

End of Waste/By-Product / CE Worksheets

CIRCULÉIRE is the first cross-sectoral industry-led innovation network dedicated to accelerating the net-zero carbon circular economy in Ireland.

CIRCULÉIRE's overarching objective is to source, test, finance, and scale, circular manufacturing systems, supply chains and circular business models to deliver significant reductions in both CO₂ emissions and waste across our Industry Membership over the programme's lifespan.

End of Waste/By-Products and CE

End-of-waste and by-product notifications are recognised as playing a key role in a circular economy. They do this by helping to establish a market for a wide range of secondary raw materials, improving resource management, encouraging symbiotic industrial practices, and preventing resources from being sent for disposal. By maintaining resource value within the economy, the successful application of end-of-waste and by-product status reduces the environmental impacts arising from waste disposal.

CIRCULÉIRE's End of Waste, By-products and Waste Licensing Pathfinders Thematic Working Group (TWG) intends to increase Member's knowledge and understanding of the opportunities afforded by End of Waste and By-product status in delivering a circular economy in Ireland. The outcomes will provide knowledge of processes and procedures alongside an understanding of how this fits with regulatory process compliance, with clear recommendations to aid the economy's transition to a circular model.

A circular economy is one where the life cycle of a product has been modified from a linear take-make-dispose model to one where the product can serve a further economic purpose outside the requirements for further regulatory controls.

End of Waste and by-product status for secondary product and raw materials present an ideal opportunity to enhance circularity principles through enabling reduced primary resource demand/use and extending the life of materials within the economy.

This series of worksheets is intended to provide direction in exploring the opportunities that transpire through TWG participation and identify real nationally significant projects that will present positive circular outcomes for the Irish economy if implemented.



About this worksheet

End-of-waste and by-product notifications are recognised as playing a key role in a circular economy. They do this by helping to establish a market for a wide range of secondary raw materials, improving resource management, encouraging symbiotic industrial practices, and preventing resources from being sent for disposal. By maintaining resource value within the economy, the successful application of end-of-waste and by-product status reduces the environmental impacts and some costs associated with waste disposal. Nevertheless, end-of-waste and by-product regulations are often poorly understood by certain sectors of Irish industry, which amongst other challenges, can result in poor engagement or unsuccessful applications.

End-of-waste and by-product regulations are recognised as being technically complex, particularly for companies who have had limited engagement with them. While it's possible you will still need professional support if preparing a strong End of Waste or By-product application, this worksheet is intended to guide you with the initial prompts and steps to help you when considering preparing an application. Throughout you find key [definitions](#) you'll need to be aware of.

Structure of the Worksheet

This worksheet has been designed with the following key steps in mind:

Getting Started

- [Exercise 1](#) prompts you to reflect on the circularity potential of your waste / residuals. Here you identify your key waste or production residues by volume and value that could benefit going through the process – Selecting one of these materials / objects you will use for the subsequent worksheets.

Determining if your material is a waste or by-product

- [Exercise 2](#) aims to provide you with a series of prompts aimed at helping you determine if the material you have identified in Exercise 1 is a waste or by-product, whether you are required to dispose it, and whether it has circular potential at its end of life.
- [Exercise 3](#) sets out a number of prompt question which will enable you to undertake an initial End of Waste or By-product test. By the end of this exercise you should have a clearer idea about the potential applicability of either EoW or BP to your process and the residues it produces.

If you identify a potential EoW product proceed to Exercises 4 - 5 :

- [Exercise 4](#) aims to interrogate your waste material in greater detail if you found you met the requirements of the EoW test in Exercise 3.
- [Exercise 5](#) aims to provide you with prompts on the information requirements that need to be developed to aid an EoW submission
- [Exercise 6](#) provides a checklist of items needed for EoW to confirm that all relevant issues have been considered/addressed and a submission can be developed
- [Exercise 9](#) provides a Summary Sheet for both EoW and BP submissions that will enable confirmation that the necessary information is in place.

