justification of an additional specific risk should be an outweighing overall risk reduction for human health and the environment.

Good working relations and trust

One option in allowing business to adopt a new approach is to work closely with it to monitor its implementation and consequences, such as through a plan for inspection and monitoring. This requires reasonably good working relationships and a level of trust, which can be supported through having a common and transparent approach to risk analysis within permitting. This, therefore, reflects the organisational culture of a regulator. It delivers the circular goals of the operational cycle, ensuring feedback to inform regulatory decisions and so enable the regulator to build on, or change, its approach to innovation based on actual experience.

4 THE ROLES OF POLICY-MAKERS

WHAT IS COVERED BY THIS CHAPTER?

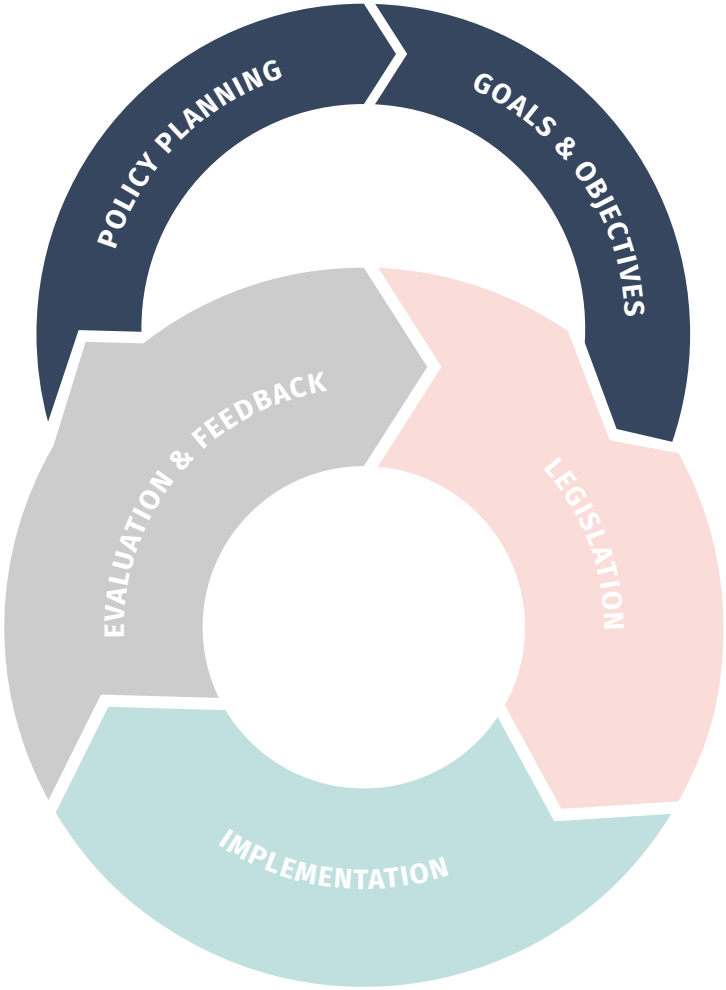
This chapter describes how policy and lawmakers can support regulators in enabling circular innovations.

FOR WHOM IS THIS CHAPTER PARTICULARLY RELEVANT?

- Management of regulator
- Policy- and law-makers

HOW CAN THIS CHAPTER HELP?

This chapter can be used to identify what actions by policy- and law-makers will help the regulator.



4.1 Introduction

For regulators it is important that policy- and law-makers provide the right framework and environment for encouraging and authorising circular innovations. Many of the levers to promote the circular economy are developed at EU level. At MS level policies and law may be developed at national, regional or local level (ministries, provincial or municipal administrations etc.). At ministerial level policies regarding circular economy often are not only developed by environment ministries, but also by economic or industry ministries.

This chapter examines how regulators and policy- and law-makers can jointly identify actions to promote outcomes on the ground.

The following sections set out three core areas where policy-makers, particularly in the MS, policy-makers, can support regulators in enabling circular innovations:

- ensure the legislative framework is fit for purpose using the feedback from regulators > see Section 4.2;
- support regulators in the application of their duties and powers in implementing legislation supporting circular innovations > see Section 4.3;
- provide a coherent, joined up policy framework with the right mix of instruments to allow circular innovations to be implemented > see Section 4.4.

4.2 Ensure the legislative framework is fit for purpose

Making the EU legislative framework circular using feedback from regulators

Important parts of the EU legislative framework relevant to circular innovations have been discussed in Chapter 2, illustrating the opportunities that exist in the legislation to facilitate circular innovations and aspects of the legislation that might inhibit or limit these. Some elements in the EU legislative framework discussed in Chapter 2 can be perceived as barriers or are apparently not used to their full potential. To name a few that stand out: the requirements for by-products and end-of-waste in the WFD, the seemingly limited possibilities for emerging techniques and experimentation under the IED, the lack of harmonised MS approaches regarding the shipments of waste in the WSR and the interface between REACH and WFD. The more detailed considerations of Chapter 2 are not repeated here. However, the key message for policy- and law-makers is to ensure that legislation is fit for purpose for the circular economy. This means that when EU legislation is evaluated and revised, it should be analysed carefully to determine if there are elements or gaps that in practice are barriers to circular innovations or that aim to facilitate such innovations, but have proven to be difficult to implement. Regulators can provide the information on how legislation works out in practice. After making such analysis, amending the legislation may be appropriate to overcome barriers and enhance opportunities. At EU level all legislation is periodically reviewed, for example through the REFIT process. Policy-makers in the MS can input to Commission work programmes and reviews the experiences of their respective regulators and businesses. The forthcoming evaluation of the IED is another opportunity for Commission and MS to examine how this directive may better contribute to the circular economy.

Both operational as well as more strategic aspects of the EU legislative framework need attention. At operational level policy- and law-makers should ensure that the requirements on regulators set out in law help to facilitate the transition to the circular economy. This is an economy in which resource efficiency is optimised, resource loops are closed where possible and the value of resources in the economy is preserved as long as possible. But it is also an economy which respects the precautionary principle as primary law principle of the EU (191 TFEU), aims at sustainability and safeguards compliance with existing protection standards.
For permitting, end-of waste decision making, and inspection systems, it is most important to be practical, proportionate and consistent with supporting circular innovations. This should lead to improved material flows and waste reduction while respecting the precautionary principle, product and chemical law as well as article 13 WFD (protection of human health and the environment). It should also work towards realisation of a non-toxic environment with the ambition to eliminate dangerous substances from material cycles (both substances of very high concern as well as "candidate/suspect substances"). A tailored risk-based approach and transparent sharing of information between product producer, waste treatment operator and secondary material user is fundamental to avoiding unnecessary burdens and uncertainty as to movements of products and materials. Until the major changes in the production and use of new secondary raw materials are achieved, policy-makers will be challenged to rethink the underlying principles of the legal framework. In the course of developing this guidance the following areas were explored:

- a value-based approach to secondary raw materials, in addition to a risk based approach, provided that risk assessment shows no increased risks to the environment and human health;

- moving from a mind-set based primarily around the management of waste to one based primarily around the management of materials, following more an internal market approach, thereby making the use of secondary raw materials easier;
- a regulatory approach regarding the production and use of secondary raw materials at industrial facilities not limited to the boundaries of the geographical location of these facilities, but covering chains of industrial activities or flows of materials.

These considerations do not alter the fact that in all cases, when and where relevant, the precautionary principle, the aim for a non-toxic environment and binding product and protection standards have to be respected. Furthermore the guidance recognises that any legal framework should as a principle only encourage innovations that contribute to lowering risks for humans and the environment and not support innovations which do not minimize the overall risk but create trade-offs between different environmental and health protection goals. It is worth noting that according to the Council conclusions on legacy substances of June 2018 (para 17) Member States agreed, that secondary raw materials in general need to respect the same criteria as primary raw materials. While the detoxification of waste containing legacy substances should be the preferred option in order to reach non-toxic material cycles, certain derogations to such criteria may be appropriate in individual cases subject to conditions, in particular time-limits and possibly their review, provided that risks for human health and the environment are adequately controlled and properly communicated. They therefore encouraged the Commission's actions to develop a methodology addressing the management of waste containing substances of concern and also in consultation with Member States to identify waste types that typically contain legacy chemicals and that could successfully be recycled in a restricted set of specific applications that are safe for health and the environment.

MS implementation of EU law

The above comments focus on EU environmental law, but the principles apply equally to relevant national and sub-national law. In particular, it is important that where EU law has deliberately included some flexibility in application to allow businesses and regulators to adopt innovative and more circular approaches, that these elements are not lost during transposition or practical implementation.
Such flexibility does add to legal complexity (and potentially uncertainty), but the temptation to adopt a simpler, but more rigid, approach at national level may act to hamper innovation.

4.3 Supporting regulators

Steering and helping regulators

Policy-makers are critical players in steering and supporting regulators in making more circular regulatory decisions:

- ministries and other policy making bodies generally have the power and responsibility for issuing instructions to require action by regulators, including how to consider regulatory decisions, or priorities for regulatory activity;
- policy-makers can encourage regulators to develop strategic thinking that sets out how their decisions can be more supportive of the circular economy;
- ministries also often determine budgets and decisions on money may influence the priorities of regulators.

Many regulators in MS are still building their capability to support circular innovations and are eager to build their knowledge of what policies apply and how to interpret the law. In this respect at EU level mechanisms such as the Environmental Implementation Review (EIR) Peer2Peer or the IMPEL Review Initiative (IRI) can be useful. At MS level, policy-makers can help clarify the wider regulatory/delivery landscape and the place of regulators and other key players within it. Issuing guidance or encouraging regulators to issue their own internal guidance, establishing a helpdesk for regulators, providing legal advice and support can be useful tools in this respect.

EXAMPLE OF GUIDANCE ON END-OF-WASTE

In England, Wales and Northern Ireland Quality Protocols (QPs) were published. QPs are voluntary end-of-waste frameworks for specific wastes and end uses based on the relevant end-of-waste case law. QPs ensure the product made from waste does not pose an unacceptable risk to human health or the environment, increase market confidence in the quality of products made from waste and their potential value and encourage greater waste recycling and recovery.

See for other examples of guidance on assessing end-of-waste status Practical Tool 1.

A particular issue for regulators is that they sometimes need to balance different (seemingly) conflicting environmental interests which can involve accepting uncertainties and taking risks in authorising or assessing circular innovations. Policy-makers can encourage and guide regulators in making clear, transparent and justified decisions. Policy-makers can also support wider dialogue, bringing together different actors including businesses and regulators. The Green Deals in The Netherlands, for example, do this, not only providing a forum for communication between business and regulators, but providing clear messages on how best to frame the legislative and policy environment to support circular innovations.

EU level support

Finally, while this section has focused upon the interaction between policy-makers (ministries) and regulators at MS level, EU level policy-makers are also important. For some areas of regulation, the Commission or others may develop guidance for regulators (covering particular aspects of implementation, such as permitting, compliance monitoring, etc.). It is also important, therefore, that these EU level policy-makers ensure that such guidance is supportive of types of regulatory decisions which are facilitating circular innovations.

4.4 Create a favourable policy environment

Supporting markets

Businesses seeking to become more circular need a supportive regulatory environment. However, they need much more than this. For example, they may work with a regulator to change their processes to produce a secondary raw material rather than a waste. However, if that secondary material is more expensive than a virgin material, there is no business case no matter how supportive a regulator is. The market, therefore, is a critical aspect of the circular economy. Supply and demand both can be influenced by policy-makers. Policy-makers can develop policies regarding bans, e.g. product/material or landfill bans, taxes, prices, producer responsibility schemes, green/circular public procurement etc. that are supportive of secondary materials or products made from such materials and stimulate reduced use of virgin materials.

Public procurement

Green public procurement policies[10] act to promote goods and services with lower environmental impacts. However, they may not fully take account of the objectives of a circular economy, e.g. ensuring that materials can re-enter the economy. Policy-makers can examine public procurement policies to identify how these contribute to or support the uptake of circular innovations. If for instance public services across Europe, such as health services, were to require increased use of products made from secondary raw materials, this would have a significant impact on the stimulation for circular innovations.

Spatial planning

A further area policy-makers can explore is the role of spatial planning in bringing together activities at a certain location to allow for materials and products flows. While many spatial planning decisions are undertaken at local level, national level policy-makers may have a role in guiding those making such decisions. Further, policy-makers have an important role to play in ensuring consistency of approaches between spatial planning and regulatory decisions (there is little point in bringing activities physically together if there is a regulatory barrier to material flows between them).

Waste management plans and waste prevention programmes

The WFD requires that MS develop waste management plans and establish waste prevention programmes. Together these describe how to prevent waste arising, waste management infrastructure and how specific wastes should be managed, recovered and disposed of.

In this context, policy-makers (as well as regulators) can develop strategies on specific big waste streams to be reduced or reused or recycled. This is done for example in the Dutch national waste management plan. This plan also points to expected developments (e.g. experimental technology). This enables business to anticipate by innovating. For instance, the plan mentions new techniques for separating brominated flame retardants from waste extruded polystyrene (EPS, a commonly used insulation material), which in time may become the minimum processing standard (recovery treatment instead disposal).

[10] See for EU level: http://ec.europa.eu/environment/gpp/index_en.htm

Other interventions by MS policy-makers

There are several other interventions that can be supportive of a circular economy that policy-makers could explore:

- creating platforms, forums, etc., for sharing of ideas, feedback for example as to regulatory barriers, etc.;
- supporting communication with consumers to enhance acceptance of products from secondary raw materials;
- developing databases on EoW decisions so that regulators and businesses have clearer information for future planning;
- supporting product standards for products based on secondary materials (working with business on their development). Or encouraging/supporting businesses to develop their own standards, quality assurance and certification schemes etc.;
- developing databases on other circular economy issues, such as digital marketplaces to bring together demand and supply of secondary raw materials;
- financing schemes for different circular economy/innovation actions; and
- supporting research for instance by universities, on making materials with lower contamination, or how virgin materials can be substituted.

It is important to note that across all policy interventions there is a need to bring stakeholders together (whether in an informal platform or when discussing legislation)[11]. Policy-makers often have the ability to convene such processes more effectively than many others. This should be recognised by policy-makers and used.

Joint-up policy making is equally important. Regulatory requirements, market interventions, financing and support actions should "work together". This often requires different ministries jointly sign up to the policy framework. For example, the Netherlands Circular Economy Action Plan and the Resources and Waste Strategy in England have been produced jointly by several ministries.

Policy actions at EU level

The above roles for policy-makers have focused on those at national level. There are some additional actions that policy-makers at EU level can take forward.

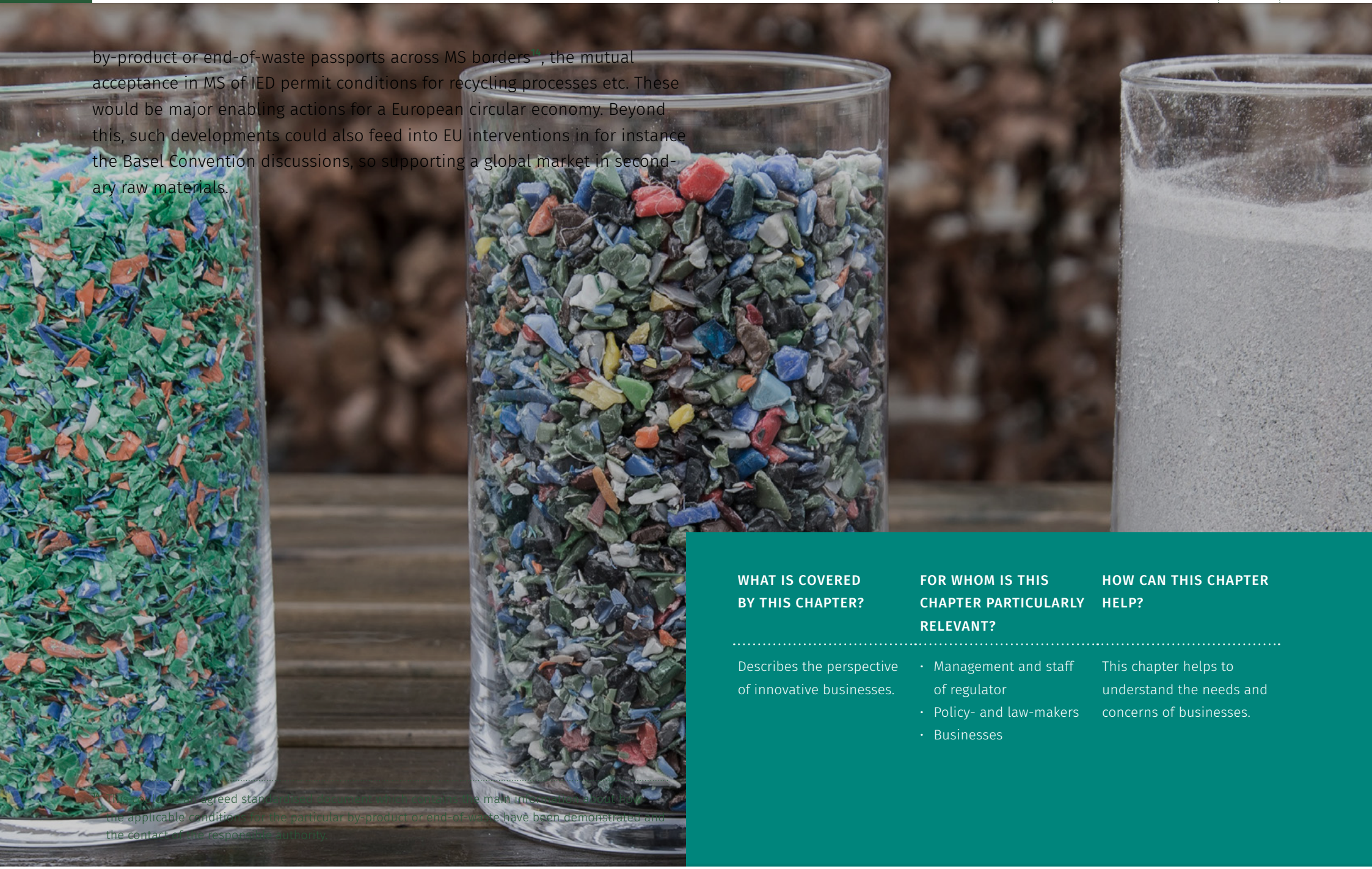
The EU legal framework leaves a lot of room for different approaches in the MS. Currently, there is between MS neither a commonly agreed approach for end-of-waste decisions or assessments or for the quality of secondary raw materials on the market[12]. As a result, actions by businesses to create secondary raw materials in one MS (supported by policy-makers and regulators) may find a barrier when seeking to sell in another MS. There are positive developments with MS working together, but overall there is a significant barrier within the internal market. Possible ways that EU and MS policy-makers can explore are encouraging common standards, the voluntary alignment of interpretations or mutual recognition of assessments on end-of-waste or by-product status[13], the use of voluntary

[11] See for EU level: https://circulareconomy.europa.eu/platform/

[12] With the exception that for iron, steel and aluminium scrap, glass cullet and copper scrap there are EU wide end-of-waste criteria in place.

[13] See for an example the North Sea Resources Roundabout (NSSR): https://www.youtube.com/watch?v=Tb7Poc2CcOM and http://www.circulary.eu/project/north-sea-resources-roundabout/ and https://www.greendeals.nl/nieuws/international-green-deal-north-sea-resources-roundabout-work-new-case

by-product or end-of-waste passports across MS borders[75], the mutual acceptance in MS of IED permit conditions for recycling processes etc. These would be major enabling actions for a European circular economy. Beyond this, such developments could also feed into EU interventions in for instance the Basel Convention discussions, so supporting a global market in secondary raw materials.



[75] This would be agreed standardised documentation setting out the main information about how the applicable conditions for the particular by-product or end-of-waste have been demonstrated and the contact of the responsible authority.

WHAT IS COVERED BY THIS CHAPTER?

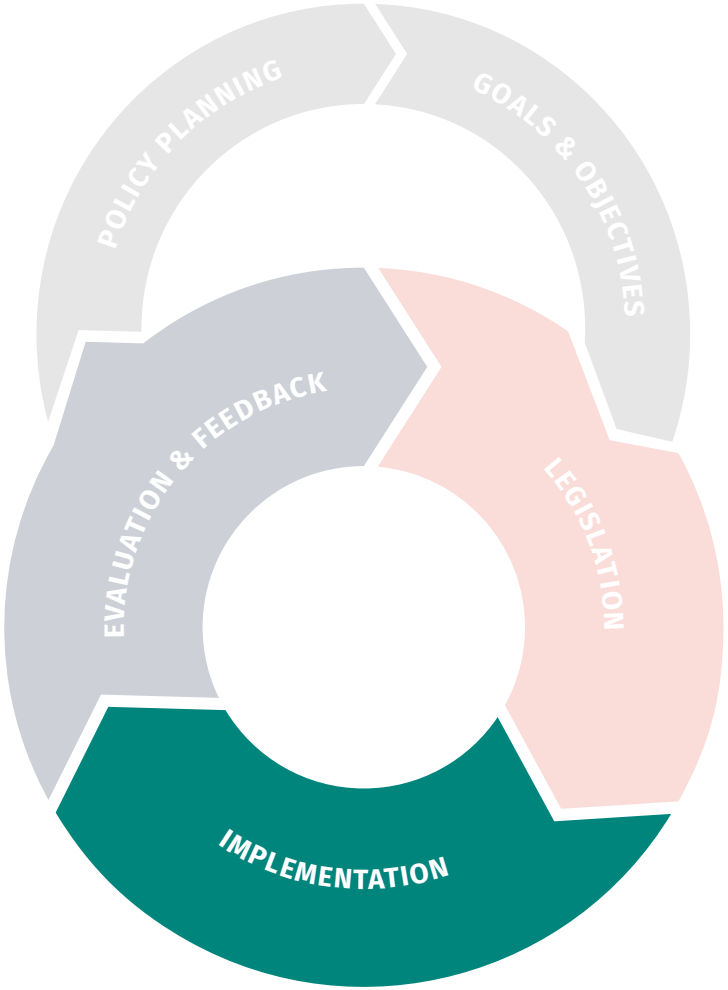
Describes the perspective of innovative businesses.

FOR WHOM IS THIS CHAPTER PARTICULARLY RELEVANT?

- Management and staff of regulator
- Policy- and law-makers
- Businesses

HOW CAN THIS CHAPTER HELP?

This chapter helps to understand the needs and concerns of businesses.


POLICY PLANNING
GOALS & OBJECTIVES
LEGISLATION
IMPLEMENTATION
EVALUATION & FEEDBACK

5.1 Introduction

To perform their task of enabling circular innovations effectively, regulators need to understand what (innovative) businesses drives and what businesses need in terms of regulatory certainty, flexibility and decision making. Some barriers and problems regarding the legislative framework, experienced by businesses, require action from policy- and law-makers. In developing this chapter, businesses from a range of (innovative) companies of different sizes provided valuable input inter alia through a working session. The views of these businesses are set out in this chapter. Businesses may find this chapter useful when interacting with regulators and policy- and law-makers.

The following sections address:

- **need of businesses for fit-for-purpose legislation > see Section 5.2 (particularly relevant to policy- and law-makers);**
- **context in which innovative businesses operate > see Section 5.3 (particularly relevant to regulators);**
- **opportunities for smarter implementation > see Section 5.4 (particularly relevant to regulators).**

5.2 Need of businesses for fit-for-purpose legislation

The businesses we talked to for the development of this guidance, raised a number of constructive points which could usefully be considered by policy- and law-makers when promoting circular innovations:

- the amount of detail of some requirements sometimes does not match the risk; it then may obscure the environmental benefits of an innovation;
- the current risk-based approach of especially the body of waste legislation is not adequate and should be combined with a value-based approach;
- policy tends to focus on waste-to-secondary material routes, and less on waste-to-fuel or waste-to-chemicals. This leaves out important circular opportunities embodied in a whole range of operations like carbon capture and use, chemical recycling, pyrolysis, gasification, etc., with which current policy and legislation sit uneasily;
- BREFs could set targets for use of recycled material in products and other relevant 'circular' requirements. This has to be tailored to the practical needs of sectors and material flows. E.g. for steel this specific requirement is not suitable, as the market is already taking care of this. Nor would it be suitable for aggregates, because there are so many different types of blocks which are used in a huge variety of different applications. Technically each type of block has a different specification for strength/weight/performance etc. and consequently there are limitations on the use of recycled aggregates;
- recycling, in particular recycling of plastics, would benefit from regulation that drives separate collection/sorting;

- improving the interoperability of legislation on chemicals, waste and product is very important. The current proposal to limit the presence of hazardous substances in recycled products to instances where they serve a functional purpose would severely limit the prospects of many wastes being recycled. In the discussion around these issues, there should be room for considerations of both risk and value. Current practices on different waste/material chains using safe applications and technologies could point the way. Furthermore, standards for secondary raw materials are inconsistent and this needs to be addressed;
- harmonisation of legislation and implementation is key to the transportation of secondary materials between regions and between Member States;
- the type of information accompanying a waste transport, especially if it contains hazardous waste, is not clearly specified. All partners (recycling and disposal) require a Safety Data Sheet for waste transports crossing borders, in order to identify them as hazardous waste transports. However, the SDS is required by REACH and CLP for substances; it is not legally required for waste and is not adequate for waste. The SDS should be replaced by a different type of information which is tailored to the needs of waste management. This could be a kind of simplified SDS for certain transports and treatments, where only those test results are required that are relevant. This could take the form of an ID card or passport, and could also be used for end-of-waste;
- currently, lab-scale innovations and pilots are supported through Horizon 2020, the biggest EU research and innovation funding programme. However, upscaling to a full-fledged industrial scale is hard, as it requires both capital and more certainty, and needs to be supported as well[15].

[15] In response to this concern the Commission indicated that several EU programmes focus their support on that stage and awareness on their existence could be further promoted. In the field of environment and climate change the LIFE Programme funds through annual calls innovative projects that demonstrate new techniques and methods (among other kinds of projects). These 'traditional' style projects are complemented by 'integrated' projects that combine LIFE funding with other sources of support to maximise their impact over a large area. LIFE funding can also be supported by two financial instruments, the Natural Capital Finance Facility (NCFF) and Private Financing for Energy Efficiency (PF4EE). The Eco-innovation initiative run from 2008 to 2013 and was set up to support innovation among SMEs and to improve their competitiveness. It bridged the gap between research and the market and helped good ideas for innovative products, services and processes that protect the environment become fully-fledged commercial prospects, ready for use by business and industry. For more generic support to SMEs and start-ups there are multiple EU funds available for start-up businesses. To find out which one meet the specific needs, the Start-up Europe Club has been created to search for funding opportunities. Entrepreneurs can also use the Start-up Europe Partnership platform to get help with expanding and developing their business. To increase the visibility of a business project, it can be registered on the European Investment Project Portal. The portal also enables to get in contact with potential international investors.

5.3 Context in which innovative businesses operate

Regulators enabling circular innovations should bear in mind that businesses operate in very different settings which may complicate matters. In some cases:

- businesses do not fit traditional sectoral boundaries, like businesses offering new product-service systems and businesses in multisector collaborative arrangements (clusters, industrial symbiosis, etc.);
- businesses operate in different Member States, where the regulatory context varies.

Two other observations which are relevant to regulators are the following:

- a focus of regulators just on new companies introducing novel technologies, processes and products would be too narrow. Also more traditional companies in e.g. the chemical and metal sectors are updating their technology and processes, as well as finding new markets for new product;
- when developing circular innovations, for instance bringing new secondary raw materials on the market, businesses may experience technical, regulatory and commercial hurdles that interact. For instance businesses recovering a secondary raw material from waste and selling it as a secondary raw material (end-of-waste) will need to comply with the commercial specifications of their customers. If they fail, this may in turn have regulatory consequences.

EXAMPLE OF AVAILABLE INFORMATION THAT IS NOT ALWAYS KNOWN TO REGULATORS.

Plants that gasify waste should not be considered waste treatment. See IED article 42(1), which excludes from its scope certain gasification and pyrolysis plants. This article should be read taking into account the judgment of the European Court of Justice in the case C-209/09 (second judgment in the preliminary ruling concerning Lahti Energia, Finland). This ruling makes clear that a gas, obtained by the gasification of a (solid or liquid) waste, and which is subsequently purified to such an extent that it has properties "similar to a fossil fuel", would need to be considered as a product and no longer as a waste. The firing of such a gas in a power plant could not be considered as incineration or co-incineration of waste. If the gas is not purified to the extent that is has properties similar to a fossil fuel and is burned subsequently in a power plant, the combination of gasification or combustion will be considered as a co-incineration plant.

Article 42(1) clarifies that the quality of the syngas following possible purification should be assessed in relation to the potential emissions that could result from its combustion. It will be up to the competent authorities issuing the permit for the plant to consider thoroughly whether the produced gas is sufficiently purified to fulfil the criteria set out in this article.

See also: *https: https//circabc.europa.eu/ui/group/06f33a94-9829-4eee-b187-21bb783a0fbf/library/2f2b443d-905a-4ea1-b18d-66da8e98af61/details*

5.4 Opportunities for smarter implementation

Businesses highlighted a number of areas where regulators, often in cooperation with businesses could improve implementation practices.

Encourage the exchange of good practices

Businesses indicated that the exchange of good implementation and governance practices between regulators should be encouraged. This is particularly relevant for the issue of dealing with known and unknown substances of concern in materials.

Better organise the provision of information in permitting processes

During the process of acquiring a new or updated permit, the operator has to provide information. It is not always clear what sort of information and in which amount of detail this should be provided. Often, between sending in the application and receiving the decision, additional information will be asked. This can lengthen the process, which is costly to the operator, because return-on-investment is delayed. Further, regulators tend to be over-cautious and therefore demand more information to be more certain. Especially for new end-of-waste, it can be difficult to arrive at a timely decision as there may be uncertainty about the new market and standards may not yet be well established. Businesses made the following suggestions which regulators could consider:

- business operators ask for clarity from the start on the type and detail of information that is required;
- the operator asks for clarity about the level of proof or substantiation that is required;
- the operator offers information that he has already provided in an another region or MS; this may satisfy the needs of the current regulator.

Assure access to available information for regulator and operator

Businesses underlined the importance of good access both for regulators and operators of information regarding end-of-waste decisions, assessments and opinions, but also for other issues, like using the by-product route, using particular waste codes, classifying installations, safe applications and installations, understanding and using specific articles of relevant legislation for innovative techniques, etc.

Assure right level of engagement and performance of the regulator

Businesses pointed out that building an industrial-scale facility before any revenue is received is capital-intensive and the regulations present a big element of risk and uncertainty. Processes of permitting etc. could be speeded up as well as give more transparency, clarity, and security to the operator, by having a regulator who is more engaged throughout the whole process. Businesses made the following suggestions which regulators could consider:

- making an agreement at the start of a permitting process, which states the expected timeline for delivering the permit;
- having the same regulating officer for all permit applications of one facility;
- having permitting teams visit operational facilities and experience ‘real life’, as opposed to simply scrutinising documents;
- face-to-face meetings would reduce the number of email exchanges and foster a better working relationship;
- a fee for a speedier process could be levied. Business would be prepared to pay a higher fee, if this would mean more certainty, a speedier delivery, and thus save cost;
- as much of the lack of speed and clarity have to do with risk-averseness, fear of judicial rulings under pressure from the public etc., it would be important to take time to be more transparent to the public

and explain intended decisions better. This would enable a better balance between the views of different stakeholders.

Provide more room for flexibility, for learning-by-doing and for experimentation

Businesses suggested that regulators could consider allowing for more flexibility in permits, e.g.:

- allow different inputs into an installation and focus more on regulating outputs from recovery processes. In turn operators must be prepared to install robust Quality Assurance or Quality Control procedures and to have these audited by the regulator;
- use permit variation;
- grant a temporary permit during which monitoring takes place to gather the required information on emissions. IED allows temporary permits of 6 months for pilot plants and 9 months for emerging techniques. These may be too short.

A precondition for this more flexible mode of operation is a certain level of knowledge and skills of the regulator.

Using all available instruments to their full potential

Businesses suggested that not all available instruments are being used to their full potential. An important gap can be found in the use by regulators of environmental management systems. By increasing feedback, using available data and information, e.g. from life cycle assessments (LCAs) as well as periodic monitoring results, and periodically revisiting the installation and pointing out these results and discussing them, the regulator could encourage the operator to improve performance. There is information available at JRC that could give support on LCAs.

Engaging industry at the right level

Instead of case-by-case or one size fits all, there is a middle way, which looks to develop approaches and decisions fit for specific sectors, value chains, or material flows (clusters). A collective understanding of how similar materials are managed will allow benchmarking and a more informed decision process.

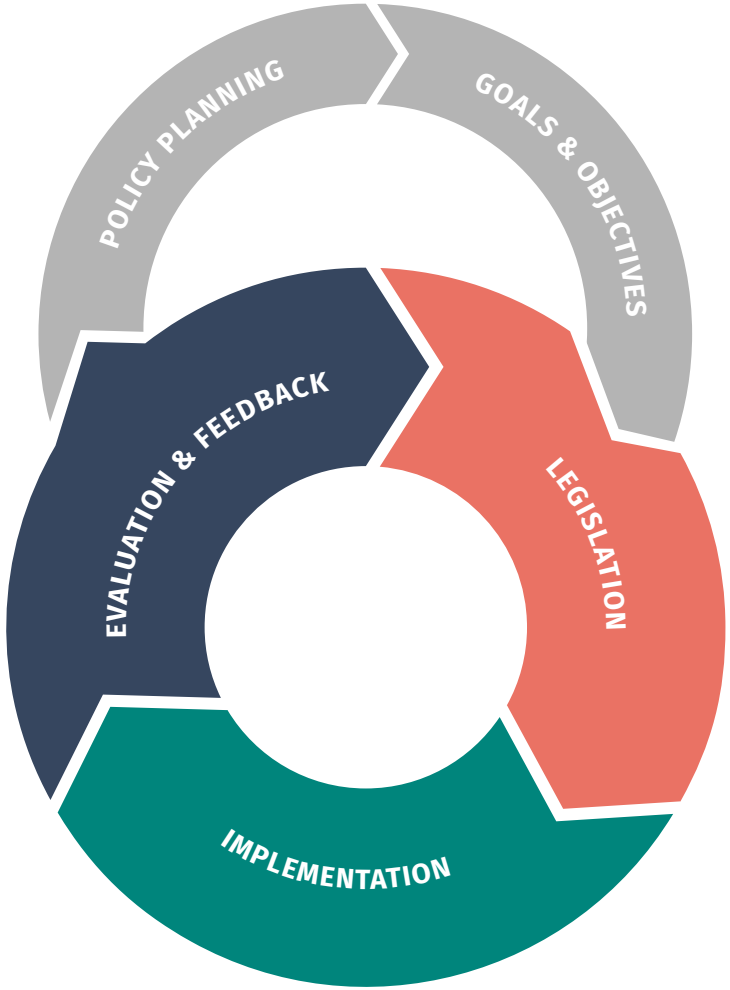
Other points

Businesses also suggested some further points for consideration by policy- and law-makers, and regulators:

- balancing the presence of hazardous substances in a recycled product against the benefit of not consuming raw materials or carbon benefits associated with recycled products.
- more flexibility around time limits for storage awaiting recycling. Especially because acquiring permits for treatment can sometimes take so long that the material has exceeded the time allowed for storage and has to be landfilled.
- a European permit (i.e. mutual recognition for national permits) for similar operations of the same company. Even if the legislation describing the European permit is not currently in the picture, exchanging information between regulators on permits already received for an installation in one MS could help to speed up or ease the process of gaining a permit for a new, similar installation in another MS. This could mean that the regulator does not ask for new tests if the process is the same as in the other MS.

6 PLASTICS

WHAT IS COVERED BY THIS CHAPTER?	FOR WHOM IS THIS CHAPTER PARTICULARLY RELEVANT?	HOW CAN THIS CHAPTER HELP?
Describes different areas of actions to a more circular use of plastics, applying where relevant the previous chapters.	· Management of regulator · Policy-makers · Businesses	Helps to understand the broader range of circular interventions for plastics and highlights in particular for recycling of plastics specific points of attention for the regulator and the policy-maker.



6.1 Introduction

The plastics waste problem (mainly associated with the production of cheap single-use plastics and the ocean littering) occupies a large place in public opinion currently and, recently, more policies and legislation have been adopted to address it. Policy-makers and regulators in countries in Europe are challenged to encourage and facilitate innovations to make the plastics value chain more circular. These innovations include new ways of recycling plastics waste, but there are many other innovations possible in the plastics value chain which covers design and manufacturing of the product, product use, collection, sorting, preparation for reuse and recycling of waste.

This thematic chapter on plastics therefore not only addresses recycling but also gives a broader perspective by describing other, complementary and often related areas of actions aimed at a more circular use of plastics: less use, more reuse, less littering and take-up of spillage from nature and addressing the presence of substances of very high concern (SVHCs) and other potentially harmful substance. An “area of actions” encompasses all appropriate actions and interventions appropriate to the outcome of that area of actions. For example, less littering could encompass many different interventions – from regulatory (fines) to education, planning, etc., which may be undertaken by different actors, governmental and non-governmental. In considering different regulatory or other approaches to address the problems of plastics in this chapter, it is, therefore, important to note that these form part of a range of possible actions that might be taken for one or more “areas of actions”, which will vary according to circumstances (especially between Member States).

For many of these areas of actions, the key actors for delivering the actions and interventions at government side, are the policy-makers.

For recycling the plastics theme brings together several of the issues addressed earlier in this guidance. As Chapter 3 recommends, regulators can take a strategic approach to materials such as plastics. The importance of the issue to society will encourage regulators to actively support circular innovations to increase recycling of plastics waste. This involves identifying the "hooks" in the regulatory regimes (such as the IED and the WFD) to allow this, as identified in Chapter 2, and working with business to identify what is possible, but also legally compliant. It also involves regulators working with others that also have responsibilities within the plastics management chain (such as local authorities) to identify where innovation is needed in technology and in practice. The range of different challenges that plastics present to society means that the issue can only be tackled through joined-up policy-making. As Chapter 4 recommends, policy-makers need to identify the right policy mixes necessary to address plastics, both with regard to the problems they create as waste and emissions and to facilitate circularity of the material within the economy. Some of these measures will concern product quality or market interventions.

This chapter is set up as follows:

- the chapter starts with a short description of the problem of plastics waste and summarises the main legislation and policy approaches in the EU > see Section 6.2
- it then addresses the five complementary areas of actions aimed at a more sustainable use of plastics, mentioned above > see Section 6.3

Annex E provides some further background information by outlining in more detail EU and country policies on circular use of plastics and describing cases illustrating a more circular use of plastics.

6.2 Plastics: problems, policy and legislation

Plastics is an important part of the waste generated in the EU and it is one of the most visible signs of the downside of our current system of consumption and production. Plastics are used for many different applications in many sectors of the economy. An important source of concern is plastics littering in our seas. This is derived from both land-based and sea-based sources. In recent years many innovations have been developed to achieve a more sustainable and more circular plastics value chain.

There is a wide range of EU law and policy which affects the plastics in society. There is legislation relating to product quality, waste management legislation, legislating relating to marine littering, etc. The individual provisions within any of this legislation may facilitate or inhibit the movement of plastics in a circular economy and development of innovative solutions to plastics, and also how all of the legislation fits together may similarly facilitate or inhibit such objectives. As a large proportion (59%) of plastics waste is packaging[16], the packaging and packaging waste directive is relevant. It includes requirements for plastics packaging and sets targets for its recycling. An important instrument is Extended Producer Responsibility (EPR). Through EPR policies, waste management cost or physical collection is partially or fully shifted from local governments to producers. Policies also involve incentives for producers to take environmental considerations into account when designing their products. Littering, especially of plastics and especially in water systems, has a huge impact on marine ecosystems.

