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Identification of Effective State-of-the-art Green Public Procurement Policy and Practice for the Irish Public Sector (GAPS)

Authors: Jamie Goggins, Danuka J. P. D. Anagipura, Thomas Adams and Vincent Carragher

Lead organisation: University of Galway

www.epa.ie

Rialtas na hÉireann
Government of Ireland

Environmental Protection Agency

The EPA is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

The work of the EPA can be divided into three main areas:

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Knowledge: Providing high quality, targeted and timely environmental data, information and assessment to inform decision making.

Advocacy: Working with others to advocate for a clean, productive and well protected environment and for sustainable environmental practices.

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- Large-scale industrial, waste and petrol storage activities;
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- Oversee the implementation of the Environmental Noise Directive;
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- Coordinate and fund national environmental research activity to identify pressures, inform policy and provide solutions;
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- Monitoring radiation levels and assess public exposure to ionising radiation and electromagnetic fields;
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- Provide independent evidence-based reporting, advice and guidance to Government, industry and the public on environmental and radiological protection topics;
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- Work with international and national agencies, regional and local authorities, non-governmental organisations, representative bodies and government departments to deliver environmental and radiological protection, research coordination and science-based decision making.

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The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

1. Office of Environmental Sustainability
2. Office of Environmental Enforcement
3. Office of Evidence and Assessment
4. Office of Radiation Protection and Environmental Monitoring
5. Office of Communications and Corporate Services

The EPA is assisted by advisory committees who meet regularly to discuss issues of concern and provide advice to the Board.

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What did this research aim to address?

The EPA-funded **GAPS (Green Public Procurement: Analysis and Support)** project aimed to close the gap between GPP policy frameworks and practical implementation in Ireland. Although strong EU and national GPP policies exist, adoption in the Irish public sector lags behind other European countries. The project sought to understand why and offer practical solutions to improve uptake.

Key objectives included:

- Identifying barriers and enablers of GPP adoption.
- Supporting climate goals by aligning procurement with sustainability targets.
- Developing tools and resources tailored to the Irish public sector.

What did this research find?

The research used a participatory approach, engaging public bodies, policymakers, and suppliers through expert surveys, case studies, and stakeholder workshops. A major outcome was a user-focused toolkit, including a **carbon footprint calculator** and a **GPP case study finder**, designed to bridge the gap between policy and practice.

The project identified a range of factors influencing GPP adoption:

- **Barriers:** Limited political will, unclear criteria, lack of training, and insufficient supplier readiness.
- **Enablers:** Strong policy mandates, standardised procurement criteria, capacity building, and market incentives.
- **Supplier Needs:** Support in understanding and meeting GPP requirements, including training and guidance.

Insights were gathered through Irish and EU-wide engagement, helping to shape recommendations grounded in real-world challenges. The project analysed over 270 case studies and developed:

- A **carbon footprint calculator** covering Scope 1, 2, and 3 greenhouse gas emissions to support procurement decision-making.
- A searchable **GPP case study finder** tool to promote replicable good practices.

These tools address key data and knowledge gaps, enabling evidence-based, climate-conscious procurement.

How can the research findings be used?

The GAPS findings support both **policy refinement** and **operational improvements**:

- **Policy:** Strengthen implementation mechanisms, introduce supplier incentives, and update procurement standards.
- **Practice:** Use the carbon footprint calculator for training, greenhouse gas (GHG) emissions tracking, and improved reporting and transparency. The GPP case study finder tool empowers procures to confidently adopt innovative GPP approaches by providing targeted case studies that align with specific objectives, sectors or sustainability priorities.

Public bodies and suppliers can apply the tools to align procurement with climate targets. Pilot projects, such as sustainable procurement at the University of Galway, offer scalable models for wider adoption.

Next steps include integrating tools into national procurement systems, expanding workshops, and enhancing cross-sector collaboration. Further work is needed to explore sector-specific cost-benefit analyses and better understand the supplier perspective.

By applying these insights and tools, Ireland can enhance its GPP performance and make meaningful progress towards its climate action goals.

Project code: 2021-GCE-1066

EPA RESEARCH PROGRAMME 2021–2030

Identification of Effective State-of-the-art Green Public Procurement Policy and Practice for the Irish Public Sector (GAPS)

(2021-GCE-1066)

EPA Research Report

Independent scientific research funded by the Environmental Protection Agency

Prepared by

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This report is based on research carried out/data from 31 March 2022 to 31 December 2024. More recent data may have become available since the research was completed.

The EPA Research Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

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Executive Summary

The Identification of Effective State-of-the-art Green Public Procurement Policy and Practice for the Irish Public Sector (GAPS) project was initiated as a transformative effort to empower the Irish public sector to adopt green public procurement (GPP) as a core practice, aligning public procurement with Ireland's sustainability objectives and the European Green Deal. By fostering sustainable purchasing decisions, GPP holds the potential to drive significant environmental benefits, economic innovation and social progress.

It is vitally important to identify state-of-the-art GPP policy and practice in both Ireland and other parts of Europe. This is identified through desktop review and participatory research with experts involved in state-of-the-art GPP policy and practice in Ireland and other parts of Europe. Both the European Union (EU) and Ireland have adopted legislative frameworks to promote GPP, including directives, regulations and national procurement policies. While EU directives provide legislative acts that set out goals that EU countries must achieve, Ireland must devise its own laws on how to reach these goals. Thus, Ireland has developed a national GPP strategy and action plan that aligns with EU objectives.

The integration of GPP into the procurement process in organisations is still lagging behind in Ireland compared with other European countries. To better understand why this is the case, a survey was conducted among experts in GPP both in Ireland and in Europe. The survey focused on four main areas: (i) barriers encountered in GPP; (ii) GPP resources and enablers; (iii) policy recommendations; and (iv) market development. These findings were shared with stakeholders through a number of platforms (e.g. the GAPS website, conferences).

Since the main goal of this project was to develop a toolkit for the public sector, three innovative tools have been developed: (i) a carbon footprint calculator; (ii) a purchased goods and services template to be used in the carbon footprint calculator; and (iii) a case study finder tool. The carbon footprint calculator and purchased goods and services template are data-driven tools. The carbon footprint calculator is used to calculate the carbon footprint of an organisation in Ireland, including for scope 1, 2 and 3 greenhouse gas emissions. The purchased goods and services template is for calculating the emissions solely associated with purchasing goods and services under scope 3. The case study finder tool is a searchable tool that can be used to find GPP success stories across 22 themes and 42 enablers. These tools were tested in real-world scenarios to ensure their applicability and impact.