If you identify a potential By-Product proceed to Exercises 7 - 8 :

- [Exercise 7](#) aims to interrogate your waste material in greater detail if you found you met the requirements of the BP test in Exercise 3.
- [Exercise 8](#) will help you compile the main types of evidence you'll need to gather if preparing a formal By-product application with the EPA

At the end of the worksheet pack, you will find some suggested [next steps](#) and [additional resources](#) to help you progress your EoW /BP application.

Exercise 1 – Considering the circularity impact of your waste / residuals

1. Do you produce any waste/residue with a significant volume?	List Relevant Wastes:						
2. What impact does this have on your business?	Tick box:	Lost Revenue/ Cost		Resource Loss		GHG Emissions	
3. Details about the material: Provide as much detail as you can on the substance/material under consideration including details on the potential product it could be made into:	i. Tonnage/Volume per annum:						
	ii. Disposal Costs:						
	iii. How/where is it produced:						
	iv. How is it currently managed:						
	v. Potential value opportunity:						
4. Select priority waste stream to progress: Please provide any additional details to help assess the project opportunity:							

Exercise 2 - What wastes or production residues do you produce?

Determine the basic elements relating to your project and End of Waste/By-Product/Waste Regulation to assess whether you produce a waste and whether an alternative EoW/BP opportunity may exist subject to the implementation of any necessary assessment/material processing.

2.1 Do you produce a Waste?

Is the material you have selected in Exercise 1 actually a waste by definition?

What are you currently doing with this material e.g. re-use/recycling/disposal?

Have you confirmed the key regulatory requirements relating to your handling and/or processing of waste?

Add your responses here...

2.2 Must you dispose of it?

Does this material have to go for disposal/recycling elsewhere or could you do something with it?

Do you have internal expertise to determine an EoW/By-product opportunity?

Can the waste be reclassified internally or must you send it to a third party processor under licensed transport?

Add your responses here...

2.3 What else could you do?

If possible, could the waste be re-incorporated within existing manufacturing systems?

Does it produce a final product which meets existing product specifications?

Or – does it provide an opportunity to produce a new product which has a clear use/application?

Add your responses here...

Exercise 3 - End of Waste or By-Product test?

3.1 Waste

If the substance or object that you have to manage or which you collect/receive does not meet either of the End of Waste or By-product tests below, then you have confirmed that it is a waste. This does not mean that End of Waste cannot be achieved however – End of Waste is only possible where a substance or object is a designated waste in the first place! Waste must be managed in accordance with the relevant regulations in force at the time. Failure to manage waste in compliance with statutory regulations renders you liable for prosecution.

Detailed assessment is required to confirm the status of a substance or object and whether it offers the opportunity to be used in production of an End of Waste product. The key pillars for determining whether you are dealing with something that could be considered an End of Waste or By-product follow:

3.2 End of Waste- if you tick **Yes** to all of the below then it is likely that the substance will have End of Waste status – confirm with EPA through the formal EoW application process. Go to [page 6](#)