In the last five years, the following strategies, action plans and legislative measures have been agreed and are being implemented:

- EU Action Plan on Circular Economy, which also addresses plastics among other material flows;
- The dedicated EU plastics strategy (2018), and legislation in the form of a proposal for a Directive on Single-use of plastics (May 2018), which will ban single-use plastic products from the market where alternatives are readily available and affordable. For products without straightforward alternatives, the focus is on limiting their use through a national reduction in consumption; design and labelling requirements and extended producer responsibility.
- The regional marine conventions, closely linked to the Marine Strategy Framework Directive, have developed strategies and action plans for the combatting of marine littering. Especially OSPAR and HELCOM are active, distinguishing land-based and sea-based sources, and describing specific actions to address each of these. Under the MSFD itself, MS are to set targets with respect to marine litter in their Marine Strategies and adopt measures to meet these targets.
- Member States have also developed policy initiatives, some in response to EU developments, others in a more front-running position. National policies in Sweden, the UK and the Netherlands have in common that they use mixes of instruments (e.g. bans, restrictions, fiscal and economic instruments, like charges, differentiated taxes, extended producer responsibility) and a multi-stakeholder approach, involving businesses, NGOs, universities, etc.

See for some more detailed info on EU and country policies Annex E, Part 1.

[16] See EU Plastics Strategy 2018

6.3 Areas of actions aimed at sustainable use

Five different but complementary areas of actions to achieving more sustainable production and use of plastics can be distinguished:

- Less use of plastics;
- More re-use of plastics;
- Less littering (progressive actions)/take-up of spillage from nature (damage control measure);
- Recycling;
- Addressing the presence of SVHCs and other potentially harmful substances.

These areas of actions are interconnected. For instance, less littering and take-up of spillage of plastics are linked to the materials which are collected and recycled; harmful substances can be present as a legacy in the products that are intended for reuse or recycling.

As noted above, within each area of actions, a range of different actions and interventions may be taken. These include a wide range of possible innovative approaches to changing the current linear economy and making the plastics value chain more resource-efficient. Achieving this raises a number of specific challenges which can be assigned to:

- the specific type of material and/or mixes of materials;
- the many different applications;
- the specific characteristics of the value chain;
- the fact that many plastics products are aimed at the consumer;
- specific obstacles in the EU environmental legislation.

Each of the five areas of actions is illustrated below by concrete examples that highlight specific problems and solutions. Full descriptions of the cases can be found in Annex E, Part 2.

6.3.1 Less use of plastics

Less use of plastics can be achieved by using other materials or by using different systems. Note that substitution of one material for another is not necessarily more sustainable; a life-cycle analysis can help to evaluate alternatives.

EXAMPLES OF LESS USE	
1	Using packaging in paper or glass instead of plastic
2	Packaging-free groceries where consumers bring their own containers (GRAM, SE)
3	Rental schemes where customers can rent outdoor clothing (Houdini, SE)
4	Reducing plastic catering waste at events and festivals (Plastic promise, NL)

As already indicated in Chapter 4, solutions often lie in correcting market conditions, setting the prices right, influencing consumer behaviour (through prices or otherwise). Policies to address these are mainly in the fiscal sphere (e.g. lowering VAT for labour-intensive economic activities). Also, multi-stakeholder approaches, where solutions are co-created in close contact with the market, are successful. Such policy interventions are largely the responsibility of policy-makers at national level.

Specific approach for each product group

There are many different applications of plastics, each with its own characteristics. This means that a generic approach focusing on 'plastics' might not work. A separate approach for each product group could be considered. For example, consumer packaging requires looking at re-design, necessary use, separate collection at household level etc. Products with a large quantity of plastics components, like electronics and nylon clothing, requires looking at re-design, substitution, use of secondary raw materials, etc. At the front of the cycle, re-design is important. Rethinking the necessity of some of the applications (especially single-use) and compositions are also an important approach. Government can address this by funding design challenges or by adopting eco-design requirements. These types of interventions may be undertaken by national policy-makers, but as plastics in products move across the internal market, intervention by EU level policy-makers will be important.

Addressing consumer behaviour and encouraging businesses to promote less use

Plastics products are often aimed at the consumer, like packaging, electronics, toys and clothing. This means that a transition to more sustainable production and consumption chains will involve behavioural changes by the consumer. These are more difficult to achieve. Policy-makers can consider to influencing consumer behaviour directly or through encouraging businesses and NGOs in nudging and influencing the consumers.
Different approaches can be taken:

- Giving information to consumers about sustainable production and consumption, supported by different policy measures, especially economic instruments. The sustainable option also has to be available and convenient for the consumer.
- Supporting business models that focus on less use of plastics, for example through fiscal instruments;
- Encouraging businesses to promote existing alternatives to single-use plastic items (e.g. in catering and take-aways), where these are more environmentally beneficial;
- Encouraging businesses to deliver voluntary pledges with regard to less of plastic or uptake of secondary raw materials;
- Focusing policies on business activities that cause a lot of waste, such as festivals and other events;
- Public procurement policies setting challenges for the market.

EXAMPLES OF POSSIBLE INTERVENTIONS BY POLICY-MAKERS	
1	Multi-stakeholder approach: REBus (UK and NL) and Green Deals (NL)
2	CIRCO which is a government-funded platform of designers and university researchers that helps companies and designers to develop circular products, services and business models. *www.clicknl.nl/circo* (NL)
3	Public procurement: setting a challenge to design and produce medical gloves without phthalates (SE)
4	Policy aiming at prevention and waste management in event permits (NL)
5	Develop a certification scheme along the plastic supply chain and/or a BREF for plastics recycling, including sorting

6.3.2 More re-use of plastics

Re-use can be either at business or consumer level. It requires specific interventions and encouragement of the users (either business, institutional or consumer) and/or deposit-refund schemes.

EXAMPLES OF MORE RE-USE OF PLASTICS	
1	Take-back schemes for electronic gadgets, initiated by private enterprises, for refurbishment, reuse, or recycling (UK)
2	Re-usable lunchboxes at takeaway restaurants (FR)
3	Rental of outdoor clothing (SE)

Specific approach for each product group, addressing consumer behaviour

Similar to promoting less use of plastics a generic approach focusing on 'plastics' might not work. For instance, products with a large quantity of plastics components, like electronics and nylon clothing, could benefit a lot of the involvement of retail and producers for take-back schemes, etc. For some deposit and refund schemes, such as food and beverage containers, specific consideration needs to be given to hygiene requirements. As with promoting less use re-use will involve behavioural changes by the consumer. Again policy-makers can consider to influence consumer behaviour through market instruments, information campaigns on take-back and deposit-refund schemes and nudging.

6.3.3 Less littering and take-up of spillage

Most often or most visibly, this area of actions addresses marine litter, where either the aim is to phase out certain products or design them differently so there is less littering (progressive actions), or marine litter is collected to be recycled (damage control measures).

EXAMPLES OF LESS LITTERING AND TAKE-UP OF SPILLAGE	
1	Research project focused on phasing out dolly ropes from fishing nets by new design (DE)
2	Collecting, sorting, cleaning ghost nets (many examples across EU)
3	Non-profit initiatives that intend to reduce waste volumes and clean-up beaches, rivers, canals or harbours (many examples across the EU)
4	Preventing of spill of plastic pellets/beads from IED installations by urging operator to apply duty of care, improve or change his process (UK)

Engage in regional seas conventions, in particular to develop regional plans against marine litter

Many plastics applications are light and prone to getting into waterways, thus becoming litter. It is important to identify the sources of littering, as has been done by the Commission in the proposal for the single-use-plastics directive, and aim measures at each source (like the OSPAR & HELCOM action plans).

Addressing consumer behaviour

Policy-makers could raise more awareness of littering and consider fines. It could also be useful to promote private clean-up initiatives at beaches, and in rivers, canals and harbours. Policy-makers can also consider introducing deposit refund schemes, in particular for food and beverage containers most found in litter. Product design could also play a part here, because the sustainable option has to be available and convenient for the consumer.

6.3.4. Recycling

Many innovative technologies that enable more effective or higher-quality recycling of plastics have been developed in the last few years. The present legislation does not always offer clear solutions when the innovators want to start a production facility. The following cases illustrate some successful examples, where operators and regulators have been able to apply the current legislation.

EXAMPLES OF INNOVATIVE RECYCLING	
1	Producing clothing and carpets from recycled plastics (many examples across EU)
2	Chemical PET recycling (NL)

As with other circular innovations, the WFD, WSR, IED and REACH are also relevant for plastics. See Chapter 2 and Annexes A-D. Some specific points are especially relevant for prevention and recycling of plastics.

Improve separate collection and sorting of plastic waste

There are many types of plastics (different polymers), which require separate recycling in order to make a high-value plastics feedstock again. Mixtures of plastics can only be recycled into rather low-value applications. Policy-makers can consider to improve collection and sorting technologies and infrastructure. Once collected, the different waste flows require different treatments and different technologies. A key instrument to achieve this might be setting a standard for sorting facilities. This could be in the form of a certification of sorting facilities that achieve a minimum quality standard, or, in the context of the IED, through a BREF for sorting facilities. (These are future measures suggested in the Plastics Strategy).

Address traceability of the composition of materials

One of the problems specifically encountered with plastics is the traceability of the composition of collected materials along the chain, which hampers large-scale high-value recycling. The companies involved in the plastics reuse and recycling value chain are often SMEs. They have less capacity than primary producers for testing and acquiring technical knowledge about the materials they recycle, esp. of the additives in plastics received from upstream. Therefore, it is more difficult and expensive for them to arrive at the 'clean' material flows required for high-quality recycling. To improve recycling of plastics, several instruments can be developed:

- The WFD 2018 points to a solution by demanding that any supplier of articles that contain a certain amount of hazardous substances must provide that information to the European Chemicals Agency (ECHA)[17],

[17] Article 9 (1) (i) WFD 2018.

so that ECHA can set up a database to be used by waste treatment operators.

- Standards for plastic packaging, which set limits for the polymer composition and the additives like colouring, stabilisers etc.
- Policy-makers can also encourage the implementation of new solutions to aid future traceability, e.g. to tag different plastic materials digitally in combination with block chain techniques or likewise, to better trace the different materials and be able to reuse/recycle them efficiently.

With respect to plastics, recent years have seen a boost in the development of recycling technologies. This is probably due in the first place to market drivers (the production of secondary plastics are less energy-intensive, which decreases cost; prices of disposal have gone up in many EU countries; and finally, China has banned imports of plastics for recycling), combined with public pressure to prevent 'plastic soup' and policy was, therefore, developed to deal with this. Several innovative technologies that enable more effective or higher-quality recycling of plastics have run ahead of the BREFs and BAT-conclusions. Both regulators and industry have been challenged to arrive at timely permits for industrial facilities where these innovative technologies are applied. Also for certain innovative recovery processes it was unclear what IED category applied.

Regulators can play several roles, as described in Chapter 3. These are no different for plastics than for other material flows. Some plastics cases can illustrate some of the approaches suggested in Chapter 3, see Annex E, Part 2.

EXAMPLES OF REGULATORS WORKING PROACTIVELY WITH BUSINESS

1. Chemical PET recycling partly covered by the dome permit, which addresses emissions, chemicals storage and transports (NL)
2. In the same chemical PET recycling facility, a dialogue between business and regulator (which can be initiated from either side) was instrumental in arriving more speedily at a permit for the innovative operation.

6.3.5 Addressing the presence of SVHCs and other potentially harmful substances

A specific issue related to recycling is the issue of addressing the presence of Substances of Very High Concern (SVHCs) and other potentially harmful substances. Harmful substances in plastics (plasticisers, flame retardants) present a challenge and several approaches to deal with SVHCs can be identified. The best way to avoid 'legacy' problems in the future is to substitute SVHCs by less harmful substances.

EXAMPLES OF SUBSTITUTION OF SVHCS

1. Design and produce medical gloves without phthalates (SE)
2. Producing artificial grass by using materials like coconut or sand, or no granules at all (NL, DK, SE)

However, this does not address the recycling of plastics that have been in circulation for a longer time, the so-called 'legacy substances'[18]. These are harmful substances that were formerly added to plastics to improve the functional performance, like phthalates, flame retardants etc., but have in the meantime been banned through the Regulation on POPs and/or have been put on the so-called candidate list of REACH for substances to be banned. There is also the issue of substances not yet on the candidate list, but with similar characteristics and therefore similar risks. Assuming that the composition of the material is known, the question then is whether it is desirable to recycle waste containing harmful substances.

Facilitating regulators to address legacy substances

It would help the regulator if policy-makers would produce guidance on how to assess the presence of legacy substances in order to take decisions regarding recycling of plastic products. A decision tree like the one used in NL could be a suitable instrument, to be put in place by policy-makers.

EXAMPLE OF IDENTIFYING AND MANAGING UNCERTAINTIES AND RISKS

The Dutch national waste programme (LAP3) contains a SVHC decision tree, which helps to structure the decision-making process of the regulator, in those cases where a certain SVHC in a waste flow poses an environmental risk when it is transformed into a product and put onto the market (relevant for REACH). The decision tree should be used in a permit procedure, wherever the question arises whether the presence of SVHCs in a waste flow requires a risk assessment.

Supporting businesses in proving the safety of their input materials

Recycling companies will have to gather the information about plastic waste upstream. There are many different types of plastics. At the sorting stage it might be clear (bales of bottles), but along the value chain there is no required level of detail of documentation to be passed on with the material flow. Two issues can be distinguished:

- Traceability: The problem of the traceability of harmful substances in input materials for recycling, as mentioned above. This is a concern with for example the shredding of plastics from waste electronics and end-of-life vehicles. Measures mentioned above to enhance traceability could be helpful.
- Assessment: Policy-makers could consider a guidance for businesses, especially SMEs, regarding how to assess and verify the content of harmful substances in recycled materials and how to use the different materials in new products to attain a safe use, if possible. Such a guidance could also be able to present adequate information.

[18] This is explored in the Commission Communication on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation, COM(2018) 32 final

ANNEX A

INDUSTRIAL EMISSIONS DIRECTIVE (IED)[19]

WHAT IS COVERED BY THIS ANNEX[20]?	FOR WHOM IS THIS ANNEX PARTICULARLY RELEVANT?	HOW CAN THIS CHAPTER HELP?
This annex is linked to Chapter 2. It contains a more detailed overview of provisions of the Industrial Emissions Directive (IED) relevant to circular innovations. It includes some examples and cases from MS practice.	Staff of regulator	Provides further explanation on how the IED can be applied

[19] In this annex reference is made both to articles in the IED as well as to recitals from that legislation. It should be noted that recitals in EU law are not binding on the Member States, but they give clarification on the intention/purpose of that law.

[20] Tables in this Annex summarise provisions in the Directive; they do not contain the full legal text of these provisions.

REFERENCES

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

Commission implementing decisions establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU for specific industrial activities (BREFs)

General overview of the IED

The Industrial Emissions Directive (IED) is the main EU instrument regulating pollutant emissions from industrial installations. The IED is the successor of the Integrated Pollution Prevention and Control (IPPC) Directive. The IED aims to achieve a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques (BAT). Around 50.000 installations in the EU, undertaking the industrial activities listed in Annex I of the IED are required to have an IED permit issued by the competent authority of the MS concerned. The IED permit should be based on an integrated assessment of all the environmental impacts of the installation, including all emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents and restoration of the site upon closure. The permit conditions should require the use of the best available techniques (BAT).

Key topics in the IED relevant to circular innovations

In the next sections the following topics relevant to circular innovations will be addressed in more detail:

ITEM	TOPIC	RELEVANCE
1	Definition of installation	Sets a framework for Industrial symbiosis
2	IED categories of activities	Determining what regime is applicable to waste recovery process
3	Requirement to apply Best available techniques (BAT) and BREFs (BAT reference documents), in particular the BAT Conclusions in BREF's	Sets a framework for assessing innovative, more circular production and waste recovery processes
4	Stimulating the use of Emerging Techniques (ETs) and allowing for temporary derogations from the requirements on emissions for the testing and use of emerging techniques	Can encourage and facilitate carrying through innovative, more circular production and waste treatment processes
5	Requirement to use resources efficiently	Can trigger and encourage circular innovations at production/waste treatment facilities aimed at using less resources and substituting primary resources by secondary resources
6	Requirement to prevent waste and to properly manage waste	Can trigger and encourage circular innovations at production/waste treatment facilities aimed at preventing waste from processes and/or producing secondary materials from waste streams.
7	Requirement to have an environmental management system (EMS)	Can facilitate a dialogue between regulator and operator on opportunities for circular innovations

1 DEFINITION OF INSTALLATION, PERMIT AND OPERATOR	IED
Addresses the boundaries of installations. Also sets a framework for industrial symbiosis.	Article 3(3), definition Installation, 3(7) definition permit 3(15) definition operator, Article 4, paragraph 2 and 3 Annex I and Annex VII, Part I · An installation is an stationary technical unit within which specified activities (listed in Annex I or Part I of Annex VII) are carried out. · "Directly associated activities" should be included, other activities may be included. · It is possible to cover more than one installation with one permit, or several parts of one installation operated by different operators. · Operator is defined as any natural or legal person who operates or controls in whole or in part the installation (…) where this is provided for in national law, to whom decisive economic power over the technical functioning of the installation or plant has been delegated.

Critical points and opportunities for the regulator

In the context of industrial symbiosis on a certain location, where the wastes after recovery or the by-products of one facility become the secondary raw materials for another facility close-by, circular innovations can be facilitated through one permit covering the multiple sites (e.g. as can be found in NL) rather than each one separately. Bringing several facilities under one 'umbrella' permit may mean that some emissions and wastes will no longer be leaving the site, thereby easing the burden for both the regulator (in setting the permit conditions) and the operators (in complying). The benefits for the environment are larger too, because there is more efficient use of resources.

2 IED CATEGORIES OF ACTIVITIES	IED
Determining what regime is applicable to waste recovery process	Annex I of the IED sets out the categories of (industrial) activities which fall under the Directive and require a permit.

Critical points and opportunities for the regulator

Annex I of the IED sets out the categories of (industrial) activities which fall under the Directive and require a permit. These include waste management activities above given thresholds which also require a permit under the WFD. Both permits can be combined to form one single permit. For certain innovative recovery processes it may be unclear what IED category applies.

EXAMPLES OF DIFFICULTIES IN ASSIGNING A NEW PROCESS TO THE RIGHT IED CATEGORY

1. Chemical textile recycling: does this belong to the category waste treatment, textiles or chemicals? In a facility in Sweden waste textiles are dissolved and new fibres are created from the solution, currently at pilot scale. The facility is classified as a waste treatment facility, although the operator prefers classification as a chemical demonstration facility. The facility has to operate under the waste treatment BREF; this is felt as a disadvantage, due to the disproportionality of the requirements.
2. Production of bio-coal, pyrolysis oil or syngas from waste: does this belong to the category 'refineries', 'chemical industry', or 'waste treatment' or none of these?

3 REQUIREMENT TO APPLY BEST AVAILABLE TECHNIQUES	IED
Sets a framework for assessing innovative, more circular production and waste recovery processes	• Article 3(10) definition BAT, 3(11) definition BREFs, 3(12) definition BAT Conclusions • Article 11 (b), BAT in general principles governing the basic obligations of the operator • Article 14 (3), BAT as basis for permit conditions • Article 15 (2), BAT as basis for emission limit values • Annex III, Criteria for determining best available techniques • Article 14 (4), setting more stringent permit conditions which enable a better performance than the best available techniques described in the BAT conclusions.

Critical points and opportunities for the regulator

A key element of IED is formed by the obligation for the regulator to use the Best Available Techniques conclusions (BAT conclusions) as the reference for setting permit conditions. These conclusions are described in the BREFs (BAT Reference Documents) and established in dedicated Commission Implementing Decisions. For waste treatment facilities in particular the BREF for Waste Treatment is relevant[21]. In the case of a new process, questions may arise regarding the applicability of current BREFs. Updates of the BREFs normally take considerable time. The BAT conclusions do not specify techniques that should be used by an installation. They do list various technologies and techniques that may be applicable, but this is not meant as an exhaustive and prescriptive list. If a technique has not

[21] Best Available Techniques (BAT) Reference Document for Waste Treatment, *http://eippcb.jrc.ec.europa.eu/reference/BREF/WT/JRC113018_WTbref.pdf*

been identified by the BAT conclusions this does not mean that it cannot be BAT. Regulators may set permit conditions on the basis of techniques that are not described in any of the relevant BAT conclusions, as long as these techniques qualify as BAT. They should in that case apply Annex III of the IED which contains twelve criteria for determining BAT (which are also valid when drawing up the BREFs).

EXAMPLE OF ASSESSING BAT

Bottom ash is a residue from household waste incineration. In an innovative waste treatment plant in the Netherlands it undergoes treatment in three steps. The first step: sieving, separation of ferrous (magnetic) and non-ferrous metals. The second step: recovery of fine metal fractions (e.g. Al, Cu, Zn, Pb, Au). The third step: the resulting mineral fraction is washed to remove the salts (e.g. chloride, sulphate). The resulting material is used in construction, e.g. as road foundation or in concrete production.
The waste treatment plant requires an IED permit. The final draft BREF for Waste incineration (December 2018) includes techniques for bottom ash treatment using wet treatment systems. However, there are no BAT conclusions for treating the washing water. There are different options: either purification and discharge, or reuse followed by concentration/dehydration and landfilling. The operator and permitting authority have to decide what can be regarded as BAT for this aspect.

The IED also explicitly allows setting more stringent permit conditions which enable a better performance than the best available techniques described in the BAT conclusions. This may provide flexibility to include circular innovations in the permit conditions.

4 STIMULATING THE USE OF EMERGING TECHNIQUES (ETS)	IED
Can encourage and facilitate carrying through innovative, more circular production and waste treatment processes	Articles 3(14) definition ETs, 3(12) ETs in BREFs, Article 27, encouraging ETs, Article 15 (5) temporary derogations for testing ETs • ETs are techniques which, if commercially developed, could provide a higher general level of protection of the environment or at least the same level of protection of the environment and higher cost-savings than existing best available techniques. BREFs contain a description of ETs. • Member States are obliged to encourage the development and application of ETs. • A permitting authority may grant temporary derogations from the requirements on emissions for the testing and use of emerging techniques for a total period of time not exceeding 9 months, provided that after the period specified, either the technique is stopped or the activity achieves at least the emission levels associated with the best available techniques.

Critical points and opportunities for the regulator

Emerging techniques (ETs) are techniques (not just technologies but could include management techniques, etc.) which, if commercially developed, could provide a higher general level of protection of the environment or at least the same level of protection of the environment and higher cost- savings than existing BAT. MS are obliged to support the development and application of ETs, including ETs not mentioned in the BREFs.

In order to improve the systematic tracking and follow-up of ETs, the European Commission is piloting an 'external' Innovation Observatory. It is hoped that this 'Observatory' can help the European Commission to foster innovation in the sectors concerned. Project outcomes are a stakeholder database with a set of experts on industrial techniques that minimise environmental impact of manufacturing activities; and a Novel Technique database, with a set of candidate emerging techniques on industrial activities covered by the Industrial Emission Directive. The project has recently started[22].

EXAMPLES OF CHALLENGES AROUND ETS IN PRACTICE

1. Permitting of the pilot facility in Sweden, where waste textiles are dissolved and new fibres are created from the solution, permitting of the plant proved difficult as the process is very new. The regulator found it difficult to deal with it. It would be useful to have a set of guidelines for the regulator to assess an ET that is not in the BREF, and under certain conditions to allow a certain amount of experiment in the early developing stages, when not all the information about a process and its emissions is available.
2. Due to an interpretation of the phrase 'ETs close to market introduction' in the IED Implementing Decision on the BREF textiles, an ET has to have a high Technology Readiness Level (TRL) to be considered in the BREF process. Many ETs initially will have lower TRLs, but may develop quickly.
3. In Italy a plant was proposed for an innovative recovery of red mud which is solid waste from the process of aluminium extraction from bauxite. The treated red mud could be used for the remediation of contaminated sites and treatment of contaminated liquid waste. Competent authorities were reluctant to issue a permit because of a lack of information on the recovery process. The use of treated red mud to remediate problems of acid rock drainage and metals pollution however is considered an ET in the BREF 'Management of Tailings and Waste-Rock in Mining Activities' (January 2009). In the BREF "Non-Ferrous Metals Industries", red mud recovery is considered as one of the ETs and different red mud processes are mentioned.

[22] See https://ied-innovation-observatory.vito.be/

The temporary derogation may be helpful in the situation where an operator wants to test a potential eco-innovation and is not yet able to provide proof of an improved environmental performance, because the new process is not yet, or rarely, applied elsewhere at full scale. However, the IED only allows a temporary derogation for ETs for a limited time. This may be insufficient to collect sufficient monitoring information on the process and its environmental consequences (and so determine if it is BAT).

EXAMPLE OF NEED FOR DEROGATION

In the pilot facility in Sweden where waste textiles are dissolved and new fibres are created from the solution, the process water currently can contain different substances at varying limit values. It is therefore hard to specify the conditions for treating this water within the plant before discharging it. A possible approach would be for the regulator to allow for some temporary derogation, e.g. a trial during a certain period during which measuring of the emissions can take place. However currently the plant is obliged to incinerate the water.

EXAMPLE: REGULATORY POSITION STATEMENT (RPS) FOR TRIALS OF INNOVATIVE WASTE RECOVERY TECHNIQUES

Where appropriate the Environment Agency (UK, England) can use a Regulatory Position Statement (RPS) for trials of innovative waste recovery techniques that are not (yet) permitted. The RPS will set out criteria that need to be met for the trial to take place and may also include actions to be taken by the operator once the trial has ended. Once the trial is over the innovation that was being trialled will need to move into the normal environmental permitting system. Where the trial is to take place at an existing permitted site, there should be clear separation between the permitted activity and the trial activity, and consideration should be given to whether it is better to vary the permit to enable the trial to take place.

5 RESOURCE EFFICIENCY	IED
Can trigger/encourage circular innovations at production/ waste treatment facilities aimed at using less resources and substituting primary resources by secondary resources	• Recital 2: In order to prevent, reduce and as far as possible eliminate pollution arising from industrial activities in compliance with the 'polluter pays' principle and the principle of pollution prevention, it is necessary to establish a general framework for the control of the main industrial activities, giving priority to intervention at source, ensuring prudent management of natural resources and taking into account, when necessary, the economic situation and specific local characteristics of the place in which the industrial activity is taking place. • Article 12-1(b): A permit application includes a description of (b) the raw and auxiliary materials, other substances and the energy used in or generated by the installation; • Article 13-2(a) BAT reference documents and exchange of information: The exchange of information shall, in particular, address the following: (a) the performance of installations and techniques in terms of emissions, expressed as short- and long-term averages, where appropriate, and the associated reference conditions, consumption and nature of raw materials, water consumption, use of energy and generation of waste; • Annex III, Criteria for determining best available techniques: (9) the consumption and nature of raw materials (including water) used in the process.

Critical points and opportunities for the regulator

Article 12-1(b) may trigger a discussion between regulator and operator about resource efficiency. Article 13-2(a) and Annex III-9 may play a role in updating BREFs to include specific resource efficiency aspects, as well as in determining BAT in case-by-case decisions.

EXAMPLES OF DIALOGUES, AGREEMENTS ETC. BETWEEN REGULATOR AND OPERATOR ON SPECIFIC MEASURES THAT INCREASE RESOURCE EFFICIENCY

1 UK-Scotland: Sustainable Growth Agreements are voluntary, non-legally binding, formal agreements through which an organisation (or organisations) and SEPA can explore new and innovative ways to improve environmental performance and focus on practical actions that deliver environmental, social and economic success. They also include resource efficiency aspects.

2 IT-Veneto Region: a guideline to perform self-monitoring by waste treatment IED installations was published including the monitoring of resource efficiency, using indicators and reporting the trends of these in an annual report. This tool can help improve resource efficiency and best practices development, combined with benchmarks or targets (currently lacking) to ensure that actions are taken.

6 PREVENT WASTE AND PROPERLY MANAGE WASTE	IED
Can trigger encourage circular innovations at production/ waste treatment facilities aimed at preventing waste from processes and/or producing secondary materials from waste streams.	Article 11, General principles governing the basic obligations of the operator: (d) the generation of waste is prevented in accordance with Directive 2008/98/EC; (e) where waste is generated, it is, in order of priority and in accordance with Directive 2008/98/EC, prepared for re-use, recycled, recovered or, where that is technically and economically impossible, it is disposed of while avoiding or reducing any impact on the environment; · Article 12 1(h): A permit application includes a description of the following: (h) measures for the prevention, preparation for re-use, recycling and recovery of waste generated by the installation; · Article 13-2(a) BAT reference documents and exchange of information: The exchange of information shall, in particular, address the following: (a) the performance of installations and techniques in terms of emissions, expressed as short- and long-term averages, where appropriate, and the associated reference conditions, consumption and nature of raw materials, water consumption, use of energy and generation of waste; · Annex III, Criteria for determining best available techniques: 1. the use of low-waste technology; 2. the use of less hazardous substances; 3. the furthering of recovery and recycling of substances generated and used in the process and of waste, where appropriate; · See also Recital 4 of the WFD

Critical points and opportunities for the regulator

Waste prevention and management are core requirements of the IED and relevant to all IED activities. Article 12(h) of the IED refers to the obligation for the operator to prevent or minimise waste and manage it, when it occurs, in an environmentally-sound manner, following the preferred order (waste hierarchy, as defined in the WFD, see Annex B).

Preventing waste in an installation will basically mean:

- designing out waste, so a production process leads to less residues;
- minimising waste through efficient use of resources;
- re-using the residue in the same process or another process;
- decreasing its hazardousness (qualitative prevention), e.g. through substitution of hazardous substances. The MS waste prevention programmes under the WFD may provide guidance.

Where waste is generated, it should be prepared for re-use, recycled, or otherwise recovered. Where that is technically and economically impossible, it should be disposed of while avoiding or reducing any impact on the environment. The MS waste management plans under the WFD may provide guidance.

Waste prevention and waste management are dealt with in the BREFs. Best available technologies on recycling, recovery, raw material efficiency, process optimisation etc. are treated in each BREF as relevant and as available.

7 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)	IED
Can facilitate a dialogue between regulator and operator on opportunities for circular innovations	The BAT conclusions include the obligation for operators to have environmental management systems (EMS) in place.

Critical points and opportunities for the regulator

EMSs are meant to provide a continuous loop process that may lead to improvement of the environmental performance within the installation.

Regulators may discuss with the operators to what extent their EMSs actively aim to improve environmental performance and trigger circular innovations, for instance by preventing or minimising waste (resource-efficiency), or by turning waste into secondary materials. This could become a dialogue between operator and regulator, aiming for and encouraging continuous improvement, looking at figures of waste recycling and using these as benchmarks for the industry, asking for further improvement etc.

ANNEX B

WASTE FRAMEWORK DIRECTIVE (WFD)[23]

WHAT IS COVERED BY THIS ANNEX[24]?	FOR WHOM IS THIS ANNEX PARTICULARLY RELEVANT?	HOW CAN THIS CHAPTER HELP?
This annex is linked to Chapter 2. It contains a more detailed overview of provisions of the Waste Framework Directive (WFD) relevant to circular innovations. It includes some examples and cases from MS practice.	Staff of regulator	Provides further explanation on how the WFD can be applied

[23] In this annex reference is made both to articles in the WFD as well as to recitals from that legislation. It should be noted that recitals in EU law are not binding on the Member States, but they give clarification on the intention/purpose of that law.

[24] Tables in this Annex summarise provisions in the Directive; they do not contain the full legal text of these provisions.

IMPORTANT NOTE:
In 2018, amendments to the WFD have been agreed, mainly to adjust certain provisions to actual practice in the MS. This is the case for by-product and end-of-waste procedures. Other topics like prevention are now dealt with in more depth. This annex addresses both the current WFD as the revised WFD (WFD 2018).

The revised WFD has entered into force on 4 July 2018. This means that other legislation that includes references to the WFD, like the WSR, will already have to work with amended elements of the WFD. The revised WFD has to be transposed by the MS before 5 July 2020. Regulators can already act in the spirit of WFD 2018.

REFERENCES

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives (WFD 2008)

Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on Waste (WFD 2018)

General overview of the WFD

Waste prevention and management, waste plans and waste hierarchy

The WFD regulates waste prevention and waste management in the MS. According to Article 13 WFD Member States shall take the necessary measures to ensure that waste management is carried out without endangering human health, without harming the environment and, in particular (a) without risk to water, air, soil, plants or animals; (b) without causing a nuisance through noise or odours; and (c) without adversely affecting the countryside or places of special interest.

Waste management includes the collection, transport and treatment of waste. Treatment of waste covers recovery and disposal of waste as well as preparation prior to recovery or disposal. MS are obliged to establish waste management and waste prevention plans. The waste management hierarchy should be followed. The waste management hierarchy indicates an order of preference for action to reduce and manage waste:

1. ***Prevention of waste:*** this includes re-use, repair, refurbishment and remanufacturing. 'Re-use' means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
2. ***Recovery of waste:*** 'Recovery' means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. In order of preference recovery includes:
   - preparing for reuse: checking, cleaning or repairing, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing;

EXAMPLE OF PREPARING FOR REUSE

Regenerated refrigerants (Finland). Waste refrigerants are collected and analysed in a laboratory for the level of contamination. If they are pure, they are not regenerated, but classified as products directly. Contaminated refrigerants are regenerated to remove the contaminants. Regenerated refrigerants can directly substitute imported virgin refrigerants and are cheaper than virgin ones. According to the waste hierarchy the regeneration is considered preparing for re-use and should be preferred over disposal of the refrigerants. In the current practice, used refrigerants are disposed by burning them and then virgin refrigerants are being imported. Regeneration reduces the amount of produced GHG emissions and harmful fluoride compounds that are produced in the process of disposal. The environmental impacts of the recovery operation are small.

- recycling: any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes, but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operation;
- other forms of recovery, e.g. energy recovery and backfilling. 'Backfilling' means any recovery operation where suitable non-hazardous waste is used for purposes of reclamation in excavated areas or for engineering purposes in landscaping. Waste used for backfilling must substitute non-waste materials, be suitable for the aforementioned purposes, and be limited to the amount strictly necessary to achieve those purposes.

3. ***Safe disposal:*** when these steps are not possible or feasible, the final step is safe disposal, for example incineration or landfilling.

General requirements, issuing permits and general binding rules, interface with IED

The WFD contains general requirements regarding recovery, re-use, recycling and disposal. Under the WFD (Article 23) Member States shall require any establishment or undertaking intending to carry out waste treatment to obtain a permit from the competent authority. Such permits shall specify inter alia the types and quantities of waste that may be treated and for each type of operation permitted, the technical and any other requirements relevant to the site concerned. According to Article 24 WFD Member States may exempt establishments or undertakings from this permit requirement in case of the disposal of their own non-hazardous waste at the place of production or in case of recovery of waste. Where a Member State wishes to allow exemptions, it shall lay down, in respect of each type of activity, general rules specifying the types and quantities of waste that may be covered by an exemption, and the method of treatment to be used (Article 25 WFD).

Above certain thresholds, certain waste treatment facilities also require an IED permit (Annex I, Section 5 of the IED). The Best Available Techniques (BAT) Reference Document for Waste Treatment as a rule will be applicable. The waste management and prevention plans can be taken into account, both when issuing a WFD permit and when assessing waste issues in the context of issuing IED permits.

Key topics in the WFD relevant to circular innovations

In the next sections the following topics relevant to circular innovations will be addressed in more detail:

ITEM	TOPIC	RELEVANCE
1	Aims of the WFD	Gives direction to the transition to a circular economy within the context of waste management
2	Definition of waste	Gives direction to what materials can be regarded as products and not waste
3	By-products	Sets out when production residues can be regarded as by-products and not waste
4	End-of-waste	Sets out when waste after recycling or other recovery operation be regarded as end-of-waste and not waste
5	Waste management plans	Can give direction to recycling innovations in terms of priorities and conditions
6	Waste prevention programmes and measures	Can give direction to prevention of waste Can encourage innovations aimed at waste prevention

1 AIMS OF THE WFD	WFD 2008	WFD 2018
Gives direction to the transition to a Circular economy within the context of waste management	Article 1 (subject matter and scope) WFD aims to protect the environment and human health by preventing or reducing the adverse impacts of the generation of waste, reducing the overall impacts of resource use and improving resource efficiency.	Article 1 (subject matter and scope) New in the WFD 2018: • Preventing or reducing the generation of waste • Enable the transition to a circular economy.

Critical points and opportunities for the regulator

To protect the environment and human health the WFD sets conditions for safe handling (including recovery, transportation and storage) and disposal of waste. However, increasingly, production residues and waste streams are seen as useful resources that have a value for the economy. This has been more explicitly acknowledged in the WFD 2018. Regulators are therefore encouraged to facilitate where possible the use of these materials, though they still need to balance two different objectives that both aim to support a sustainable environment: keeping materials in the economy versus ensuring that materials do not damage the environment. Chapter 3 of this guidance describes different ways in which regulators can better organise their decision-making.

2 DEFINITION OF WASTE	WFD 2008	WFD 2018
Gives direction to what materials can be regarded as waste	Article 3.1 Waste is defined as any substance or object which the holder discards or intends or is required to discard.	Article 3.1 (unchanged) Recital 61 underlines the need to facilitate a common understanding and application in practice of the definition of 'waste', including the term 'discard', taking into account circular business models in which, for instance, a substance or object is transferred from one holder to another holder without the intention to discard.

Critical points and opportunities for the regulator

This guidance focuses on production and recycling facilities where materials from production processes are not regarded as waste but as by-products or where certain wastes are recycled and turned into and used as end-of-waste. However, there are also products which do not become waste as defined in the WFD at all. Increasingly, in circular business models, reuse, repair, remanufacturing and refurbishment extend the lifetime of products which would otherwise have been discarded. The fact that materials are sorted or even repaired does not immediately mean that it is waste, this depends on whether the holder discards or intends to discard the material or has an obligation to do so. Regulators may struggle to find solutions for these business models to stay outside of the waste regime. Recital 61 of the WFD 2018 stresses the need for a common understanding and application in practice of the term 'discard', especially taking into account circular business models in which, for instance, a substance or object is transferred from one holder to another holder without the intention to discard. This clarification should be prepared by policy-makers (MS + EC), who could share experiences from practice (both from businesses and regulators) in order to create further guidance on this particular issue. The Commission can also draft guidance on the interpretation of the definition of waste (Article 38 (2) WFD 2018).

EXAMPLE OF SUBSTANCES OR OBJECTS TRANSFERRED FROM ONE HOLDER TO ANOTHER, WITHOUT THE INTENTION TO DISCARD, E.G. IN THE CONTEXT OF REUSE, REFURBISHMENT OR REMANUFACTURING.

Shipment of used mobiles imported into Estonia from Sweden and Norway. According to WEEE-guideline proof has to be presented that they have been tested and found to be in technically good condition, they should be well-packaged, the further use must be evident and based upon contracts. If the shipment consists of electronic equipment where there is reasonable doubt that the equipment might not work and the documents which are referred to in the guidelines have not been presented, then it would be considered as WEEE and WSR has to be followed.