The project's findings and resources were shared with the broader research and policy community via the Civil Engineering Research in Ireland conference, different GPP community-based events across Ireland and peer-reviewed articles, as well as through workshops with climate action coordinators in local authorities, webinars, training courses and short recorded explainer videos. These contributions aim to inspire further advancements in sustainable procurement practices and policymaking.

1 Introduction

This research work has been led by University of Galway in partnership with South East Energy Agency and Climate Action Regional Office for Atlantic Seaboard North.

1.1 Background

Green public procurement (GPP) is a process in which public authorities seek to source goods, services or works with a reduced environmental impact (DECC, 2021). In Ireland, public bodies (excluding utilities) spend an estimated €18.5 billion a year on goods, services and works (DPER, 2021), and therefore have enormous potential to reduce emissions and protect our environment, saving money over the full life cycle of goods and services while leading by example (EPA, 2023). Public sector ambitions of achieving net zero greenhouse gas (GHG) emissions mean that carbon footprints and budgets have been central to successful GPP policy and practice solutions.

GPP is acknowledged nationally and at the European Union (EU) level as a key policy lever in improving sustainability. The EU actively promotes the use of GPP as a means of delivering its environmental and economic objectives and provides comprehensive technical support to Member States in assessing products and services that meet green criteria. The European Green Deal also promotes GPP, suggesting that public authorities, including the EU institutions, should lead by example and ensure that their procurement is green (European Commission, 2019). Sustainable Development Goal (SDG) 12.7 also advocates promoting public procurement practices that are sustainable across Member States (United Nations, 2015).

Ireland's Climate Action Plan 2019 promotes the need to accelerate GPP by supporting research on quantifying costs/benefits of GPP in an Irish context, while also requiring local authorities to sign a climate action charter (DECC, 2019). In January 2019, the government decided to introduce a number of measures that demonstrate public sector leadership in embedding sustainability practices.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (Government of Ireland, 2021) introduces a requirement for each local authority to prepare a climate action plan, which must include both mitigation and adaptation measures and be updated every 5 years. Local authority development plans must also align with the climate action plans and "Public Bodies will be obliged to perform their functions in a manner consistent with national climate plans and strategies, and furthering the achievement of the national climate objective" (Government of Ireland, 2021). The outputs from this project are imperative for assisting local authorities in meeting these obligations.

1.2 Project Aims and Objectives

The main goal of the Identification of Effective State-of-the-art Green Public Procurement Policy and Practice for the Irish Public Sector (GAPS) research project is to support the Irish public sector in advancing GPP, aligning procurement practices with Ireland's sustainability and climate action goals.

A main ingredient in the concept is our focus on the state-of-the-art GPP policy and practice already established. The project designed a comprehensive toolkit tailored to the needs of Irish public sector bodies, equipping them with practical tools and resources to integrate environmental considerations into procurement decisions.

The specific objectives were as follows:

- to provide decisive state-of-the-art GPP policy and practice guidance to the EPA;
- to gain a range and depth of stakeholder expertise and input on GPP policy and practice;
- to thoroughly examine the expert stakeholder views on GPP policy and practice using best practice participatory methods;
- to create best practice guidance, a toolkit and a video that enable public sector professionals to engage in green procurement successfully;
- to test the toolkit and advice in a number of diverse pilots so that our final GPP and practice guidance is operative;

- to guide opportunities to lower the carbon intensity across the diversity of applications presented by the public sector;
- to disseminate the state-of-the-art GPP policy and practice to stakeholders and beyond after project completion by creating a clear, actionable post-dissemination plan.

2 Green Public Procurement Practice in Ireland and Across the European Union

2.1 Green Public Procurement Policy and Practice in Ireland

This chapter of the report presents the findings from the desktop review of literature related to GPP that were associated with policy and practice both in Ireland and across the EU. A comprehensive review of GPP policies and practices was conducted to identify effective strategies and provide guidance for advancing GPP within the Irish public sector. This review covers both Irish and EU frameworks, as well as best practices from various countries, aiming to inform Ireland's journey towards sustainable procurement. The findings highlight existing policy frameworks, challenges and opportunities, as well as practical recommendations to support the adoption and effectiveness of GPP in Ireland (Anagipura *et al*., 2024).

2.1.1 National green public procurement policy framework in Ireland

Ireland's approach to GPP has been shaped by its national climate goals and alignment with EU directives. The national Climate Action Plan (Government of Ireland, 2023) and other government initiatives set ambitious targets for reducing emissions and improving energy efficiency in the public sector. Specific GPP requirements have been established, such as the mandate for public sector bodies to include green criteria in procurement and adhere to energy-efficient standards in purchases. There are five main strands in the national public procurement policy framework *Buying Greener: Green Public Procurement Strategy and Action Plan 2024–2027* (DECC, 2024):

1. legislation (national regulations transposing EU directives);
2. government policy (circulars);
3. the Capital Works Management Framework for public works;
4. general procurement guidelines for goods and services;
5. guidelines, templates and documentation issued by the Office of Government Procurement (OGP).

2.1.2 Buying Greener: Green Public Procurement Strategy and Action Plan 2024–2027

Buying Greener: Green Public Procurement Strategy and Action Plan 2024–2027 is Ireland's comprehensive roadmap for embedding sustainability and circular economy principles into all public sector purchasing. Approved and published in April 2024, it replaces the decade-old "Green Tenders" policy and aligns public procurement with Ireland's climate, circular economy and sustainability commitments (DECC, 2024). Table 2.1 highlights new policies and targets from the Buying Greener strategy and action plan.

The Buying Greener strategy and action plan for 2024–2027 reflects Ireland's firm commitment to using public sector procurement as a lever for environmental transformation. It emphasises mandatory integration of sustainability criteria, capacity building and measurable targets. Its success will depend on strong leadership, consistent training, market engagement and robust monitoring systems.