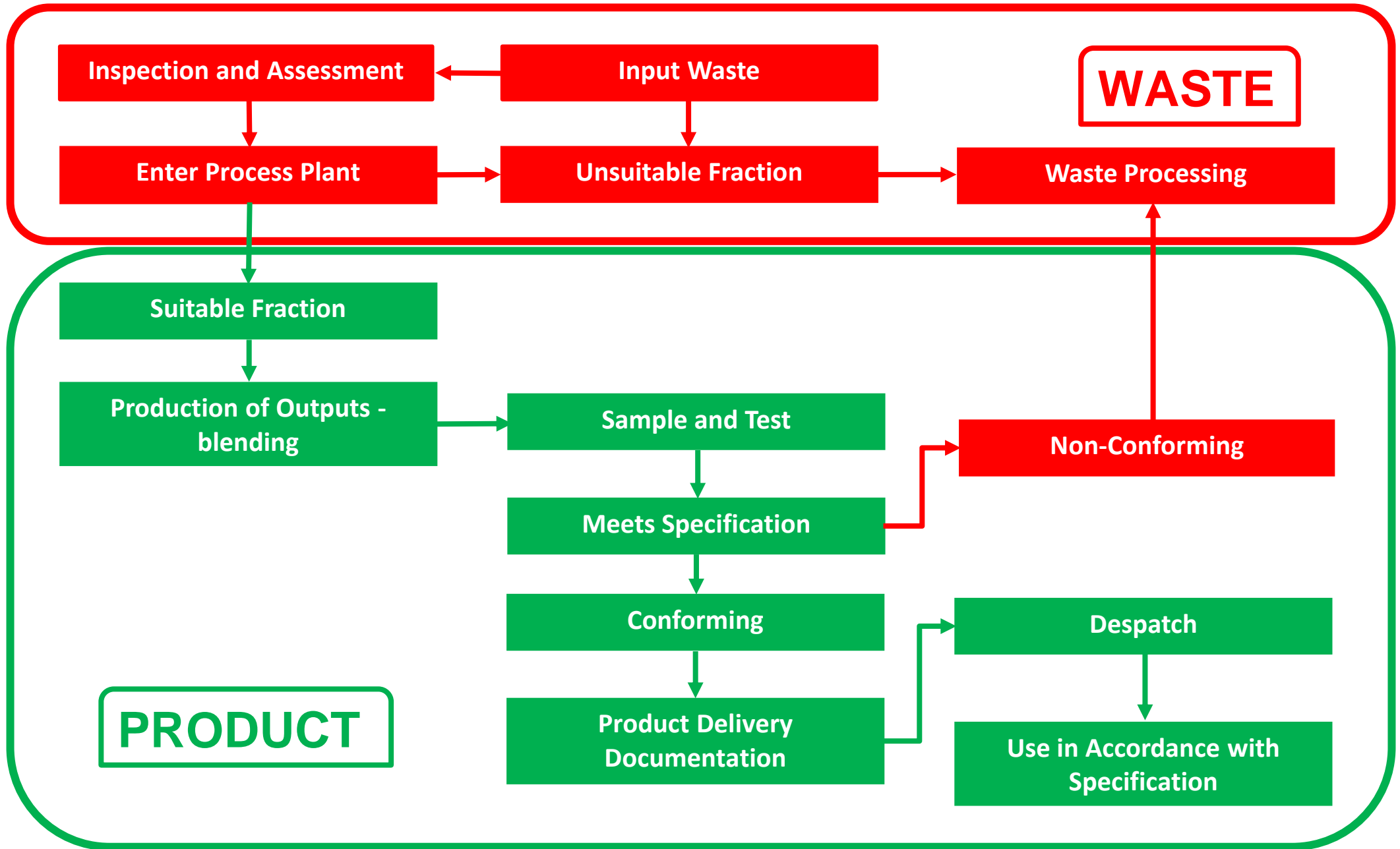
- Has the substance or object undergone a recovery operation, including recycling? Yes No
- Can the substance or object be used for a specific (lawful) purpose without further processing? Yes No
- Does a market or demand exist for such a substance or object? Yes No
- Does the substance or object fulfil the technical requirements for the intended product and meet the existing legislation and standards applicable to the product? Yes No
- Is the substance or object safe to use in the chosen application (i.e., no known adverse environmental or human health impacts)? Yes No

3.3 By-Product - if you tick **No** to all of the below then it is likely that the substance will have By-product status – confirm with EPA and go to market. Go to [page 11](#)

- Has the substance or object been discarded, or is it required to be discarded, or intended to be discarded? Yes No
- Was this substance or object intentionally and deliberately produced for a specific use? Yes No
- Did the production process deliberately directly seek to produce the substance or object? Yes No
- Are you confident you have a customer/or specific use for this material? Yes No
- Does the substance or object require any further processing (other than normal industrial practice) before it can be used? Yes No
- Could the original process which delivers the material be carried out without producing the substance? Yes No
- Could further use of the substance or object lead to overall adverse environmental or human health impacts? Yes No

End of Waste

End of Waste Process Schematic



Exercise 4 - End of Waste Requirements

The requirements to achieve an End of Waste position are complex and require significant information and data on both the feedstock materials and the proposed final product. This exercise will assist you in making your EoW case, based around criteria needed to achieve a successful outcome.