3 BY-PRODUCTS	WFD 2008	WFD 2018
Production residues which can be used as secondary raw material and fulfil the conditions for by-products.	Article 5 A substance or object can be regarded as a by-product and not waste if it results from a production process not primarily aimed at producing such substance or object (is a production residue) and it meets the following conditions; · Its further use is certain (a); · It can be used directly without any further processing other than normal industrial practice (b); · It is produced as an integral part of a production process (c) · Its further use is lawful, i.e. meets all product, environmental and health protection requirements and will not lead to overall adverse environmental or human health impacts (d).	Article 5 · The conditions for by-products remain unchanged. · Recital 16 adds that the recognition of by-product status should be facilitated in particular to promote sustainable use of resources and industrial symbiosis. · Member States are now instructed to take appropriate measures to ensure that a product residue that meets the conditions is regarded as by-product and not as waste. · The Commission can establish detailed criteria on the uniform application of the conditions to specific substances or objects. · These criteria need to ensure a high level of protection of the environment and human health and facilitate the prudent and rational utilisation of natural resources. The Commission shall take as a starting point the most stringent and environmentally protective of any criteria adopted by Member States and shall prioritise replicable practices of industrial symbiosis in the development of the detailed criteria. · Where criteria have not been set at Union level Member States may establish detailed criteria on the application of the conditions to specific substances or objects.

Critical points and opportunities for the regulator

Production residue

A substance or object resulting from a production process not primarily aimed at producing such substance or object is a production residue. 'Production process' includes industrial and other processes such as mining, production of goods, production of chemicals, agriculture, cattle breeding and forestry.

The Commission guidelines on the interpretation of key provisions of the WFD further clarifies the term 'production residue': "A production residue is something other than the end product that the manufacturing process directly seeks to produce. Where the production of the material concerned is 'the result of a technical choice', it cannot be a production residue and is considered a primary product. If the manufacturer could have produced the primary product without producing the material concerned but chose not to do so, this can be evidence that the material concerned is

a primary product and not a production residue. Also, a modification of the production process in order to give the material concerned specific technical characteristics could indicate that the production of the material concerned was a technical choice."

Conditions for by-products

With regard to the compliance with the conditions for by-products (see table on p.85) the following points are important:

- ***Further use is certain:*** the holder of the material has to show that it is certain that actual use will take place and that the material is fit for that purpose. This can be shown by producing a declaration or intention from the user including specifications, quality criteria etc. that the material has to meet.
- ***Direct further use is possible without further processing other than normal industrial practice***

EXAMPLE OF DIRECT FURTHER USE

Blast furnace slag produced in parallel with hot iron in a blast furnace can be used directly at the end of the production process, without further processing that is not an integral part of this production process (such as crushing to get the appropriate particle size).

- ***The material is produced as an integral part of a production process:*** the process where the by-product is generated has to be an integral part of the main production process. According to the Commission guidelines on the interpretation of key provisions of the WFD treatment operations to prepare the material for direct further use which are normal industrial practice do not exclude the classification of a production residue as a by-product, irrespective of where such industrial treatment is carried out – on the site of the generator of the material, on the site of the industrial facility using the material, or on an intermediate site (see previous point). What need to be assessed is whether these operations to prepare the material for direct further use which are undertaken as part of 'normal industrial practice' can also be regarded as an integral part of the main production process. The relevant BREF might help to answer this question.
- ***Further use is lawful:*** the holder has to make sure that the further use complies with the relevant legislation (e.g. REACH, see Annex D) and with (public or private, national or EU-wide) product standards, quality standards, etc. Where these are absent, the regulator needs to look for further information on possible risks, e.g. at research institutes.
- ***Further use will not lead to overall adverse environmental or human health impacts.***

4 END-OF-WASTE	WFD 2008	WFD 2018
Waste which is recycled and will be further used as secondary raw material is no longer be regarded as waste but as end-of-waste.	Article 6 Waste which has undergone a recovery operation (recycling or other recovery operation) can be regarded as an end-of-waste if it meets the following conditions: · the material is commonly used for specific purposes (a); · a market or demand exists for the material (b); · the material fulfils all the technical requirements for the specific purposes and meets existing legislation and standards applicable to products (c); and · the use will not lead to overall adverse environmental or human health impacts (d).	Article 6 · The conditions for end-of-waste remain unchanged, except for a minor clarification in condition (a) (the material *is to be used* for specific purposes). · Member States are now instructed to take appropriate measures to ensure that waste which has undergone a recycling or other recovery operation is considered to have ceased to be waste if it complies with the conditions. · The Commission can establish detailed criteria on the uniform application of the conditions to certain types of waste. These criteria need to ensure a high level of protection of the environment and human health and facilitate the prudent and rational utilisation of natural resources. They should reflect the following requirements: - Is the waste input material for the recovery operation permissible? - Are the treatment processes and techniques allowed? - Are the quality criteria applied to the end-of-waste materials in line with the applicable product standards, including limit values for pollutants where necessary; - Are requirements set for management systems to demonstrate compliance with the end-of-waste criteria, including for quality control and self-monitoring, and accreditation, where appropriate; and - Is a requirement set for a statement of conformity? · Where criteria have not been set at Union level Member States may establish national criteria. · Where criteria have not been set at either Union or national level, a Member State may decide on a case-by-case basis, or take appropriate measures to verify, that certain waste has ceased to be waste on the basis of the conditions for end-of-waste status, where necessary reflecting the requirements above and taking into account limit values for pollutants and any possible adverse environmental and human health impacts. · The holder of an end-of-waste who for the first time places the material on the market or uses it for the first time is now explicitly required to assure that the material meets all the requirements under the applicable chemical and product legislation.

Critical points and opportunities for the regulator

Appropriate measures to assess and decide on end-of-waste status

MS need to take measures to support the uptake of end-of-waste used as secondary raw material. Recital 17 of WFD 2018 states: "In order to provide operators in markets for secondary raw materials with more certainty as to the waste or non- waste status of substances or objects and to promote a level playing field, it is important that Member States take appropriate measures to ensure that waste that has undergone a recovery operation is considered to have ceased to be waste if it complies with all the conditions (...)".

Recital 17 continues by elaborating what appropriate measures could consist of: "Such measures may include the adoption of legislationtransposing those conditions supported by procedures for their implementation, such as the establishment of material and application-specific end-of-waste criteria, guidance documents, case-by-case decisions and other procedures for the ad hoc application of the harmonised conditions established at Union level."

The recital than stresses that "Such measures should include enforcement provisions to verify that waste that is considered to have ceased to be waste as a result of a recovery operation complies with the law of the Union on waste, chemicals and products, in particular prioritising waste streams that pose a higher risk to human health and the environment due to the nature and volume of those waste streams, waste that is subject to innovative recovery processes or waste that is recovered for subsequent further use in other Member States. Measures may also include the setting of a requirement on the operators recovering waste or holders of recovered waste materials to demonstrate compliance with the conditions (...)".

The recital continues: "In order to prevent illegal shipments of waste and to raise awareness among Member States and economic operators, there should be greater transparency about Member State approaches to end-of-waste status, in particular with regard to their case-by-case decisions and the result of verification by competent authorities, as well as the specific concerns of Member States and competent authorities about certain waste streams."

The recital ends by noting that the final determination whether the conditions for by-products or for end-of-waste are fulfilled "remains the exclusive responsibility of the Member State based on all relevant information provided by the holder of the material or waste".

Recycling or other recovery operation

This guidance focuses on waste which is recycled. Recycling will often involve treatment techniques that address waste-related characteristics of the material (which could be a residue resulting from a production process or a used, end-of-life use product), such as its contamination with components which are hazardous or not useful. However, it is important to note that also waste which has undergone another recovery operation then recycling can be considered end-of-waste if it complies with the conditions for end-of waste. Another recovery operation may be preparing for re-use. Sorting of collected worn clothes (if they are discarded and thus waste) so that they can be used as second-hand goods is an example. The sorted cloths can be end-of-waste if all WFD conditions are met.

Moment when a material (recovered waste) reached end-of-waste status

The recycled waste which fulfils all the conditions and requirements is regarded end-of-waste the moment it is ready to be used for a specific purpose, so when this material leaves the recycling facility or when it is temporarily stored before it leaves the facility. The Commission guidelines on the interpretation of key provisions of the WFD note: "The moment when a material or substance reaches end-of-waste status is simultaneous with the completion of the recovery and recycling processes." "Generally speaking, the point of completion of a recovery operation may be considered to be the moment where a useful input for further processing, not representing any waste-specific risks to health and the environment, becomes available."

Conditions for end-of-waste status

With regard to the compliance with the conditions for end-of-waste (see table) the following points are important:

- ***Is there a specific use?*** This can be proved in cases where the secondary raw material is already used. Where this is not the case (known secondary raw materials but lacking EU-wide, uniform standards or unknown secondary raw materials), this can be harder to prove. This condition, currently phrased in the WFD 2008 as "(a) the substance or object is commonly used for specific purposes" has been broadened with the WFD 2018. The condition is rephrased as "(a) the substance or object is to be used for specific purposes". So a specific use of a completely new end-of-waste is also acceptable, as long as it can be substantiated. In guidance documents for regulators in different countries it is suggested that the use can be proven by letters of intent, agreements or orders by the final users.
- ***Is there a market?*** This can be proved when there is a demand, e.g. through a contract for a delivery of this particular secondary material to a production facility. There are situations where for a well-known waste stream with defined technical and environmental standards and uses, a drop in the market occurs (for instance aggregates from construction and demolition waste when the building sector enters an economic crisis); the practical experience of inspectors show that long time storage of the end-of-waste may increase, reducing the certainty of the final use.
- ***Is the use compliant with applicable legislation and standards?*** Is REACH applicable? Is a registration needed? Is an authorisation required? Do restrictions apply? See for more info Annex D (REACH). Are there technical requirements, rules, standards applicable? These can include voluntary standards, requirements set by the customer, or more generally, within the sector or binding standards set at national or EU level. Sometimes the specific use of the end-of-waste is very common and technical standards may be easy borrowed from the substituted virgin material. In other cases, there is a lack of national legislation and the required standards may be sought from other Member States, etc. For innovative end-of-waste products there is normally a lack of prior experience and it may be useful to evaluate the technical properties of the material in a first phase in cooperation with the end users. After that technical standards may be developed.
- ***No adverse impacts on environment or human health?*** The entire cycle is relevant here: not only the impact of the process of recovery of the waste, but also the potential impact of the products made from the secondary raw material. In some countries the waste management plan can give guidance as it provides mandatory minimum processing standards in relation to the waste hierarchy and the aim of resource efficiency. In England the so-called waste comparator has been developed, which is a tool for an analytical comparison between the candidate end-of-waste and the primary raw material. Information provided by

the operator needs to be as complete as possible. Where relevant, input waste analyses can be available for the assessment. In the case of a risk analysis points of attention are: avoiding over-simplified models, including worst case scenarios and evaluating all potential substances of concern in the model. Where relevant short term and long term impacts need to be taken into account.

See for further info regarding some good practices in countries in Europe Practical Tool 1.

EXAMPLES OF ASSESSING END-OF-WASTE

Wooden chips for the production of "wooden bricks" (Finland)

A waste management facility separates wooden wastes based on their origin and quality and crushes some of the sorted wooden waste into wooden chips. This material is used as secondary raw material in a facility for construction products turning the wooden chips into "wooden bricks". The regional permitting authority has accepted the end-of-waste status of the wooden chips because it meets the conditions:

- ***Used for specific purposes (a) and market (b):*** According to market research the wooden bricks can substitute the common concrete products on the market. Therefore, there is a market and demand for the chips as secondary raw material to make the wooden bricks.
- ***Lawful use (c):*** There are no specific standards for the wooden bricks. They have been tested in a laboratory for their strength, permeability and biodegradability and they fulfil the technical requirements. In addition, the wooden bricks have advantages. They are lighter, the wooden fibres fortify the composition, the working and attaching the products is easier and products with good sound-proofing can be manufactured
- ***The use will not lead to overall adverse environmental or human health impacts (d):*** Once wooden chips have undergone the recovery operation, their purity is similar to natural wood. The chips and the wooden bricks are not harmless to human health and their production has no negative impacts on the environment.

5 WASTE MANAGEMENT PLANS	WFD 2008	WFD 2018
Can give direction to recycling innovations in terms of priorities and conditions.	Article 28 MS need to make waste management plans describing waste management infrastructure and how specific wastes should be managed, recovered or disposed of.	Article 28 (no substantive change)

Critical points and opportunities for the regulator

Regulators can use the sections on specific wastes in the waste management plans to find which minimum standards apply for their treatment in light of the waste hierarchy. This can serve to guide practical decision-making, e.g. for permits and for WSR-import or export.

EXAMPLE OF WASTE MANAGEMENT PLANS THAT GIVE DIRECTION TO RECYCLING INNOVATIONS

Examples NL

The Dutch national waste management plan states that for plastic collected separately the minimum is recycling. The use of PVC waste for a purpose with a lower value than recycling is deemed to be inefficient use of resources and will not receive a permit. Turning PVC waste into PVC recyclate on the other hand is eligible to get a permit.

The Dutch national waste management plan points to expected developments (e.g. experimental technology). This enables business to anticipate by innovating. For instance the plan mentions new techniques for separating brominated flame retardants from waste extruded polystyrene (EPS, a commonly used insulation material), which in time may become the minimum processing standard (recovery treatment instead disposal).

6 WASTE PREVENTION PROGRAMMES AND MEASURES	WFD 2008	WFD 2018
Can give direction to prevention of waste and can encourage innovations aimed at waste prevention.	Article 29 · MS are obliged to establish waste prevention programmes. These can be integrated into the waste management plan. · The programmes shall set out waste prevention objectives, describe measures taken, how the progress of these measures is monitored and assessed, and evaluate the usefulness of example measures described in Annex IV of the Directive. These programmes may also contain specific qualitative or quantitative targets and indicators. Annex IV Examples of waste prevention measures are, inter alia, measures that can affect the design and production and distribution phase, inter alia measures regarding: · The provision of information on waste prevention techniques with a view to facilitating the implementation of best available techniques by industry. · Organising training of competent authorities as regards the insertion of waste prevention requirements in permits under this Directive and Directive 96/61/EC. · The inclusion of measures to prevent waste production at installations not falling under Directive 96/61/EC. Where appropriate, such measures could include waste prevention assessments or plans. · The use of voluntary agreements, consumer/producer panels or sectoral negotiations in order that the relevant businesses or industrial sectors set their own waste prevention plans or objectives or correct wasteful products or packaging. · The promotion of creditable environmental management systems, including EMAS and ISO 14001.	Article 9 MS are obliged to take prevention measures, inter alia measures to: a. promote and support sustainable production and consumption models; c. target products containing critical raw materials to prevent that those materials become waste; f. reduce waste generation in processes related to industrial production, extraction of minerals, manufacturing, construction and demolition, taking into account best available techniques; g. reduce the generation of food waste in primary production, in processing and manufacturing; i. promote the reduction of the content of hazardous substances in materials and products; j. reduce the generation of waste, in particular waste that is not suitable for preparing for re use or recycling; Member States shall monitor and assess the implementation of the waste prevention measures. Article 29 Member States are obliged to establish waste prevention programmes setting out at least the waste prevention measures as laid down in Article 9. When establishing such programmes, Member States shall, where relevant, describe the contribution of instruments and measures listed in Annex IVa (Examples of economic instruments and other measures to provide incentives for the application of the waste hierarchy) to waste prevention and shall evaluate the usefulness of example measures described in Annex IV. The programmes shall also describe existing waste prevention measures and their contribution to waste prevention. Member States shall adopt specific food waste prevention programmes within their waste prevention programmes. Annex IV unchanged

Critical points and opportunities for the regulator

Prevention of waste can be achieved, following different paths. Policy-makers as well as regulators can develop national or regional and local plans and strategies on specific big waste streams to be reduced or reused or recycled. At the level of an individual business regulators can discuss with operators ways to be more resource-efficient and prevent waste.

The EEA has analysed the prevention programmes and the measures taken by MS and includes examples of practices all around Europe[25]. The table below summarises tools that work for different waste streams. National prevention programmes could use these findings to indicate specific sectors where specific tools could be used and private and public investments applied in order to prevent waste.

[25] Waste prevention in Europe – the status in 2014, EEA 2015 (can be downloaded as a PDF from the EEA-website)

PREVENTION TOOLS FOR DIFFERENT WASTE STREAMS

WASTE STRATEGIES	WASTE STREAMS								
	Metals	**Plastics**	**Hazardous waste**	**Biowaste**	**Household waste**	**Mineral**	**Wood**	**Glass**	**Paper and cardboard**
Product requirements*	■	■	■	■		▒	▒	▒	▓
Financial incentives	■	■	■	■	■	▒	▒	▓	▓
Awareness and education	■	▒	■	▒	▒	▒	▒	▓	▓
Green public procurement**	■	▒	■	▒		▒	▒	▓	▓
Green marketing	■	■	▓	■		▒	▒	▓	▓
Voluntary agreements***	■	▒	■	▒	▒	▒	▓	▓	▓
Ecodesign	▓	■	■				▓	▓	▓
Techonological standards	■	▒	■	▒		▒	▒	▓	▓
Labelling/certification	■	■	▓	▓		▓	▒	▓	▓
Prevention targets	▒	▒	▓	▓	▓	▓	▓	▓	▓

■ Very efficient strategy for specific stream ▒ Useful strategy ▓ Inefficient strategy ⬚ No data or data not applicable

source: *Basel Convention, 2012*

* Prohibited toxic substance, packaging or volume requirements, etc.
** Green organizations and public spending.
*** Environmental targets set in consultation with industry.

Waste prevention programmes that are updated to comply with WFD 2018 could provide a framework for the regulators, to encourage circular innovations by posing questions to the operator regarding opportunities for reducing waste and the reduction of hazardous substances in products. BAT reference documents (see Annex A) already contain measures on waste prevention, raw material reduction, and other resource efficiency measures. Regulators can stimulate their uptake by the provision of information on waste prevention techniques and training of their staff in regard to the insertion of waste prevention requirements in permits under the WFD and the IED. They can furthermore encourage circular innovations (new techniques, further process optimisation, looking for substitution etc.) by:

- the inclusion of measures to prevent waste production at installations not falling under the IED. Where appropriate, such measures could include waste prevention assessments or plans;
- the use of voluntary agreements, consumer/producer panels or sectoral negotiations in order that the relevant businesses or industrial sectors set their own waste prevention plans or objectives or correct wasteful products or packaging;
- the promotion of creditable environmental management systems, including EMAS and ISO 14001.

ANNEX C

WASTE SHIPMENT REGULATION (WSR)

WHAT IS COVERED BY THIS ANNEX[26]?	FOR WHOM IS THIS ANNEX PARTICULARLY RELEVANT?	HOW CAN THIS CHAPTER HELP?
This annex is linked to Chapter 2. It contains a more detailed overview of provisions of the Waste Shipment Regulation (WSR) relevant to circular innovations. It includes some examples and cases from MS practice.	Staff of regulator	Provides further explanation on how the WSR can be applied

[26] Tables in this Annex summarise provisions in the Regulation; they do not contain the full legal text of these provisions.

REFERENCES

Regulation (EC) no 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste

General overview of the WSR

The WSR is of interest as waste is often traded and shipped across borders to be recovered (recycled) and the new secondary raw material is again often traded and shipped. While traded wastes may often have a positive economic value and (after treatment) replace primary raw materials in industrial facilities, waste transports sometimes involve materials which can create risks for human health and the environment. To address these risks the WSR lays down control procedures for the transboundary shipments (i.e. transport) of waste.

The definitions of the WFD apply – e.g. the definition of waste, by-products and end-of-waste. If a certain secondary raw material can be regarded as by-product or end-of-waste their shipments don't fall under the WSR.

Key topics in the WSR relevant to circular innovations

In the next sections the following topics relevant to circular innovations will be addressed in more detail:

ITEM	TOPIC	RELEVANCE
1	Definitions	The same definitions (of waste etc.) apply as in the WFD.
2	Control procedures for shipments of waste	Sets controls for shipments of waste within the EU. Where recycling is clearly intended and the environment is not at risk, a lighter procedure prevails.
3	Provision to solve disagreement between MS on what control procedure to follow	Sets a procedure to solve situations where MS disagree which control procedure should be followed.
4	Simplified administrative procedures in certain situations	As shipments for recycling occur frequently and recycling takes places in the same facilities, simplified administrative procedures can be applied to decrease waiting times and other burdens.

1 DEFINITIONS	WSR
The same definitions (of waste etc.) apply as in the WFD; Mixture of wastes is separately defined, as these are often shipped across borders, and clear definitions and their implementation poses problems.	• 'waste' is as defined in the WFD • 'hazardous waste' as defined in the WFD • 'mixture of wastes' means waste that results from an intentional or unintentional mixing of two or more different wastes and for which mixture no single entry exists in Annexes III, IIIB, IV and IVA. Waste shipped in a single shipment of wastes, consisting of two or more wastes, where each waste is separated, is not a mixture of wastes;

Critical points and opportunities for the regulator

Authorities of different MS (country of dispatch versus receiving country) might disagree on the waste status of a shipment. E.g. the WSR authority of the exporting country might consider a shipment as containing used goods destined for repair, whereas the authority of the country of destination might see it as waste. This occurs with ELVs, electrical appliances, construction and demolition wastes and other inert materials. The development of an internal market for secondary materials could be facilitated more by improving the understanding of different MS approaches and by MS aligning interpretations on a voluntary basis.

2 CONTROL PROCEDURES FOR SHIPMENTS OF WASTE	WSR
Sets controls for shipments of waste within the EU. Where recycling is clearly intended and the environment is not at risk, a lighter procedure prevails.	Article 3: Overall procedural framework Chapter 1: Prior written notification and consent Chapter 2: General information requirements

Critical points and opportunities for the regulator

The WSR provides for two control procedures for the shipment of waste within the EU. General information requirements are normally applicable to shipments of non-hazardous wastes destined for recovery ('green-listed' wastes, Annex III, IIIA, IIIB), such as paper or certain plastics. A procedure of prior written notification and consent is applicable for other types of shipments of wastes, mainly shipments of wastes destined for recovery containing both hazardous and non-hazardous characteristics ('amber-listed' waste Annex IV), and shipments for disposal for all types of waste. The notification procedure requires the prior written consent of the competent authorities of the countries concerned by the shipment (country of dispatch, countries of transit and country of destination), to be given within 30 days. For agreeing to the shipment it is important that the recycling plant is operated in accordance with the requirements of the WFD, e.g. has a proper and adequate permit or is complying with proper and adequate general binding rules. The country of destination may want to assess the recovery process against its waste management plan. The country of dispatch may want to assess the recovery process against the waste management hierarchy. All shipments of waste for which notification is required shall be subject to the requirement of a financial

guarantee or equivalent insurance covering costs of transport, costs of recovery or disposal, including any necessary interim operation and costs of storage for 90 days.

Though treating hazardous waste can also be an issue in a domestic (national) situation, it becomes more urgent when shipments of these types of waste across borders occur and circular economy operations face more challenges. Under the WSR, shipments of hazardous waste destined for recovery have to follow the procedure of prior notification and consent ('amber-listed' waste).

The concrete administrative requirements put in place to implement the WSR procedures vary significantly between the MS both in terms of content and length. This can cause unnecessary burdens and delays and hinder an European market for secondary raw materials. There are however various other ways to speed up procedures. In this respect the digital exchange of documents can be very useful. Although digital notifications are already used in some countries, in many other countries notifications are still done by paper. Some countries have quickened up procedures for well-known material streams with limited risks so that they can allocate more resources to verifying less known (innovative) materials which then can be handled more speedily. The fast-track procedure would consist of merely rubber-stamping of notifications. In case the notification is accompanied by a self-declaration by the operator based on external audits this procedure can take even less time.

Furthermore the digital exchange of data (notification, movement document) is certainly also worth implementing.

EXAMPLES OF AMBER-LISTED AND GREEN-LISTED WASTES TREATED DIFFERENTLY BY DIFFERENT MS

1. Tyre granulate shipped from PL – EE. Several companies produce granulates from end-of-life tyres. Due to different quality standards what is regarded as a product in one MS might not be a product in the other MS. With tyre granulate coming from Poland the accompanying proof was a certificate issued by Health and Safety Board, but no information was presented on the quality, which parameters had been measured and on what evidence was the decision based that the requirements were met. This makes deciding if the product can be considered as a product or as a waste in the receiving country (in this case EE) difficult.
2. Crashed vehicles imported into EE with final destination PL. Estonia turned to Polish colleagues and asked their position on the waste status and acceptance of these vehicles. Polish authority replied that according to the guidelines it can be deemed as waste and that they do not accept these vehicles in Poland as second-hand goods, but as waste. In this case it was helpful that several countries were involved and a common understanding was necessary. This made the decision process shorter and easier to understand because everyone is familiar with the content of the guidelines and the suggestions it makes.

3 PROVISION TO SOLVE DISAGREEMENT BETWEEN MS ON WHAT CONTROL PROCEDURE TO FOLLOW	WSR
Sets a procedure to solve situations where MS disagree which control procedure should be followed.	Article 28: In case of disagreement on classification issues the strongest procedure will prevail.

Critical points and opportunities for the regulator

In case of disagreement between MS, the strongest procedure will apply. An end-of-waste decision in one MS is not recognised by the other. If the competent authorities of dispatch and of destination cannot agree on the classification as waste or non-waste, the substance or object shall be treated as waste. One MS might call something a product (e.g. destined for repair), while the other will call it waste.

Different waste codes are applied in different MS, which lead to questions whether the green- or amber-list procedure should be applied. In case there is disagreement whether green-or amber-list procedures should be applied, the amber list applies, etc. If the competent authorities of dispatch and destination cannot agree on the classification of the waste treatment operation notified as being recovery or disposal, the provisions regarding disposal shall apply.

The meeting of correspondents has produced guidance in cases that commonly occur. This can help, but is generally quite slow, and many waste streams and treatments are not covered.

To speed up procedures the use of shared databases and other ways of exchanging information on codes used and on end-of-waste decisions can be useful. Harmonisation can take in practice by recognising each other's decisions (unless there are severe grounds not to do so).

EXAMPLES OF GUIDANCE

1. Guidance from the WSR Correspondents Meeting, for specific cases of waste shipped for recycling (e.g. WEEE, fly ash, copper slags, armed forces waste, wood waste, glass waste): *http://ec.europa.eu/environment/waste/shipments/guidance.htm*
2. UK guidance: *https://www.gov.uk/guidance/importing-and-exporting-waste* *http://impel.eu/wp-content/uploads/2015/11/Waste-Sites-Manual-English-version.pdf*
3. The North Sea Resources Roundabout examines cases where this problem arises and aims to arrive and solutions and agreements on specific material flows between MS. E.g. PVC, Bottom ash, struvite.

4 SIMPLIFIED ADMINISTRATIVE PROCEDURES IN CERTAIN SITUATIONS	WSR
As shipments for recycling occur frequently and recycling takes places in the same facilities, speedier administrative procedures can be applied to decrease waiting times and other burdens.	Article 13: General notifications for similar shipments Article 14: Pre-consented facilities

Critical points and opportunities for the regulator

The WSR contains two specific provisions that can speed up the procedural completion of shipments as well lead to a reduction of administrative burdens. These are Article 13 (General notifications for similar shipments) and Article 14 (Pre-consented recovery facilities).

Under Article 13, one general notification to cover several shipments can be used if for each shipment the waste has essentially similar physical and chemical characteristics, the waste is shipped to the same consignee and the same facility and the route of the shipment as indicated in the notification document is the same.

Under Article 14, competent authorities of destination which have jurisdiction over specific recovery facilities may decide to issue pre-consents to such facilities. This means that the authority of destination will not raise objections concerning shipments of certain types of waste to the recovery facility, and as a consequence the time limit for objections by the authorities of dispatch and transit is shortened to 7 working days.

These two possible ways to speed up procedures are not used in all MS, or not in the same ways.

ANNEX D

REGULATION ON REGISTRATION, EVALUATION, AUTHORISATION AND RESTRICTION OF CHEMICALS (REACH)

WHAT IS COVERED BY THIS ANNEX[27]?	FOR WHOM IS THIS ANNEX PARTICULARLY RELEVANT?	HOW CAN THIS CHAPTER HELP?
This annex is linked to Chapter 2. It contains a more detailed overview of provisions of the REACH Regulation relevant to circular innovations. It includes some examples and cases from MS practice.	Staff of regulator	Provides further explanation on how REACH can be applied.

[27] Tables in this Annex summarise provisions in the Regulation; they do not contain the full legal text of these provisions.

REFERENCES

Regulation (EC) no 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the registration, evaluation, authorisation and restriction of chemicals

General overview of the REACH regulation

REACH stands for Registration, Evaluation, Authorisation and Restriction of Chemicals. The REACH regulation aims at protecting human health and the environment from the risks that can be posed by chemicals. According to Article 1 of REACH the purpose of REACH is to ensure a high level of protection of human health and the environment, including the promotion of alternative methods for assessment of hazards of substances, as well as the free circulation of substances on the internal market while enhancing competitiveness and innovation. REACH places the burden of proof on companies. To comply with the regulation, companies must identify and manage the risks linked to the substances they manufacture and market in the EU. They have to demonstrate how the substance can be safely used, and they must communicate the risk management measures to the users. If the risks cannot be managed, authorities can restrict the use of substances in different ways. In the long run, the most hazardous substances should be substituted with less dangerous ones.

REACH establishes procedures for collecting and assessing information on the properties and hazards of substances. Companies need to register their substances at The European Chemicals Agency (ECHA). ECHA receives and evaluates individual registrations for their compliance, and the EU Member States evaluate selected substances to clarify initial concerns for human health or for the environment. Authorities and ECHA's scientific committees assess whether the risks of substances can be managed. Authorities can ban hazardous substances if their risks are unmanageable. They can also decide to restrict a use or make it subject to a prior authorisation.

REACH does not apply to waste. But REACH does apply to by-products and end-of-waste. According to the WFD a material can only achieve a by-product or end-of-waste status if it complies with applicable legislation and standards, one of which is REACH. Therefore REACH is highly relevant for the circular economy: in principle any secondary raw material that can (potentially) be regarded as by-product or as end-of-waste may need a REACH registration in order to achieve the by-product or end-of-waste status. Sometimes an authorisation may be required and restrictions may apply. There are however some exemptions to these obligations.

Key topics in REACH relevant to circular innovations

The following topics relevant to circular innovations will be addressed in more detail:

TOPIC	RELEVANCE	REACH
Registration, authorisation, restrictions.	For a by-product or end-of-waste status a REACH registration and in some cases a REACH authorisation may be needed or restrictions may apply. Exemption may apply to these obligations. These obligations can pose challenges and burdens to establish a market for secondary raw materials.	Article 6: General obligation to register substances on their own or in mixtures. Article 2-7(d): Exemption for already registered recovered substances. Article 9: Exemption from the general obligation to register for product and process orientated research and development (PPORD). Article 56: Prior authorisation of the use of a substance. Article 67: Substances for which Annex XVII contains a restriction shall not be manufactured, placed on the market or used unless they comply with the conditions of that restriction.

Critical points and opportunities for the regulator

Obligation to register

All manufacturers and importers of chemicals must identify and manage risks linked to the substances they produce and market. For substances manufactured or imported in quantities of one tonne or more per year, per company, this must be demonstrated in a registration dossier submitted to the European Chemicals Agency (ECHA). This obligation applies to substances on their own and in mixtures. Therefore, also secondary raw materials as a rule cannot be placed on the market without a REACH registration. This applies in principle both to production residues which, without any further treatment, can be sold and used as a secondary raw material (by-product) and for materials (waste streams) which, after recovery (recycling) can be sold and used as secondary raw material (end-of-waste).

Exemptions from obligation to register

Note that in Article 2-7(b) in connection with Annex V (exemptions from the obligation to register in accordance with Article 2(7)(b)) by-products are exempted from the obligation to register unless they are imported or placed on the market themselves.[28]

[28] In the Commission Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste (*http://ec.europa.eu/environment/waste/framework/pdf/guidance_doc.pdf*) the following is stated: An object considered a by-product under the WFD is in principle subject to REACH Regulation (EC) 1907/2006, since the exclusion provisions of Article 2(2) REACH apply to 'waste' only. All REACH requirements (e.g. registration and communication obligations) have to be fulfilled where applicable. It should be noted that Annex V of REACH Regulation includes an exemption from the registration obligation concerning 'by-products'. Note that the term 'by-products' is not defined in REACH Regulation itself. The Guidance Document for Annex V of the REACH Regulation issued by the European Chemicals Agency (ECHA) (*https://echa.europa.eu/documents/10162/23036412/annex_v_en.pdf*) refers to article 5 of the WFD for the definition of 'by-product'. However, it should be stressed that the exemption set out in Annex V of REACH Regulation applies only on the condition that by-products are not imported or placed on the market themselves.

According to Article 2-7(d), no registration is required for recovered substances, if the substance that results from the recovery process is the same as a substance that has already been registered. However, if no existing registration properly represents the recovered substance, a new registration is required.[29]
There is no obligation to register a substance manufactured in scientific research and development. Scientific research and development (SR&D) is any scientific experimentation, analysis or chemical research carried out under controlled conditions in a volume <1 tonne/year.

Article 9 contains an exemption from the obligation to register for a period of 5 years (or longer) for substances manufactured or imported at tonnages >1 tonne/year when they are used in product and process orientated research and development (PPORD) or exported for the purpose of PPORD. A notification to ECHA is necessary. Product and process orientated research and development (PPORD) is any scientific development related to product or process development and/or application of a new or already existing substance, irrespective of the tonnage. The notifier may only start the manufacture or import (of the substance or mixture) or production (of an article) upon the confirmation of the completeness by ECHA or two weeks after the notification, unless he receives an indication to the contrary from ECHA.[30] The PPORD notification exempts the quantities above 1 tonne imported or manufactured for the purpose of PPORD only from the obligation to register; an authorisation may be required and restrictions may apply.

EXAMPLE OF AN EXEMPTION

Tyre pyrolysis is a thermo chemical conversion process in which an irreversible chemical change is caused to end-of-life tyres by the action of heat in absence of oxygen. The result is fuel, carbon black and gas. An Estonian company made a notification for an exemption of REACH registration (PPORD). They succeeded and could market their product. The Environmental Board in Estonia issued a temporary permit for 1-year period to evaluate if the process and the plans have worked.

Restrictions

Under restriction, the manufacture, import, placing on the market or use of a substance can be made subject to certain conditions, going as far as prohibition in some circumstances. The substances to which restrictions apply and the terms of those restrictions are listed in Annex XVII of the REACH Regulation.
REACH sets restrictions on certain substances that are allowed in recovered materials (article 67-73). E.g. a restriction on Cd-content in plastic is in force. The allowed cadmium content in recycled plastic (0,1%) is higher than in new plastic (0,01%). A similar restriction of lead (pb) is underway.

Authorisation

In some cases, secondary raw materials may require a REACH authorisation allowing only certain specific uses of the material. The authorisation requirement must ensure that the risks from substances of very high concern (SVHCs) are properly controlled and that those substances are progressively replaced by suitable alternative substances or technologies. Substances subject to authorisation are listed in Annex XIV to the REACH Regulation. Once included in this annex, a substance cannot be placed on the market for a use or used after a given date (the so-called 'sunset date') unless the companies concerned are granted an authorisation for

[29] ECHA has produced a guidance on this issue where it is further explained: https://echa.europa.eu/documents/10162/23036412/waste_recovered_en.pdf

[30] ECHA has produced a guidance on this issue where it is further explained: https://echa.europa.eu/documents/10162/23036412/nutshell_srd_ppord_en.pdf/14675e6c-b2cf-4049-81ad-3d1bc41ace6d

the specific use(s). Authorisations are granted by the Commission, after obtaining the opinion of the Committee for Risk Assessment and the Committee for Socio-economic Analysis of the ECHA.
An authorisation may be granted if either the risks from the use of the substance are adequately controlled or the socio-economic benefits outweigh the risks to human health or the environment. This may for instance be the case for plastic materials produced out of certain plastic waste. Many different technologies for plastics recycling have recently become available. Separate collection, especially from industrial or construction sources, is also feasible from the point of view of cost and infrastructure. Furthermore, there is a high demand for specific types of plastics for many different applications.
In the context of recovering materials to become new secondary materials a lack of information about the presence in such materials of SVHCs as specified in Annex XIV, can make it difficult for the company that produces the recovered material (secondary raw material) to comply with REACH.[31]
The recently introduced Article 9-1(i) and 9-2 in WFD 2018 may make things easier by requiring MS to ensure that any supplier of an article provides the information on these substances to ECHA. ECHA shall establish a database for these data and provide access to waste treatment operators.
REACH allows exemption from authorisation and restrictions for substances used in scientific research and development at tonnages <1 tonne/year.

[31] This was also concluded in the project 'Recovered Substances (Återvunna ämnen)', in which The Swedish Chemical Agency (Kemikalieinspektion), in cooperation with The Swedish Environmental Protection Agency (Naturvårdsverket), the municipalities and the County Administrative Boards, have inspected companies which recycle waste. *https://www.kemi.se/global/tillsyns-pm/2016/enforcemnet-13-16-recovered-substances.pdf*

ANNEX E

CIRCULAR USE OF PLASTICS – BACKGROUND INFORMATION

WHAT IS COVERED BY THIS ANNEX?	FOR WHOM IS THIS ANNEX PARTICULARLY RELEVANT?	HOW CAN THIS CHAPTER HELP?
This annex is linked to Chapter 6. It describes: • EU and country policies on circular use of plastics (Part 1); • cases illustrating a more circular use of plastics (Part 2)	• Management of regulator • Policy- and law-makers • Businesses	Provides background information regarding circular use of plastics

PART 1 LEGISLATION AND POLICIES RELEVANT TO SUSTAINABLE PLASTICS VALUE CHAIN IN THE EU, SE, UK AND NL

European union

WSR, REACH and IED

For a description of the Waste Framework Directive, Waste Shipment Regulation, Industrial Emissions Directive and REACH, which are also relevant for plastics, please see Chapter 2. Some specific points related to these directives are especially relevant for plastics.

Related to the WSR:

- It is important to note that China has recently banned major (low quality) import streams for recycling; this means that other forms of recycling have to be found, which has meant a surge in new recycling technologies in Europe.

Related to REACH:

- The recycling of plastics that have been in circulation for a longer time, there is the specific issue of 'legacy SVHCs' and other harmful substances. These are substances used to improve the functional performance of plastics, like phthalates, flame retardants etc., but have in the meantime been banned (through REACH or the Regulation on POPs). Taking decisions regarding recycling of plastic products that contain these legacy substances can be complex and controversial.
- There is an issue with the burden of proof. Recycling companies could gather the information on SVHCs and other harmful substances in the waste they treat from upstream producers. But obtaining that information can be difficult or even impossible. Then chemical analysis of the recycling product is needed to obtain the information required to proof compliance with REACH.

- Specifically the traceability of the input materials that contain SVHCs and other harmful substances along the recycling chain can be a concern with the shredding of plastics from waste electronics and from end-of-life vehicles.

Related to IED:

- Many innovative technologies that enable more effective and/or higher-quality recycling of plastics have been developed in the last few years. These run ahead of the BAT described under the IED. Both regulators and industry have been challenged to arrive at timely permits for industrial facilities where these innovative technologies are applied.

Packaging and Packaging Waste Directive

Because plastics waste consists for such a large part of packaging, the PPW is an important instrument in the policy mix to address the problems associated with it.
The PPW was adopted in 1994 in order to prevent or reduce the impact of packaging and packaging waste on the environment, and was amended several times. An important change regarding plastics came in 2015, when provisions were introduced that required Member States to take measures to reduce the consumption of lightweight plastic carrier bags. These could include national reduction targets, economic instruments and marketing restrictions. Most MS have enacted charges on plastic bags or bans.