Different public bodies must follow the legal obligations and practices that have been set out by EU legislation. Table 2.2 shows other requirements for public bodies besides that of the Buying Greener strategy and action plan.

2.1.3 Green Public Procurement: Guidance for the Public Sector *(Third Edition, 2024)*

The third edition of the EPA's GPP guidance, updated in April 2024 (EPA, 2024), offers step-by-step instructions for implementing GPP across various procurement stages. It is designed for use by central and local government bodies, state agencies and other public institutions, such as universities, hospitals and schools. The guidance emphasises the importance

Table 2.1. Highlights from the Buying Greener strategy and action plan

Highlighted policy/target	Requirement/action
ICT procurement targets	• By 2025, 80% of ICT devices (e.g. laptops, desktops, phones) must meet recognised environmental standards (i.e. EPEAT Gold, TCO Certified, remanufactured) • Encourages lower energy use, recyclability and responsible manufacturing
Organic and sustainable food targets	• A minimum of 10% (by value) of publicly procured food must be certified organic under new contracts • Emphasises sustainable agriculture, local food chains and healthier meals in schools, hospitals and public institutions
Low-carbon construction policies	• Mandates life cycle carbon assessments for major infrastructure projects • Requires using lower-carbon materials (e.g. cement), avoiding over-specification, and application of whole life cycle GHG emissions assessments • Gradually reduces thresholds so that more projects are subject to LCA over time
Circular economy integration	• New procurement procedures must prioritise reused, repaired or remanufactured products where feasible; extended product lifetimes; and modular design for easier repair and upgrading
ISO 20400:2017 compliance	• Public bodies with an annual procurement spend over €200 million are required to align with ISO 20400:2017, the global standard for sustainable procurement practices

ICT, information and communications technology; ISO, International Organization for Standardization; LCA, life cycle assessment.

Source: Based on information in DECC (2024).

Table 2.2. Other requirements for public bodies in Ireland on GPP

Topic	Instrument	Requirement	Applied public body
Planning	Circular 20/2019 (DPER/OGP)	A corporate procurement plan must state where GPP criteria will be used in upcoming procurements	Government departments
Reporting	Circular 20/2019 (DPER/OGP)	From 2020, annual reports must detail the number and value of contracts, including GPP criteria	Government departments – to be extended to other public bodies
Application of GPP criteria	Climate Action Plan/ Programme for Government	All procurement using public funds must include green criteria by 2023	All public bodies and any other organisation spending public funds
	Energy Efficiency Public Procurement Regulations S.I. No. 151/2011, 426/2014 and 646/2016	Public bodies may only procure equipment or vehicles that are included on the Triple E Products Register or meet the relevant energy efficiency criteria	All public bodies
Inclusion	*Buying Greener: Green Public Procurement Strategy and Action Plan 2024–2027*	Include GPP criteria from national GPP guidance or use EU GPP criteria and criteria in published public procurement tender documentation The GPP mandate from 2025 to public sector bodies where the individual procurement spends using public funds is above applicable national procurement thresholds	All public bodies

DPER, Department of Public Expenditure, Infrastructure, Public Service Reform and Digitalisation.

of incorporating green criteria into procurement to achieve environmental objectives and supports the transition to a circular economy.

In 2022, the OGP – Ireland's central body responsible for public sector procurement, ensuring value for money, compliance with EU/national rules and the integration of sustainability (including GPP) – launched a green criteria search tool, adopting the content of the EPA's 2024 GPP guidance to support GPP (OGP, 2024). This tool can be used to select the required

green criteria for specific products and services. The following 11 sectors are included in the tool at present:

1. energy-related products;
2. food and catering services;
3. heating equipment;
4. information and communications technology (ICT) products and services;
5. indoor cleaning services;
6. indoor and outdoor lighting;
7. office building design, construction and management;
8. paper products and printing services;
9. textile products and services;
10. road transport vehicles and services;
11. furniture.

To identify the green procurement criteria relevant to each of the 11 sectors listed above, a keyword search can be conducted using the tool. The tool will generate the relevant criteria – sometimes both "core" and "comprehensive" criteria. Depending on the subject, these may be selection criteria, technical specifications, award criteria and/or contract performance clauses. The core criteria are those suitable for use by any contracting authority and address the key environmental impacts of each product or service, including basic legal compliance. They are designed for use with minimal additional verification effort or cost increases. The comprehensive criteria are for public bodies that aim to purchase products with enhanced levels of environmental performance. These may require additional verification effort, or a slight increase in purchase price, compared with other products with the same functionality.

2.2 European Union Policies and Support for Green Public Procurement

The EU has established a strong foundation for GPP, with directives such as Directive 2014/24/EU on public procurement (European Union, 2014), the European Green Deal (European Commission, 2019) and frameworks such as Europe 2020, which promote sustainable economic growth. The aim of EU procurement policy is to create a level playing field for all business across Europe by setting out minimum harmonised public procurement rules for contracts valued over a determined value threshold. The EU also offers various tools and resources to support Member States, including:

- the EU Green Public Procurement Helpdesk (European Union, 2010);
- GPP criteria and requirements (European Union, 2020c);
- a GPP training toolkit (European Union, 2020d);
- the Good Practice Library (European Union, 2020b);
- life cycle costing (LCC) calculation tools (European Union, 2020e).

2.2.1 Case studies and best practices

The GAPS project identified 21 case studies from Ireland, the EU and other regions, showcasing successful GPP policy implementations across various sectors. Table 2.3 summarises the case studies reviewed, and a summary of lessons learned from each case study is listed in Table 2.4 (Anagipura *et al*., 2024). An extended report can be found on the GAPS project website.

Table 2.4 presents the key lessons learned from each country that the case studies were categorised under.

By thoroughly examining case studies and exemplary practices, valuable insights into effective strategies for implementing policies have been gained. These insights provide valuable guidance for Ireland's policymakers, offering tangible examples of successful approaches that can be adapted and integrated into the country's policy framework.

Below are the key policy recommendations extracted from these case studies:

- align local authorities' policies with the broader context;
- get political support for GPP;
- merge different sustainability aspects (e.g. SDGs) together;
- integrate ICT into the procurement process;
- stimulate the market towards GPP via financial incentives;
- empower public authority staff;

- emphasise the importance of collaboration and joint procurement;
- make GPP mandatory.