4.1 Knowledge of Waste

What is the waste that you produce or collect/receive?

How does the waste arise?

What characterisation information do you hold?

Do you have detailed chemical/analytical data on the input materials?

Add your responses here...

4.2 Knowledge of Product

What is the product that you wish to manufacture?

What processing is required to deliver a product?

Are there clearly defined specifications for the product?

Does product meet the specifications without further processing?

Add your responses here...

4.3 Information Requirements

Demonstrate that the waste has been fully recovered?

Demonstrate factory quality controlled procedures?

Demonstrate no greater harm to health/environment than existing product?

Add your responses here...

Exercise 5 - End of Waste Evidence Requirements

A significant quantity of quality data will be required to deliver an End of Waste outcome. This exercise will assist you in understanding the key information requirements necessary and refine the data collection to develop your EoW case.

Guidance - <https://www.epa.ie/publications/licensing--permitting/waste/draft-end-of-waste-guidance-part-1-and-part-2.php>

5.1 Technical Assessment

What specification is intended/required to be met?

Published or customer specification?

What testing is required to demonstrate compliance?

Has this technical compliance assessment been done?

Add your responses here...

5.2 Impact Assessment

What potential contaminants exist in the substance?

Have all of these been identified?

Has analysis been undertaken to make an assessment?

What compliance standards must be met?

Add your responses here...

5.3 Market Assessment

Demonstrable market for the product?

What evidence do you have for this market?

Does the product meet market requirements?

Is there a clear value for the product?

Add your responses here...

Exercise 6 - End of Waste Checklist

Use the knowledge applied from the previous worksheets to set out a key delivery plan to enable successful project completion. This exercise will enable you to demonstrate that the key tenets of EoW can be met, or define what additional information may be required for a successful submission.

6.1 Common Use

You should gather supporting evidence for the following:

- Relevant standards / specifications that apply to this product type?
- Known scale of the market?
- Commercial consideration – Revenue achievable?
- Letters of support from prospective customers?

6.2 Is it a Product?

You should gather supporting evidence for the following:

- Can it be converted into a marketable product?
- You know what the original waste is?
- Do you understand which recovery process is to be undertaken?
- Does the envisaged EoW product meet existing product specifications?

6.3 Requirements?

You should gather supporting evidence for the following:

- Does the product meet standards for virgin product?
- Does it meet existing or bespoke standards?
- Does product meet relevant legislative requirements (Health and Safety, Trading Standards, etc.)?
- Is there any confirmatory analysis/testing in place?