EU Circular Economy Action Plan

The Circular Economy Action Plan (CEAP) was published in December 2015 to foster the transition to a stronger and more circular economy with more sustainable resource use. Proposed actions aimed at 'closing the loop' of product lifecycles through greater recycling and re-use.

The Action Plan was accompanied by the so-called 'Waste package' of amendments to existing waste legislation (the WFD and several directives aimed at separate waste flows, like the PPW) included an increased target for recycling of plastics and a target for the reduction of landfilling of household waste. A mandatory extended producer responsibility scheme has to be established for all packaging by 2025. The CEAP identified action on plastics as a priority and promised to develop a plastics strategy.

EU plastics strategy

The EU Plastics strategy was published in January 2018. It contains analysis, facts and figures related to the problem of plastic waste (including micro plastics and marine littering), sets out a vision for a more circular plastics economy and proposes lines of action:

A smart, innovative and sustainable plastics industry, where design and production fully respects the needs of reuse, repair, and recycling, brings growth and jobs to Europe and helps cut EU's greenhouse gas emissions and dependence on imported fossil fuels.

In Europe, citizens, government and industry support more sustainable and safer consumption and production patterns for plastics. This provides a fertile ground for social innovation and entrepreneurship, creating a wealth of opportunities for all Europeans.

Key objectives to achieve the vision:

- Improving the economics and quality of plastics recycling
- Curbing plastic waste and littering
- Driving innovation and investment towards circular solutions
- Harnessing global action

From each of these objectives, specific actions follow attached, which include legislation, funding, guidance and other policy measures, both at EU and Member State level. The strategy also calls on other stakeholders to take steps. From the strategy, one of the actions that followed was the recent.

Directive on single-use plastics

This Directive was under final negotiations while this chapter was being written. In December 2018 the Presidency of the Council reached an provisional agreement with European Parliament on the Directive. The directive targets the 10 single-use plastic products most often found on Europe's beaches and seas, as well as lost and abandoned fishing gear. Together these constitute 70% of all marine litter items. The directive's provisions include different measures for different products. Where alternatives are readily available and affordable, single-use plastic products will be banned from the market. For products without straight-forward alternatives, the focus is on limiting their use through a national reduction in consumption; design and labelling requirements and waste management/clean-up obligations for producers. Items such as plastic straws, cotton swabs, disposable plastic plates and cutlery would be banned by 2021, and 90% of plastic bottles recycled by 2025. For fishing gear, which accounts for 27% of all beach litter, the Commission aims to complete the existing policy framework with producer responsibility schemes for fishing gear containing plastic. Producers of plastic fishing gear will be required to cover the costs of waste collection from port reception facilities and its transport and treatment. They will also cover the costs of awareness-raising measures.

Marine Strategy Framework Directive

Another range of policies is provided from the perspective of marine littering. The Marine Directive aims to achieve Good Environmental Status of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. It is the first EU legislative instrument related to the protection of marine biodiversity, as it contains the explicit regulatory objective that "biodiversity is maintained by 2020", as the cornerstone for achieving GES.

The Directive enshrines in a legislative framework the ecosystem approach to the management of human activities having an impact on the marine environment, integrating the concepts of environmental protection and sustainable use.

In order to achieve its goal, the Directive establishes European marine regions and sub-regions on the basis of geographical and environmental criteria. The Directive lists four European marine regions – the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea and the Black Sea – located within the geographical boundaries of the existing Regional Sea Conventions. Cooperation between the Member States of one marine region and with neighbouring countries which share the same marine waters, is already taking place through these Regional Sea Conventions. These are OSPAR, HELCOM, The Barcelona Convention and the Bucharest Convention. The first two have produced Strategies and Action Plans to combat marine littering.

Regional Marine Conventions

OSPAR

OSPAR is the mechanism by which 15 Governments[32] & the EU cooperate to protect the marine environment of the North-East Atlantic. OSPAR started in 1972 with the Oslo Convention against dumping and was broadened to cover land-based sources of marine pollution and the offshore industry by the Paris Convention of 1974. These two conventions were unified, up-dated and extended by the 1992 OSPAR Convention. The new annex on biodiversity and ecosystems was adopted in 1998 to cover non-polluting human activities that can adversely affect the sea.

Regional Action Plan for Prevention and Management of Marine Litter in the North-East Atlantic

This Regional Action Plan (RAP) was adopted in 2014 and sets out the policy context for OSPAR's work on marine litter, describes the various types of actions that OSPAR will work on over the coming years and provides a timetable to guide the achievement of these actions.

HELCOM

The Baltic Marine Environment Protection Commission, usually referred to as HELCOM, is an intergovernmental organisation of the nine Baltic Sea coastal countries[33] and the European Union working to protect the marine environment of the Baltic Sea from all sources of pollution and to ensure safety of navigation in the region.

Regional Action Plan for Marine Litter in the Baltic Sea

This Action plan was adopted in 2015. It recommends the Governments of the Contracting Parties to the Helsinki Convention to jointly develop appropriate regional actions (collective HELCOM actions) as well as voluntary national actions based on the list of possible actions to be finalized and agreed by mid-2015 into concrete measures aiming at:

- The achievement of a significant quantitative reduction of marine litter by 2025, compared to 2015, and prevention of harm to the coastal and marine environment in the Baltic Sea area;
- Prevention of further introduction from land-based and sea-based sources in the Baltic Sea and reduction of marine litter already present in the marine environment;
- The enhanced coordination, cooperation and coherent implementation;
- A framework under which Contracting Parties can identify where a regional approach can add value to actions on marine litter of individual Contracting Parties, and exchange platform for gaining and sharing information on technical, socio-economic and policy aspects of such actions.
- Proposed measures are included, which address both land-based and sea-based sources of marine litter. OSPAR and HELCOM often take joint action.

[32] Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

[33] Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden.

Examples of national approaches in SE, NL and UK

Sweden

Sweden has made a number of voluntary commitments to address the issue of plastic waste following the United Nations Oceans Conference in 2017. They are currently running a number of initiatives to address the issue of plastic waste entering the marine environment. These include increasing beach cleaning operations and testing new materials and new handling methods for artificial turfs with the purpose of mitigating leakage of microplastics into the environment. Sweden has also joined and supports the UN Clean Seas initiative.

The Swedish Government commissioned the EPA to widen their remit on the issue of plastic waste, starting in 2018, which included:

- International work with sustainable use of plastics and decreasing microplastics
- Identifying important sources of microplastics in the sea and to work for reducing the production and emission of microplastics from these sources
- Measures to reduce emissions of microplastics from storm/surface water and other sources
- Information to reduce littering and to increase the knowledge about the negative effects
- Innovation of plastics: less use of plastics, substitutions to other materials or smart solutions
- Environmental standards for plastics
- Municipalities: collect and handle plastic waste from the sea, i.e. beach cleaning
- Measures and policies to reduce plastic littering

Sweden also participates in the Nordic Plastics Programme. Its vision: In future, plastic should be produced, used and recycled in a circular process that presents no risks to health or the environment.

It has six focus areas:

1. Prevention of plastic waste and support for design that promotes greater reuse, longer life-time and recycling
2. Effective waste-management systems and increased recycling of plastic waste
3. Co-operation on measures to stop plastic waste in the sea and find cost-effective clean-up solutions
4. Advancing knowledge of micro plastics and identifying measures to cut emissions to the environment
5. Advancing knowledge of the environmental impacts and advantages of bio-based alternatives to plastic and biodegradable plastics
6. Advancing knowledge of problematic substances in recycling plastic materials.

The programme covers the years 2017-2020.

Netherlands

The circular economy has been included in the Netherlands' National Climate Agreement and is fully embedded in the national policies on the circular economy. The Netherlands is one of the first countries to set quantitative targets. The objectives are 50% reduction in the use of primary raw materials (from minerals, fossils and metals) by 2030, and becoming 100% circular in 2050. To accelerate the transition of the current Dutch economy into a circular economy, three strategic objectives have been formulated:

- The use of raw materials in existing supply chains must be at a high-quality level, thus increasing efficiency and a reduced need for raw materials in existing chains.
- In case new raw materials are necessary, fossil-based, critical and non-sustainably produced raw materials must be replaced by sustainably produced, renewable and generally available raw materials.
- New production methods must be developed, new products designed, and sectors restructured. New ways of consumption must be adopted.

The desired transition to a circular economy requires measures in all phases of the use of raw materials. From extraction and production to consumption and waste management. The active involvement and efforts of companies, scientific institutes, financers, non-governmental organisations, governments and consumers are therefore indispensable. Technological innovations are needed, as well as social and economic innovations. The challenges faced in the circular economy cut across business sectors and various scale levels. The agreement on circular economy forms the basis for transition agendas. These have been formulated by all stakeholders involved, on five priorities: Biomass and Food, Manufacturing, Plastics, Construction, and Consumer Goods.

The transition agenda plastics (2018) sets separate goals. An important goal is a decrease of waste incineration by at least 44% in 2030, from a total of 1,313 kton (2016) to 740 kton (2030). This decrease will be achieved through:

1. More separate collection, sorting and recycling of plastics with investments (subsidies) in new installations focused on high quality output of recycled plastics;
2. The development of “closed loop” return systems (e.g. for mattresses) as a result of EPR systems for furniture, clothing, and throw-away consumer goods;
3. Discourage incineration, landfilling and exports of plastic waste through higher waste taxes.

With the reduced incineration of plastics, CO_2 emissions in the Netherlands will be reduced by 0.97 Mton in the period 2016-2030. To expedite this transition, four development directions are elaborated further in actions and interventions, linked to a social agenda, a knowledge and investment agenda, and an investment agenda:

1. Prevention of unnecessary use;
2. Increased supply and demand of recycled/renewable plastics;
3. Better quality focused on high quality application of recycled materials in new products, more environmental efficiency;
4. Strategic (chain) cooperation on a national, European and global level.

Specific for the Netherlands, a national NL Plastics Pact will be launched: a multi-stakeholder Pact together with frontrunners in industry producers, recyclers and retail and fast food chains about the disposable single used plastic products and packaging. The aim is to phase out unnecessary single use plastic packaging and products, to stimulate reuse of plastic and to improve the recycling of plastics packaging and products. The Pact will be launched in February 2019. Concrete targets will be set, companies will provide data to be transparent on the progress of achieving their targets. The common targets for 2025 will be:

1. 30% CO_2-reduction of the used plastics by each company;
2. 100% of all single use plastic products and packaging which are brought to the market will be recyclable of which as many as possible will be reusable as well;

3. 70% of all discarded single use plastic products and packaging will be recycled;
4. All new plastic products and packaging have an average content of 35% recyclate.

United Kingdom

In the UK, there are the recently published Industrial and Clean Growth Strategies, which are targeting avoidance of any avoidable waste by 2050, and plastic waste by 2042. To support ambitions, Defra published the 25 Year Environment Plan in January 2018. Through its 25-year Environment Plan, the UK has announced a host of measures on plastics. Measures to address plastics waste include:

UK Plastics Pact: A voluntary pact between industry, WRAP and the Ellen MacArthur Foundation seeking to move towards the creation of a circular economy for plastics. It has been signed by 68 organisations representing 80% of plastic packaging sold through UK supermarkets. Scope is for all plastic packaging. The Pact has four targets. By 2025 -

- 100% of plastic packaging to be reusable, recyclable or compostable;
- 70% of plastic packaging effectively recycled or composted;
- Eliminate problematic or single-use packaging items through redesign, innovation or alternative (reuse) delivery models;
- 30% average recycled content across all plastic packaging.

Plastic bag charge: on 5 October 2015, England introduced a 5p single-use carrier bag charge to apply to retailers with 250 or more employees. The scheme aimed to reduce the use of single-use plastic carrier bags and the litter associated with them, by encouraging people to re-use bags. This has been successful: customers in England now purchase the equivalent of just 19 bags per person in England, compared with 140 bags in 2015 – a reduction of 86%.

Ban on microbeads in rinse-off personal care products: the ban on manufacture was introduced in January 2018, and the ban on sale came into force in June 2018.

Planned initiatives, subject to consultation, include:

- Deposit Return Scheme;
- Extended Producer Responsibility to increase resource efficiency, starting with packaging;
- Bans on certain single use plastics;
- Plastic-free aisles in supermarkets.

The UK Government has invested approximately £54 million on plastics innovation in the past seven years. £200,000 was pledged in May 2018 for an 11 month research project to explore how plastic particles from tyres, synthetic materials like polyester, and fishing gear enter waterways and marine environment, and analyse the impact various sources.[34] Through the Industrial Strategy Challenge Fund, potential research is being explored into the development of new, more sustainable materials that will have a lower environmental impact.

[34] https://www.gov.uk/government/news/government-launches-microplastics-research-to-protect-oceans

International engagement: The UK is engaging internationally on plastics-related issues as part of the G7 and G20. This includes:

- The UK signed up to the G7 Ocean Plastics Charter in June 2018, underscoring its commitment to taking action toward a resource efficient lifecycle approach to plastics in the economy.
- The UK participates in the G7 Alliance on Resource Efficiency, which aims to share knowledge and encourage collaboration to advance resource efficiency, promote best practice, and foster innovation. The UK supports the Alliance and the actions identified in the associated 5-year Bologna Roadmap, which includes important actions to reduce plastic waste and its impacts.
- The UK participates in the G20 Resource Efficiency Dialogue, which is a platform for the exchange good practices and national experiences to improve the efficiency and sustainability of natural resource use across the entire lifecycle, and to promote sustainable consumption and production patterns.

The Resources and Waste Strategy for England was published December 2018[35]. It sets out a framework for delivery including a comprehensive set of policies covering waste reduction, promoting markets for secondary materials, incentivising producers to design better products and how to better manage materials at the end of life by targeting environmental impacts. A number of consultations are planned including on Deposit Return Schemes and reform of the extended producer responsibility system, starting with packaging.

[35] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

PART 2

CASES ILLUSTRATING ACTIONS WITHIN THE FIVE AREAS OF ACTIONS TOWARDS SUSTAINABLE PRODUCTION AND CONSUMPTION OF PLASTICS

Less use of plastics

1. Gram, packaging-free grocery store

Gram[36] is a new type of "zero waste" grocery store. The goods are offered without packaging in hygienic dispensers. Customers bring their own containers (jars, boxes, bags, etc.) or use the paper bags provided. Goods are sold loose and by weight. Gram is born out of a crucial need to reduce the waste we create on a daily basis. Reducing household waste by reducing packaging can help to tackle climate change and marine littering. The store follows strict food hygiene procedures. Products are around 92% organic. Gram works with suppliers and aims at reducing packaging at every stage from producer to consumer. Products are bought in bulk. Challenges encountered by GRAM were the following.

Difficulty in getting hold of unpackaged goods

Food products are often packaged at an early stage, which makes it hard to get unpackaged goods or products packed in large volumes (thereby reducing the packaging per kg). Collaboration with smaller, local producers is easier, as they are willing to change their systems and it's easier to have a direct dialogue with the person producing and packaging the products. Large-scale producers don't want to change their production and packaging systems. The most common wholesale packaging is 25kg paper sacks. In conventional food value chains, the content of these sacks is re-packed into smaller consumer packs. Zero-waste stores, however, fill the sacks into large dispensers, which customers then put into their own reusable containers (jars, boxes, cloth bags, etc.) or into paper bags. So, one stage of packaging is removed.

[36] www.grammalmo.se

Solution: There is a need to give incentives for less packaging in the food value chain

Quantity of packaging throughout the value chain

The responsibility or blame for excessive packaging waste is often put on individuals, and there's a suggestion they should use and throw away less plastic. But often, there is no consumer choice. You have to buy food and the food available is excessively packaged. This can only be changed at a systemic, production level. For example, fruit and vegetables could be offered without plastic wrapping, liquids and products with a long shelf-life could be available in bulk, for the consumer to put in reusable containers. Plastic parts of packaging should be phased out, for example plastic windows to show the content. This could be supported by an assessment of the necessity of plastics and a tax on over-use. There are several shops around Europe trying to make a change towards zero waste, but there needs to be a change on a systemic level.
Solution: Create legislation for less single-use-packaging, especially assessing the need for plastic packaging.

Consumerism

Consumerism and convenience still beat what is better for the environment. People do their grocery shopping close to home and in the most convenient way. The change has to be made where people shop, at the supermarkets. It may also be possible to tap into and address the huge trend in home delivery and online shopping. An example is Charlotte's cupboard in the UK; they operate a mobile shop, with online ordering and delivery at the door in an electric van, where customers fill their own containers, or use reusable, hired containers or paper packaging.

Solution: There is a need for policies to help consumers change their habits.

Unfair competition

For early-adopter companies that provide zero-waste options, developing sustainable initiatives is very difficult, due to competitive disadvantages. Businesses that take steps to change habits and decrease the environmental impact of their economic behaviour, feel that they are on a constant uphill struggle.
Solution: A tax relief for entrepreneurial businesses making a change for the environment would help the businesses keep going. A tax relief for hiring staff, for example, would provide much needed help towards every day running costs, because the environmental improvement is more labour-intensive.

2. Checklist for event organisers in Amsterdam to reduce catering waste at events

Waste left behind after events (especially outdoor festivals in parks or forests) is a substantial problem in festival-keen Amsterdam. When organising events, there is always the challenge to deal with the waste, especially the catering waste, that is left behind when the visitors have left. Visitors want to have a good time, and can often not be bothered with the hassle of sorting and cleaning up.

The licensing of events offers a possibility to reduce plastics waste. Organisers of events in Amsterdam that have more than 2000 visitors, have to follow the 3 R-principles: reduce, reuse, recycle, and have to take at least 5 measures. It is important for the organiser to look at the purchasing process – "What goes in, should go out of it again" –

and then considering the whole chain. The measures taken are mapped into the cleaning & waste plans and a coordinator is appointed to guide everything. Suggestions are given, but organisers can also take other measures that have an impact. Examples:

- If possible, avoid packaging and trash (example: no double wrapping, no straws in drinks)
- Introduce so-called hard cups. In most cases, this is the most effective means of creating a clean event site. However, not always: in practice it will depend on the available conditions for rinsing and logistics challenges presented by the site.
- Rent instead of purchase (e.g. lease of decoration materials instead of buy for single use)
- Internal reuse of (decoration) materials or borrow/lend, rent from/to other organisers
- Strict guidelines for backstage crew to separate waste
- Frontstage information to visitors (clear directions on separation of waste) and sufficient bins to separate waste
- Bins with clear marking of the type of waste (according to national guidelines for colour use)
- Create mono-stream (choose either PET or bio-plastics)

3. Plastic Promise – reducing plastic catering waste at events

On 17 October 2018 the 'Plastic Promise' campaign was launched during ADE Green, the sustainability conference at the Amsterdam Dance Event. Together with other representatives of the parties involved, State Secretary for Infrastructure and Water Management Stientje van Veldhoven and DJ Sam Feldt inaugurated the campaign. In this movement festivals, sports events, the events industry and beverage companies are taking their responsibility for the reduction of single-use plastics. The target is a reduction of fifty per cent in three years. Representatives from various big music events, the City of Amsterdam, sports organiser Le Champion – which organises some well-known Dutch running events – and several beverage companies, such as Bar le Duc, Coca-Cola, Grolsch, Heineken, Lipton and Vrumona, were present.

Plastic Promise is a national movement that originates from the No-Waste Festivals Green Deal and was initiated by the events industry, making the industry a pioneer in the responsible use of plastics. Festivals such as Eurosonic Noorderslag, Q-dance and Solar Weekend Festival received praise from the State Secretary for taking their responsibility.

The promises made by the parties are ambitious. Vrumona, for instance, states that within three years its bottles will consist of fifty per cent recycled PET. Heineken aims to replace fifty per cent of its plastic cups with reusable cups in three years, or to have them recycled high-grade. The City of Amsterdam will prohibit single-use plastics at events in 2020.

ADE Green also saw the publication of the No-Waste Festivals Tool Kit, a document containing three years' worth of knowledge and experience from the No-Waste Festivals Green Deal. After several pilot projects run by key players from the events industry, the results have now been laid out. Which steps to take to reduce the use of plastics? How to make the transition to 'circular' drinking cups? What pros and cons should one take into account? The Tool Kit includes a chapter on composting and on reducing camping waste, and is illustrated with case stories.

4. Houdini – rental of sports clothing

Houdini is a Swedish company that produces and sells sportswear and outdoor clothing. Most of their products are made from polyester, due to its specific properties that make it well-suited for sportswear. Houdini is working with sustainable production and consumption through re-use (second-hand products are sold in their stores), recycling (you can bring back your worn clothes for recycling), repairs and a rental service. Houdini started their rental service in 2013, and have now moved on to the concept of providing packages of clothing for rent. This challenges the consumer in his consumption behaviour. Incentives for the consumer could be governmental deductions on the rental price and lower VAT rate for second hand clothing.

Lowered costs for work with circular services

Houdini is working with repairment of clothes and long (lifetime) guarantees so that the clothes will last longer. The rental and repairs services involves more work than ordinary business: washing, handling of clothes packages etc. It would drive the development if more attractive prices could be offered for the rental service, that can compete with the alternative of buying (material is cheap, labour expensive). This could be realized through a lower VAT on labour costs for the hours spent on providing the rental service and other circular services. This would enable a more attractive price for the customer and would provide an incentive to change the consumption pattern.

More reuse

1. Take-back schemes for electronic gadgets

Electronic gadgets contain a lot of plastic, besides valuable metals, so it is interesting to look at take-back schemes that close the loop and reduce waste. WRAP (UK) has partnered with industry through the electrical and electronic equipment sustainability action plan (esap) to pioneer innovative business practices that promote a more circular economy.[37]

Solution: Argos, one of the UK's major retailers, wanted to develop a convenient offer for customers to recover value from their used smartphones when buying new ones. This was in line with Argos's goal of becoming a UK leading digital retailer. Through esap, Argos implemented a gadget trade-in offer available online and throughout its 700 UK retail outlets. The WRAP team helped Argos to develop the evidence and build a commercial case for the model, refining the customer journey and the operations required to provide traceability for traded-in products. The service includes wiping data on the gadget before recycling.

In 2015, Argos launched its Gadget Trade-in service online and across nearly 800 UK stores. The scheme initially includes mobile phones and tablets, but could be extended to include satnavs, cameras and laptops in the future. The incentivised return model enables customers to trade in their old mobile phone or tablet in exchange for an Argos gift card which can be spent on anything in store.

[37] http://www.wrap.org.uk/sites/files/wrap/Switched%20on%20to%20value%20-%20Powering%20business%20change_0.pdf

2. Re-usable lunchboxes (Reconcil)

Reconcil is a young company in Paris that wants to reduce takeaway waste with a deposit-refund system. At breakfast time the Social Bar, a takeaway in the 12th arrondissement of Paris, is filled with customers studying the menu. Today there is a new service on offer: they can opt for a polypropylene (a thermoplastic polymer often used for food packaging) container with a two-euro deposit. The money is refunded when they return the container, which the takeaway owner rents from Reconcil. The company collects the used containers for high-temperature washing, then returns them to the restaurant. At the Social Bar, ninety per cent of the customers have embraced the deposit system straightaway. 'People want to stop the mess. Many customers told us it annoyed them that their food came in single-use containers,' says Renaud Seligman, owner of the Social Bar. So Reconcil's initiative to create a deposit network for takeaway containers came at the right time.

A deposit system to leave the single-use world behind

Of course many takeaways offer options such as paper or corn-starch plates. But according to Reconcil manager Sofiane Haïssane-Teston this solution, presented as sustainable, does not solve the waste-reduction problem. 'These bio-sourced containers made from vegetable materials can't be recycled. They can be composted, but then you'd have to be able to put your container in a compost bin after having your breakfast. So they end up in the incinerator,' Sofiane explains. For Reconcil, it's time to leave the single-use society behind us: the future lies in reuse. The young company estimates that in Paris alone, half a million people a day eat takeaway food. With one container weighing about 30g, that amounts to almost fifteen tons of takeaway packaging in the bins on a daily basis. To reduce waste while stimulating positive action, Reconcil based itself on a practice that certain festivals already have in place for drinking cups: deposit refund. A perfect opportunity for consumers to take concrete action to limit their waste output.

Reconcil launched its activities this summer. A dozen of Paris takeaways now take part in the scheme: the first step. A few months ago the start-up was awarded first prize in the City of Paris circular-economy competition, in a gesture aiming to allow the initiative to develop further and attract potential investors. Sofiane hopes to deliver 10 to 20,000 reusable containers in Paris by the summer of 2019. Now he only has to convince the restaurant owners.

Less littering and take-up of spillage

1. Phasing out dolly ropes from fishing nets by new design

A German roundtable has discussed all the available options for decreasing the littering by dolly ropes. Several German shrimp-fishing organisations have agreed to phase out dolly ropes, and there are also experiments with alternative, biodegradable materials.

There is also DRopS, a 3-year research project of the Institute of Baltic Fisheries, commissioned by Niedersachsen and Schleswig-Holstein and co-financed by the EMFF.[38]

Polyethylene ropes are often mounted on beam trawls in the North Sea to prevent net damages due to abrasion. These so-called dolly ropes are wiped off after a short while and get lost at sea.

Only a small part of the plastic waste in the sea is visible to humans as a large part of it remains under the sea surface or far away from the coasts. On the shores of the North Sea, colourful, mostly orange or blue threads, ropes or balls are particularly visible during a boat trip or while walking on the beach.

Although the origin of plastic waste is often difficult to determine, it is likely that a large proportion of these coloured plastic fibres originate from bottom trawling. Especially in the beam trawl fisheries directed to sole and North Sea shrimps, the nets are dragged very close to the ground due to the design. To protect the bottom side of the gear, it is often provided with abrasion protection. Various materials can be attached to the meshes of the gear in order to prevent abrasion of the material on the seabed – especially of the codends.

One of the most common materials used as scuff protection in bottom trawling are the so-called „dolly ropes“. These are Polyethylene ropes (PE ropes), which are cut to size by the fishermen and woven into the net material.

During fishing, the dolly ropes fray very easily and parts of it break off. Within two weeks 10 to 25% of the material has already been torn off. After this time, the remaining cords become tangled or entangled, reduce their flexibility and cause sand and gravel to clog. As a result, the remaining dolly ropes are replaced.

The aim of this project is to develop and test trawl gear modifications that reduce or prevent the contact of the gear with the seabed, thus making the use of dolly ropes as abrasion protection superfluous. Initially they will focus on the shrimp fishery in the North Sea.

The research project is testing several modifications to the gear, which decrease the contact with the seabed and cause less abrasion.

The project has defined the following research questions:

- Which gear modifications can reduce or avoid the contact between the gear material and the seabed?
- How practicable are the newly developed modifications on board commercial fishing vessels?
- Does the developed gear modification affect the catchability of the gear? It is important to distinguish the effect of the not-use of dolly ropes (e.g. due to changed selectivity) and the effect of the net modification.
- How does a modified gear behave in long-term use, or can gear damage be reduced to an acceptable level in the long term?
- Is it possible to transfer the solutions, developed within the project, to other fisheries?

[38] https://www.thuenen.de/en/of/projects/fisheries-and-survey-technology/reduction-of-plastic-waste-from-the-brown-shrimp-fishery-through-gear-modifications-drops/

2. Collecting, sorting, cleaning ghost nets

Aquafil collects fishing nets (and other Nylon 6 waste, such as old carpets, industrial plastic components, fabric scraps, yarn discards) all over the world in an established waste supply chain of ECONYL® Reclaiming-Program and a minor part of fishing nets is also collected through different initiatives like the Healthy Seas initiative and Net-works™.

Aquafil transforms fishing nets – together with other Nylon waste – into the ECONYL® regenerated nylon.

Collected fishing nets have a status of waste. Apart from generic guidelines of end-of-waste criteria, currently there is no existing specific end-of-waste criteria legislation at EU level for such type of waste, which would enable under certain conditions for fishing nets to reach end-of-waste status. Consequently, many administrative burdens are in place for transboundary shipments, but not only limited to that.

Aquafil has registered the recycled output product (the raw material for polyamide 6) under REACH.

See also example 1 under Recycling

3. Preventing of spill of plastic pellets/bio beads from IED installations

There are different types of small plastic pellets, beads and balls coming from different industrial processes, that may cause pollution of water-courses.

Nurdles: pre-production plastic pellets; these are the raw material of the plastic industry. They are sometimes found polluting watercourses after escaping a permitted facility, or when transported.
The Environment Agency in the UK have investigated several incidents where these have been lost and have worked with businesses to improve performance and require duty of care.

Biobeads: used as a filtering media at sewage works, or in cooling systems at power stations. [39]

Taprogge balls: sponge rubber balls which are injected into the cooling water flow, to clean the tubes of the installation (e.g. nuclear power station). [40]

[39] Plastic pellets are sometimes used as a filtering media at sewage treatment works. These are called biomedia, Brightwater media, BAFF media or Bio-Beads. Not all BAFF (Biological Aerated Flooded Filter) plants contain Bio-Beads – some have a mineral media and others have a fixed structural media.

[40] Taprogge GmbH is a medium-sized company based in Wetter, Germany, and known for its tube-cleaning systems for steam turbine condensers, heat exchangers and debris filters for water-cooled shell and tube heat exchangers and condensers. The patented process uses sponge rubber balls which are injected into the cooling water flow (1) before it enters into the condenser.

The EA's experiences and initiatives to counter these pollution cases

Several large energy generation power stations use Taprogge balls in their cooling systems. The EA has proactively worked with these sectors, who have taken responsibility as operators and improved their systems, including monitoring on a mass balance type approach, to prevent loss.

Some water companies also use bio beads in wastewater treatment processes (in BAFF plants). One company has recently installed extra screening on the outfalls and is trialling their use and seeing how effective this is in reducing spills to the watercourse. The EA has set up a strategic group working with the water companies to investigate microplastics as a whole. One of its first tasks will be to consider bio beads and the most appropriate methods of preventing their loss to the environment.

There is an industry best practice, which was adopted by EnergyUK. The loss of Taprogge balls from the thermal combustion sector has been identified as an unauthorised release under the IED and the EA has sought action by the relevant operators to limit that loss. The operators have put several improvements in place – to asset maintenance and replacement and how they ran, monitored and managed those processes to reduce losses.

The EA has experienced no obstacles in applying the IED (asking for further information from the operator, requiring further management measures, substitution, or enforcement).

Note: on the List of future EU measures to implement the Plastics Strategy, one of the measures aimed at curbing microplastics pollution is: Development of measures to reduce plastic pellet spillage *(e.g. certification scheme along the plastic supply chain and/or Best Available Techniques reference document under the Industrial Emissions Directive)*.

Recycling

1. Recycling ghost nets and remnants from textile production to produce stockings

Swedish Stockings are a sustainable hosiery brand. They have a sustainable production process using either natural fibres (cashmere or organic cotton), or regenerated nylon. The materials are sourced and produced in Europe, with the exception of the elastic/elasthane, that comes from Japan. It is currently not possible to separate nylon and elasthane. The feedstock for the nylon can either be ghost nets, old fishing nets, or remnants from nylon production.

Aquafil produces ECONYL® regenerated nylon yarn (see under Littering 2), from which the stockings are made.

Fulgar uses remnants from virgin nylon production (recycled polyamide 6,6) to produce the nylon yarn Q-Nova, from which also stockings are made. The input material is from Fulgar (based in Castel Goffredo, Italy) and the recycling also takes place in Italy. The production remnants are considered a by-product; they are melted and become new polymer.

In the sense of REACH, Fulgar has to be considered a downstream user of chemicals, as they produce articles. The whole portfolio production complies with the Oeko-Tex(R) Standard 100, Class I Appendix VI (which is in itself compliant with REACH). No separate registration with REACH is required for the articles.

2. Chemical PET recycling

The Dutch start-up company Ioniqa has developed an innovative process for chemical recycling of PET. The feedstock can be derived from different sources of PET, e.g. textiles, bottles, and industrial sources (residues from PET-processing). The chemical process removes impurities and breaks the polymer down to monomers. These are then turned back into PET by a PET production company. The process has been tested at a pilot plant and currently, an industrial scale operation is being built in the south of the Netherlands, at the Chemelot Campus.

Its challenges are similar to those of other innovative recycling operations, they have tackled these successfully:

Permit: The facility will be covered by the dome permit of the Campus, which covers emissions, chemicals storage and transports. For the specific topic of waste intake, the dome permit is not applicable, and Ioniqa has applied for a separate permit. This permit is flexible to different types of feedstock and names the European Waste Catalogue (EWC) codes that can be accepted by the facility.

End-of-waste or by-product: Ioniqa accepts PET feedstock (secondary PET) that is supplied by recycling/waste treatment companies under different labels, some suppliers deliver it as a (by-) product, others as waste. This may depend on economic choices made by the suppliers, or on the permitting regimes chosen by the different regulators.

REACH: Ioniqa is still in the process of registering its products under REACH. Currently, they have a temporary PPORD-registration.[41]

[41] PPORD. In order to provide encouragement to innovate for research-orientated companies, REACH Article 9 allows exemptions from authorisation and restrictions for substances used in scientific research and development (SR&D) at tonnages <1 tonne/year. REACH further encourages innovation by allowing substances manufactured or imported at tonnages >1 tonne/year to be exempted from registration for a period of 5 years (or longer) when they are used in product and process orientated research and development (PPORD) or exported for the purpose of PPORD.

Addressing the presence of SVHCs and other harmful substances

1. Medical gloves without phthalates

An example of how public procurement can drive qualitative prevention and substitution of hazardous substances (Sweden). The health care administration ("landsting") wanted to buy medical gloves free of phthalates. These weren´t available on the market, all gloves contained phthalates. So they made an innovation procurement specifying that they wanted phthalate-free gloves. At first these gloves were 4 times more expensive than the regular ones, but after 4 years on the market they were the same price. This was due to extra budget for hospitals to buy these new gloves and because environmental goals were set that gave the hospitals incentives to buy the phthalate-free ones.

2. Substitution of input materials (tyres) by cleaner materials for the production of artificial grass

The Swedish EPA is financing a project where purchasers of artificial grass fields are working together to find ways of mitigating the leakage of microplastics from these fields, and testing new materials like cork, coconut, sand or curly grass. The Swedish EPA is considering classifying sports' fields with artificial grass as environmentally hazardous activities that are required to give notification. This would oblige them to register the establishment at the municipal committee for environmental and health protection. They are also considering developing an ordinance for artificial turfs, playgrounds and equestrian centres with granules.

3. Decision tool on SVHCs in recycling

The Dutch national waste programme[42] contains a guidance for assessing waste streams that contain a SVHC and may hence require a risk analysis to determine whether recycling is possible in an environmentally sound manner. The guidance is intended to structure the decision-making process of the regulator. The guidance is to be used in permit procedures for recycling materials containing SVHCs. If the competent authority is of the opinion that a company has overlooked certain SVHC in its application for processing of a waste, it may stipulate that it assesses for the SVHC concerned to what extent it is included in the waste material. On the basis of the RIVM report 'Concentration limit value for SVHC in waste streams', letter report 2017-0099 [2017], the limit value for a risk analysis is in principle 0.1% (g/g), but can be lower for specific SVHCs.

[42] LAP3, section B14.4.3

PRACTICAL TOOL 1

END-OF-WASTE STATUS ASSESSMENT (PART A) AND PROPOSAL FOR A DATABASE COLLECTING END-OF-WASTE CASE-BY-CASE ASSESSMENTS (PART B)

PART A
END-OF-WASTE STATUS ASSESSMENT

1 INTRODUCTION AND PURPOSE OF THIS TOOL

This tool aims to help regulators to assess if materials meet the conditions and requirements for end-of-waste set out in the WFD 2018, Article 6.
At MS level, assessments of end-of-waste status are carried out when:

- A MS establishes national detailed criteria regarding end-of-waste status for certain types of waste (WFD 2018, Article 6, paragraph 3);
- A MS regulator decides on or assesses end-of-waste status of a material on a case-by-case basis, either through prior authorisation (e.g. permit) or verification afterwards (WFD 2018, Article 6, Paragraph 4).

See for further details of these situations Section 2.2 of Chapter 2 of the guidance.

This practical tool aims especially to support regulators and producers in assessing end-of-waste status of materials on a case-by-case basis. It contains practical suggestions on what information may be needed to make a proper assessment. It also describes different approaches in MS to assess the end-of-waste status of a material recovered from a waste.

This tool should not be viewed as mandatory nor viewed as a definitive interpretation of EU law. It is hoped that it will contribute to a better understanding of the practices of assessing end-of-waste status across Europe and by that way support the further use of high quality and safe end-of-waste materials.

2 CONTENT OF THIS TOOL

This tool, Part A, covers the following topics:

- Analysis of existing methodologies and guidances on assessing end-of-waste status used in different countries in Europe – see Section 3
- An indicative and not mandatory list of information to be used in the end-of-waste assessment procedure – see Section 4
- Procedures in MS for allowing experiments to produce new end-of-waste – see Section 5.

3 METHODOLOGIES AND EXAMPLES OF GUIDANCES TO ASSESS THE END-OF-WASTE STATUS

The conditions that need to be met for the end-of-waste status are laid down in Paragraph 1 of Article 6 of the WFD 2018, which states that "Member States shall take appropriate measures to ensure that waste which has undergone a recycling or other recovery operation is considered to have ceased to be waste if it complies with the following conditions:

a. the substance or object is to be used for specific purposes;
b. a market or demand exists for such a substance or object;
c. the substance or object fulfils the technical requirements for the specific purposes 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."

Paragraph 4 of Article 6 also states that "Where criteria have not been set at either Union or national level under Paragraph 2 or 3, respectively, a Member State may decide on a case-by-case basis, or take appropriate measures to verify, that certain waste has ceased to be waste on the basis of the conditions laid down in Paragraph 1 and, where necessary reflecting the requirements laid down in Points (a) to (e) of Paragraph 2 and taking into account limit values for pollutants and any possible adverse environmental and human health impacts".

See for further details regarding this article Section 2.2.1 of Chapter 2 and Annex B, Point 4 of the guidance.

The table here below lists different methodologies and guidances developed to assess end-of-waste status. Some are used for developing EU or national criteria some to support case-by-case decisions. The majority proposes a technical approach to assess the end-of-waste status, others include a legal evaluation, based on EU or national jurisprudence or on the basis of legally non-binding opinions that have already been issued. It's worth noting that some guidances are used both for end-of-waste and by-products status assessment, and others only for end-of-waste assessment.

See Table 1 ➜

MEMBER STATE	DRAFTING INSTITUTION	TITLE OF THE METHODOLOGY OR GUIDANCE	YEAR OF PUBLICATION	APPLICATION FIELD		APPROACH	
				END-OF-WASTE	BY-PRODUCT	TECHNICAL	LEGAL
EU Commission	JRC – IPTS	*End-of-waste criteria*	2009	X		X	
Belgium – Flanders	OVAM	*Handleiding bij de afbakening van de afvalfase: materialen, afvalstoffen en grondstoffen in de kringloop* (Manual for delimiting the waste phase: materials, waste and raw materials in the cycle)	2013	X	X	X	
United Kingdom	EPA DEFRA	• *IsItWaste tool user guide* • *Guidance on the legal definition of waste and its application*	2015 2012	X	X	X	X
France	RDC Environment and VDC	*"Assessment of environmental and sanitary impacts within the context of an end-of-waste request – Practical guide – Final report. ADEME"*	2017	X		X	
Italy – Veneto Region	Veneto Region Government	Deliberation of the regional Government n. 120/2018: *"Primi indirizzi operativi per la definizione di criteri per la cessazione di qualifica di rifiuto "caso per caso", ai sensi dell'art. 184 ter, comma 2, del d.lgs. n. 152/2006 e s.m.i."* ("First operational guidelines for the definition of criteria for the end-of-waste status on a case-by-case basis, pursuant to article 184 ter, Paragraph 2 of Legislative Decree no. 152/2006)	2018	X		X	
Netherlands	Ministry of Infrastructure and Water Management	*"Leidraad Afvalstof of product"* (Guidance Waste or product)	2018	X	X	X	X
Spain	Ministry of Ecological Transition	*"Procedure for by-product Declaration"* (JRC-JPTS methodology considers end-of-waste criteria, however it doesn't include any by-product criteria) (2015 and modified 2017)	2015 and modified 2017	x	x	x	x

TABLE 1
List of methodologies or guidances concerning end-of-waste assessment.