These case studies provide significant insights and actionable strategies for policymakers, practitioners and stakeholders seeking to advance green procurement practices and contribute to SDGs.

2.3 Insights from Experts in Green Public Procurement

GPP experts were identified through three methods: (i) a comprehensive desktop review of local and international case studies; (ii) round-table stakeholder discussions; and (iii) participation in local GPP events. These methods were used to identify an expert group

Table 2.3. Summary of the case studies reviewed

No.	Category	Description/context	Country	Enabler/solution	Year
1	Policy	GPP action plan for Zemgale region (Penčura, 2019)	Latvia	Initiated a working group on GPP regulation amendment	2019
2	Policy	Action plan for Lombardy region green purchases (Superti, 2020)	Italy	Good GPP practice driven by policy	2020
3	Policy	Sardinia's regional action plan for GPP (Mulas, 2015)	Italy	Development of new policy framework	2015
4	Policy	Action plan for the province of Antwerp (Taverniers, 2019)	Belgium	Identified needs and roles, and developed a helpdesk and knowledge centre (sessions and training)	2019
5	Policy	Sustainable Procurement Plan 2021–2024 from the province of Zeeland (Scherpenisse, 2022)	Netherlands	Government procurements align with the SDGs	2022
6	Policy	Promoting responsible purchasing in Nantes (Dupré-Cormerais, 2017)	France	Sets out 11 actions targeting public policy	2017
7	Legal	Action plan for Andalusia (Briones Alcañiz, 2020)	Spain	Introduced a guide to incorporate green criteria in all phases of procurement	2020
8	Policy	Ireland's Green Government Initiative (Cadogan, 2019)	Ireland	Government's decisions on reducing waste from public departments	2019
9	Policy	*Ireland Makes Sustainable Furniture Purchasing Work* (Guihen, 2010)	Ireland	Policy decision to include GPP within the department	2003
10	Policy	Procurement of green stationery and paper (Boulton, 2013)	UK	Establishing sustainability policy and strategies backed by political support	2012
11	Policy	*Sustainability Strategy 2013–2016* (Thomsen, 2015)	Denmark	Collaboration between environmental and procurement offices	2015
12	Policy	*Strategy and Approach to SPP in the Municipality of Copenhagen* (Pagel Fray, 2016)	Denmark	Political support	2016
13	Policy	Incorporation of gender equality clauses in contracts (Agirre Saez de Eguilaz, 2022)	Spain	Provincial regulations and political support	2022
14	Policy	*Lithuania's Central Purchasing Body Introduces GPP* (Zuskit, 2011)	Lithuania	EU GPP criteria	2017
15	Policy	*Greening Public Procurement in the Basque Country* (Ibarra, 2017)	Spain	Established GPP as standard practice	2017
16	Legal	An ambitious national law (European Union, 2020a)	France	Anti-waste and circular economy law	2020
17	Policy	*Procurement Policy Notes* (Schaa, 2020)	Malta	Procurement policy notes to address gaps in legislation	2013
18	Legal	Legal framework for GPP (Green Purchasing Network Malaysia, 2017)	Japan	Made GPP mandatory for public authorities	2013
19	Legal	Implementing a legal framework for GPP (OECD, n.d.)	Korea	Produces annual guidelines, monitors the GPP process	2015
20	Policy	Systematic approach to GPP (Green Purchasing Network Malaysia, 2017)	Japan	Established an eco-labelling scheme	2013
21	Legal	"Buy Clean" Act programme (Cox and Milko, 2022)	USA	Converting the Buy Clean California Act to a law	2017

SPP, sustainable procurement policy.

Table 2.4. Summary of lessons learned from reviewed case studies

No.	Country	Lesson learned
1	Ireland	• Engage with the market before finalising the tender document • Consider the LCA during the evaluation phase • Change the waste charge from a fixed charge to a waste generation-based charge
2	Latvia	• Include GPP from the legislation level • Increase awareness among public procurers about the environmental impacts associated with procurement • Utilise EU funds to implement GPP in low-income municipalities
3	Italy	• Implement communication and awareness initiatives in the territory and disseminate green purchasing and good practices • Establish a monitoring system to verify the effectiveness of a GPP plan • Give officials the training needed to build up their capacity to include green criteria in traditional procurements • Establish technical support desks in eight provincial administrations • Form interdepartmental working groups on specific topics under the action plan • Introduce tools and guidelines such as product information brochures, technical glossaries and practical manuals to support GPP
4	Belgium	• Develop a coordinated and integrated approach to support local authorities in providing knowledge and resources on GPP • Set up an online system for sharing green tenders • Update guides for sustainable procurement, using circular criteria where possible and useful • Include contract performance clauses that describe the follow-up process, even beyond contract duration, in tender documents
5	Netherlands	• Align SDGs and the regional procurement plan • Re-organise the procurement process and improve collaboration across departments • Work together to achieve the SDG targets
6	Denmark	• Ensure departments work together to execute policy development • Ensure that political support is obtained • Build the capacity of staff working in the public procurement sector • Ensure that procurers and those with a responsibility towards GPP have a sense of local ownership • Ensure that finalising the tender document involves cooperation between procurement personnel and environmental experts • Hold events such as a “meet the buyer” launch to establish a market dialogue between suppliers and buyers
7	Spain	• Emphasise the importance of strong political commitment and integrating political process with actual practice • Legitimise the process and continue it regardless of the political circumstances • Establish a system to monitor and measure the results of policy practice • Identify and provide basic necessary resources to introduce environmental aspects to the procurement process • Continuously communicate with the market