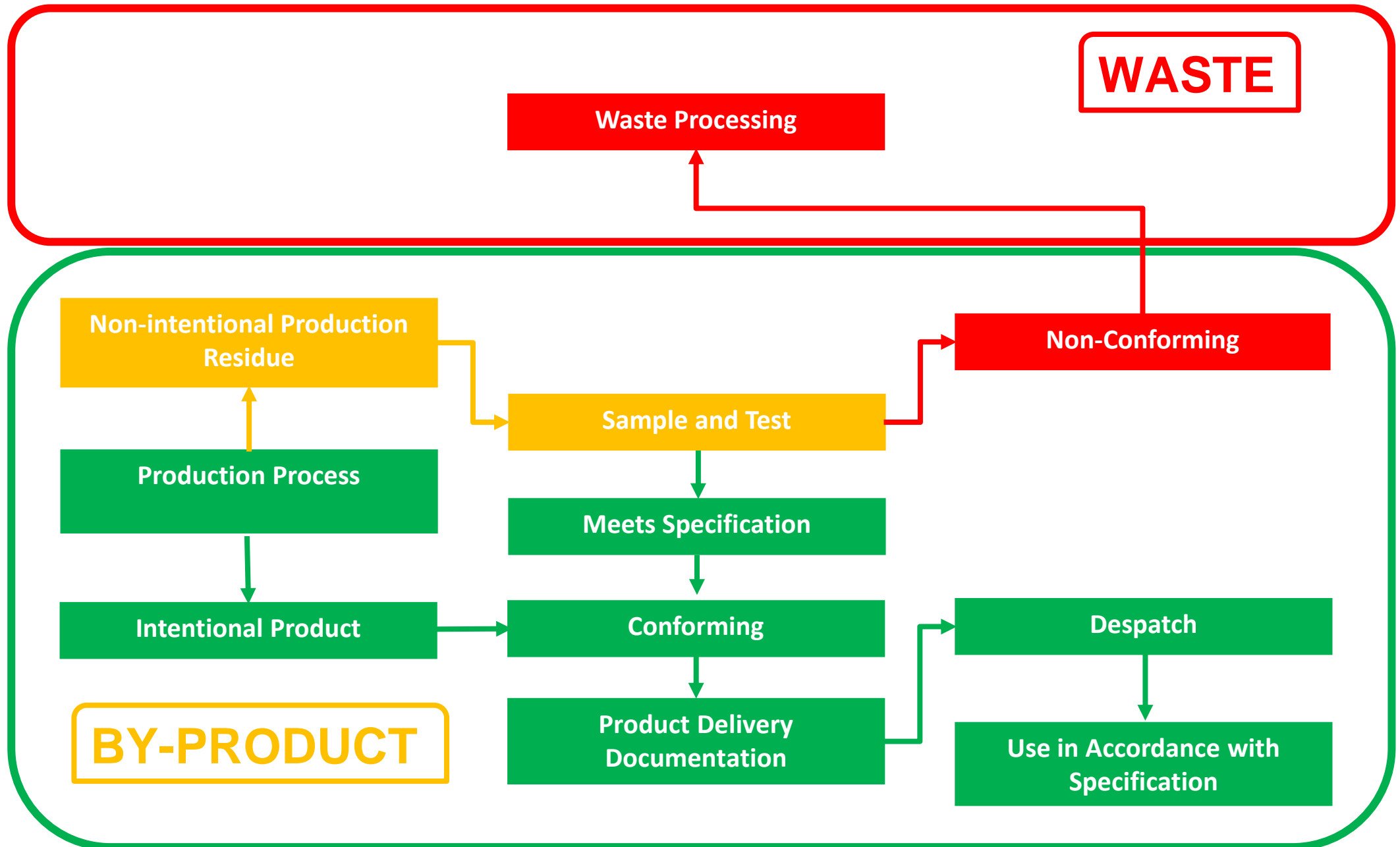
6.4 Impacts?

You should gather supporting evidence for the following:

- Demonstrate no overall negative impact from product?
- Is there a comparator?
- Has a detailed risk assessment been completed?
- What impacts have been identified for the final product?

By-Products

By-Product Process Schematic



By-products – notification system

By-product notification must be made to the EPA via online notification system.

Access is via EPA's Eden Portal (<https://www.edenireland.ie/>)

First time users must request access to By-product Module. Guidance is available on [how to register for Eden](#).

Further information on EDEN is available in the '[Frequently Asked Questions](#)' and in the EDEN Portal 'Help' section

If you have queries or issues in relation to EDEN, submit these to eden@epa.ie

Detailed user guidance: <https://www.epa.ie/publications/licensing--permitting/waste/by-product-notification-form-guidance.php>

Key Features of the New Online notification system:

- In-built data validation to improve quality of incoming notifications
- Improved automatic alerts to local authorities
- RSS feeds available to follow activity on notifications of interest
- All correspondence now issued via Eden Portal
- Streamlined communication with all stakeholders
- Display of status (stage of assessment/ determination) of a notification
- Full public access to documentation provided via [By-Product Register](#)
- Ability to download the By-Product Register to manipulate data