In the following subsections each methodology or guidance is outlined.

3.1 The JRC-IPTS methodology

The Joint Research Center (JRC) and the Institute for Prospective Technological Studies (IPTS) of the European Commission have developed a general methodology analysing the principles according to which the EU end-of-waste criteria should be established and providing the related analytical and impact assessment frameworks required to determine end-of-waste criteria.

The procedure can be considered as a very comprehensive one to define EU wide end-of-waste criteria, requiring detailed information and studies. However some crucial steps may be considered also for development of national criteria or to support in case-by-case decisions or verifications.

The development of a general methodology has been a parallel process together with the development of potential end-of-waste criteria for three pilot case studies, namely aggregates, compost, and aluminium and steel scrap. Its refinement is based on the work developed to determine a set of potential end-of-waste criteria for these three materials.

The general methodology encompasses these different examples in a general way, in order to enable its future application to any kind of waste stream candidate for end-of-waste criteria. The case studies have been conducted solely with the purpose of facilitating and illustrating the development of the general methodology.

The main point of the methodology proposed by JRC-IPTS is the focus on the quality of the material candidate for end-of-waste (see Figure 12), because the authors state that, though quality requirements for the final product may be established, more effective criteria have to be fixed for the input waste, the processing and the use.

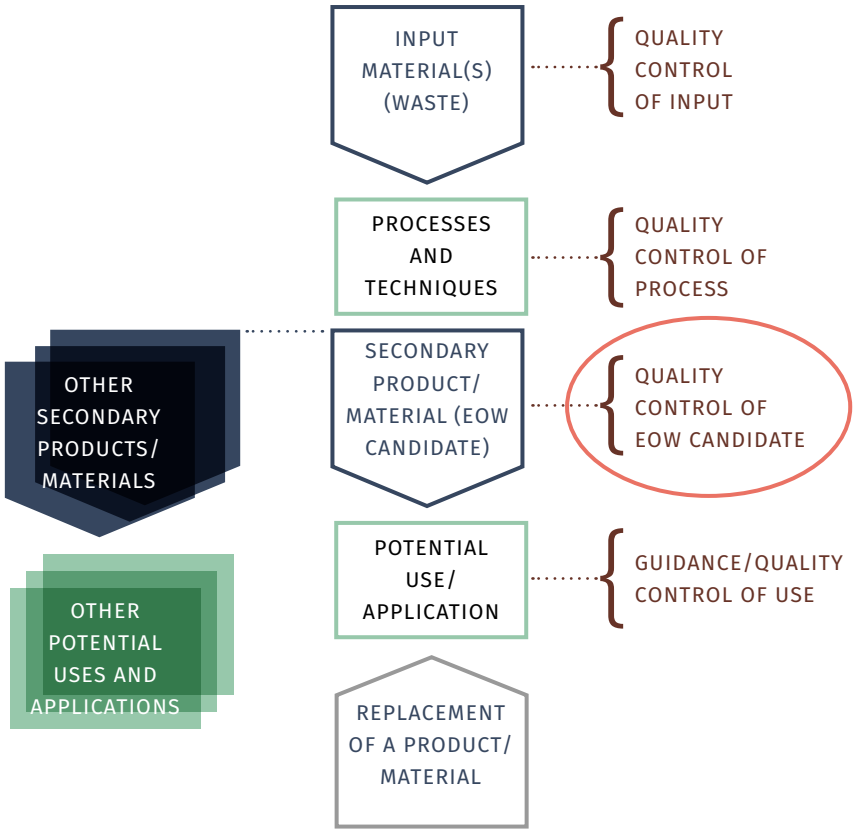


FIGURE 12
Recovery chain and the steps to establish end-of-waste criteria (JRC – IPTS, End-of-Waste Criteria, 2009).

The first step in the process of establishing end-of-waste criteria is the analysis of potential input waste (see Figure 13) to be recovered in order to obtain a certain end-of-waste. The guidance states that for the input waste the following aspects are relevant:

- Positive list of waste streams that are allowed;
- Negative list of waste that are excluded;
- Limit values for potential pollutants;
- Source control of the allowed waste based on the processing chain (one kind of waste should be admitted only if originating from certain producing processes and should be excluded if deriving from other ones where a higher risk of contamination may be assumed);
- Limiting the recovery of mixed waste.

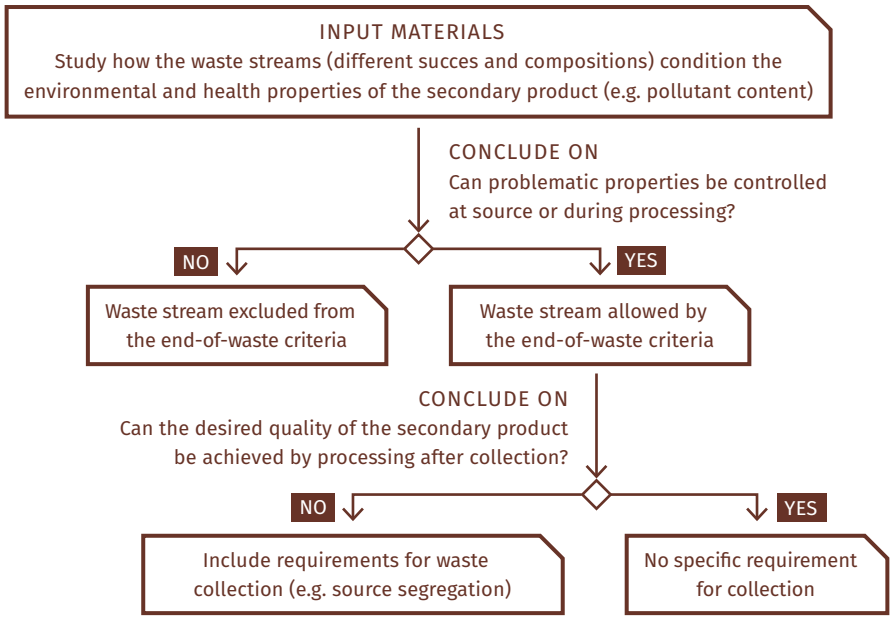


FIGURE 13
Guidance to develop end-of-waste input material criteria (JRC – IPTS, End-of-Waste Criteria, 2009).

The second step is the determination of requirements regarding the recovery process (see Figure 14) to guarantee that a specific quality material is produced. For example temperature and moisture are fundamental parameters to ensure a correct development of the composting process in order to obtain a safe and well stabilized and mature compost. Such requirements may be excluded in case of basic processing (sorting, shredding), for which the control may only focus on the quality of input waste or product quality.

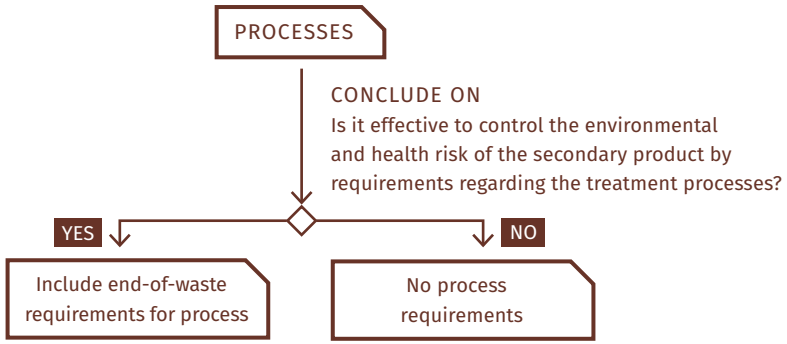


FIGURE 14
Guidance to develop end-of-waste processing criteria (JRC – IPTS, End-of-Waste Criteria, 2009).

The third step is to set up product (end-of-waste) quality standards. These could be:

- Recognized National standards;
- International standards;
- Recognized Specific user requirements, in terms of material characteristics, amount of available material and consistency over time.

The legal basis and geographical scope of each standard has to be noted.

A noteworthy aspect set out in the JRC-IPTS guidance is that, regardless of the existence of a national or international standard for the specific end-of-waste, it is necessary to assess environmental risks associated with storage, transport, processing and use of the material in question, in order to evaluate the need to incorporate in the end-of-waste criteria specific and additional product quality standards (see last step of the procedure illustrated in Figure 15).

Such additional criteria may include pollutant limit values, maximum content of impurities etc. and could be derived from best practices or quality standards for primary materials which may substituted by the recovered waste (secondary raw material).

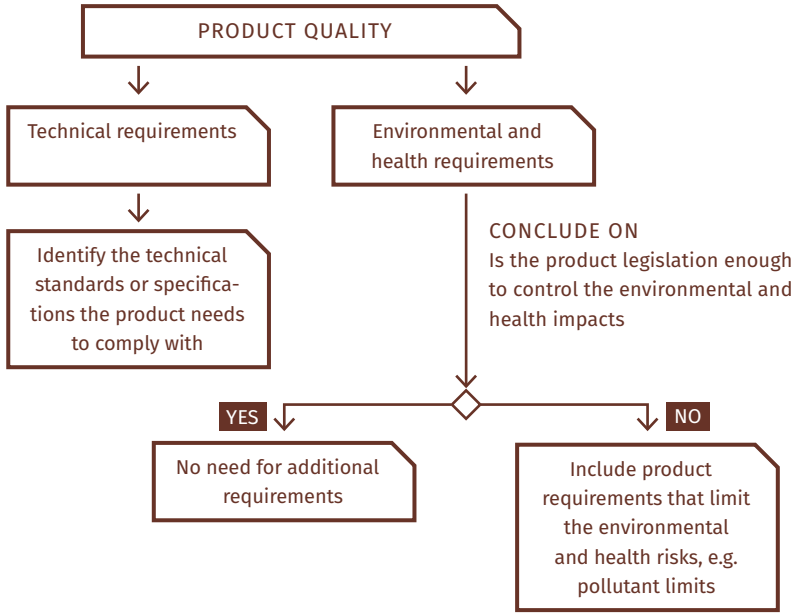


FIGURE 15
Guidance to develop end-of-waste product quality criteria (JRC – IPTS, End-of-Waste Criteria, 2009).

The last step outlined in the Guidance is an impact assessment, covering:

- Environmental and health impact;
- Economic impact;
- Market impact;
- Legislative impact;
- Socio-economics impacts.

The main factors that affect the direct environmental and health impacts of using the material may be the introduction of pollutant concentration limits and the changes in the applicable regulatory controls and in the product market situation. Indirect environmental and health impacts may be for instance changes in the process related emissions.

Finally a fundamental step is related to the quality management system, which should define methods and procedures (for instance sampling and analytical methods) that guarantee quality control and assurance of the product characteristics.

Other assessments should cover the evaluation of economic, market, legislative and other socio-economic impacts.

In the next box an example for establishing end-of-waste criteria for aggregates is given, summarised from the JRC-IPTS document.

EXAMPLE: AGGREGATES CASE STUDY, PRESENTED IN THE JRC-IPTS GUIDANCE

The case study includes following sections:

1. **General analysis.** It covers the topic of virgin material (natural aggregates) and secondary aggregates production at EU level, the most important type of applications, the existing standards for specific uses (both technical and environmental standards), the related EU and national legislation (on construction products as well as the specific conditions laid down in the landfill directive for inert waste) and a market assessment (for example analysing the taxation on natural aggregates and the landfill taxation).
2. **Specific waste streams study.** The study proposes a detailed analysis of 3 main fluxes: construction and demolition waste, ashes from coal combustion and slags from iron and steel production. For each stream the production step (through the description of the production process, the amount and quality of such materials), the use, the relevant applied processes and techniques, the EU wide existent quality assurance systems and the environmental risks are illustrated.
3. **Proposal of end-of-waste criteria.** In this section firstly compliance with the conditions of article 6 of WFD is discussed.
   a. ***The common use:*** this condition is satisfied by the high recycling rate, demonstrated in Section 2, as well as by the existence of standards and common uses described in the literature;
   b. ***The existence of a market (certain use):*** the data of Section 2 show that there is a potential market for these streams. The limitations are related to the high density of the aggregates that influences the transport cost and allows a small range market (within 50 km) as well as the low cost of natural aggregates (specifically in some areas). There are some national economic instruments to overcome this problem, such as levies for the extraction of primary aggregates and landfill taxes or bans to reduce the disposal of these waste streams.
   c. ***The fulfilment of technical requirements laid down in the existing legislation and standards:*** it is demonstrated that many technical EU wide standards are already in force, despite the lack of EU environmental

standards. Most of the MS have developed such standards.

d. ***The use will not lead to overall adverse environmental or human health impacts:*** it is stated that recycled and secondary aggregates present little risk for the environment; however due to the long periods of contact between these materials and the environment the release of substances from the secondary materials to the environment, caused by the contact with water has to be assessed and monitored. That impact may be reduced through an assessment of the entire production chain in order to minimize the risk as well as setting up limit values for the leaching test.

Lastly **specific end-of-waste criteria** for aggregates are set up for the three different waste streams, following the structure:

a. ***Input waste.*** A description of allowed and not allowed input waste.

b. ***Processing.*** Necessary operations are listed and described. It is also required that the processing **must** be part of a quality management system.

c. ***Product requirements.*** The link to European standards is foreseen, as well as the percentage of unwanted materials, the maximum amount of unwanted impurities (e.g. metals, glass) and also meeting a leaching test in the case of recycled aggregates derived from polluted buildings.

d. ***Product applications.*** It is stated that "recycled aggregates must comply with national regulations and standards applicable to the use of aggregates as construction materials"

e. ***Quality control procedures.*** The implementation of a quality assurance system is mandatory. The implementation of such a system should be monitored by competent/independent authorities.

4. **Impact assessment**

a. ***Environmental impact:*** a general discussion of the benefits due to the increase of recycling rates, the saving of natural resources and the reduction of landfill spaces is described. The impact of end-of-waste criteria on the current national legislation is also discussed. It is stated that in general the end-of-waste limit values are more stringent than national leaching requirements, which leads to an overall positive legislative impact. The introduction of end-of-waste criteria (especially the exclusion of hazardous contaminants in the input waste and the set of limits for the leaching test) is evaluated as a positive environmental perspective and as a way to increase the confidence of the users in these materials.

b. ***Market impact:*** the set of end-of-waste criteria will facilitate the market of recycled and secondary aggregates, but an actual increase of their use will be possible only with additional financial policies, like taxes on landfill and on primary aggregates.

c. ***Legislative impact:*** the compliance of secondary aggregates with the Construction Products Directive is already an end-of-waste criterion and such materials are already listed in this Directive. REACH Regulation compliance also needs to be evaluated. In the case of aggregates deriving from selected C&D waste they could be considered as articles and because of that they are likely excluded from registration. In the case of aggregates deriving from coal combustion ashes and iron and steel slags recovery, they have to be registered, maybe as UVCB substances (UVCB substances are Chemical Substances of Unknown or Variable Composition, Complex Reaction Products and Biological Materials).

3.2 The Flemish approach: the OVAM guidance

In Flanders, a region of Belgium, a specific guidance was published to support applicants of by-products and end-of-waste case-by-case decisions. The Flemish Regulation for sustainable management of material cycles and waste materials includes the Material Decree and the VLAREMA. The latter is a more detailed technical rule, which also includes a list of waste materials that are eligible for each area of use as "raw materials" or by-products. Specifically there are 4 (laid down in VLAREMA) plus 2 (laid down in 2 external decrees) foreseen uses as:

- Fertilizers;
- soil;
- building material;
- artificial sealing coats (utilizing water glass);
- material from non-ferrous metallurgy;
- material from ferrous metallurgy.

These 6 groups may be considered as national criteria. The Flemish rule regulates end-of-waste and by-products in the same way, considering both as "raw materials". So all the statements provided in the guidance are applicable either to end-of-waste or to by-products.

Even for waste that is covered by one of the 6 criteria, a raw material declaration (Grondstofverklaring – GV) is required for some of the materials listed in Annex 2.2 of VLAREMA to become by-products/end-of-waste. This is *"a statement delivered by the Flemish government"* (by OVAM, the Flemish Public Waste Agency) *"in which it is stated that a certain material is not or no longer considered as a waste"*.

In the guidance it is also stated that the raw material declaration is "only delivered for a specific material that is produced by a specific producer or arising from a specific production process and for which a specific application is intended". A "group declaration" is only allowed if the same product is produced by the same process.

For certain materials an alternative to the raw material declaration is the application of inspection schemes performed by independent authorities (certification systems). This is the case of quality assurance system for compost and digestate developed by VLACO, an independent non-profit membership organisation including OVAM, composting producers, municipalities and inter-municipalities. The quality assurance system includes not only a monitoring of the end product quality, but also input waste checking and process management inspection.

A similar path is developed for the use of recycled aggregates where COPRO and Certipro are two certification organisations.

In the end-of-waste case-by-case decisions compliance with the criteria laid down in the WFD and transposed in the Flemish Material Decree (article 37) may be established by:

- a raw material declaration (GV) by OVAM (voluntary option)
- a self-assessment by the operator, submitted to inspections carried out by public authorities.

The OVAM guidance provides some general indications in order to demonstrate that the material is not considered as waste:

- ***The intended use of the material:*** it may be demonstrated by a long term contract between the holder and the later user.
- ***The existence of a market:*** the fact that the material has a positive value can be an indication (but it is not a decisive argument), a negative value indicates that the material must be considered as waste. It should be clear that only the quantities that "have or will have sales within the foreseeable future" can be indicated as raw material.
- ***The substance meets the technical requirements:*** the product should meet the product standards (such as EN standards), REACH etc.; if the use of the material is prohibited in certain cases that use is not lawful and consequently the material must be considered as a waste.
- ***The overall use of the substance has no adverse effects on the environment or human health:*** various effects over the entire life cycle of the material have to be evaluated in terms of environmental and health impact. The material is also comparable or better in terms of nature, composition and impact on people and the environment than the primary raw material.

BELGIUM FLANDERS: EXAMPLE OF A RAW MATERIAL STATEMENT.

An application for a raw material declaration was requested for lime pellets (EURAL code 19.09.99) produced by a water production plant. During the step of softening hard water, the last step is a reactor containing sand. Caustic soda or lime milk were added in order to increase the size of the sand grains to enable them to sink to the bottom of the reactor.

1. ***Intended use:*** the lime pellets are used directly and without special pre-treatment in power plants to replace calcium carbonate in a certain step in order to prevent clogging of the process;
2. ***Existence of a market:*** it was evaluated that the use in power plants is realistic;
3. ***Product legislation:*** The lime composition is the same as the virgin material (calcium carbonate).
4. ***Overall impacts:*** Analysis on metals, BTEX, PAHs, PCBs and mineral oil were performed and showed concentrations below the detection limits. A leaching test was also carried out, although it was not required, because the concentration of heavy metals was lower than the values for free use of excavated soil. However, the heavy metal concentration of the leaching test meets the standards provided.

In the end, it was concluded that no adverse consequences can be expected.

3.3 The England experience: the Is it-Waste (IIW) tool and the Definition of Waste (DoW) service.

In England, Wales and Northern Ireland there are several Quality Protocols (QPs) available for certain recovered wastes and uses. They are voluntary end-of-waste frameworks for specific wastes and end uses based on the relevant end-of-waste case law. These QPs can be regarded as national criteria as meant in article 6 WFD. QPs were published for:

- Aggregates from inert waste;
- Poultry litter ash;
- Processed fuel oil (PFO);
- Pulverised fuel ash (PFA);
- Anaerobic digestate;
- Recycled gypsum from waste plasterboard;
- Non packaging plastics;
- Flat glass;
- Compost;
- Biodiesel;
- Tyre derived rubber materials;
- Biomethane;
- Steel slag (aggregate).

If there is no applicable Quality Protocol, then case-by-case end-of-waste assessment may be undertaken. The guidance "Turn your waste into a new non-waste product or material" states *"If no EU end-of-waste Regulation applies to your waste derived product, you need to make an end-of-waste assessment on the basis of the relevant case law on end-of-waste. The Court of Appeal OSS end-of-waste test generally represents all the case law requirements for the end-of-waste test.*

This test assesses whether:

- *the waste has been converted into a distinct and marketable product, this means:*
- *the waste has been turned into a completely new product, for example a playground surface is produced from waste tyres;*
- *the new product is different from the original waste (minor changes to its composition may not be sufficient), for example non packaging plastic recycled material is processed to make new plastic products;*
- *there is a genuine market for the material, so it will definitely be used – if it's stored indefinitely with little prospect for use the material remains waste;*
- *the processed substance can be used in exactly the same way as a non-waste;*
- *the processed substance can be stored and used with no worse environmental effects when compared to the material it is intended to replace.*

Between 2013 and 2015 an EU Life Project, called EQual, was developed by England's Environment Agency[43] with the aim of improving confidence in waste derived products.
One of the main outcomes of the Equal project was the **IsitWasteTool**, a web application, based on Article 5 (by-products) and 6 (end-of-waste) of the WFD. It makes provisions for self-assessment by the operator aiming to support the decision of whether a material is likely to be a waste or not. This tool has separate sections for by-products and end-of-waste assessment and lists the documents and their main contents that should

[43] EQual stands for Ensuring quality of waste-derived products to achieve resource efficiency. The partners were the Netherlands' Ministry of Infrastructure and the Environment, the chartered Institution of Waste Management, the Organic Recycling Center, The Environmental Services Association, the Northern Ireland Environmental Agency and Energy UK.

be produced for self-assessment of end-of-waste or by-products status. The IsItWaste tool can also be used to make a formal "submission" to the Environment Agency's (EA) Definition of Waste Service in order to get a view from it on end-of-waste or by-products status.

The IsItWaste tool user guide explains that the following steps have to be followed for end-of-waste:

1. ***Start report*** (company details)
2. ***Description and source of the material inputs and the processing:*** details on the Eural code entries, composition and consistency of input waste, as well as data for each processed waste have to be produced; the same for the output material and for other input material (not waste) used in the recovery activity.
3. ***Market assessment:*** evidence must be provided of the current or prospective purchasers of the material as well as the evidence of the price or the economic benefit for the producer.
4. ***Technical product requirements:*** the output material has to be compared against an equivalent non-waste comparator: the reference of existing and suitable standards has to be provided as well as comparison of the physical and chemical properties of obtained material against a virgin material for similar use.
5. ***Environmental and human health impact:*** the applicant must provide information on the environmental and health impact of the output material, showing that no properties, including trace components and contaminants, will lead to an unacceptable risk. If there is a non-waste comparator, the properties of the obtained material have to be compared with that, otherwise a generic or site specific risk assessment has to be performed. For the last purpose a specific guidance was drafted under the Project Equal, "End-of-waste and by-product hazard and risk assessment", which may be used to determine the risk to human health, soil, crops, livestock, air, controlled waters.

In order to support the comparison of the by-product or end-of-waste material with a non-waste material another tool was developed – **the Waste Comparator**. This is an excel file summarising the results of several reports, which collate the analytical results of various materials used as comparators for the uses reported in Table 2. It simply provides characterisation data that may be used for self-assessment or submission purposes.

USE OF THE MATERIAL	NON WASTE COMPARATOR
For materials applied to land	· Manufactured fertilisers · Non-waste biochar · PAS 100 compost · Peat · Soil improver · Straw
For fuels	· Biomass · Charcoal · Coal · Natural gas
For construction materials	· Concrete blocks · Natural limestone aggregate · Non-waste wood used in construction and manufacturing
For animal bedding	· Straw

TABLE 2
List of non waste comparator included in the EA tool.

The analytical results arise from samples analysed by the Environmental Agency's National Laboratory as well as from the literature. The parameters' categories are physical properties, metals, elements (like organic carbon, hydrogen, nitrogen etc.), organic contaminants, nutrients, microbiological contaminants, calorific value and leachability. The samples results may not be exhaustive for self-assessment or Environment Agency reviewed case-by-case submissions.

In conclusion in England end-of-waste assessments are carried out through:

- a self-assessment by the operators, potentially using the IsitWastetool;
- asking for a view from the Definition of Waste (DoW) Service[44] of the EA, which gives an opinion on the self assessed material. There is a charge for the service aimed at recouping all costs associated with the EA's assessment of a case-by-case submission.

ENGLAND: END-OF-WASTE CASE-BY-CASE EXAMPLE

A company receives and treats waste Air Pollution Control residues (APCr) from the incineration of municipal solid waste (MSW). This waste stream is an absolute hazardous waste and is highly alkali and contains a range of leachable metals and metal chlorides.

Following treatment of the APCr to reduce the concentration of leachable substances it is used in the production of precast concrete products as a replacement for aggregate.

The end-of-waste point is after treatment but prior to inclusion in the pre-cast products. The end-of-waste view of the Environment Agency (EA) is only relevant where that material is treated in the way described in the submission to the EA and meets the input and output specifications, and is subsequently used in the manufacture of precast products.

There is a clear market for aggregates and precast concrete products and evidence was provided of this together with details of the waste, waste treatment process and final material.

The potential environmental and human health (HH) impact of the material was considered in the following ways by the operator:

- Development of a 'conceptual' model using a realistic and justified worst case scenario covering storage of the treated unbound material. This model was used as the basis for risk assessment. Potential risk was considered greatest for the storage of the unbound material and so this was the main focus of risk assessment.
- HH impact using a risk assessment for both public and worker exposure using relevant worker exposure limits and other relevant regulations such CoSHH (Control of Substances Hazardous to Health).
- Groundwater (GW) risk assessment and detailed GW impact modelling covering a 1000 year period with both constant and reducing source terms.
- Surface water generic risk assessment using relevant Environmental Quality Limits.

[44] Prior to September 2016 the DoW panel was the mechanism by which the EA Provided case-by-case assessments and was a free of charge service. Due to resource constrains this service was stopped in 2016 and, after a public consultation, which stimulated interest from operators the new service was launched including a charge for its use (EA, personal comunication).

3.4 The French RDC/VNC guidance

In France end-of-waste status is given by the national criteria through ministerial orders. The procedure foresees the issuing of a ministerial order at the end of the assessment procedure performed until now by the Offices of the Ministry, consisting of:

- a consultative phase with the public and private stakeholders;
- submitting a draft of the criteria to a Consultative Commission on end-of-waste (CCSD).

The procedure is under revision. Ministerial order has a general relevance for every operator that fulfils the requirements of the established criteria.

Until October 2018, four national criteria have been approved:

- Wood packaging used as combustible;
- Plants residues used as combustible;
- Used edible oils used as combustible;
- Distillation residues of waste oils uses as plasticiser of bitumen.

Other applications are currently running.

No case-by-case decisions are taken, because it was decided to guarantee harmonised criteria at a national level.

RDC Environment and Vincent Nedellec Consultants (VNC), funded by the public Agency ADEME, drafted a guidance document to support the technical discussions about a new end-of-waste application.

For each topic specific and detailed guidelines were developed and included in the general guide.

The procedure consists briefly of the following steps:

- End-of-waste request – description of the case study, which includes a description of foreseen life cycle with end-of-waste, quality management, description of the uses and other data for stakeholder consultation (waste producer, recyclers and current and potential users).
- Assessment of the 3 first conditions namely the evidence of usefulness and demand (current or potential) and the aspect of relevant product legislation and standards. The last should include REACH. The technical specifications and standards shall include technical and environment and health elements.
- Qualitative risk assessment before use stage, to be performed before the end-of-waste status if the activities aren't covered by environmental permits. This analysis should be carried out also if between the end-of-waste point and the use stage significant changes in composition take place or further treatments (not commonly performed on the substituted product) are applied or if the steps before use are associated with significant additional risks compared to the substituted product.
- Qualitative assessment of environmental and sanitary impacts, at a local and global level, based on the risks related to the presence of hazardous substances for human health or the environment.

In some cases a quantitative health risk assessment should be carried out, for instance if certain hazardous substances of concern are not already regulated for the same purpose by product legislation.

3.5 The Veneto Region (Italy) guidance

In February of 2018 a regional decree (N. 120 of 7th February 2018) was issued as a guidance to assess end-of-waste in case-by-case decisions within the borders of the Veneto Region.

The guidance establishes the procedure and the conditions to apply in order to get an end-of-waste decision. In Italy until 2018 the case-by-case decision was regulated within an Environmental permitting procedure for a recovery plant and the competent authority may be the Region or the Province (an intermediate administrative authority between the Region and the municipalities). At this moment (January 2019), after a Judgment of the National Administrative Court which established that the Competence for the case-by-case end-of-waste decisions belongs to the Environment Ministry, the procedure is under revision.

Currently, national end-of-waste criteria are established for solid recovered fuel (SRF) and asphalt. Some decrees, drafted before the Waste Framework Directive, are also in force.

In the regional guidance, the following worth noting aspects are included:

1. Only non-hazardous waste undergoing a recovery process may be subject to an end-of-waste case-by-case decision (permit).
2. In the case of hazardous waste a pre-treatment should be applied in order to remove hazardous properties before starting the recovery process.
3. In general the mixing of different waste streams has to be avoided except in the case of technical demonstrated reasons and avoiding the dilution of contaminants.
4. In the case of end-of-waste used with direct contact with the soil, a leaching test has to be performed and the limit values of the national decree for water remediation have to be applied.
5. In the absence of environmental and sanitary standards an opinion of the national sanitary authority has to be requested (the local sanitary authority, or the National Institute for Sanity or lastly the Sanitary Ministry).
6. A conformity declaration has to be issued before transferring the end-of-waste to the final user.
7. An experimental procedure may be applied in case of innovative end-of-waste products, submitting to the regional authority a specific application pursuant to article 211 of National environmental Act (Experimental plants).

3.6 The "Waste or product" Guidance of the Netherlands

The Dutch Ministry of Infrastructure and Water Management issued its *"Leidraad afvalstof of product"*, (*"Waste or Product Guidance"*) in July 2018. As the title already suggests, it is a tool for determining the waste status of a material. The guidance can particularly be used by the holders of materials who have doubts about the legal status of the materials concerned. It also serves as guidance for regulators (permitting and inspection authorities).

The guidance starts with discussing the waste definition ('to discard', Article 3 WFD). On the basis of the WFD and related case law from the Court of Justice of the European Union (CJEU), it explains how the waste definition should be applied, addressing all relevant aspects such as the aims of the WFD, the need to consider all the specific factual circumstances involved in a particular case and that, in principle, the burden of proof lies with the holder of the material. Furthermore, it discusses the relevance of end-of-waste or by-product criteria for specific material streams at European or national level (in the Netherlands, national end-of-waste criteria have only been established for recycled aggregates from construction and demolition waste).

Next, the waste definition is further clarified by looking at possible situations where it is unclear whether or not a material has a waste status. References are made to provisions in the WFD and EU case law. Three situations are distinguished, i.e. when a material is or becomes:

1. non-waste ('not to discard' ≠ article 3(1) of the WFD);
2. a by-product (article 5(1) of the WFD); and
3. end-of-waste (article 6(1) of the WFD).

The first situation covers all situations other than those in which it is a matter of by-product or end-waste status. This is for example the case when it is unclear whether a product is destined for reuse or is destined for preparation for reuse or recycling.

The final part of the Waste or Product Guidance deals with how the waste definition and the conditions for obtaining the by-product and end-of-waste status are interpreted in practice. The guidance introduces three benchmarks for assessing the non-waste status. These benchmarks are based on the relevant articles in the WFD and related case law. The use of the assessed material must be:

- lawful;
- certain enough; and
- of a sufficiently high quality (based on the waste hierarchy and waste management plan).

By cross-referencing between the three situations, someone dealing with for instance an end-of-waste case can draw inspiration from 'other' situations as well. Because, regardless of the situation under discussion, in the end, the same question needs to be answered: is a particular material waste or not?

The following Figure 16 shows the three benchmarks and their origin.

	ARTICLE WFD	ARTICLE 4 WFD	ARTICLE 5(1) WFD*	ARTICLE 6(1) WFD
CERTAIN USE			**a** Further use of the substance or object is certain.	**a** The substance or object is commonly used for specific purposes. **b** A market or demand exists for such a substance or object.
LAWFUL USE	This Directive lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste (...).		**d** Further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health protection require-ments for the specific use and will not lead to overall adverse environmental or human health impacts.	**c** The substance or object fulfils the technical requirements for the specific purposes and meets the existiing legislation and standards applicable to products. **d** The use of the substance or object will not lead to overall adverse environmental or human health impacts.
SUFFICIENT HIGH QUALITY USE	This Directive lays down measures (...) by reducing overall impacts of resource use and improving the efficiency of such use.	**1.** The following waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy (...) **2.** When applying the waste hierarchy referred to in paragraph 1, Member States shall take measures to encourage the options that deliver the best overall environmental outcome. (...)	**d** Further use (...) will not lead to overall adverse environmental or human health impacts.	**d** The use of the substance or object will not lead to overall adverse environmental or human health impacts.

* Conditions b and c are not part of the benchmark

FIGURE 16
Benchmarks for assessing the non-waste status.

The guidance provides real-life examples to illustrate how a material is assessed against each benchmark. These examples are from judgments of the CJEU or national courts or from so-called 'declaratory opinions'. The Ministry of Infrastructure and Water Management can issue on request of a company a legally non-binding declaratory opinion on the end-of-waste or by-product status of a material. Declaratory opinions are also published online.

The Ministry of Infrastructure and Water Management also maintains an online tool, which can be used by anyone who wishes to verify the waste or non-waste status of a material.[45]

The following table shows how according to the guidance the end-of-waste status of materials can be assessed against the three benchmarks.

See Table 3 →

[45] www.ishetafval.nl/

BENCHMARK	POINTS OF ATTENTION	SOME EXAMPLES (CASE LAW/OPINION)	COMMENTS
1. Certainty of use (Article 6 (1) WFD, conditions a and b) "The holder must demonstrate that the intended use of a material by himself or someone else is not only possible, but also sufficiently certain that this use will actually take place and the material is also suitable for this".	General examples	· Brady judgement (ECLI:EU:C:2013:627) on slurry produced in intensive pig farming · Palin Granit judgement (ECLI:EU:C:2002:232) on gangue rock released during the operation of a quarry · Foil roll judgment Administrative Jurisdiction NL (ECLI:NL:RVS:2013:2212) on film rolls · Lapin judgement (ECLI:EU:C:2013:142)	· It was ascertained that the reuse as fertilizer was not only possible but certain. · The leftover rock was stored indefinitely awaiting a possible use. If, in addition to the mere possibility of reusing the substance, there is also a financial advantage to the holder in so doing, the likelihood of reuse is high. In such circumstances, the substance in question must no longer be regarded as a burden which its holder seeks to 'discard', but as a genuine product. · Unusable Foil rolls form the start of a production process were transferred in an intermediate company, but it was not demonstrated that there was a real deployment in another production process. The use was uncertain. · Waste remains waste whenever it fulfils the waste definition, even if it has completed a recovery process, which has given the same properties and characteristics as a raw material.
	Written agreements (contracts, invoices...) between holder and buyer	· Declaratory opinion Trimfoam as by-product (2016.11.15) · Declaratory opinion lithium ion cells (2017.09.22) and qualidrink-beverage residues (2017.05.23) · Declaratory opinion tomato stems and leaves (2016.12.22)	· Certainty of the use confirmed by submitting invoices. · Certainty of the use was determined on the basis of letters of intent from customers (market development). · Written agreements in a consortium within the chain of tomato growers and packers.
	Suitability of the material (for the intended use): the material has to meet the contractual requirements (such as quality requirements and composition)	· Declaratory opinion powder coal fly ash for production of asphalt fillers (2016.03.15) · Declaratory opinion Topcrete for the application as corrosion inhibitor (2017.09.22) to replace other building lime or binders.	· Quality controls (sampling and analysis) and compliance with specification established in the contract. · The material complies with the EU harmonized product standard for building lime and is patented.

BENCHMARK	POINTS OF ATTENTION	SOME EXAMPLES (CASE LAW/OPINION)	COMMENTS
	Existing market and market in development	· Declaratory opinion potato peels as a raw material for animal feed production (2017.11.22) · Declaratory opinion flue gas desulphurization plaster for production of cement (2017.06.20) · Declaratory opinion of lithium-ion cells suitable for use in new batteries for stationary energy storage (2017.09.22)	· Several contracts and invoices were presented and the peels were completely sold to the animal feed industry, who pays a positive price for it. · Long term contracts with different companies were presented and it was demonstrated that there is a high demand for flue gas desulphurisation plaster to replace the natural plaster. · The market was under development. It was considered as a functional and desirable application in terms of resource efficiency. Some letters of intent demonstrated that it could become customary and that a market was in development.
	Actual delivery and quantity	· Brady judgment (ECLI:EU:C:2013:627) on slurry produced in intensive pig farming · Declaratory opinion potato peels as a raw material for animal feed (2017.11.22) · Declaratory opinion Topcrete for the application as corrosion inhibitor (2017.09.22) to replace other building lime or binders.	· "the actual storage of the material strictly is limited to the proposed fertilization activities quantity required". · The potato peels are completely sold to the industry, who pays a positive price for it. · It was demonstrated that the product has a sufficient sales market and the contract with the customer established in principle that the total produced amount of TopCrete decreases.
	Brokering (it must be determined whether there is sufficient certainty about the final use of the material)	· Foil roll judgement Administrative Jurisdiction NL (ECLI:NL:RVS:2013:2212) on film rolls	Unusable foil Rolls unusable from the start of a production process were transferred in an intermediate company but it wasn't demonstrated that there was a real deployment in another production process. The use wasn't certain.

BENCHMARK	POINTS OF ATTENTION	SOME EXAMPLES (CASE LAW/OPINION)	COMMENTS
2. Use is lawful (Article 6(1) WFD, condition c) The holder will have to demonstrate that the intended use of a material by himself or another in any case meets all applicable legislation and any private (commercial) standards) and has no adverse effect on the environment and human health.	Product legislation	· Declaratory opinion tomato stems and leaves used for producing packaging (2016.12.22) · Declaratory opinion potato peels as a raw material for animal feed (2017.11.22) · Declaratory opinion powder coal fly ash (2016.03.15)	· The producer of packaging demonstrated the compliance with the Food Contact Materials Regulation. · The compliance with various European and Dutch regulations for animal feed was tested. · The pulverized coal fly ash has a REACH registration and the safety sheet indicates that storage, transport and application don't have any undesirable impact on the environment and human health.
	Private product standards: there may be product specifications established by costumers or based on national standards or on certification systems.	· Declaratory opinion flue gas desulphurization plaster for production of cement or for production of anhydrite cast floors (both dated 2017.20.06) · Declaratory opinion flue gas desulphurization plaster for production of plasterboard and gypsum fiber (2017.20.06) · Legal opinion compost as application soil improver and fertilizer (2017.09.22)	· In addition to REACH the obtained products were tested against EU regulation on construction products (REG. 305/11) and against a national Dutch (NEN) standard for product properties of binder time regulator for cement or screed mortar. · The product was tested against different national specific standards (NEN) and certificated pursuant to assessment guidelines for certification (BRL). · The product was evaluated on the basis of the quality requirements for certificated compost, which is based on the Fertilizers Act.
	Unregulated environmental and health risks: if the standard included in the product legislation or established by the costumer doesn't include limits or parameters to assess the effects on environment and health	· Declaratory opinion beverage residue (2017.05.23): beverage residues are used as carbon source for biological wastewater treatment · Pending declaratory opinion on recovered materials from recycling diapers	· No standards were available, hence the legal use was assessed using the requirements imposed on the original beverages. · No standards are available on medication in materials. With advice of the national Institute for public health and the environment (RIVM) a method to assess the risk will be made.