Table 2.4. Continued

No.	Country	Lesson learned
8	France	• Set out strategic direction and operational targets for incorporating policy goals into procurement • It is essential to identify priorities, define a perimeter and create a framework of actions that take into account two criteria – feasibility and measurability • Continuous monitoring to track the progress of the policy implementation and identify the adjustments that need to be done is important • It is required that dedicated resources and appropriate verification tools for GPP be identified • Collaboration with internal stakeholders and representatives from the health and safety section to validate the products is essential • It is important to conduct a preliminary market engagement to identify the availability of potential bidders
9	Lithuania	• Use online catalogues for purchasing purposes • Include LCC in the evaluation process
10	Malta	• Make available online all procurement policy notes • Provide guidance on best practice for public sector procurement
11	Japan	• Set up an institutionalised legal framework for GPP • Establish a systematic approach to green procurement by making it mandatory by law • Improve the availability of information regarding eco-labelled products and raise awareness of them • Track and monitor the inclusion of green criteria in procurement
12	Korea	• Learn from the effectiveness of merging two policies, Korea Eco-label and the Good Recycled Mark, for setting green procurement standards • Ensure that government scales up GPP to make a competitive green product market • Ensure that GPP works abreast with eco-innovation policies to stimulate the market • Harmonise green procurement with other procurement regulations such as social impact and ecological efficiency
13	USA	• Make policy practice usable for all levels of government • Ensure that administrators work hand in hand with industry, labour and environmental organisations throughout development to identify potential barriers and ways to eliminate these • Stimulate the market to participate in policy practice by giving financial incentives to generate EPDs • Ensure that adequate systematic education and training are provided across the awarding agencies

EPD, environmental product declaration; LCA, life cycle analysis.

of 210 members who were invited to complete a survey and/or participate in an individual interview.

This survey was conducted to get the experts' insights on the following key areas:

- the main barriers to or challenges in implementing GPP;
- the tools or resources (enablers) found useful in GPP;
- the policies or regulations regarding GPP that need to be changed or adopted;
- the support that the market requires to uplift GPP.

2.3.1 Survey design

Employing various methods to collect data from a sample is known as triangulation (Carter *et al.*, 2014). This study utilised triangulation, employing both a survey form and interviews with expert groups. This flexibility enhanced the participation count for the survey, and inputs from each method were merged into a single Microsoft Excel spreadsheet to make them easier to analyse. The survey used a discourse-based approach to limit biased decisions influenced by other responses (Jorgensen and Phillips, 2002) during the survey. The semi-structured questions included in the survey and the type of question used to code

within the NVivo software are given in Table 2.5 (see Appendix 1 for the full list of questions and question types). These questions were used in the survey to gather insights for predefined questions. In addition, respondents had the freedom to elaborate on their answers, providing more detailed information or insights beyond the predefined response options. A focus group was identified through previous case studies from Ireland and other European countries that actively engage with GPP. This population includes decision-makers from government institutes, procurement officers and other procurement team members. Of the 210 survey invitations sent, 39 responses were received (i.e. 19% response rate). Four of the 39 responses were completed via individual interviews, which were given by those who agreed to a follow-up interview when completing the survey. The conceptual model used for the survey is shown in Figure 2.1.

Table 2.5 lists the questions included in the survey form.

Two of the 39 responses received were omitted before analysis due to incompleteness of the surveys. The collected data were then analysed by the NVivo 20 qualitative data analysis software (QSR International, 2020). This software used the thematic analysis method to identify the themes, ideas and suggestions given by the participants and then graphically represent them in a meaningful way. Open coding was used based on the responses given by the participants. The summary of the code hierarchy is described in Figure 2.2. Every response was assigned a case and the required insights were divided into four main groups (child code). Insights were then coded into different subcodes, as shown in Figure 2.2. Finally, this subcoding was used to visualise the whole idea behind the cases as a percentage and to summarise the different perspectives of the participants in relation to the questions.

2.3.2 Survey findings

This survey mainly focused on procurement officers, government officials and members of procurement teams. Further insights into challenges and solutions in GPP could also be gained from other stakeholders, such as suppliers, manufacturers and end users of green products and services. Due to time and resource limitations within the project, these stakeholders were not included in the survey. However, engagement with these stakeholders would allow future researchers to explore and identify challenges and drivers from other stakeholders' perspectives.

Table 2.5. Questions and the question types included in the survey form

No.	Question	Type of question
Contact details		
1	Enter your name	Open
2	Email address	Open
3	Organisation/workplace	Open
4	Country	Open
5	What is your role/expertise in the organisation? (Select from the list)	Open/closed
Questions related to barriers or challenges		
6	Have you been involved in green procurement or are you currently involved in green procurement? (Yes/no)	Closed
7	What are the main barriers or challenges you faced/face regarding the implementation of green procurement?	Open/closed
Questions related to tools and resources		
8	What tools or resources do you find useful in procuring more greenly? (Select from the list)	Closed
9	Are there any tools or resources that are not available to you that you feel would help?	Open
Questions related to policy recommendations		
10	Do you think any policies or regulations regarding green procurement need to be changed or adopted?	Closed
11	If "yes", what are they?	Open

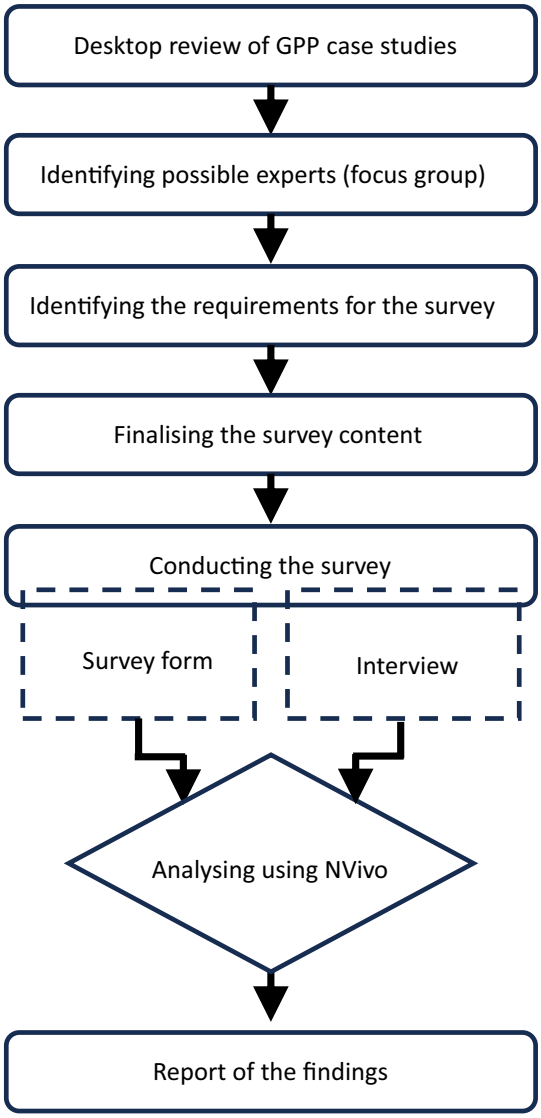

Figure 2.1. Conceptual model for the conducted survey.