By-product Register

- Contains a link to each notification
- Local authorities, third parties and members of the public can:
 - view notification information and documents
 - make submissions
 - follow the progress of individual notifications via RSS feeds
- Includes a feature to download the register into Excel (CSV) format and manipulate data accordingly
- <https://www.epa.ie/byproduct>

Exercise 7 - By-Product Requirements

The requirements to achieve a By-product position are complex and require significant information and data on both the feedstock materials and the final product. This exercise will assist you in determining the relevance of the substance as a by-product and understanding what data/information is required to enable a successful submission.

7.1 Knowledge of Input

What is the substance that you produce?

Does it arise as part of standard process?

Can the substance be used without further processing?

Do you have detailed chemical/analytical data on the input materials?

Add your responses here...

7.2 Knowledge of Output

Where can the output be used and is this lawful?

Is this use certain and is there a defined market?

Are there clearly defined specifications for the output?

Does product meet the specifications without further processing (excluding 'normal industrial practice'?)

Add your responses here...

7.3 Information Requirements

Can you demonstrate that the substance has arisen as an integral part of the process?

Is this a final product or virgin raw material replacement?

Can you demonstrate no 'adverse effects' on health or environment?

Add your responses here...

Exercise 8 - By-Product Evidence Requirements

A significant quantity of quality data will be required to deliver a By-product outcome. This exercise will assist in understanding the key information requirements necessary and refine the data collection to develop the BP case.

Guidance - <https://www.epa.ie/publications/licensing--permitting/waste/draft-by-product-guidance.php>

8.1 Production Assessment

How is the substance produced?

Is this as an integral part of the normal process?

What volumes are produced and all be used?

Is further use certain?

Add your responses here...

8.2 Impact Assessment

Can it be used without further processing or controls?

Does it meet all technical product requirements?

Does it meet all environmental/health controls with no overall adverse impact?

Add your responses here...

8.3 Market Assessment

Demonstrable market for the product?

What evidence do you have for this market?

Does the product meet market requirements?

Is there a clear value for the product?

Add your responses here...

Summary Sheet & Next Steps...

Exercise 9 - Planning Summary Sheet

Use the knowledge applied from the previous exercises to set out the key considerations to plan for a successful project completion – relevant for both EoW and BP.

9.1 What

What input materials do you have to deal with?

What output products will you deliver?

What do you need to do to deliver your outcome?

9.2 How

Have you internal resources to do the work?

Have you the financial resources allocated?

Do you require external legal and technical support?

9.3 Who

Who is responsible for delivery of the project?

Do they have appropriate experience and leverage?

Are they appropriately resourced financially and team-wise?

9.4 When

What are the deadlines you are working to?

Are these realistic and have they been confirmed with regulators?

What impact would extended timelines have on the project?

Next Steps

The development and delivery of an EoW or By-product submission is a complex process. There is a need to present the case so that the regulator has the confidence to agree the position through satisfaction with the information that has been provided. The worksheets here are designed to assist (alongside the existing statutory guidance highlighted) in working through the information and data that will be required to develop your submission. Once the details in this sheet have been determined for both EoW or BP determinations you will then need to:

- Confirm the internal commercial acceptability for developing an EoW or BP submission – there will be a significant cost in time and data collection/analysis/external legal and technical support to complete this process – this will only be worth it where there is a tangible commercial or environmental outcome that benefits the company.
- Consider your internal expertise and resources – have you the capability to develop a quality submission or should you seek external support to do so?
- Once you know whether you have a case for either EoW or BP (including a clear product proposition with evidence of customers) – review the appropriate EPA submission documentation (see [Further Reading](#) slide below) and start to complete the information requirements – there will be a need to affix supplementary information as appendices to the relevant questions – the spaces on the forms are not big enough to accept the necessary input requirements.
- Develop and submit your application once complete. The EPA will acknowledge receipt under either Article 27 (BP), or Article 28 (EoW). The submission has then been accepted for review by the EPA and will enter into the queue.
- Be patient – make sure that the submission has been received and accepted but then you are at the “start of the wait” – the next you will hear is either a response (positive or negative) or a list of clarification questions (the most likely scenario if your submission was of suitable quality for review).
- Once confirmation of a successful submission has been received – you will then need to refine the quality management procedures that will be followed – this will be developed based upon both the submission documentation and the EPA’s stipulations on the decision notice.
- Deliver your product to the market!