BENCHMARK	POINTS OF ATTENTION	SOME EXAMPLES (CASE LAW/OPINION)	COMMENTS
	Risks after (re)use of the material	· Declaratory opinion glass granulate of CRT display used as a raw material for concrete blocks (2018.01.31) · Declaratory opinion lithium-ion cells (2017.09.22)	· The environmental risks posed by the concrete in the future product stage were considered in the opinion. This concerned the lead contained in the glass fraction, which would have had redistributed after the granulation process, if it were to be waste. The material did not qualify as end-of-waste. This was amongst others based on REACH. · It was assessed that lithium ion cells after reassembling in new batteries for stationary energy storage at the end of their life are going to be recycled and processed under the provisions of the specific law on Batteries.
3. Use is of sufficiently high quality (talking into account waste hierarchy and waste management plan) (Article 6(1) WFD, condition d) The holder will have to demonstrate that the intended use of a material and has no adverse effect on the environment and human health.	This subject is evaluated on the basis of the Dutch Waste Management Plan, which sets up minimum standards for the treatment of the material as waste or using the waste hierarchy	· Declaratory opinion of citrus peel as a raw material for the production of foodstuff (2018.04.30) · Declaratory opinion tomato plant stems and leafs for the production of cardboard (2016.12.22)	· The minimum standard provisions of the Dutch Waste Management Plan were that citrus peels must at minimum be recycled. The use of such material as product in the food industry was assessed in a positive way, due to the more efficient use compared to the minimum standard · The minimum standard provisions of the Dutch Waste Management Plan were that stems and leafs must at minimum be recycled. The use as cardboard is of sufficient high quality as this use can also been seen as recycling.

TABLE 3
Examples included in the guidance "waste or product" on how the end-of-waste status of materials can be assessed against the three benchmarks..

3.7 The Spanish system

Article 5 of Law 22/2011, of July 28, on waste and contaminated soils, grants the Ministry of Agriculture and Fisheries, Food and Environment the power to establish by ministerial order, specific end-of-waste criteria for certain types of waste that have undergone a recovery operation.

There is no procedure for operators to request for an end-of-waste declaration like there is for by-products (Procedure for by-product Declaration[46]). It is the Ministry that decides on the waste streams for which it is most appropriate to evaluate the possible establishment of end-of-waste criteria.
Currently, priority is being given to those waste streams that may have greater environmental relevance, considering the type of waste, the impact on large sectors of economic operators and the quantities of waste affected.

[46] https://www.miteco.gob.es/en/calidad-y-evaluacion-ambiental/temas/prevencion-y-gestion-residuos/171212procedimientodeclaracionsubproductoaprobado20171212_tcm38-435981.pdf

4 GUIDANCE ON PROVIDING INFORMATION TO DEMONSTRATE END-OF-WASTE STATUS

The table below provides guidance on what information may be used to substantiate that a material meets the conditions and (where necessary) requirements set out in Article 6 WFD. Under the column “Reference” references are made to MS examples of methodologies or guidances, discussed in the previous Sections 3.1 – 3.7 which may contain relevant suggestions.

In the same table the possible general contents of a voluntary end-of-waste “passport” is described. An end-of-waste passport could be a voluntary document that may be adopted in order to promote transparency about the end-of-waste assessments when the end-of-waste material moves across borders between MSs.

See Table 4 →

DIRECTIVE PROVISIONS	GUIDANCE ON PROVIDING INFORMATION TO DEMONSTRATE END-OF-WASTE STATUS			VOLUNTARY END-OF-WASTE PASSPORT	
	REQUESTED INFORMATION	INDICATIVE CONTENTS	REFERENCE		
Conditions (Art 6 Paragraph 1 WFD 2018)				General information about the operator, the Authority which assessed or which verified the end-of-waste status (if not only self assessed).	What end-of-waste assessment procedure has been followed and date of decision/ assessment: · Prior decision (permit, legal opinion, state-ment...). · Self assessment · Verification after self assessment: report.
a. the substance or object is to be used for specific purposes	***Definition of the use***	**1.** Description of the intended use (process, function...). **2.** Description of the substituted virgin material. **3.** Description of the product (end-of-waste) performances, showing, if possible, a comparison with the non virgin substituted material or with a non waste comparator (see also condition c). **4.** In case of experimental end-of-waste (eco-innovative case) description of the potential use, proposing also the expected performance.	· See for example Section 3.3 of this Tool, Part A, (England) · See for example Section 3.6 of this Tool, Part A, (NL)	Short Description of the intended use.	

DIRECTIVE PROVISIONS	GUIDANCE ON PROVIDING INFORMATION TO DEMONSTRATE END-OF-WASTE STATUS			VOLUNTARY END-OF-WASTE PASSPORT	
	REQUESTED INFORMATION	INDICATIVE CONTENTS	REFERENCE		
b. market or demand exists for such a substance or object	***Existence of a market***	**1.** If possible, description of the existent or potential market for the product in comparison with the virgin substituted material. **2.** Description of the commercial agreements with the users, attaching following documents: a. Contracts with the end users or b. Letters of intents, purchaser agreements or c. Possible sales evidence. **3.** Description of the required storage time: an assessment of the storage time needed to manage the delivery of the product to the user and to overcome the potential market demand fluctuations may be required. **4.** In case of brokering, commercial agreements with the end users have to be demonstrated (see point 2). **5.** In case of experimental end-of-waste (eco-innovative case), commercial agreements (like letters of intent) and if possible potential sales evidences.	· See for example Section 3.3 of this Tool, Part A, (England) · See for example Section 3.6 of this Tool, Part A, (NL) · See for example Section 3.1 of this Tool, Part A, the JRC methodology (EU) · See for example Section 3.4 of this Tool, Part A, (France)	Short description of the existence of a market.	

DIRECTIVE PROVISIONS	GUIDANCE ON PROVIDING INFORMATION TO DEMONSTRATE END-OF-WASTE STATUS			VOLUNTARY END-OF-WASTE PASSPORT	
	REQUESTED INFORMATION	INDICATIVE CONTENTS	REFERENCE		
c. the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products	***Technical standards***	**1.** The product legislation that may be applied to the product for the specific use has to be listed, for instance: a. REACH; b. Applicable EU product regulation; c. National Regulations or other MS Regulations; d. Private standards. Results of testing the product against the technical standards and, if possible, comparison of the result with a non-waste comparator. **2.** In case of experimental end-of-waste: detailed description of the test and experimental design to be performed during the experimental stage in order to define the technical standards to be met for the intended use.	· See ECHA guidance raw materials + Chapter 2 ANNEX D · See for example Section 3.6 of this Tool, Part A, (NL)	· List of technical standards applied to the end-of-waste. · List of technical parameters. · Conformity analysis.	
	Environmental standards	**1.** Description of the environmental standards included within the technical standards. **2.** If necessary, define specific environmental standard. **3.** Provide data on the end-of-waste compliance with environmental standards.	· See for example Section 3.1 of this Tool, Part A, the JRC methodology (EU)	· List of environmental standards. · List of environmental parameters. · Conformity analysis.	

DIRECTIVE PROVISIONS	GUIDANCE ON PROVIDING INFORMATION TO DEMONSTRATE END-OF-WASTE STATUS			VOLUNTARY END-OF-WASTE PASSPORT	
	REQUESTED INFORMATION	INDICATIVE CONTENTS	REFERENCE		
d. the use of the substance or object will not lead to overall adverse environmental or human health impacts.	***Overall impact on environment and human health evaluation***	**1.** A qualitative description of the environmental or human health impact for the use of the end-of-waste. **2.** The impacts may be evaluated using a non waste comparator. **3.** The impacts may be evaluated by a risk analysis. **4.** Information about efficient use of the resource, if available, may be added.	· See for example Section 3.3 of this Tool, Part A, England (EPA 2016, A waste comparator; EPA 2014, end-of-waste and by-product hazard and risk assessment) · See for example Section 3.6 of this Tool, Part A, NL · See for example Section 3.4 of this Tool, Part A, France · See for example Section 3.2 of this Tool, Part A, Flanders · See for example Section 3.1 of this Tool, Part A, the JRC methodology (EU)	Description on how was demonstrated that the use of the substance/object doesn't lead to overall adverse environmental and human health impacts.	
Optional requirements ***Art 6 paragraphs 3 and 4 in connection with paragraph 2 (detailed criteria a-e)***					
a. Permissible waste input for the recovery operation		**1.** Description of the types of input waste. The EER codes fitting with the material intended to be recovered may also be listed. **2.** Specifications on limit values on pollutants may be reported.	· See for example Section 3.1 of this Tool, Part A, the JRC methodology (EU)	List of EER codes used for end-of-waste production and eventual pollutants checked in the input waste.	

DIRECTIVE PROVISIONS	GUIDANCE ON PROVIDING INFORMATION TO DEMONSTRATE END-OF-WASTE STATUS			VOLUNTARY END-OF-WASTE PASSPORT	
	REQUESTED INFORMATION	INDICATIVE CONTENTS	REFERENCE		
b. Allowed treatment processes and techniques		A description of the recycling or preparation for reuse steps in order to achieve the end-of-waste status is reported, including: a. R code activity; b. The need of a pre-treatment; c. Information about mixing step if several waste fluxes are blended.	· See for example Section 3.1 of this Tool, Part A, the JRC methodology (EU) · See for example Section 3.5 of this Tool, Part A, the Veneto Region Italy guidance	Short description of the recycling or preparation for reuse process.	
c. Quality criteria for end-of-waste materials resulting from the recovery operation in line with the applicable product standards, including limit values for pollutants where necessary		Technical and environmental standards (see condition c).		See condition c.	
d. Requirements for management systems to demonstrate compliance with the end-of-waste criteria, including self monitoring, and accreditation, where appropriate		The Quality assurance system is described in relationship with the end-of-waste compliance with the criteria (a) to (c).		Short information on the QAS adopted.	

DIRECTIVE PROVISIONS	GUIDANCE ON PROVIDING INFORMATION TO DEMONSTRATE END-OF-WASTE STATUS			VOLUNTARY END-OF-WASTE PASSPORT	
	REQUESTED INFORMATION	INDICATIVE CONTENTS	REFERENCE		
e. A requirement for a statement of conformity		A scheme of statement of conformity is proposed in order to demonstrate compliance with the criteria. The frequency of the analysis (for technical and environmental standards) is described.		A copy of statement of conformity, if requested by the MS legislation.	

TABLE 4
Guidance on providing information to demonstrate end-of-waste status.

5 PROCEDURES FOR EXPERIMENTS TO PRODUCE A NEW END-OF-WASTE

Where innovative recovery treatment processes produce new end-of-waste materials, for which uses or technical/environmental standards are not yet established, it may be important to promote an experimental procedure or permits in order to test new materials at a reduced scale so as to stimulate innovations which contribute to the circular economy.

At a national level there are examples of acts that have specific provisions on permitting of trial operations. See for instance the Italian and Austrian Waste Management Acts and the England Modernising Waste Regulation which can issue "trials Regulatory Position Statements". Article 15, point 5 (see also Annex A of chapter 2) of IED allows for a testing period (9 months maximum) to perform trials and to test emerging techniques.

The examples given below show that a possible general experimental procedure may require:

- Short term permit;
- Small scale size of the plant;
- Experimental trials, that should for instance:
  - demonstrate that there is a sure use and a market for the end-of-waste materials;
  - demonstrate that a full scale upgrade of the process is feasible;
  - define technical and environmental standards;
  - support gathering of information to allow evaluation of the overall impact on the environment and human health.

IT: RECOVERY PLANT FOR DIAPERS

In Italy an eco-innovative plant to recover diapers obtained by a specific separate collection of nappies and diapers from MSW was built. The process includes a sterilization step and then a separation of several fractions, like plastics, cellulose and the SAP ("super-adsorbent"). A permit for an experimental recovery plant was granted pursuant to article 211 of National Environmental Act (experimental plants). The permit has a short time of validity (2 years, that may be repeated) and the plant works at a small scale (1.500 Mg/year).

In the application documents the potential uses of the outcomes were explained and many letters of intent of the end users were delivered. Also sales evidence was provided. The plastic is already used as end-of-waste pursuant to national criteria. The purpose of the experimental step is to test the use of cellulose and SAP as end-of-waste in different industrial facilities at full scale, in order also to define technical standards. Environmental standards are going to be tested, taken into account also a representative number of active ingredients included in medicines, that may be present as residue in the recovered fractions. The latter is also used to evaluate the overall impact on environment and human health.

AT: USE OF WASTE IN CEMENT FACTORIES

In Austria an experiment to use waste and secondary raw materials in a cement factory had positive outcomes. Tyres, sludge, spent solvents as well as plastic are used for co-incineration in the main and in the secondary furnace. Secondary raw materials (slags, ashes, C&D waste and waste from decontamination sites) are used as corrective and slags, ashes as well as steel by-products are used as clinker components. The plant was granted a permit to treat/use waste pursuant to the national Waste management act. A special permitting procedure, laid down in the Waste Management Act, was applied in order to test the change of waste origin, new type of waste, change of point of input. In the test period intensive monitoring of emissions was carried out. The permit established environmental quality requirements for the input waste, especially related to heavy metals.

NL: RESELLING OF COLLECTED AND SORTED LATEX PAINT

In the Netherlands an experiment to collect and sort latex paint aiming at reintroducing used paint as second-hand paint resulted in a mixed outcome. Paint buckets with a certain level of paint where transported from municipal waste collecting points to a central point to be sorted out in good quality and volume paint and unusable paint. The good quality paint would be sold again at a second-hand shop. A special short permitting procedure, laid down in the main permit, was applied in order to allow this activity (collecting, sorting and storing of the different quality paints) and to monitor the recovery-efficiency of consumer quality latex paint. The end-of-waste status was self-assessed by the operator. The permit established environmental quality requirements for the disposed waste as well as the recovered paints.

PART B
PROPOSAL FOR A DATABASE COLLECTING END-OF-WASTE CASE-BY-CASE DECISIONS

1 INTRODUCTION AND PURPOSE OF THIS TOOL

This tool aims at creating the structure of a voluntary database to help permit writers, inspectors and operators to find information on end-of-waste case-by-case decisions or resulting from self-assessment verification.

The suggested database, which is not mandatory, is one of the possible tools to answer to the following indications of the WFD 2018:
Article 6: "*Member States may make information about case-by-case decisions and about the results of verification by competent authorities publicly available by electronic means*".
Article 38: "*The Commission will organize a regular exchange of information and the exchange of best practices among Member States, including, where appropriate, with regional and local authorities, on the practical application and compliance with the requirements of this Directive, including: (d) the national by-product and end-of-waste criteria, referred to in Article 5, Paragraph 3, and in Article 6, Paragraphs 3 and 4, provided by an electronic register at Union level that will establish the Commission*".

Actually, only national end-of-waste criteria issued in Member States are collected in the Technical Regulation Information System (TRIS[47]) database, managed by DG GROW (http://ec.europa.eu/growth/tools-databases/tris/en/search/). TRIS enables Member States and the Commission to inform and be informed about new draft technical regulations and to detect potential barriers to trade before they have any negative effects.

[47] Under the Transparency procedure (see the Single Market Transparency Directive (EU) 2015/1535) Member States are obliged to notify to the Commission all draft technical regulations concerning products and information society services before they are adopted in national law. In 1983 a transparency procedure was set up and the Technical Regulation Information System (TRIS) established.

The access to the pieces of information gathered in the suggested database could encourage uniformization across Member States and allow to identify common technical and environmental standards, making end-of-waste movements across the borders easier.
At the same time, such a database could help operators to find information such as standards and provisions set in other Member States for the same secondary raw material they would like to produce, in order to gather a comprehensive documentation when accessing a self assessment or permitting procedure.
Public access is considered an added value with respect to transparency, availability of environmental data and building trust on new products derived from recycling of waste. Eco-innovative products are likely not to be known by many actors and this can create difficulties to customers as well as to public authorities.
The lack of information and uniformization is an obstacle to innovation and detrimental to exchange of best practices, particularly in those situations where no market is present at all and there are no technical standards to refer to.
The fields evaluated in this work are a starting point to elaborate a new database that collects the information related to case-by-case decisions. The database may become a strategic tool to promote the exchange of information and to guarantee uniformity of behaviour for the proper circulation of end-of-waste new products.

2 CONTENT OF THIS TOOL

This tool (Part B) covers the following topics:

- Overview on the existing databases in Member States, see Section 3.
- Structure of the proposed database, see Section 4.
- Action plan for the database implementation, see Section 5.

3 OVERVIEW OF THE EXISTING END-OF-WASTE DATABASES IN MEMBER STATES

The present section provides an overview on the existing end-of-waste databases across Member States, as resulting from the gathered answers to a survey preliminarily circulated and from further interviews.

3.1 Public databases

a. Italy

There is not a national database on end-of-waste. Regione Veneto has implemented one quite detailed database[48] of waste management facilities, requesting data as end-of-waste codes, waste streams, name and localization of the enterprise and the recovery/disposal activity allowed by the permit. A browser to find out recovery plants authorized for specific waste streams is available.

As far as end-of-waste is concerned, Regione Veneto has a not public available database which includes the specific end-of-waste that an operator produces according with the categories reported in a National Decree (Environmental Ministry Decree DM 05/02/98). The Regional Waste Observatory of Veneto Region made an inventory in 2013 and 25 case-by-case decisions were registered. A new inventory has started in 2018 that includes the following pieces of information:

- name of the enterprise;
- localization of the plant;
- number and date of the permit;
- EWC code and description of the allowed waste;
- end-of-waste technical and environmental standards;
- end-of-waste description.

A not mandatory database at a national level, on by-products, has been established in 2016. The above mentioned database, run by the Chambers of Commerce, is aimed to promote the exchange and trade of by-products. Producers and users subscribe, without financial burdens, to a list that is made public and freely consultable. The entry in the list of the producer or the user is not compulsory and the lack of registration does not imply the immediate inclusion of the residue in the category of waste. The list can be consulted on the website *www.elencosottoprodotti.it*.

b. UK- England

The Environment Agency does not have a publicly available database for case-by-case assessments. There are a range of publically available national Quality Protocols which specifically define the criteria for the end-of-waste status for some waste streams. These are available to download on the website and were notified to EU commission *https://www.gov.uk/guidance/turn-your-waste-into-a-new-non-waste-product-or-material*.

c. The Netherlands

Rijkswaterstaat (Ministry of Infrastructure and Water Management) has a publicly available list of end-of-waste case-by-case assessments issued by the Ministry (i.e. the so-called declaratory opinions), which can be

[48] *http://www.arpa.veneto.it/temi-ambientali/rifiuti/datirifiuti/impianti_rifiuti.php?prov=VR*

considered as a database[49]. Only the final assessment document is available, while a complete dossier is available in a restricted online area that is only accessible to government officials. Each published declaratory opinion contains a detailed description of the situation concerned, including the composition and origin of the (waste) material (i.e. the stage before the recovery process); the recovery process and the composition and use of the (potentially recovered) material (i.e. the stage after the recovery process). It also contains a description of the legal framework, whereupon the actual assessment of the specific case follows.

The declaratory opinions on end-of-waste so far available on the website address:

- compost;
- PVC-granulate for a waste recycler;
- activated carbons for water purification;
- lithium-ion cells for battery recycler;
- lithium ion-batteries for a battery recycler;
- television glass, (negative decision) building company;
- topcrete anti-corrosive;
- tomato and paprika leaves juice.

d. Croatia

Croatia has implemented a simple database that collects the following fields:

- name of the operator;
- types of waste involved in the recovery process;
- name of the product.

The following end-of-waste registrations have been included so far:

- 11 operators: activity of managing non-hazardous and/or hazardous types of waste;
- 6 operators: local municipal companies producing compost, by green areas maintainance;
- 1 operator: recycling industrial rags and textiles;
- 3 operators: biogas plants producing anaerobic digestate and non-hazardous waste from the agricultural and food industry;
- 6 operators: recycling construction waste companies;
- 1 operator: municipal company recovering bulky waste;
- 1 operator: municipal company producing wood chips as biofuel.

e. Spain

There is not a national database on end-of-waste. Nevertheless, every end-of-waste act is available on the Ministry website (*https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/prevencion-y-gestion-residuos/comision-coordinacion/Procedimiento-Evaluacion-Subproducto.aspx*). Currently, two end-of-waste acts have been published in Spain. In addition, other evaluations under development, can be consulted on the same website.

Regarding information on by-products at national scale, already published acts, submitted projects under evaluation and finally rejected proposals can be also consulted on the same site. There is not a national database on by-products. At regional scale, for example, in Catalonia, the Waste Agency of Catalonia promotes the exchange and trade of some types of waste within that region, which have not yet been considered as by-products as foreseen by Law 22/2011 *http://www.residuorecurso.com/es*.

[49] *https://www.afvalcirculair.nl/onderwerpen/afval/toetsing-afval/*

Another example is the Andalusian Region where a tool has been developed in order to exchange information on some types of waste within that region, which have not yet been considered as by-products as foreseen by Law 22/2011. This tool is run by some Andalusian Chambers of Commerce (*http://www.juntadeandalucia.es*)

3.2 Private databases

Some EU-wide, private databases on wastes exist. They are market oriented, therefore they usually do not specify among waste, by-product or end-of-waste. The analysis of the included information allows to identify which secondary raw materials are more demanded by industrial sectors.

It is worth to mention the following:

a. Europe's Recycling Marketplace (*euro.recycle.net*)

It connects buyers & sellers online and deals with some of the more demanded waste fluxes by the industry:

- scrap Metal Recycling;
- automotive Recycling;
- non-Metallic Materials Recycling;
- surplus, Second Hand & Reusable Goods;
- eco-Friendly Products.

b. European Recycling Composite Index (*https://www.eurorecyclate.com/cgi-bin/composite_prices.cgi?id=100021*)

The European Recycling Composite Index tracks the changing market prices across the spectrum of the recycling industry in Europe. The Index is a composite Index of 11 industry sectors within the recyclable and secondary materials marketplace. The sectors include ferrous metals, non-ferrous metals, exotic metals, waste/scrap paper, plastics, textiles, tire/rubber, electronics, recovered minerals, curbside materials, waste energy and automobile related scrap. The Index includes snapshots of 5 viewpoints of market trends: the past 7 days, past 30 days, past 90 days, past 1 year and past 2 years.

c. wastechange.com (*www.wastechange.com*)

Wastechange.com has been established as a waste exchange network to promote waste diversion. It operates as an online information exchange that matches waste generators and recyclers with the goal of achieving waste reduction. Wastechange.com has been established as a free service to promote waste diversion between local recyclers who collect materials from local commercial and industrial waste generators.

The above presented databases of wastes work like stock exchange, giving price information, so it could be useful for the operators to gather evidence about the existence of markets.

4 STRUCTURE OF THE PROPOSED DATABASE

The suggested voluntary database is excel based, the idea behind it is to keep it easy to be filled in, simple and clear.

The pieces of information requested are grouped in six clusters:

1. ***Compiler information:*** This section is relative to whom is filling in the database; it may be useful if somebody wants to contact the compiler. All the fields are required.
2. ***Permitting authority:*** This part is requested when the end-of-waste status is granted within a permit. It is not requested in case of operator self-assessment. Contact details of the permitting authority can be useful if asking for more information is needed.
3. ***Recycling company:*** This part is optional; the data of the producer can be public available if included in a permit. In case of self assessment, it is up to the operator whether to publish the requested information or not.
4. ***Input waste:*** It contains crucial information about provisions of the waste to be recycled.
5. ***Treatment and final use:*** This section requires information about the recycling process, the destination market of the end-of-waste, the substance/material replaced by end-of-waste, etc.
6. ***Environmental and technical standards:*** This section collects crucial data about technical standards required, environmental standards, REACH registration.

To respect the protection of privacy, sensitive fields are optional while technical information is mandatory.

Where possible there is a drop-down menu since it very important to avoid different definitions of the same products. Obviously not all the fields can be fixed with the drop-down menu and so there are some free fields.

The structure of the excel database is here presented:

COMPILER INFORMATION	REQUIRED FIELD	1	Member State
	REQUIRED FIELD	2	Name of the Institution of the compiler
	REQUIRED FIELD	3	Role of the compiler
	REQUIRED FIELD	4	Compiler Name
	REQUIRED FIELD	5	Compiler email address
PERMITTING AUTHORITY (IF THE CASE)	REQUIRED FIELD	6	Permitting authority
	REQUIRED FIELD	7	Authorization number
	OPTIONAL FIELD	8	Contact person at the permitting authority
	OPTIONAL FIELD	9	Email of the contact person
RECYCLING COMPANY	OPTIONAL FIELD	10	End-of-waste producer
	OPTIONAL FIELD	11	City
	OPTIONAL FIELD	12	Company email address
	OPTIONAL FIELD	13	Geographic coordinates
	OPTIONAL FIELD	14	Website
INPUT WASTE	REQUIRED FIELD	15	Input waste (typology)
	REQUIRED FIELD	15bis	If other, which?
	REQUIRED FIELD	16	Max Incoming waste (t/y)
	REQUIRED FIELD	17	Temporary storage capacity (t)
	REQUIRED FIELD	18	Maximum storage time
	REQUIRED FIELD	19	Kind of industry/stream
	REQUIRED FIELD	19bis	If other, which?
	REQUIRED FIELD	20	EWC
	REQUIRED FIELD	21	Hazardousness
	REQUIRED FIELD	22	Input waste requirements
	REQUIRED FIELD	22bis	If other, which?
	REQUIRED FIELD	23	Frequency of the waste characterization
TREATMENTS AND FINAL USE	REQUIRED FIELD	24	Recycling process
	REQUIRED FIELD	24bis	If other, which?
	REQUIRED FIELD	25	Destination market of the end-of-waste
	REQUIRED FIELD	26	Substance/material replaced by end-of-waste
	REQUIRED FIELD	27	Direct contact with the environment or consumption cycle
	REQUIRED FIELD	28	If other, which?
	REQUIRED FIELD	29	Re-use in another production cycle
	REQUIRED FIELD	30	If other, which?
	OPTIONAL FIELD	31	End-of-waste Storage – Quantity limit
	OPTIONAL FIELD	32	End-of-waste Storage – Time limit
	OPTIONAL FIELD	33	Transport system between recycler and final user

ENVIRONMENTAL AND TECHNICAL STANDARDS	REQUIRED FIELD	34	Compliance limits fixed for the use of the end-of-waste in the sector it is intended to be used
	REQUIRED FIELD	35	Technical standards (EPA, EN, ISO, ...) to be complied
	REQUIRED FIELD	36	"Technical parameters" for which a limit is set
	REQUIRED FIELD	37	REACH/CE registration
	REQUIRED FIELD	38	Chemical analysis for conformity limits
	REQUIRED FIELD	38bis	Frequency
	REQUIRED FIELD	39	In the absence of chemical analysis, list the guarantees required to the company for the conformity of the EoW
	REQUIRED FIELD	40	Environmental standards to be complied with
	REQUIRED FIELD	41	"Environmental parameters" for which a limit is set
	REQUIRED FIELD	42	The use of the substance or object will not lead to overall adverse environmental or human health impacts

5 ACTION PLAN FOR THE DATABASE IMPLEMENTATION

The implementation of the end-of-waste case-by-case database will be achieved following a roadmap of consecutive steps that will be planned within the ongoing IMPEL "Waste management and Circular Economy" project.

Relevant questions to be solved during the project, as they strongly influence the success of the database, are:

- Where to host the database?
- Who is going to fill in the data?
- Who is taking care of maintenance?
- Which is the cost of maintenance?

A list of possible actions is here presented:

First step: testing phase of the excel file

Some of the members of the IMPEL project will be asked to fill in the excel file, in order to start a "testing phase" aiming at collecting remarks on the compiling activity. At the end of this step, the fields of the excel file can be amended and/or integrated according to the feedback reported by the compilers.

Second step: Building a demo on the IMPEL website

The Excel based database will be converted in a web-based one; a demo will be produced to be hosted in the IMPEL website.
A further pool of IMPEL members will be identified to test the web-based database. A guideline with compilation criteria will be drafted and published as well.

After six months from the publication on the IMPEL website, the structure of the database will be revised to come up with the final official version. A cost evaluation of the necessary continuous maintenance will be performed and a team will be appointed to this essential part.

Third step: promoting the database – communication strategy

To give visibility to the tool, it will be asked to promote its use within the IMPEL network. A communication strategy will be in place to spread the tool and encourage its use.

A desirable outcome would be to promote national protocols to ratify the use of the database. The support of EU DG Environment to disseminate the tool to the Member States would be crucial for a diffuse use and the efficiency of the database.

The suggested database on case-by-case end-of-waste decisions could be useful to the Commission when setting the electronic register on best practices (Article 38 of WFD 2018).

A connection with TRIS database collecting end-of-waste national criteria, is also worth to be investigated.

PRACTICAL TOOL 2

BUILDING BLOCKS FOR INSPECTING END-OF-WASTE ACTIVITIES

1 INTRODUCTION

In a move toward a circular economy, (recycled) waste is increasingly viewed as a source of raw materials or products. This creates new markets and opportunities for legitimate businesses. At the same time, these new markets and opportunities can also be attractive for illegal operators who disregard the law and undercut lawful operators. Regulators, in particular Inspection Authorities, have to balance potentially competing demands to:

1. encourage circular innovations, and
2. assure compliance with legislation, but also
3. prevent environmental crime.

Environmental inspections are an important tool in helping to meet this challenge.

2 PURPOSE AND MAIN TARGET AUDIENCE OF THE TOOL

The main objective of this Tool is to help raise awareness and build a common understanding of the planning and performing of inspections in the waste recovery or recycling chain (end-of-waste recycling installations, waste and end-of-waste fluxes). Promoting end-of-waste recycling or other recovery processes within the framework of circular economy has important consequences for the activity of the Environmental Inspection Authorities, which have to align their planning activities and competences according to the following new tasks:

- inspecting compliance of end-of-waste processes producing new (secondary) products destined to new markets;
- prevent and tackle new waste crimes related to illegal production of supposed end-of-waste.

WFD 2018 (Recital 17) states, *"in order to prevent illegal shipments of waste and to raise awareness among Member States and economic operators, there should be greater transparency about Member State approaches to end-of-waste status"*. It is indisputable that the Inspection Authorities have to play an important role to contribute to this goal.

This Tool aims to support Environmental Inspection Authorities involved at different levels and at different instances of the waste recovery or recycling chain. It can also help to make businesses aware of the actions they may be required to take and the information and documents that may be required during inspection activities.

This Tool provides suggestions to adapt and refine the inspection strategy, by including specific actions in the steps of the "inspection cycle", as

described in the step-by-step IMPEL Guidance book for the planning and undertaking of environmental inspections "Doing the Right Things"[50], see further Section 11.
Furthermore, this Tool gives guidance for Environmental Inspection Authorities when performing an inspection in any of the steps of the end-of-waste recovery chain, see further Section 9.

It is hoped that this Tool will also contribute to preventing and tackling environmental crimes related to the waste recovery and recycling chain. It is therefore also of relevance for the work of environmental prosecutors. As pointed out in the Commission Document *"Environmental Compliance Assurance – scope, concept and need for EU actions"* (Action 4), environmental crimes, with particular reference to waste crimes, are amongst the most serious forms of non-compliance and cooperation is needed at different levels.
Circular economy and eco-innovation, promoting a new market for secondary raw materials and by-products, are going to bring important modifications to society, and the Inspection Authorities are at the forefront of this new challenge: they do not have to chase the change but to anticipate it, investing in technical skills and developing appropriate inspection strategies.

3 SCOPE OF THE TOOL

This Tool will provide:

- an overview of the relevant inspection regimes related to the topic of end-of-waste;
- an overview of the end-of-waste inspection systems across the EU;
- suggested contents of inspections at different instances of the "recovery chain";
- a checklist for end-of-waste inspections;
- suggested content for inspection strategies and planning when including end-of-waste fluxes and recycling facilities.

The aspect of production and use of secondary raw material is further explained in Section 2.2 of the Guidance. Inspection as a key element of the operational cycle of regulators is also analysed in Section 3.4 of the Guidance.

[50] https://www.impel.eu/wp-content/uploads/2016/06/step-by-step-guidance-book-final-2007-12-11.pdf http://impel.eu/wp-content/uploads/2015/01/Step-by-step-guidance-for-IED-Inspections-June-2013-final-080713.pdf

4 TERMS

In this tool the following terms are used.

Conditions: Article 6 paragraph 1 of the WFD 2018 states that Member States shall take appropriate measures to ensure that waste which has undergone a recycling or other recovery operation is considered to have ceased to be waste if it complies with the following four conditions:

a. the substance or object is to be used for specific purposes[51];
b. a market or demand exists for such a substance or object;
c. the substance or object fulfils the technical requirements for the specific purposes 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.

Criteria: detailed end-of-waste (End-of-waste) criteria on the application of the conditions laid down in Article 6 paragraph 1 of the WFD 2018 can be established to certain types of waste at EU or national level. Criteria shall satisfy the requirements laid down in points (a) to (e) of Article 6 paragraph 2 of the WFD 2018.

Requirements: they are laid down in Article 6 paragraph 2 of the WFD 2018 and shall be considered when defining EU and national end-of-waste criteria. Where these criteria have not been set and a Member State decides on a case-by-case basis, or verifies, that certain waste has ceased to be waste these requirements shall also, where necessary, be considered (article 6, paragraph 4 WFD 2018):

a. permissible waste input material for the recovery operation;
b. allowed treatment processes and techniques;
c. quality criteria for end-of-waste materials resulting from the recovery operation in line with the applicable product standards, including limit values for pollutants where necessary;
d. requirements for management systems to demonstrate compliance with the end-of-waste criteria, including for quality control and self-monitoring, and accreditation, where appropriate; and
e. a requirement for a statement of conformity.

Environmental Inspection Authority: an authority in a MS competent for carrying out inspections to assure compliance with relevant environmental legislation, (environmental permit) conditions etc...

[51] The extent of the Tool includes the provisions of the WFD 2018 (Directive 2018/851) that amended Article 6 of the Directive 2008/98/EC on waste. The first end-of-waste condition (*"the substance or object is commonly used for specific purposes"*) has been changed as follows: *"the substance or object is to be used for specific purposes"*, opening therefore to new products and markets not necessarily already known, that inspection authorities have to confront with.

5 AN OVERVIEW OF THE END-OF-WASTE INSPECTION SYSTEMS ACROSS THE EU

End-of-waste status assessment follows different processes and approaches across Europe. This was an important finding of the survey carried out within the context of developing this guidance. A prior permitting system as well as an operator self-assessment and verification system are used in different Member States. General binding rules, Quality protocols and declaratory legally non-binding opinions are tools used as well.

End-of-waste criteria can be set at European or national level. According to the WFD 2018, *"Where criteria have not been set at either Union or national level, a Member State:*

- *may decide on a case-by-case basis,*
- *or take appropriate measures to verify, that certain waste has ceased to be waste on the basis of the conditions laid down in paragraph 1 and, where necessary, reflecting the requirements laid down in points (a) to (e) of paragraph 2, and taking into account limit values for pollutants and any possible adverse environmental and human health impacts".*

The inspection system should therefore reflect the approach of end-of-waste assessment which can be achieved by a case-by-case permitting process or a case-by-case self-assessment by the operator; legally binding/non-binding opinions are also used. See for further details the Guidance, Section 2.2.1 *(Different practices and approaches in countries in Europe)* and Practical Tool 1.

The following Figure summarizes the inspection approaches:

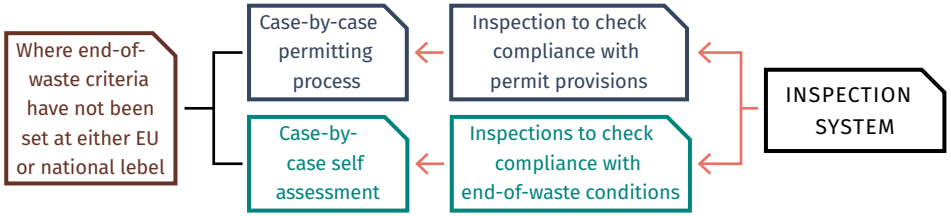


FIGURE 17
Inspection systems based on different end-of-waste assessment approaches

The content of the inspection is different in the two above mentioned approaches. In the case of self-assessment, the end-of-waste status is not explicitly granted beforehand by the government for instance in the specific permit of the installation. Compliance with the general end-of-waste conditions should be checked (verified) by the Inspection Authority during the inspection activities. It implies to have an efficient inspection system in place to guarantee a level playing field across the MS. The legal non-binding opinion, where present, can function as guidance for the Inspection Authority to check compliance.

To sum up, the different duties of the Inspection Authority can be outlined as follows based on the different approaches to reaching end-of-waste status[52]:

[52] Some MS offer legal opinions on the self-assessed material (e.g. view from the Definition of Waste (DoW) Service of the EA -UK) that have to be considered in the inspection activity to check compliance with WFD.

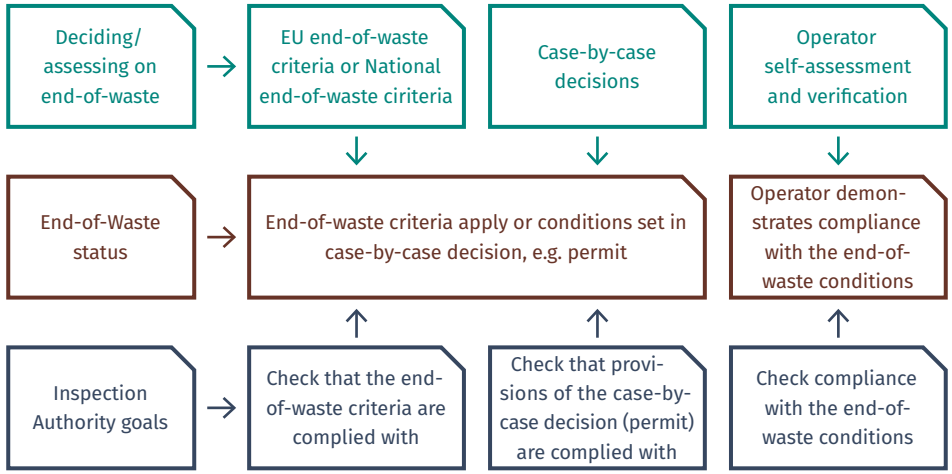


FIGURE 18
Inspection content according to end-of-waste assessment approach

An efficient verification system is therefore crucial to ensure compliance with end-of-waste conditions or criteria or with what has been prescribed in permits or assessed by regulators, since especially the absence of specific EU or national criteria and a statement of conformity can lead to uncertainties and inconsistent applications of the rules.
The results of the survey carried out within the context of developing of this guidance indicated that many of the Member States neither adopted a specific strategy for end-of-waste inspections nor have a checklist available to conduct inspections on this topic.

6 INSPECTION REGIMES

End-of-waste is a cross cutting topic where several items of EU law may apply:

- Waste Framework Directive;
- Industrial Emission Directive;
- Waste Shipment Regulation;
- REACH Regulation;
- Product technical standards (ISO, EN, CE-marking).