The survey focused on GPP experts based in Ireland and other countries in the EU. Thus, the research aimed to gain insights into the specific context of Ireland, while also drawing comparisons and exploring potential similarities across the broader EU landscape. Of the 37 participants, 21 were from Ireland. Figure 2.3 shows that, in addition to Ireland, there were responses from 10 other EU countries that are actively engaged in GPP.

Participants had diverse roles, including:

- decision-makers: individuals holding authority over strategic procurement decisions and policies;
- procurement officers: professionals responsible for managing and executing procurement processes;
- procurement team members: individuals involved in various aspects of the procurement process, such as specification development, supplier evaluation and contract management;
- other: individuals involved in other roles.

Figure 2.4 shows the numbers of respondents participating in various areas of GPP, by role.

Barriers to/challenges in implementing GPP

All participant responses were divided into two categories: (i) respondents from Ireland; and (ii) respondents from outside Ireland. This helped us to understand the GPP status in Ireland compared with other European countries. As per Table 2.5, the first question the participants were asked, other than their contact information, was about the barriers and challenges that they faced during the process of GPP. Figure 2.5 illustrates how participants identified the main barriers to GPP implementation.

According to the gathered data, most participants referred to a lack of training and awareness on GPP (18% of all references in child code 1, barriers/challenges faced in GPP) and challenges in finding qualified suppliers/products/services (18%) as the primary barriers faced by procurers and staff engaged in green procurement. The third and fourth most cited challenges in green procurement were resistance to transitioning from conventional to green procurement practices (17%) and the higher upfront costs associated with green options (15%), respectively. One participant, during an interview, highlighted poor communication between decision-makers and procurers that hindered GPP implementation. Lack of time for preparation of tender documents with green criteria and staff turnover were some of the barriers participants mentioned in the "other" category (10%). Furthermore, Figure 2.5 shows that participants outside Ireland most frequently referenced the higher cost associated with green options, resistance to change and difficulty in finding qualified suppliers or products. This suggests that adequate training has already been accomplished in other EU countries when compared with Ireland. Thus, an important policy recommendation is that required training and awareness be achieved in the public sector in Ireland.

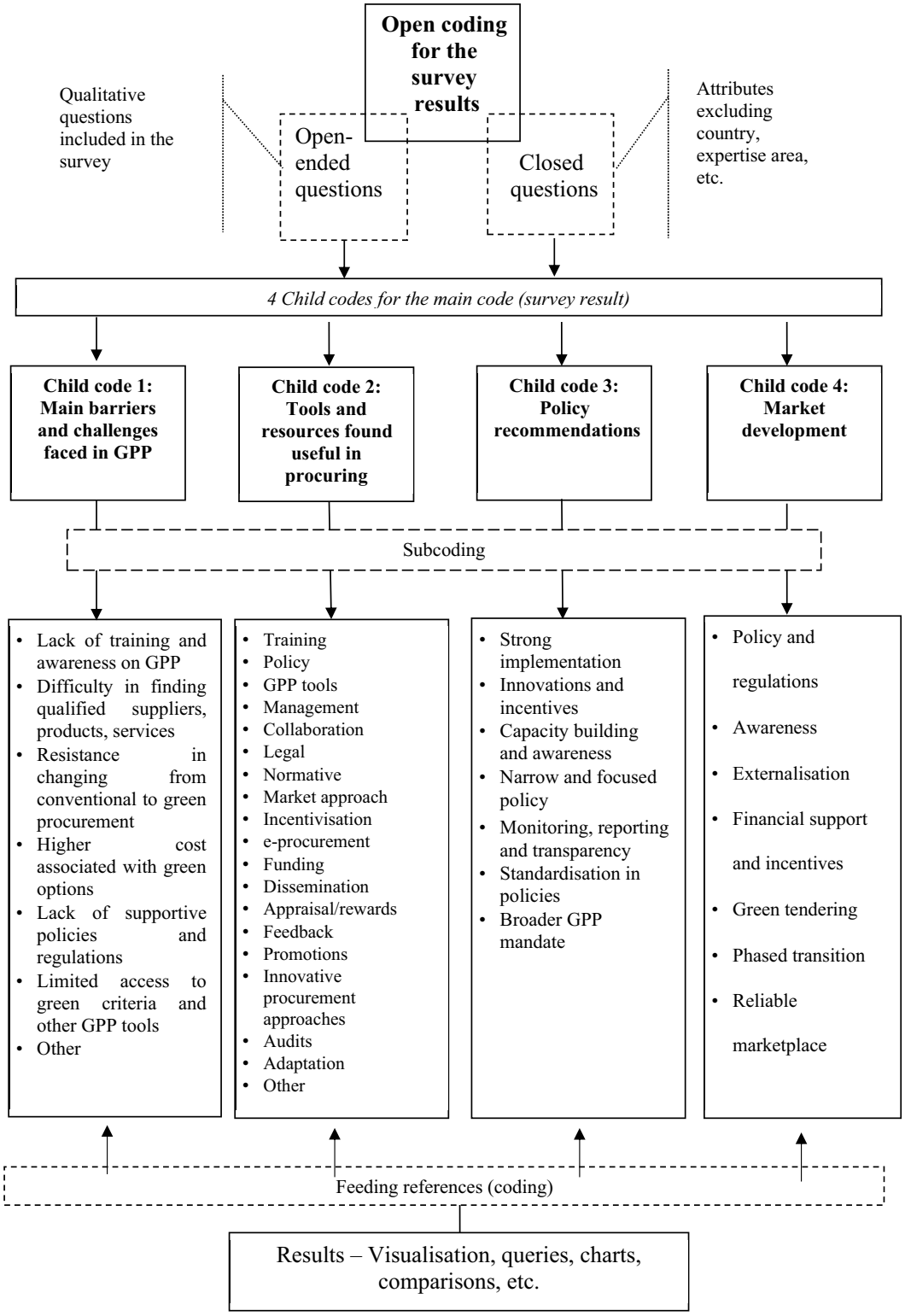

Figure 2.2. NVivo coding hierarchy.