Useful Definitions

By-product (BP) - a substance or object, resulting from a production process, the primary aim of which is not the production of that item

Circular Economy - a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended

End of Waste (EoW) – the point at which a substance or object has undergone a waste recovery process and has reached a position where it can be used as a new product or raw material

GHG – Greenhouse Gas – any gas that has the property of absorbing infrared radiation (net heat energy) emitted from the Earth's surface and reradiating it back to Earth's surface, thus contributing to the 'greenhouse effect'

Production Residue - A material that is not deliberately produced in a production process but may or may not be waste

Specifications – in the context of EoW and BP processes relate to the product specifications that apply to the final output product – these may be international or national standards, or defined in line with a customer

Standards – in the context of EoW and BP processes relate to the different regulatory and product specific standards that may apply in a given market or country. These may include the specifications but would also consider issues such as legislative requirements and health, safety and environmental considerations.

Suitable Fraction – the fraction of the original input waste stream that is deemed acceptable for processing into the final intended product

Unsuitable Fraction – the fraction of the original input waste that is deemed unacceptable for processing into the final intended product

Waste - any substance or object which the holder discards or intends or is required to discard

Waste Regulation – the legislative structure through which waste management production, collection, processing, disposing and recycling is controlled.

Further Reading

- Circular Economy Introduction - <https://www.epa.ie/environment-and-you/circular-economy/#d.en.87404>
- A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025 – Progressing the Development of a Circular Economy - <https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/>
- End of Waste Guidance - <https://www.epa.ie/publications/licensing--permitting/waste/draft-end-of-waste-guidance-part-1-and-part-2.php>
- End of Waste Application Form - <https://www.epa.ie/publications/licensing--permitting/waste/end-of-waste-application-form.php>
- By-Product Guidance - <https://www.epa.ie/publications/licensing--permitting/waste/draft-by-product-guidance.php>
- By-Product Notification Form Guidance - <https://www.epa.ie/publications/licensing--permitting/waste/by-product-notification-form-guidance.php>
- Waste Framework Directive - <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008L0098-20180705>
- S.I. No. 126/2011 - European Communities (Waste Directive) Regulations 2011 - <https://www.irishstatutebook.ie/eli/2011/si/126/made/en/print?q=126&years=2011>
- Waste Management Act 1996 (as amended) - <https://revisedacts.lawreform.ie/eli/1996/act/10/front/revised/en/html>
- S.I. No. 821/2007 - Waste Management (Facility Permit and Registration) Regulations 2007 - <https://www.irishstatutebook.ie/eli/2007/si/821/made/en/print?q=821&years=2007>

Contacts and Further info

Query	Email address	More information
By-products	By-product@epa.ie	https://www.epa.ie/our-services/licensing/waste/by-products-regulation-27/
End-of-waste	article28@epa.ie	http://www.epa.ie/waste/wastereg/art28/
Waste Licensing	licensing@epa.ie	https://www.epa.ie/our-services/licensing/waste/waste-licensing/
Industrial Emissions Licensing	licensing@epa.ie	https://www.epa.ie/our-services/licensing/industrial/industrial-emissions-licensing-ied/
Waste Collection	contactus@nwcpo.ie	www.nwcpo.ie
Waste export/import	nationaltfs@dublincity.ie	https://www.dublincity.ie/residential/environment/national-tfs-office
Standards and Specifications	info@nsai.ie	https://www.nsai.ie/standards/about-standards/