A set of non-binding general criteria on inspections is set out in Recommendation 2001/331/EC providing for minimum criteria for environmental inspections in the Member States ('RMCEI'). In the RMCEI, environmental inspection entails carrying out activities including:

- site visits;
- monitoring achievement of environmental quality standards;
- consideration of environmental audit reports and statements;
- consideration and verification of any self-monitoring carried out by or on behalf of operators of controlled installations;
- assessing the activities and operations carried out at the controlled installation;
- checking the premises and the relevant equipment (including the adequacy with which it is maintained) and the adequacy of the environmental management at the site;
- checking the relevant records kept by the operators of controlled installations.

The RMCEI has influenced provisions on environmental inspections in sectoral pieces of environment legislation (e.g. Industrial Emission Directive) as well as guidance and other work on inspections by IMPEL. Inspection provisions (compliance monitoring) are set out in the above mentioned EU Directives and Regulations. These instruments follow a similar blue-print, providing for a mix of routine (i.e. planned) and non-routine inspections.

In many MS different Inspection authorities are involved along the end-of-waste recycling chain (see Figure 19). The main public authorities involved along the compliance assurance chain are:

- environmental Inspectorates undertaking inspections of authorized plants;
- law enforcement authorities (e.g. police, customs, the forest corps, undertaking investigations on suspected breaches through site-search, wire-tapping etc.);
- REACH inspection Agencies;
- prosecutors.

The involvement of different inspection subjects at different instances of the end-of-waste recycling chain requires formal and informal arrangements for cooperation and coordination within and between authorities at the local, regional and national level in each country. Cooperation and coordination are especially crucial to tackle transnational environmental crime related to end-of-waste fluxes.

FIGURE 19
Involvement of different inspection regimes in the end-of-waste recovery chain

6.1 Waste Framework Directive

Article 34 of the WFD 2018 requires competent authorities to subject establishments or undertakings which carry out waste treatment operations, which collect or transport waste on a professional basis, brokers and dealers, and establishments or undertakings which produce hazardous waste, to appropriate periodic inspections by the competent authorities.
Inspection concerning collection and transport operations shall cover the origin, nature, quantity and destination of the waste collected and transported.
Member States may take account of registrations obtained under the Community Eco-Management and Audit Scheme (EMAS) in particular regarding the frequency and intensity of inspections.
Article 6 paragraph 4 of the WFD 2018 states that Member States may make information about case-by-case decisions and about the results of verification by competent authorities of the end-of-waste status publicly available by electronic means.

6.2 Industrial Emission Directive

Recovery facilities leading to end-of-waste production may be subject to specific inspection requirements pursuant to the IED Directive. The IED contains mandatory requirements on environmental inspections.

Art 23 requires Member States (MS) to:

- set up a system of environmental inspection of installations to address the full range of environmental impacts;
- requires that IPPC installations are covered by an inspection plan (and specifies what the plan should cover);
- sets time limits on reporting results of inspections to the operator and public following an inspection.

The period between two site visits shall be based on a systematic appraisal of the environmental risks of the installations concerned and shall not exceed 1 year for installations posing the highest risks and 3 years for installations posing the lowest risks. If an inspection has identified an important case of non-compliance with the permit conditions, an additional site visit shall be carried out within 6 months of that inspection.

IMPEL has developed a Guidance for the implementation of the IED in planning and execution of inspections[53].

[53] http://impel.eu/wp-content/uploads/2015/01/Step-by-step-guidance-for-IED-Inspections-June-2013-final-080713.pdf

6.3 Waste Shipment Regulation

Regulation (EC) No 1013/2006 (WSR) has been amended by Regulation (EC) No 660/2014; key points are stricter enforcement controls by Member States to prevent illegal shipments, particularly the distinctions between waste and products.
WSR establishes procedures and control for the shipment of waste depending on the origin, destination and route of shipment, the type of waste shipped and type of treatment applied. It applies to shipments of waste between Member States, within the Community and to/from third countries.
The Regulation applies to waste in different locations and requires co-operation between authorities within and between Member States to be effective.

The provisions relating to enforcement and inspections are laid down in Article 50 as amended by Regulation (EC) No 660/2014.
According to Article 50 (2a), *"By 1 January 2017, Member States shall ensure that, in respect of their entire geographical territory, one or more plans are established, either separately or as a clearly defined part of other plans, for inspections carried out pursuant to paragraph 2 ("inspection plan"). Inspection plans shall be based on a risk assessment covering specific waste streams and sources of illegal shipments and considering, if available and where appropriate, intelligence-based data such as data on investigations by police and customs authorities and analyses of criminal activities. That risk assessment shall aim, inter alia, to identify the minimum number of inspections required, including physical checks on establishments, undertakings, brokers, dealers and shipments of waste or on the related recovery or disposal."*.

According to Article 50 (4a), *"in order to ascertain that a substance or object being carried by road, rail, air, sea or inland waterway is not waste, the authorities involved in inspections may, [...], require the natural or legal person who is in possession of the substance or object concerned, or who arranges the carriage thereof, to submit documentary evidence:*

a. as to the origin and destination of the substance or object concerned; and

b. that it is not waste, including, where appropriate, evidence of functionality".

Furthermore, according to Article 50 (4c), *"In order to ascertain whether a shipment of waste falling under the general information requirements of Article 18 is destined for* ***recovery operations*** *which are in accordance with Article 49, the authorities involved in inspections may require the person who arranges the shipment to submit relevant documentary evidence, provided by the interim and non-interim recovery facility and, if necessary, approved by the competent authority of destination"*.

The WSR sets out further requirements relevant to enforcement in Article 50. This states that:

- Member States shall provide, inter alia, for inspections of establishments, undertakings, brokers and dealers in accordance with Article 34 of Directive 2008/98/EC, and for inspections of shipments of waste and of the related recovery or disposal.
- Checks on shipments may take place in particular:
  - **a.** at the point of origin, carried out with the producer, holder or notifier;
  - **b.** at the point of destination, including interim and non-interim recovery or disposal, carried out with the consignee or the facility;

c. at the frontiers of the Union; and/or

d. during the shipment within the Union.

- Member States shall cooperate, bilaterally and multilaterally, with one another in order to facilitate the prevention and detection of illegal shipments.

6.4 REACH

The REACH Regulation No 1907/2006 contains general inspection requirements (Articles 125-126); although not directly applicable to REACH, the RMCEI provides a useful foundation upon which a structured system for REACH inspections can be created.
The European Chemicals Agency (ECHA) issued the document "Minimum criteria for REACH and CLP inspections" addressed to enforcement authorities (and other public authorities as appropriate) in Member States with appropriate responsibilities.
REACH inspection activities should be carried out in Member States following minimum criteria to be applied in the effective organisation, planning, implementation, carrying out and review of such task.
Implementation of the minimum criteria for REACH inspections should achieve the relevant requirements of Regulation (EC) No 765/2008 setting out the requirements for accreditation and market surveillance.
Such inspection activities may be routine (proactive) or non-routine (reactive), and include inspection, investigation, monitoring, formal enforcement and other measures taken in pursuance of Articles 125 and 126 of REACH.

With reference to end-of-waste, REACH inspections are finalized to check if the product falls under REACH obligations or can benefit from exemptions.

Three actors are allocated responsibility for ensuring compliance with REACH: primary responsibility rests with the Member States, which are responsible for enforcing compliance with REACH with respect to those duty holders located in their territories. ECHA is given specific tasks related to the compliance of duty holders with REACH registration dossiers requirements, while the European Commission is responsible for overseeing that Member States carry out their responsibilities with respect to the requirements in REACH.

7 ASSURING COMPLIANCE

To assure compliance with WFD 2018 requirements on end-of-waste, it is crucial that Environmental Inspection authorities implement a cross-cutting strategy envisaging compliance promotion, monitoring activities and cooperation mechanism with different inspection and enforcement authorities.
"Environmental Compliance Assurance" is an integral part of the governance framework underpinning EU environmental law; it is an umbrella term to cover the range of interventions used by public authorities to ensure compliance by duty-holders with environmental rules on activities.
The three broad classes of compliance assurance intervention are here below illustrated:

FIGURE 20
Environmental Compliance Assurance

They comprise:

- Compliance promotion, which helps duty-holders to comply through means such as guidance, 'frequently asked questions' and help-desks. This represents the 'preventive' part of compliance assurance.
- Compliance monitoring, which identifies and characterizes duty-holder conduct and detects and assesses any non-compliance, using environmental inspections and other means. This represents the 'diagnostic' part.
- Follow-up and enforcement, which draw on administrative, criminal and civil law to stop, deter, sanction and obtain redress for non-compliant conduct and encourage compliance. These represent the 'corrective' part.

Non-compliant conduct may have a range of explanations, including confusion or poor understanding of the applicable rules, absence of investment, lack of acceptance of rules, opportunism and criminality. Enforcement and monitoring are clearly important, but so too are awareness-raising, positive engagement with duty-holders and practical support measures. Compliance assurance is adaptable allowing for a mix of compliance promotion, monitoring and enforcement measures, depending on the nature of the non-compliance and, for example, differences across Member States.
Different administrative bodies may be linked across an 'environmental compliance assurance chain', where inspectors, customs and police officers and prosecutors co-operate in evidence-gathering and prosecution.

8 BUILDING AN END-OF-WASTE VERIFICATION SYSTEM

The purpose of this section is to provide guidance for inspection of end-of-waste by integrating two complementary approaches: the *inspection cycle* approach and the *"recycling chain"* approach.

The **"waste recycling chain" approach** implies that inspections can be performed on the whole chain of the recycling process (from producer to final user).

The main aspects of the process that can be inspected include:

- production of the waste input material for the recovery operation;
- allowed treatment processes and techniques;
- quality criteria for end-of-waste materials resulting from the recovery operation in line with the applicable product standards, including limit values for pollutants where necessary;
- requirements for management systems to demonstrate compliance with the end-of-waste criteria, including for quality control and self-monitoring, and accreditation, where appropriate;
- proper use of the final product.

Such an approach may require adaptation of the inspection strategy of the Environmental Inspection Authority, in order to set priorities, establish cooperation agreement, and include end-of-waste chain inspections in the inspection plan. A structured way to take all of these tasks into account, is to refer to the *Inspection Cycle* described in the IMPEL step-by-step Guidance book for the planning and realisation of environmental inspections called "Doing the Right Things". The Guidance describes the steps to be followed when planning and performing

inspections at facilities. The basis for elaboration of the step-by-step guidance has been the EU Recommendation providing minimum criteria for environmental inspection (RMCEI).

The following four main steps of the inspection cycle could be analysed to guide the Inspection Authority to set up the system:

a. Defining a strategy and planning of inspections
b. Preparing and executing the inspection (waste recycling chain approach)
c. Reporting the results of inspection
d. Performance monitoring

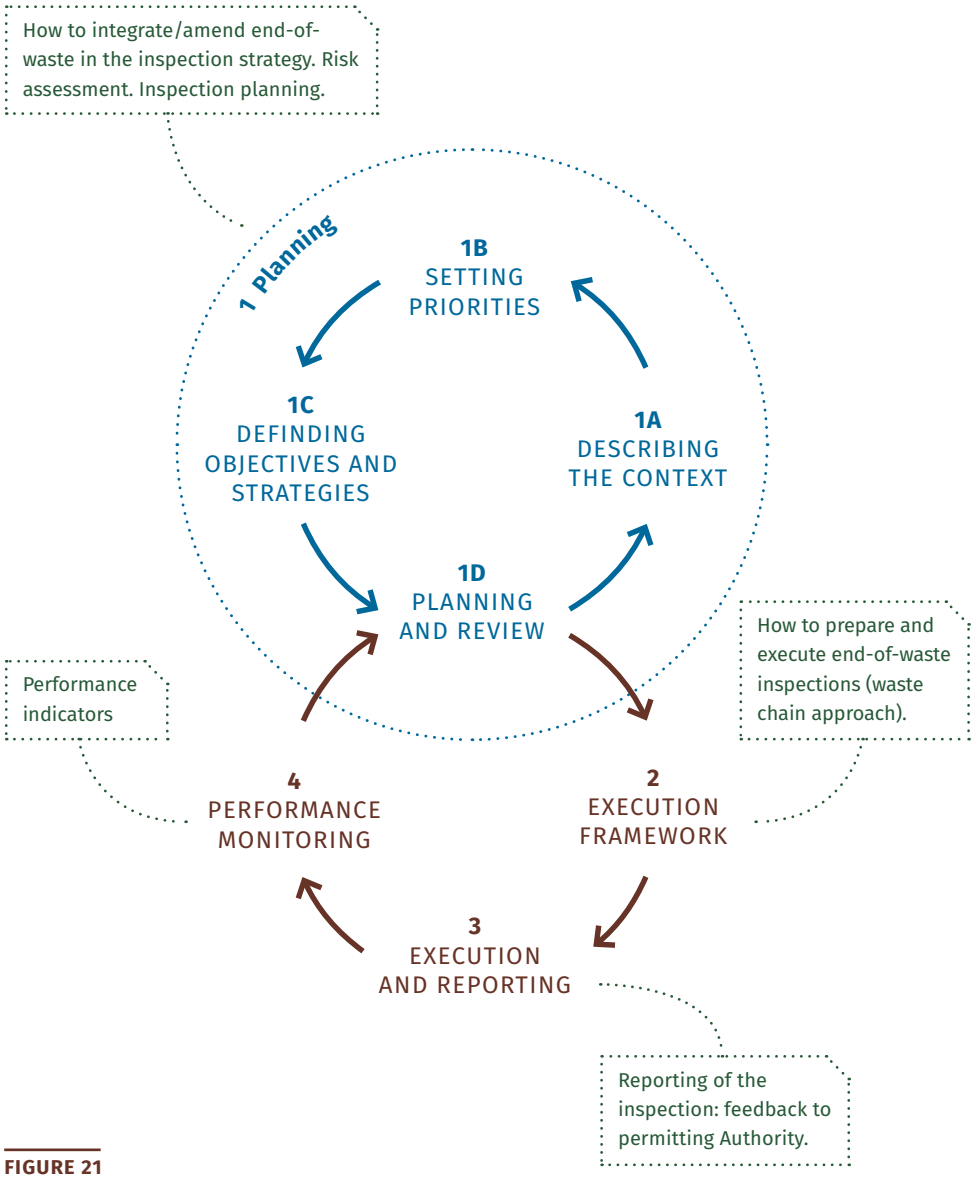


FIGURE 21
Inspection Cycle

The inspections along the end-of-waste recycling chain would be included in the Inspection Plan adopted by the Environmental Inspectorate for authorised waste treatment or IED facilities. The strategy of the Inspection plan would be elaborated within the framework of the Environmental Compliance Assurance actions.

9 WASTE RECYCLING CHAIN APPROACH FOR END-OF-WASTE INSPECTIONS: COMPLIANCE MONITORING

Inspections on end-of-waste are usually performed at the recycling plant. Nevertheless, the assessment of compliance with Article 6 of the WFD 2018 (conditions or criteria) can be carried out at different stages of the recycling chain. This section aims to help inspectors to prepare and carry out an inspection focused on end-of-waste, in order to assess the compliance with Article 6 of WFD 2018 by means of cross checks in different steps of the recycling chain.
It also aims at identifying the different competences of the Inspection authorities related to relevant legislation (IED, WFD, WSR, REACH) and the cooperation needs to align the inspection activity both at strategic and operational level.

Different inspection stages can be the responsibility of different Inspection Authorities. Considering the different inspection organizations in MS and the possibility to cooperate with police and other authorities involved, this section will give general information about the main aspects to be investigated and includes an inspection checklist.

Performing end-of-waste inspections at different stages in the chain could be a more effective way to ensure compliance; furthermore, an inspection at the final user also answers to the repositioning of the burden of proof that is stated in Article 6 paragraph 5 of the WFD 2018: *"the natural or legal person who:*

a. *uses, for the first time, a material that has ceased to be waste and that has not been placed on the market; or*

b. *places a material on the market for the first time after it has ceased to be waste, shall ensure that the material meets relevant requirements under the applicable chemical and product related legislation. The conditions laid down in paragraph 1 have to be met before the legislation on chemicals and products applies to the material that has ceased to be waste.*".

The preliminary step of performing inspections is to set up the execution framework, where training, protocols and working instructions, procedures for imposing sanctions, protocols for communication with the public are established.

The inspections can be activated in different circumstances:

- routine inspections as part of an Inspection plan;
- non routine inspections, as a consequence of:
  - complaints;
  - suspected breaches;
  - accidents and incidents;
  - occurrences of non-compliance;
  - the need to issue a new permit;
  - the need to revise the permit.

The following block diagram identifies the common steps of the recovery chain: the numbers refer to the stages at which an inspection activity can be performed.

See Figure 22 →

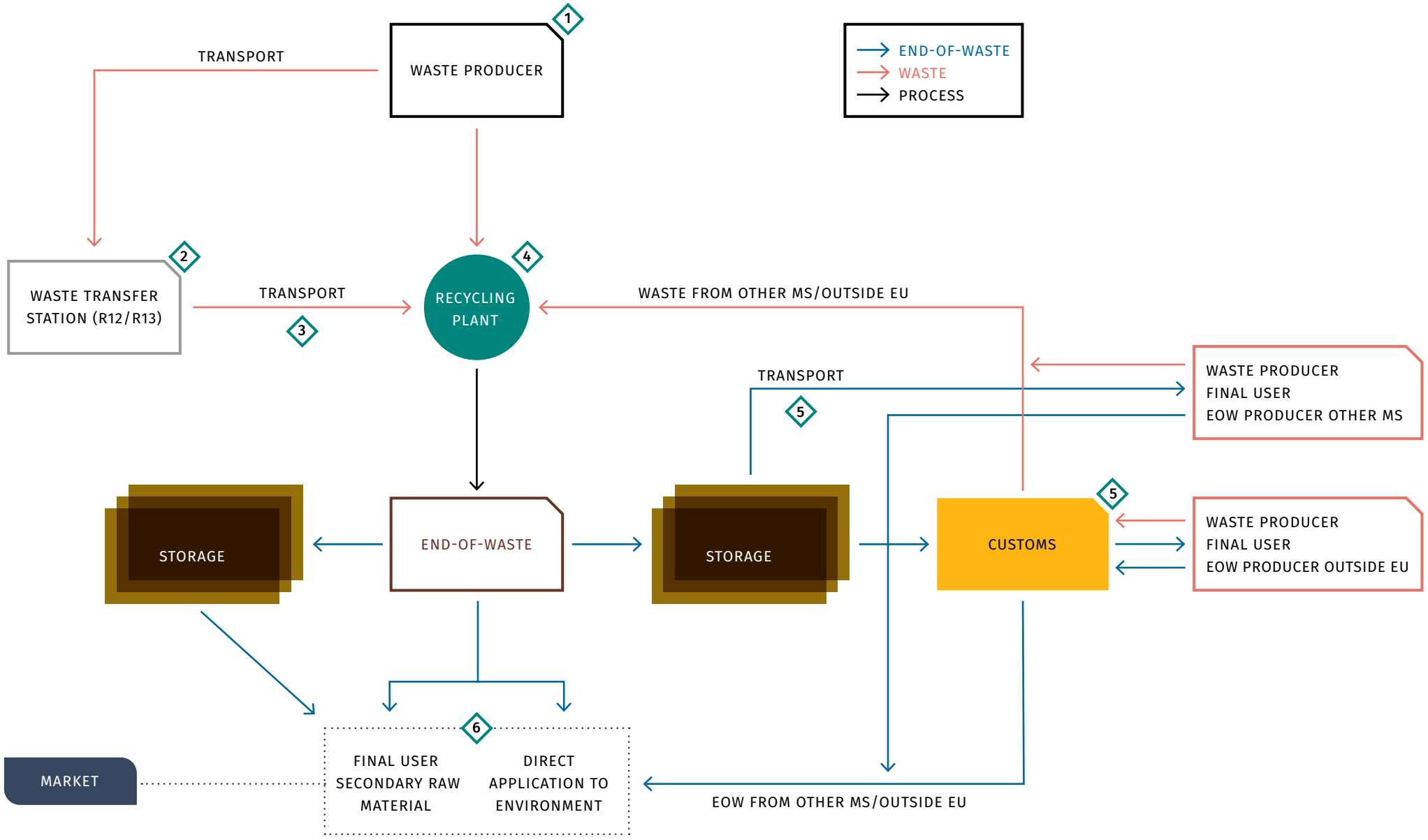


FIGURE 22
Recovery chain and possible inspection stages

The block diagram identifies six main stages where an end-of-waste inspection can be performed:

1	Installation producing the waste to be recovered
2	Waste transfer station r12/r13
3	Transport of the input waste (within or outside eu)
4	Recycling plant: end-of-waste process
5	Transport of end-of-waste product (within or outside eu)
6	Final user

Each of the six inspection stages are here presented; since the specific aim of the visit can vary along the mentioned steps, inspectors are here provided with different types of advice, with reference to:

- scope of the inspection;
- preparation of the inspection;
- execution of the inspection;
- sampling activities and equipment needed;
- responsible Inspection authority and coordination with different authorities.

The main inspection activity used in this case is one at the recycling plant (n.4), on which a particular focus will be paid in the advice below.

9.1 Installation producing the waste to be recovered

Scope of the inspection

An inspection can be performed at the waste producer to mainly gather information on the quality of the input waste. In some cases input waste to the end-of-waste recycling plant comes as a discard from another industrial installation for which an environmental permit has been issued.

Such an inspection can be performed:

- at the **permitting stage**, to collect information about the production process, the variability of the quality of the waste, the collection and transport operations etc., to ensure that hazardousness can be controlled through source selection or during processing;
- as a **non routinary** inspection, when some doubts can arise about chemical composition or waste management activities;
- as a **routine** inspection if the installation is included in the inspection programme (e.g. IED installation).

National or EU end-of-waste criteria or permit conditions may include requirements or limitations on the original source of waste material, which ultimately can influence the product quality of the material or pose a risk to health or environment during collection, storage, transport, processing or use of the material.

In general, it is necessary to identify hazardous substances associated with each waste stream. It must be determined if any hazardous associated with the particular waste stream can be adequately controlled in some way in the processing or if they need to be excluded at source. The level of source control needs therefore to be checked.

The producer of the waste has an obligation of a complete characterization of the waste, and so the end-of-waste operator, who should submit in the application a characterization of the incoming waste, or provide an indication of composition based on a range of indicative values.

Relevant elements used to classify the type of incoming waste are the following:

- the production process;
- the European waste code;
- the type of waste collection;
- the chemical composition of the waste: limit values for certain pollutants;
- relevant physical parameters: density, humidity levels.

The focus should be on the following characteristics:

- those that can influence health and environmental risks;
- those that support or limit the existence of a market or demand.

As waste characterization is a crucial step, sampling activities need to be performed by the operator according to available standards and by accredited and qualified personnel; the inspection activity can envisage an auditing part during sampling activities of the waste.

Preparation of the inspection

The collection and evaluation of existing information about the installation is crucial for the success of the inspection since it allows an easier formulation of targeted questions for the interview of the operator and the concrete investigation of those unit operations which show the highest interest with regard to waste conditions.

Examples of documents to be collected are listed below:

DOCUMENT	WHAT TO CHECK
Environmental permit	· Waste provisions · Frequency of waste classification by means of lab analysis (sampling activities) · Storage provisions · Possibility of pretreatment of the waste
Production process (technical report)	· Understanding the process where the waste comes from: variability of the process and of the quality of the waste
Reports of previous inspections of the site	· Possible non compliances in waste management
Environmental reports submitted by operator	· Quantity of waste produced · Destinations of the waste (disposal, different recovery forms) · Waste classification (lab bulletin)
Communications sent by the operator (incidents, modifications, requests, etc.)	· Possible variations of the process influencing the quality of the waste; frequency of incidents.
PRTR waste data	· Official data on production of waste
Maps	· Inspection organization (distance ecc)

TABLE 5
Examples of documents to be collected (Installation producing the waste to be recovered)

The main pieces of information that the inspector has to produce from the desk study are the following:

- understanding of the production process;
- quantity of the produced waste;
- usual destination of the waste (landfilling, incineration etc.);
- classification and chemical/physical characteristics of the waste;
- presence of hazardous substances;
- mirror code EWC;
- frequency of sampling activities;
- third part in charge of sampling and lab analysis activities;
- managing and collecting operations.

On the basis of the evaluation of the collected information the following has to be prepared:

- a check list to facilitate the inspection;
- the list of documentation to be provided by the operator;
- agenda of the inspection.

Execution of the inspection

During the site inspection, both an administrative and technical verification can be performed.

The main goal is to ensure that waste characterization and classification are properly performed, starting from the sampling activity. A better understanding of the process can also help to better define limitations on the original source of waste material and monitoring measures.

A checklist with the main topics to be inspected is suggested below:

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
Production of waste	Quantity of waste in the last 5 years (waste stream to be sent to the recovery plant)	EPRTR Self-monitoring reports
Disposal/ recovery	Final destination of the waste in the last 5 years (landfill, incineration, recovery...)	Self-monitoring reports
Waste characterization	Waste characterization: · characterization methods and frequency; · hazardous properties; · mirror code or not; · analytical methods used (Standards); · lab certification ISO 17025; · HP14 detection method (if needed); · variability of waste properties.	Lab bullettin
Sampling of the waste	Sampling: · audit a sampling activity performed by operator or third part lab; · compliance with sampling standards; · accredited sampling personnel; · custody chain.	Sampling plan

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
Production process	· Ask the operator about the variability of the production process influencing waste characteristics. · Verify if the frequency of monitoring is still adequate to the variability of production process influencing waste characteristics and if there have been changes in the process compared to what has been authorized or declared. · Raw material entering the plant: hazardous substances.	Technical report Permit application
EMS	Check if EMS includes waste sampling procedures	EMS waste procedures
Storage of the waste	Check if the storage conditions (storage average time, weather events) can worsen waste quality	--

TABLE 6
Checklist with the main topics to be inspected (Installation producing the waste to be recovered)

Sampling activities and equipment needed

Not all Inspection Authorities across Europe are equipped for sampling and analytical activities, as they do not have laboratories and inspectors with skills to take samples according to EU standards. They can anyway refer to an independent third party if this is the case.
Sampling of waste by Inspection Authority (or accredited lab on behalf of it) can be adopted where there is suspicion, to check if the waste producer analysis (or those of the end-of-waste plant operator) are reliable.

Responsible Inspection authority and coordination with different authorities

Whether the waste producer is an installation with an environmental permit, the Environmental Inspection Authority can be the same as the one appointed for end-of-waste plants inspections. The waste producer can also be placed in a different Province/Region of the same MS, or outside the borders (within or outside EU). In the latter situation, a feedback from past inspection can be collected or a special request of further investigation/inspection can be sent to the involved Authority.

9.2 Waste transfer station (R12/R13 recovery operations)

Scope of the inspection

In some cases the waste produced by an installation is sent to an intermediate R12/R13 waste treatment plant (or transfer station), before being sent to the final recycling destination.
Operations carried out in these installations usually include: reception, bulking, sorting, transfer, prior to submission to a disposal/recovery operation. In some cases, blending and mixing may also be carried out in these installations.

The aim of an inspection at this stage is to:

- check the storage conditions of the waste to prevent changes in its characteristics;
- check if blending/mixing treatment is performed on the waste;
- in case blending/mixing treatment is performed, check the variability of the blend and the quality of the final waste;
- assess the correctness of the frequency of the classification of the waste.

Such an inspection can be performed:

- as a **non-routine** inspection, when some doubts can arise about chemical composition or waste management activities or to gather information about the variability of the quality of the waste if mixing activities are performed.
- as a **routine** inspection if the installation is included in an inspection programme.

Preparation of the inspection

The preparation of the inspection at the R12/R13 recovery plant has to focus on the key points that can affect the correctness of the downstream recovery chain, ending with a secondary raw material (end-of-waste). Examples of documents to be collected are listed below:

DOCUMENT	WHAT TO CHECK
Environmental permit (under WFD or IED)	· Storage provisions · Possibility of mixing of the waste · Frequency of waste classification by means of lab analysis (sampling activities)
Blending/mixing process (technical report)	· Understanding the operation of blending/mixing of waste from different generators before it is sent to a recovery facility;
Environmental reports submitted by operator	· Quantity of waste submitted to recovery cycle after R12 or R13 operation · Destination of the waste (recovery installations) · Variations of the input waste influencing the quality of the final mixed waste · Waste classification (lab bulletin)
PRTR waste data	· Official data on production of waste
Maps	· Inspection organization (distance etc)

TABLE 7
Examples of documents to be collected (Waste transfer station (R12/R13 recovery operations)

Execution of the inspection

The main goal is to check that storage conditions and blending/mixing operations (if present) do not negatively influence the variability of the waste entering the final recycling plant.

The storage of waste prior to recovery or treatment for a period less than three years as a general rule is excluded from requirements of the Landfill Directive 1999/31/EC. Storage conditions do not have to change the nature of composition of the waste. EWC code does not change in a R13 operation.

Due to the heterogeneous nature of waste, blending and mixing are required in order to guarantee a homogeneous and stable feedstock of the wastes sent to the final waste recovery operations; this issue should not be confused with dilution, i.e. blending and mixing are processes carried out because it is a technical requirement from the downstream waste facility to guarantee a homogeneous and stable feedstock. Blending and mixing do not have to facilitate acceptance of waste (dilution).

Blending/mixing operations must be carried out according to the subsequent recovery treatment. The downstream recovery plant must be authorized to individually receive all the EWC codes that make up the mixture. It is not permissible to blend/mix to reduce the level of contaminants, which are not the subject of treatment at the next plant, below the concentration threshold envisaged for the final product (end-of-waste).

Each waste to be mixed must be characterized; mixing is not allowed for the sole purpose of declassification of the waste by means of dilution of their concentration of pollutants such as to make the mixture non-hazardous or to lose an unwanted characteristic; it follows that the mixture must keep the hazardous property (HP code) possessed by waste in entrance.

Before sending the waste to the destination plant, every batch of waste deriving from mixing should be characterized, considering that the blends are not waste regularly generated (as the mixing activity is not a constant production cycle).

A checklist with the main topics to be inspected is here suggested:

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
Storage of the waste	Check if the storage conditions (storage average time, weather events) can worsen waste quality	--
Storage of the waste	Check how long waste (destined to final recovery) is being stored[54]	· Waste register · Site permit or national legislation
Blending/ mixing operations	Check which are the blending/mixing criteria and types of waste subject to mixing	
Blending/ mixing operations	Check the characterization principles of the mixtures as frequency of analysis, batch size	· Lab bulletin
Blending/ mixing operations	Check the EWC codes that compose the blend and if the recovery destination plant is authorized to receive each of them.	· Waste register
Production of waste	Quantity of waste in the last year sent to the recovery plants.	· Waste register
Waste charac-terization	Check the variability of the characteristics of the blends sent to the recovery plant	· Lab bulletin

[54] According to the Landfill Directive 1999/31, definition of "landfill" excludes: storage of waste prior to recovery or treatment for a period less than 3 years as a general rule, or storage of waste prior to disposal for a period less than 1 year. Some MS's indicate a storage time frame of 12 months.

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
Waste characterization	Waste characterization performed by the operator: · frequency of characterization; · hazardous properties; · mirror code or not; · analytical methods used (Standards); · lab certification ISO 17025; · HP14 detection method · variability of waste properties.	· Lab bulletin
Sampling of the waste	Sampling: · audit a sampling activity performed by operator or third part lab; · compliance with sampling standards; · accredited sampling personnel; · custody chain.	· Sampling plan
EMS	Check if EMS includes waste sampling procedures	· EMS waste procedures

TABLE 8
Checklist with the main topics to be inspected (Waste transfer station (R12/R13 recovery operations)

Sampling activities and equipment needed

Sampling of waste by Inspection Authority (or accredited lab on behalf of it) can be adopted where there is suspicion, to check if the waste producer analysis (or those of the end-of-waste plant operator) are reliable.

Responsible Inspection authority

Storage of waste (R13) pending a recovery treatment (any of the operations numbered R 1 to R 12) and the exchange of waste for submission to any of the operations numbered R 1 to R 11 (R12) are waste treatment operations; therefore, establishment or undertaking intending to carry out waste treatment operations as R12/R13 need to obtain a permit from the competent authority according to the WFD. Member States may exempt from the requirement of a permit establishments or undertakings for the recovery of waste. Installations performing a R12 or R13 recovery operation may also fall under IED Annex I Cat.5.

Checking compliance with the WFD or IED permit will be the responsibility of the Environmental Inspection Authority. Both the waste transfer plant and the end-of-waste recovery plant can be part of the same inspection plan.

9.3 Transport of the input waste

Scope of the inspection

The input waste arriving at the recycling installation can come from a producer within the national border or be imported from EU or non-EU countries. According to Article 34(2) of the WFD 2018, inspections concerning [...] transport operations shall cover the origin, nature, quantity and destination of the waste collected and transported.

Important financial savings could be made by a waste handler when illegally sending a waste to a recovery plant instead to a disposal final solution. An inspection during transportation (i.e. road, railway, waterways, inland port, sea port inspections) can be triggered by an alleged illegal traffic or a detection of suspect material by customs officials or competent authorities in the country of import.

According to the WSR, wastes destined to recovery operations may either move under the procedure of prior written notification and consent or fall under the procedure of general information laid down in Article 18, depending on the kind of waste (see Article 3(1) and 3(2) of the WSR).

The WSR waste shipment scheme is based on two lists of different kinds of waste streams: amber list wastes destined for disposal[55] or recovery in OECD countries and non-hazardous green-listed waste destined for recovery. Unlisted wastes, for example refuse derived fuel and contaminated soils must also be notified prior to movement.

[55] In the UK the waste shipments plan bans imports and exports for disposal unless there is a specific agreement between the two countries government's and there is a particular need for it.

Article 33 of the WSR provides that Member States shall establish an appropriate system for the supervision and control of shipments of waste exclusively within their jurisdiction. The system must be coherent with EU law. The inspection aims to check that shipments are accompanied by the relevant documentation and that the documentation provided does correspond to description of the material being transported. As a result of such an inspection, different kind of violations can be assessed, as:

- violations of the WSR related to Article 18, where the papers accompanying the shipment (Annex VII) are incomplete, (partly) incorrect or missing;
- violations of the WSR according to Article 2 (35) when waste is shipped without authorisation, which should have been obtained via a notification, or shipments that are prohibited and which, if notified, never would have been granted authorisation;
- cases in which the material transported does not correspond to the description in the documents are also marked as illegal shipments.

According to Article 50 (4b) the inspection authorities may conclude that the product (substance or object) is waste where:

- the evidence referred to in paragraph 4a or required under other Union legislation to ascertain that a substance or object is not waste, has not been submitted within the period specified by them, or
- they consider the evidence and information available to them to be insufficient to reach a conclusion, or they consider the protection provided against damage referred to in the second subparagraph of paragraph 4a to be insufficient.

In such circumstances, the carriage of the substance or object concerned or the shipment of waste concerned shall be considered as an illegal shipment.

The results of the inspections at the "transport instances" can complement the framework of information about the proper quality of the waste arriving at the recycling installation.

Shipments within a Member State can cause certain practical difficulties because the WSR does not fully apply to them. It is mandatory to carry shipment documentation with waste shipments but otherwise transportation within Member States remains relatively unregulated.

Responsible Inspection authority and coordination

Several authorities may be involved in the enforcement of shipment of waste, as police forces, environmental authorities, customs, etc.

A National Competent Authority (NCA) for waste shipment inspections should be defined within the inspection plan to be established according to Article 50 paragraph 2a of the WSR, based on a risk assessment covering specific waste streams and sources of illegal shipments. The inspection plan includes the tasks assigned to each authority involved in inspections and arrangements for cooperation between authorities involved in inspections.

Under the EU WSR, Customs authorities are explicitly tasked with a control function on transboundary shipments of waste entering, leaving or transiting through the EU. The WSR can be complemented by national legislation that lays down the rules for enforcement.

In order to ensure that the legal framework on controls of shipments of waste is applied in a harmonised way throughout the entire EU, a deep cooperation between Customs and National Competent Authorities is essential.

The Environmental Inspection Authority, in some MS, can be identified as competent authority for planning and conducting inspections for waste shipments otherwise it can be asked to give technical support to NCAs and Customs for their inspection activities; its involvement in WSR inspections may depend on the overall inspection structure that will include all the inspection bodies, that is specific for each MS.

It is recommended that cooperation between the Environmental inspection authority, Customs and NCA, and possibly also other authorities with competences in related fields (sharing of responsibilities, joint teams and inspections, communication, sharing of best practices, case-by-case studies, etc.), is based on formal agreements.

Cooperation is envisaged in Article 50 paragraph 5 of the WSR, stating that Member States have to exchange relevant information on shipments of waste, flows of waste, operators and facilities and share experience and knowledge on enforcement measures.

Internal cooperation can be formalized with a Memorandum of Understanding (MoU). The MoU sets out the working relationships and practices and should include a commitment to strategic approaches (e.g. joint planning) and operational interaction (e.g. joint inspection).

One of the most relevant problems to be tackled is the lack of available information and their storage in an information system. Therefore, it is highly recommended to include in the MoU:

- methods for the exchange of information and intelligence between the Environmental inspection Authority, Customs NCA and other inspection authorities, for future risk-based targeting and inspection activities;

- definition of shared IT tools to store waste shipment information (permit, quantities, reports, notifications, etc);
- the establishment of regular meetings at strategic, management and operational levels.

The MoU should also set out the procedure to adopt joint planning processes and joint investigations and inspections. Goals and targets for the following year can be defined during periodical meetings to be held among the signatory authorities where problematic waste streams, results of the inspections, new laws, regulations and guidelines can be discussed.

IMPEL-TFS is an effective network that can be used to share information. It has produced several tools to support inspections and controls of waste shipments by the NCAs; it communicates and works through National Contact Points (NCPs).

Preparation and Execution of the inspection

Even when the Environmental Inspection Authority is not appointed as NCA and has not the role to stop vehicles, it can be asked to attend joint inspections or provide technical support to other authorities. In this case, a briefing for the inspection team would be beneficial.

When focusing on shipments of waste destined to recovery operations, it has to be primarily checked if they are subject to the procedure of prior written notification or to the general information requirements laid down in Article 18 of WSR. It also has to be checked if the waste may be banned from export to non-OECD countries, or it may be too contaminated to be classed as a green list waste.

The inspection concerns the presence of the duly completed documentation that accompanies the shipment of waste to be recovered, the contents of the loads transported, the integrity of the packaging, the verification of the identities of the subjects involved in the shipment as well as a physical checking of the waste.

In order to ascertain whether a shipment of waste complies with this Regulation, the authorities involved in inspections may require the notifier, the person who arranges the shipment, the holder, the carrier, the consignee and the facility that receives the waste to submit relevant documentary evidence to them within a period specified by them.

In order to ascertain whether a shipment of waste falling under the general information requirements of Article 18 is destined for recovery operations, the authorities involved in inspections may require the person who arranges the shipment to submit relevant documentary evidence, provided by the interim and non-interim recovery facility and, if necessary, approved by the competent authority of destination. Attention should be paid to illegal export.

Whether WSR applies or not, national rules requiring waste transport documentation have to be verified.