Tools/resources to enable GPP

Numerous tools and resources play crucial roles in implementing GPP within an organisation (Leal Filho *et al*., 2019). After conducting stakeholder round-table discussions and reviewing case studies, 18 key tools/resources in GPP were identified, as shown in Figure 2.6. Participants were given the opportunity to select the most relevant tools/resources based on their own experience, as well as mentioning any other beneficial tools.

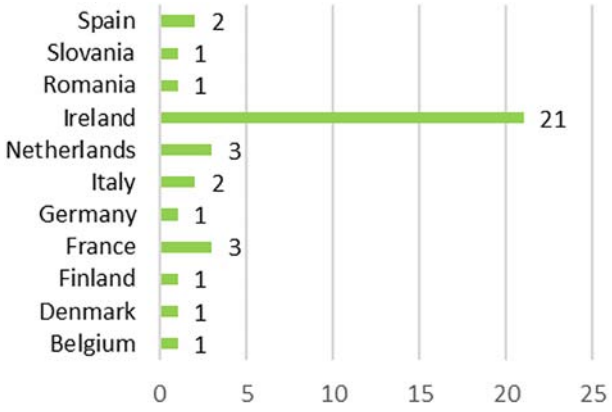

Figure 2.3. Geographical distribution of the participants.

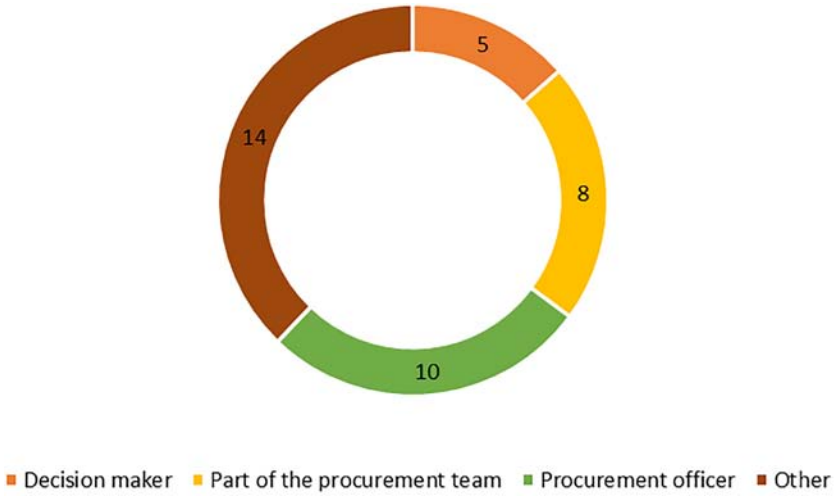

Figure 2.4. Roles of the respondents.

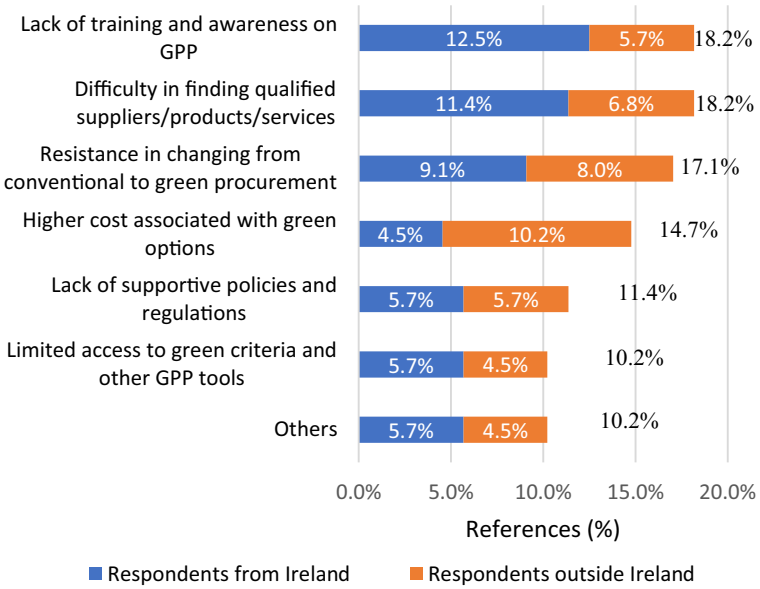

Figure 2.5. Distribution of references (%) to the different barriers identified.