A checklist with the main topics to be inspected is here suggested:

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
Waste transport documents	· Check the authorization of the operator for waste transport (registration, accreditation, permit according to MS rules); · Check the waste transport documentation that have to travel with the waste: - waste register that includes the following information: date of transfer, name & address of the producer of the waste, amount and type of waste and identification of the receiver of the waste materials (check MS rules)	· Waste transport documentation · Waste transport authorization
WSR transport documents	· Check if the documentation is of the correct type and has been properly completed (e.g. the copies of the notification document containing the consent of the competent authorities, the movement document, information according to Annex VII, custom documents, contracts, invoices, etc). · Check if the shipment fits with its requirements (notification, Article 18).	· Waste transport documents/Reg. EU n. 1013/2006
Content of the load	· Undertake a physical examination of the contents of the container/transport etc. and determine whether it matches the description in the documentation. Take (digital) pictures of the waste.	· Waste transport documents/Reg. EU n. 1013/2006
Sampling	· Undertake sampling of waste, where further investigation is required, proportional to the amount of waste transported, in conformity with (national/international) protocols.	· Samples

TABLE 9
A checklist with the main topics to be inspected (Transport of the input waste)

9.4 Recycling plant: End-of-waste process

Scope of the inspection

It is essential to point out that across the EU there are differences in the content of the permit of a recycling installation: in some cases the permit includes provisions both on the recycling process and on the final end-of-waste product (technical standards, environmental standards etc.), while in others it does not contain requirements on the final product. The content of the inspection has to be defined accordingly.

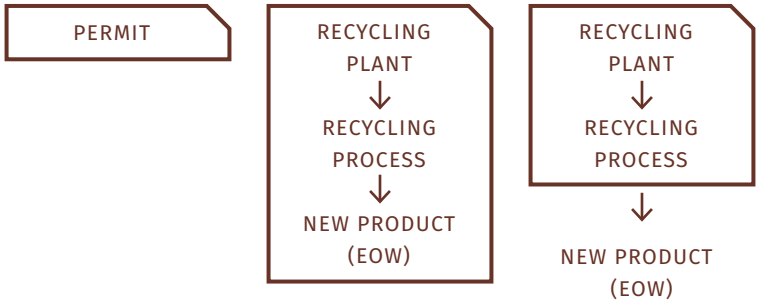


FIGURE 23
Content of end-of-waste permit across EU

When the installation is provided with a permit covering the end-of-waste final product, it is assumed the operator has already gone through an end-of-waste assessment conducted by the permitting authority (e.g. a permitting procedure) whereby a decision or assessment has been made. The aim of the Inspection Authority is therefore to check compliance with permit provisions which are a result of the application of the conditions and requirements of Article 6 of the WFD 2018 in a case-by-case decision. Permit provisions may also refer to EU or national end-of-waste criteria.

Where the permit does not contain provisions on the end-of-waste product, the operator may have conducted a self-assessment and (in some MS) may have obtained a case-by-case opinion from the regulator (see also Section 5 about the use of legal opinions). The end-of-waste status could therefore be verified by the inspection activity. The inspection visit may start by requesting and assessing the documentation collected by the operator to check compliance with conditions and requirements of Article 6 of the WFD 2018.

Verification by the inspection authority is therefore different in the above mentioned situations and can be summarized as follows:

INSPECTION GOALS IN THE PERMITTING AND SELF-ASSESSMENT APPROACHES

END-OF-WASTE LEGISLATION REFERENCE[56]		INSPECTION GOAL
EU Regulation: EU end-of-waste criteria issued Article 6 paragraph 3: National end-of-waste criteria issued		Does the product meet the end-of-waste criteria set in the EU Regulation or national decree?
Article 6 paragraph 4: lack of EU and National regulation	Case-by-case permit	Does the product meet the end-of-waste criteria and requirements set in the permit?
	Case-by-case operator self-assessment (with/without legal opinion)	Does the product meet the end-of-waste conditions and requirements laid down in article 6 WFD?

TABLE 10
Inspection goals in the permitting and self-assessment approaches

Even when a permit is regulating both the recycling activity as well as the end-of-waste status of the products, the assessment of compliance with the four end-of-waste conditions of Article 6 of WFD 2018 can be worth checking, both to verify that what was indicated in the initial permit application is actually being done as agreed, as well as the relevance and efficiency of the permit prescriptions.

Beside the final product, the whole **recycling process** has to be inspected to check compliance with the permit provisions (IED or WFD permit) or general binding rules (if the case).

[56] It is considered that a permit can include provisions which refer to the EU or National End-of-waste criteria

It has to be considered that the end-of-waste recycling plant can be an IED installation and an integrated inspection has to be performed. **BAT conclusions** for Waste Treatment (Commission implementing Decision (EU) 2018/1147) should apply as well as the provisions of end-of-waste EU or national regulations that refer to the process (quality management, process techniques etc).

An inspection can be performed at the recycling plant:

- at the **permitting stage**, if a 9 months IED derogation (Article 15 of IED) has been granted for the testing and use of emerging techniques;
- as a **non-routine** inspection, when some doubts can arise about the waste management activities or in case of accidents, incidents and complaints;
- as a **routine** inspection if the installation is included in the inspection programme (e.g. IED installation).

Preparation of the inspection

According to the goal of the inspection, human resources and equipment have to be identified. Allocating resources is up to:

- the focus of the inspection – not all issues might be relevant to inspect;
- the inspection targets that need to be achieved;
- the inspection strategy that has to be followed;
- the complexity of an installation – complex installation might require additional experts in the team;
- situations with high risk.

In relation to the previous point, it is recommended to have a check-list of the equipment needed (including safety gear, sampling equipment in case sample taking is required, laptop if available and convenient...).

A leader of the team should be identified, who is the responsible for coordinating the inspection and drafting of the final inspection report.

The inspection team identifies the equipment needed to perform the on-site inspection and it is regarded as necessary to prepare a set of documents containing at least:

1. environmental permit (IED permit, waste management permit);
2. reports of previous inspections of the site;
3. environmental reports submitted by operator, including monitoring reports;
4. communications sent by the operator (incidents, modifications, requests, etc.);
5. PRTR and other registers such as a register of polluting substances into air, register of waste producers and managers;
6. complaints received about the installation;
7. information on the installation to be inspected received from other competent authorities;
8. application for the permit;
9. maps;
10. information available on the website of the operator.

The preliminary analysis of the collected documentation must enable a better understanding of the production cycle of the plant and its past and current critical points. Furthermore, the analysis of the technical data acquired during the desk study allows better preparation of the checklist and Inspection Agenda that will be used during the site visit.

On the basis of the evaluation of the collected information the following has to be prepared:

- a comprehensive questionnaire which will be used for the operator's interview;
- a check list to facilitate the inspection;
- an outline of the key process factors and of those which significantly contribute to the pollution load coming out of the installation;
- the list of BATs (according to the issued permit) which the operator should have installed and operated;
- the list of documentation to be provided by the operator (e.g. self-monitoring records, annual reports submitted to the authorities);
- agenda of the inspection.

Execution of the inspection

The first step of the inspection visit is the opening meeting, when the leader of the inspection team presents the members of the team and explains the purpose of the visit.
The organisation of the visit, according to the inspection agenda, is presented by the leader of the inspection team, to agree on the stages of verification and define the staff to be made available by the company to follow one or more phases of the inspection. It is worth asking the operator to describe the status of the plant (to assess potential modifications) and to evaluate briefly the results of last monitoring assessments.
During the on-site inspection, both an administrative and technical verification can be performed. Everything that can be found during inspection may be worth collecting and treated as evidence and must be attached to the report.

The inspection visit ends with a concluding meeting when detected strengths and weaknesses are discussed and minutes of the inspection are drafted and signed.

The main points to deal with on site, concerning the production of end-of-waste are summarized in the following scheme:

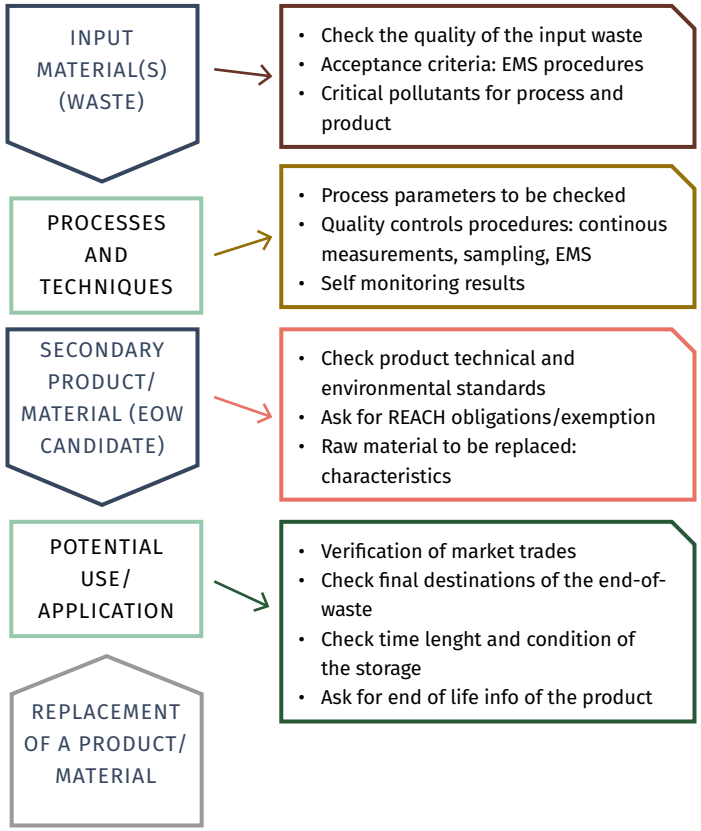


FIGURE 24
Topics of the inspection visit concerning the end-of-waste production.

One of the most difficult area to check and the most vulnerable to abuse is the market availability. A product which meets quality criteria, but does not find a customer during the transitional period is a common scenario: it necessitates stockpile management.

A big issue is therefore when a 'product' is stored for too long. Effectively, if the end-of-waste material is ultimately not put into use, it shall become waste. The allowed time length for storage[57] can be indicated in the permit or not.

Member States can set the moment when the waste cease to be waste in different points of the chain: after the process, after the characterization, when the material is sold and leave the installation.

When a permit does not set prescriptions for the final end-of-waste, another tricky point is to assess that the product will not lead to overall adverse environmental or human health impacts. A level of risk associated with a substance of concern can be considered acceptable if a similar or higher level of risk is permitted for products; when it is unclear to which product the end-of-waste product should be compared, it is advisable that a quantitative risk assessment be performed by the operator and its results checked during the inspection.

The interface between waste and chemicals regulation is another crucial point: Article 2(2) of REACH states that REACH does not apply to waste as defined in the WFD. However, after the WFD ceases to apply, all EU legislation relating to chemicals starts to apply where this is necessary. The provisions of REACH have some special features when they are applied to waste-based materials such as end-of-waste.

A checklist with the main topics to be inspected is here suggested:

See Table 11 ➔

[57] See footnote n.4.

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
	INPUT MATERIAL (WASTE)	
Quality of incoming waste in the recovery process	· Check the existence of a quality management procedure aiming at monitoring the quality of the input waste before it is accepted: - Procedure regarding the characterization of the waste and/or its origin (.) - Criteria for accepting waste into the recovery facility (specific pollutant contents, laboratory tests on a sample to verify that it is possible to comply with customer specifications after recovery...) - Procedure for managing non-conforming materials.	· EMS waste acceptance procedure · Characterization protocols · Lab bulletin of the basic characterization
	· Is pre-acceptance information compared with the incoming waste? · Is a pre-acceptance procedure performed to assess whether the waste is suitable for storage and treatment at the facility? · Are unaccepted waste deliveries documented and reported?	
	· Check the basic characterization of the incoming waste: - EWC - chemical composition of the waste - Relevant physical parameters	
	· Check compliance with limits to pollutants that can influence health and environmental risks or that can limit the existence of a market or demand.	
	· Is the accepted waste type (EWC) in line with the permit? · Is sampling performed by qualified persons and in line with corresponding standards?	
Storage of the waste input (BAT 2-3)	· Check if the quantity of waste stored is regularly monitored against the maximum allowed storage capacity. · Check if the maximum residence time of waste is respected. · Check if waste is kept separated depending on its properties in order to enable easier and environmentally safer storage and treatment.	· Waste register

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
PROCESS AND TECHNIQUES – BEST AVAILABLE TECHNIQUES (BAT CONCLUSIONS)		
Recovery operations (R codes)	· What are the different treatments throughout the facility and is it in line with the permit?	· Permit (IED or waste)
Overall environmental performance (BATc 1-2-5-6)	· Check the implementation of a quality management system and monitoring of the key process parameters influencing environment, health and the quality of the product for each step in the process chain. · Check the implementation of an Environmental Management System (BAT1) · Check the implementation of a waste tracking system and inventory. Is the waste flow documented and traceable?	· EMS · Quality Management System · Remote control area (e.g. continuous measurements control points) · Waste register
Monitoring (BATc 7-11)	· Check if the self-monitoring performed by the operator includes monitoring of: water emission, air emission, odours, diffuse emissions, consumptions, with the frequency and methods defined in BATc	· Self-monitoring report
Emissions to air (BATc 12-13-14)	· Check the implementation of an odour management plan and the use of techniques to reduce odour impact	· Odour management plan
Noise and vibrations (BATc 17-18)	· Check the implementation of a noise and vibration management plan and the use of techniques to reduce noise and vibration impact	· Noise and vibration management plan
Emissions to water (BATc 19-20)	· Check compliance with water discharge emission limit (BAT-AELs). · Check the use of techniques to optimise water consumption, to reduce the volume of waste water generated and to prevent or, reduce emissions to soil and water	· Self-monitoring report · Lab bulletin
Emissions from accidents and incidents (BATc 21)	· Check the use of techniques to prevent or limit the environmental consequences of accidents and incidents	· Technical report
Material efficiency (BATc 22)	· Check if waste is also used to substitute materials.	· Technical report
Energy efficiency (BATc 23)	· Check the use of techniques to use energy efficiently	· Energy efficiency plan
Reuse of packaging (BATc 24)	· Check if the reuse of packaging is maximized in order to reduce the quantity of waste sent for disposal	· Technical report
Specific BATc	· Check compliance with specific BATc according to the kind of recovery process (biological, chemical etc)	· Technical report
Process requirements (End-of-waste EU or national criteria)	· Check process requirement set in EU or national end-of-waste regulation	· EU or national end-of-waste regulations

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
Produced waste	· Check the final destination (disposal or recovery) of the produced waste. · Check if a pretreatment is needed.	· Waste register
END-OF-WASTE: FINAL PRODUCT AND POTENTIAL USE		
Identification of the point of end-of-waste: storage and time length	· Identify the point of end-of-waste: check length and quantity of storage of end-of-waste waiting for being dispatched in the market. · Is the end-of-waste used within 12 months[58]? If not, it must be demonstrated that this is a common timeframe for storage within the industry and that demand for the end-of-waste is guaranteed.	· Sales contracts · Trade register · Waste storage register
Traceability and quality	· Check if a document (a sales contract for example) is issued for each end-of-waste batch for purchasers. · Monitoring actions of the quality of the end-of-waste resulting from the recovery operation.	· Sales contracts · Trade register · Self-monitoring report
The inspection system aims at assessing the respect of the four conditions set in the WFD (Article 6):		
a. the substance or object is to be used for specific purposes;	· Identify the substituted product (current or potential use). · Check it the product is used for the Authorized uses. · Check the existence of sales contracts. · Check the amount of end-of-waste produced, sold and stored. · Check the final destination of the end-of-waste. · Check if the supply is significantly higher than the demand.	· Sales contracts · Trade register · Product storage register
b. a market or demand exists for such a substance or object;		

[58] This is not a mandatory timeframe limit. Some MS's uses it as a reference.

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
c. the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products;	· Check compliance with product legislation (technical standards, e.g. ISO, EN standards ecc.). Respecting thresholds for parameters to guarantee the compliance of end-of-waste with the market expectations. · Check the procedure for completing customer specifications as required. · Check the analytical results demonstrating compliance of the end-of-waste with legislation and technical parameters for standards, specifications or other commercial documents. · Check the frequency of the detailed characterization of the end-of-waste and the monitoring system of the quality of the end-of-waste. · In the absence of industrial technical/commercial standards, other commercial requirements or any other relevant documents describing and regulating the quality of marketed end-of-waste shall be described. · Check (if needed) the Declaration of Performance (DoP) and CE marking of the end-of-waste · Check if a statement of conformity is issued for each end-of-waste consignment.	· Product legislation · Lab bulletin · EMS procedures · Documents accompanying the products delivered in the market
	· Ask for documentary evidence which demonstrates compliance with relevant provisions of the CLP and REACH regulations. Compliance with REACH Regulation: - Verify the level of substances present which are subject to restrictions (Annex XVII) - Compliance with authorization requirements - Compliance with registration requirements - Compliance with information requirements.	· Documents related to REACH and CLP regulation produced by the operator

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
d. the use of the substance or object will not lead to overall adverse environmental or human health impacts.	· Check compliance with environmental standards set in the permit (e.g. leachate test etc, max content of pollutants etc).	· Permit
	· If a permit does not set end-of-waste environmental requirements, check if a qualitative assessment of the risks on the basis of the description of the treatment operations (existence of exposure) and the composition of the end-of-waste has been performed by the operator. · Check the following content of the risk analysis: - hazardous substances to human health and environment potentially present in the end-of-waste that are likely to be released during use and end-of-life; - review and analysis of the literature on information concerning the substances present; - appropriate tests (leaching, combustion) for substances of concern; - Identification of pathways and duration of the exposure of humans and the environment to identified hazardous substances; - Technical provisions made to avoid direct contact with substances of concern, if necessary; - Frequency of checks aimed at controlling the composition of end-of-waste (downstream analyses, input control, etc.). · Check that the risks are not higher than with the substituted product, in particular: - loading/transport operations: e.g. emission of hazardous dust during handling and loading - Storage operations: storage conditions do not have to favour the dispersion of hazardous substances into the environment (outdoor storage) or the concentration of hazardous substances in an unventilated room. · Check that the quality of the characterization or the level of knowledge regarding the health and environmental risks associated with the substances is sufficient to ensure risk control	· Documents produced by the operator to ensure compliance with Article 6 of the WFD · Risk analysis

TABLE 11
A checklist with the main topics to be inspected (Recycling plant: End-of-waste process)

Responsible Inspection authority and coordination with different authorities

The end-of-waste recovery plant may fall under IED and/or WFD; checking compliance with the WFD or IED permit will be under the responsibility of the Environmental Inspection Authority. The installation can also fall under the system of official controls according to the REACH Regulation.

Appropriate provisions should be made to ensure cooperation and exchange information with the:

- REACH enforcing authority;
- environmental Inspection Authority of the end-of-waste Country destination (within or outside their MS).

Formal arrangements should be devised and implemented and should contain provisions as:

- joint inspections;
- the sharing of information between enforcing authorities regarding their inspection activities. The electronic information exchange system adopted for the purposes of REACH and CLP enforcement should be used for fast and easy exchange of information;
- supporting each other with the provision of specialist advice;
- notification between enforcing authorities of identified matters of concern regarding duty holders.

Sampling activities

Taking a sample of the input waste and/or of the final product to be further analyzed can be part of the inspection, to assess compliance with input waste quality requirements or with threshold limits set for pollutants in the technical and/or environmental standards for the end-of-waste.

Reference methods for taking samples and making measurements and analysis have to be checked in advance.

It is recommended, during the collection of samples, to:

- take at least two samples in the amount necessary for examination (for a first analysis, for a second analysis at the request of the subject of inspection);
- to draft a report on the collection of the sample;
- to seal the samples and mark them properly;
- to submit without delay the sample for the first analysis to the appropriate expertise institution.

9.5 Transport of end-of-waste (product)

Scope of the inspection

The regulatory framework on shipment of waste does not apply to end-of-waste products. The regulatory framework applicable to shipment of non-waste materials is exactly the same as it would be for normal products within the EU.

However, the lack of harmonisation of end-of-waste rules, within and out of EU, often creates legal uncertainty in waste management decisions. This kind of uncertainty is particularly problematic in relation to trade between different Member States and disagreements between different MS can arise in relation to identifying waste and the recovery operation status of a particular product.

According to Article 28 of the WSR, if the competent authorities of dispatch and of destination cannot agree on the classification as regards the distinction between waste and non-waste, the subject matter shall be treated as if it were waste.

Where this material is exported as an end-of-waste product without prior notification on the basis of the WSR, the holder has the legal responsibility to provide all information to the national competent authority that this material is no longer waste. The basis of this the burden of proof is laid down in Article 50(4a) and (4b) of the WSR. If the holder is not able to provide the required information, the competent authority may classify the export as illegal waste shipment and may decide to take administrative and/or criminal enforcement actions.

An inspection to a transport of end-of-waste products is aimed at verifying that the load is accompanied by all the necessary documents to avoid misunderstanding in the acceptance of the product at the final user. Practical Tool 1 has defined the content of such information, which content can be considered as the focus of the inspection. A voluntary end-of-waste passport has been suggested in Practical Tool 1 as one of the possible actions to remove barriers in the circulation of end-of-waste. See also Chapter 4, Section 4.4 of the guidance.

Execution of the inspection

The inspection can be focused in checking the content of a possible voluntary "End-of-waste passport" as suggested in Practical Tool 1, to gather all the necessary information needed to prove the end-of-waste status.

DIRECTIVE PROVISIONS	CONTENT OF THE END-OF-WASTE PASSPORT TO BE CHECKED
ARTICLE 6, PARAGRAPH 1 WFD (2018) (CONDITIONS)	
General information	• General information about the operator, the Authority which assessed or which verified the end-of-waste status (if not only self-assessed) What end-of-waste assessment procedure has been followed and date of decision/ assessment: • Prior decision (permit, legal opinion, statement..) • Self-assessment • Verification after self-assessment: report

The substance or object is to be used for specific purposes	· Short Description of the intended use
A market or demand exists for such a substance or object	· Short Description of the existence of a market · In case there is a specific buyer/user this information should also be provided · information about the operator receiving the product? Contracts? Value of the material?
The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products	· List of technical standards applied to the end-of-waste · List of technical parameters · Conformity analysis
	· List of environmental standards parameters · List of environmental parameters · Conformity analysis
The use of the substance or object will not lead to overall adverse environmental or human health impacts.	· Description on how was demonstrated that the use of the substance/object doesn't lead to overall adverse environmental and human health impacts
ARTICLE 6, PARAGRAPHS 3 AND 4 WFD (2018) (OPTIONAL REQUIREMENTS)	
Permissible waste input for the recovery operation	· List of EER codes used for end-of-waste production and eventual pollutants checked in the input waste
Allowed treatment processes and techniques	· Short description of the recovery or preparation for reuse process
Quality criteria for end-of-waste materials resulting from the recovery operation in line with the applicable product standards, including limit values for pollutants where necessary	· (see above, condition c)
Requirements for management systems to demonstrate compliance with the end-of-waste criteria, including self-monitoring, and accreditation, where appropriate	· Short information on the QAS adopted
A requirement for a statement of conformity	· A copy of statement of conformity, if requested by the MS legislation, has to be attached

TABLE 12
Checking the content of a possible voluntary "End-of-waste passport" (Transport of end-of-waste (product))

Responsible Inspection authority

The authorities involved in the enforcement of shipment of waste, such as police forces, environmental authorities, customs etc. have to cope with the problem of distinguishing between an end-of-waste products transportation or waste transportation.

It is crucial that the authorities can agree on the content of the set of documents to accompany the end-of-waste new product, in order to look for the sufficient information to take the right decision.

The Environmental inspection authority, whether not appointed as competent authority for planning and conducting inspections for waste shipments, can be asked to provide technical support to NCA's and Customs with their inspection activities.

Sampling activities and equipment needed

If further investigation is required, it may be necessary to undertake sampling of the product, proportional to the amount transported, in conformity with (national/international) protocols.

9.6 Final user

Scope of the inspection

According to Article 6-5 of WFD 2018, *"The natural or legal person who:*

a. *uses, for the first time, a material that has ceased to be waste and that has not been placed on the market; or*
b. *places a material on the market for the first time after it has ceased to be waste, shall ensure that the material meets relevant requirements under the applicable chemical and product related legislation.*
The conditions laid down in paragraph 1 have to be met before the legislation on chemicals and products applies to the material that has ceased to be waste".

Therefore the burden of proof is not only on the end-of-waste producer (recycler) but also on the final user of the new end-of-waste based product.

The inspection at the final user has the goal to verify the correspondence with what has been authorized or declared by the operator with the real final use of the end-of-waste; the environmental permit or the evidence documents collected at the recycling plant should include the following information:

- the purposes for which the end-of-waste is to be used;
- its conformity with any standards applicable to its use in the intended market;
- the raw material that has been substituted;
- technical properties provided by the end-of-waste during use stage;
- type of facility in which the material will be used and the associated regulatory regime.

It is worth pointing out that the end-of-waste products can have different final uses:

Final uses of End-of-Waste	Secondary raw material in a different production process with Environmental Permit
	Direct application in environment (e.g.: compost)
	Secondary raw material in a firm without Environmental Permit (e.g. road construction)
	Direct introduction in the market as products

Therefore, the goals of the inspection at the final user can be summed up as follows:

- check correctness of the use of the new product;
- check compliance with chemical legislation and products standards;
- check which waste treatment installation the end-of-waste comes from;
- storage conditions;
- substituted raw material.

When the end-of-waste is used as secondary raw material in a further production process, the installation can be part itself of an inspection plan, whether it has an environmental permit. Specific provisions about the use of the end-of-waste in the process can be set out in the permit itself.

The other final use instances can be inspected where there is doubt about the proper use of the end-of-waste at the end of the recovery chain.

Preparation of the inspection

The strategy and organization of the inspection can differ if the final user is a firm or activity with or without an environmental permit or if the end-of-waste ends up in the environment or in the market.

Execution of the inspection

Even if the final use of the end-of-waste is a firm, the environment or market, some key general issues can be investigated at all the mentioned stages.

A checklist with the main topics to be inspected is here suggested:

TOPIC	WHAT TO CHECK	DOCUMENTS TO BE CHECKED
Storage	· Check length and quantity of storage of end-of-waste waiting for being used in the process/environment (some permit may contain a time length for storage of the product). · Check storage conditions to assess they cannot modify the quality of the product.	· Sales contracts · Trade register
Traceability and quality	· Check if a document (a sales contract for example) is issued for each end-of-waste batch arriving at the final user. · Check compliance monitoring actions of the quality of the end-of-waste arriving at the final user. · Acceptability procedures of the end-of-waste at the final user. · Check the end-of-waste departing recycling company.	· Sales contracts · Trade register · Self-monitoring report

Use of the new product	• Check if the product is used for the Authorized uses. • Identify the substituted product (current or potential use). • Check compliance with chemical legislation and products standards. • Check (if needed) the Declaration of Performance (DoP) and CE marking of the end-of-waste. • Check if a statement of conformity is issued for each end-of-waste consignment.	• Technical report • Permit • Sales contracts • Trade register • Self-monitoring report • Lab bulletin

TABLE 13
A checklist with the main topics to be inspected (Final user)

Responsible Inspection authority and Coordination with different authorities

As the final user may not have an environmental permit, the competent Inspection Authority can differ from the Environmental Inspection Authority.

It may also be that the final user can be located outside of the area of responsibility of the Environmental Inspection Authority (out of the region, MS or out of the EU). It is therefore necessary to create an information exchange network among different Inspection Authorities, to receive feedback on the performed inspections at the final users receiving the end-of-waste or to urge them to plan a non-routine inspection, in the case of suspected breaches. The IMPEL Network can be a useful tool to facilitate contacts with the relevant authorities in a different EU Country.

Sampling activities and equipment needed

Sampling of end-of-waste by an Inspection Authority (or accredited lab on behalf of it) can be adopted where there is suspicion, to check if the quality of the end-of-waste complies with the technical and environmental standards of the product.

Sampling the end-of-waste can be a valuable tool to be used when end-of-waste is directly applied in the environment (e.g. compost), and no further check is envisaged by the final user.

10 FOLLOW-UP AND ENFORCEMENT – REPORTING THE RESULTS OF THE INSPECTION

The Final Inspection Report of the on-site inspection is the closure of the inspection cycle and represents the basis for any subsequent compliance assessment and thus also for any subsequent enforcement actions (e.g. sanctions).

The Report can provide information about:

- the compliance with the conditions of the Permit and among them the regularity of the self-monitoring obligations by the operator;
- highlight detected non-compliance, indicating the relevant evidence and possible need for further measures, including enforcement action and sanctioning;
- the state of implementation of BAT (IED plants);
- the evaluation of the operator self-assessment about the end-of-waste status (Article 6 of WFD);
- feedback to the permit writer regarding any improvement of the authorization;
- eco-innovation compliance promotion actions.

In cases where illegal activity is detected, inspectorates shall take prompt action and report to appropriate prosecution bodies where necessary.

In case of detected non-compliance, it would be appropriate to consider at least the following actions:

- ensuring further inspection activities, including additional site visits where necessary;
- ensuring revision of permit conditions where necessary;
- ensuring mitigation or remediation of adverse environmental impacts where necessary, and any related assessment of liability and sanctioning provisions;
- ensuring that, where the authority in charge of inspections does not itself have competence for one or more of the above interventions, that it provides any necessary evidence and cooperation to the enforcement authority responsible, in order to ensure compliance.

According to the WFD 2018, Member States may make information about [...] the results of verification by competent authorities publicly available by electronic means, in order to promote transparency about Member State approaches to end-of-waste status.

The findings of inspection activity may be put into a database and used for monitoring of performance indicators (output and outcome indicators). They can be used for the development of future inspection plans and programmes (e.g. for evaluation, trends in compliance and the update of risk profiles and for interinstitutional sharing of information) and amending the inspection strategy accordingly. The information may also feed into the database of "case-by-case" end-of-waste (see Practical Tool 1, Part B).

11 STRATEGY AND PLANNING: GOING THROUGH THE STEPS OF THE INSPECTION CYCLE

End-of-waste recycling installations, depending on size and permitting system in the MS, can be divided into the following three categories:

- installations with an IED permit;
- installations with a waste permit (under WFD);
- installations without a permit (General Binding Rules, Communications etc.).

To plan and prioritise inspections for IED installations is mandatory; some MS also have a plan for non-IED plants, others not.

An overall strategy to verify compliance with the end-of-waste requirements of Article 6 of the WFD 2018 needs to be set up; a main task is to include the verification system of the end-of-waste regime within the overall inspection plan of environmental activities, which could be IED or not.

Here are some suggestions presented.

11.1 Setting priorities

Inspections in end-of-waste Recycling plants under IED are prioritized according to a systematic appraisal of the environmental risks of the installations that is mandatory according to Article 23. Many MS have adopted IRAM as a tool for the risk assessment; initially, two criteria concerning waste have been identified (https://www.fms.nrw.de/lip/download/IRAM_Guidance_Book.pdf):

- Off-site transfer of waste;
- Input of waste.

IRAM waste criteria can therefore be amended if a focus on inspections at end-of-waste recycling installations is a priority task of the inspection authority.

Beside general inspection obligations for waste plants set out in the IED and the WFD, recital 17 of the WFD 2018 specifically indicates what can be used as risk assessment criteria; it states indeed, that MS should take enforcement provisions *"to verify that waste that is considered to have ceased to be waste as a result of a recovery operation complies with the law of the Union on waste, chemicals and products, in particular prioritizing:*

- *waste streams that pose a higher risk to human health and the environment due to the nature and volume of those waste streams,*
- *waste that is subject to innovative recovery processes*
- *or waste that is recovered for subsequent further use in other Member States".*

Article 6, paragraph 4 of WFD 2018 also states that, where criteria have not been set at either Union or national level each MS may decide case-by-case

or take "appropriate measures to verify, that certain waste has ceased to be waste on the basis of the conditions laid down in paragraph 1 [...]".

The above-mentioned statements identify a first set of priority criteria that can be used within a **"waste stream based risk analysis"**, that is a tool to prioritise inspections in end-of-waste recycling plants, whether they are IED or not.

Depending on the planning strategy of the Inspection Authority Priorities of inspections can be determined:

- Among end-of-waste recycling plants themselves (different waste streams);
- Among waste installations (Recycling plants, Landfills, Storage etc);
- Among non-IED installations (Different industrial sectors).

Inspection campaigns can also be envisaged on a multi-annual scale, focused on different end-of-waste waste streams. The Recovery chain approach can be adopted, that means to conduct multiple inspections at different stages of the chain (producer – recycling plant – final user).

A further possibility is to use a **self-assessment checklist** for end-of-waste recovery plants to be tailor-made and sent to operators and final users for self-assessment, whereby any anomalies found can lead to next level inspection.

A non-exhaustive list of criteria to be used as a basis for a waste stream based risk assessment is the following:

- "case-by-case" decisions on end-of-waste;
- End-of-waste recycling plants using waste streams that pose a higher risk to human health and the environment as an input material;
- innovative end-of-waste recovery processes with a lack of consolidated market;
- Recycling plants producing end-of-waste crossing national or EU borders;
- Overall quantity of the waste stream entering the end-of-waste recovery process.

The following figure summarises the possibilities to intervene in the prioritization of end-of-waste plants inspection planning:

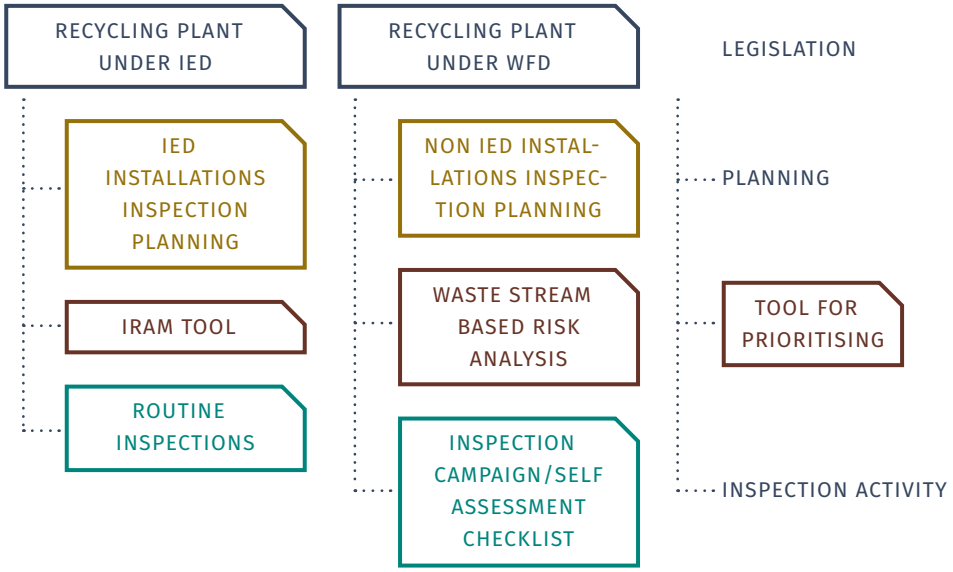


FIGURE 25
End-of-waste plants inspection planning

11.2 Cooperation with other inspection authorities

As discussed in Section 3, different Inspection authorities have a role along the chain of the end-of-waste recovery. Therefore, it is essential to define appropriate provisions, within the strategy of the Environmental Inspection authority, to ensure cooperation and collaboration with the other owners of relevant information. According to the IED, cooperation and coordination with different inspection authorities is envisaged to be part of the inspection plan.

Coordination is also necessary to avoid overlapping activities/responsibilities and an increase in the burden of inspections for the operator.

Cooperation and coordination is necessary not only with other inspection authorities but also with other authorities with relevant functions, such as police and customs. At least the following authorities are likely to be involved in the chain of end-of-waste:

- environmental Permitting authorities (IED permit, Waste permit etc);
- environmental inspection authorities (IED, non IED);
- customs;
- police;
- REACH Inspection authority;
- environmental police (where existing);
- enforcing authority;
- inspection authorities of other MS (End-of-waste/Waste crossing borders);
- third part independent laboratories.

Formal arrangements (by means e.g. of Memorandum of Understanding) should be devised and implemented as appropriate that provide for clear and effective cooperation and information exchange between inspection authorities within a Member State.

Cooperation and collaboration come in different forms; here is a list of examples:

- sharing the inspection programme to perform Joint Inspections;
- protocols of information exchange (feedback and evaluation of past inspections, likelihood of offences – e.g. is there a big financial profit for not complying with legislation). It is essential to acquire information regarding REACH inspections, or checks at the border;
- access to existing databases (e.g. RIPE Reach Information Portal Enforcement and EIES Electronic Information Exchange System, Environmental inspection reports database etc);
- notification between enforcing authorities of identified matters of concern regarding duty holders;
- supporting each other with specialist advice;
- establishment of national, regional and/or local “coordination tables” and networks for enforcement liaison;
- creating a platform for inspectors (e.g. a “Forum” as Basecamp);
- integrated permitting procedures to ensure that chemicals/product authorities contribute to waste permits.

To really enable eco-innovations it is crucial that inspection authorities align their inspection activities both in terms of priorities and strategies and at the operational level.

The IED and WFD end-of-waste installations inspection plans need to be coordinated with REACH and TFS inspection plans, whether the inspection authority is the same or not, in order to plan joint inspections or share common goals.

There is also of course the extra complication of the need of cooperation between authorities from different MS. IMPEL is an effective network that can be used to promote cooperation and facilitate contacts among different authorities.

The TFS cluster is an informal forum/network within IMPEL which aims to:

- promote compliance with the WSR through effective enforcement;
- carry out joint enforcement projects;
- promote exchange of knowledge, best practices and experience with the enforcement of the WSR;
- stimulate a uniform enforcement of the WSR.

IMPEL-TFS has produced several tools to support inspections and controls of waste shipments by the NCAs.

IMPEL and other EU – level environmental enforcement networks (such as ENPE, EnviCrimeNet and EU Forum of Judges for the Environment) play an important role in relation to development of relevant practical tools (e.g. risk assessment criteria, template for inspection plans and reports) and to training.

11.3 Compliance promotion activities

Inspection Authorities can play their part in fostering innovative business proposals on waste recovery that can achieve the status of end-of-waste. Compliance promotion initiatives can be promoted by Inspection Authorities to support the operator in fulfilling technical and administrative requirements. These initiatives can be arranged with the following goals:

- make clear how to comply with the requests of the competent authorities;
- jointly define which self-monitoring activities should be put in place;
- clarify “grey areas” of the legislation where different interpretations can exist;
- indicate the administrative deadlines to be complied (submit self-monitoring reports, EPRTR data, inspection fees etc.);
- build a relationship based on trust;
- clarify interconnections with REACH and WSR;
- etc.

Many other further goals can be found and can be achieved with some of the following initiatives:

- technical meetings with operators (sectorial or individual meetings);
- transparent and updated website with useful pieces of information on procedures, deadlines etc;
- organisation of conferences (End-of-waste legislation, best practices etc) and information campaigns;
- self-assessment checklist published on a website to help the operator to comply with administrative procedures, deadlines, general technical requirements etc.

11.4 Training

There is substantial evidence that the lack of overall staff resources and suitably qualified personnel continues to be an important barrier to the effective implementation of end-of-waste law.

Staff should have skills and qualifications needed to carry out those inspections effectively. Therefore, continuous training is needed. A way that enables continuous training of inspectors is the conducting of annual training programmes. The inspecting authority should look into the possibility for joint or mutual training with staff from other relevant authorities.

Effective environmental compliance assurance requires adequate human resources, adequate financial resources and specialised knowledge. For instance, specialised knowledge is needed to be able to:

- distinguish between waste and non-waste;
- have skills for the assessment of waste shipment documentation;
- have skills about relevant legislation (IED, REACH, WSR, product legislation etc.);
- have technical skills for the assessment of individual waste stream threats;
- understand lab bulletins and monitoring reports and assessing consequences;
- ask the right questions and detect false explanations, detect erroneous/false qualification of substances.