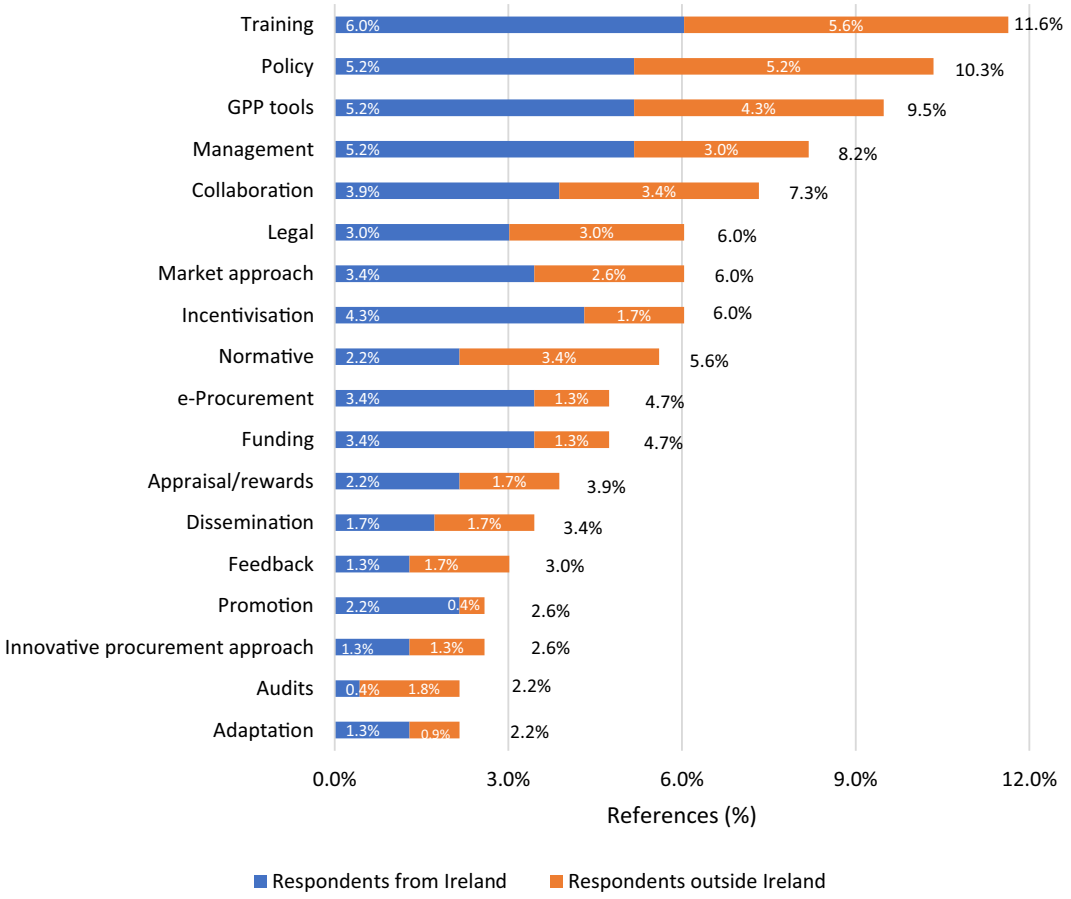

Figure 2.6. Distribution of references (%) to the different enablers of GPP identified.

The study shows that most of the participants (27 out of 37) referred to training for staff (12% out of all references) as important for making green procurement successful. Supportive policy and framework (10%), availability of GPP tools (10%), supportive management (8%) and collaboration (7%) are also crucial enablers of GPP according to the experts. Funding, dissemination, appraisal/rewards, feedback, promotion and the other components were referred to by fewer participants (less than 5%) as being drivers of GPP implementation.

Policy recommendations

The first open question in the survey form aimed to gather policy recommendations for existing policies and frameworks. The survey revealed a strong call for action among GPP experts, with 65% of participants emphasising the need for updated or new policies to bolster GPP implementation. Among the participants who indicated a desire for policy adjustments to expedite GPP, 32% of respondents hail from Ireland, while the percentage for all other countries was less than 10% each. Furthermore, participants from Finland and Slovenia expressed satisfaction with the existing policies for GPP and did not suggest any alterations. Nine of the 21 respondents from Ireland were also happy with the available policies, but the majority (12 respondents) identified that the policies available need to be changed or amended.

Participants identified policy recommendations under seven main streams, as shown in Table 2.6.

Figure 2.7 presents the references (%) collected by each subcode under the “policy recommendations” child code.

As per Figure 2.7, most of the participants indicated that strong policy implementation (23% of references) is required to boost GPP implementation. The innovations and incentives category and the capacity building and awareness category, each accounting for 18% of references, are the next most commonly cited categories, followed by a broader GPP mandate, with 14% of references. Fewer references (less than 10%) were obtained for (i) narrow and focused

Table 2.6. Proposed policy recommendations and their descriptions

Policy amendment	Description
Innovations and incentives	This includes policy changes in terms of LCC, eco labels and certifications, and other innovative changes that can be implemented to uplift GPP
Strong implementation	Policy needs to be strongly implemented
Capacity building and awareness	Training and resources for procurers and referring to resources already available across the EU
Narrow and focused policy	Targeting a particular issue or aspect precisely
Monitoring, reporting and transparency	Continuous monitoring and reporting with utmost transparency
Standardisation in policies	Keeping the exact benchmarks and maintaining thresholds for GPP
Broader GPP mandate	Policy changes that broaden the number of sectors that include GPP

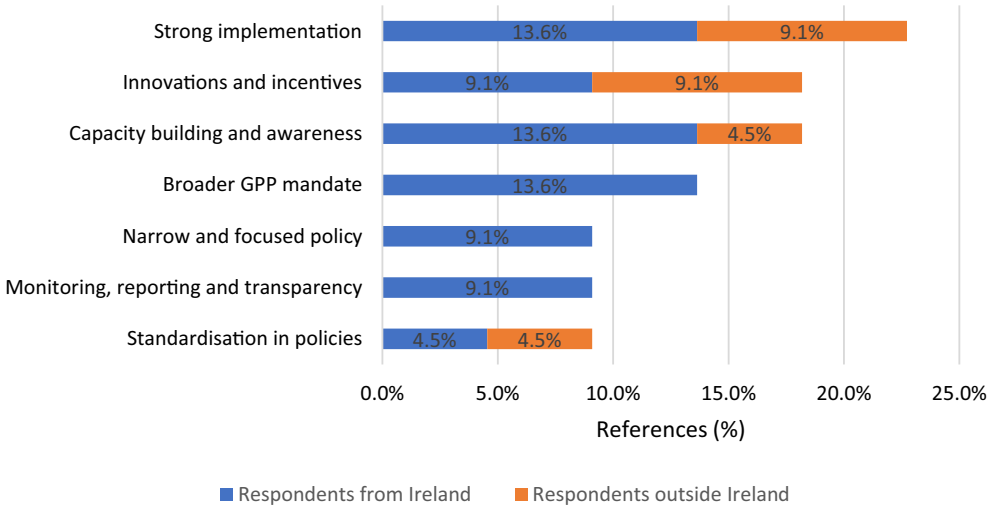

Figure 2.7. Distribution of references (%) to policy recommendations.

policy; (ii) monitoring, reporting and transparency; and (iii) standardisation in policies. These insights clearly highlight the areas that policymakers need to pay attention to in order to uplift GPP within the Irish public sector.

2.4 Green Market Development (Insights from the Survey)

The final section of our survey gathered valuable insights from industry experts on strategies to strengthen the green market and support suppliers in adopting GPP practices. Experts highlighted several areas where targeted support could enable suppliers to more effectively align with GPP requirements, ultimately contributing to a more sustainable procurement landscape. Figure 2.8 shows the references for different market development aspects that were mentioned by the participants in the survey.

The majority of participants in the survey provided their suggestions on how public sector organisations could facilitate the market in supplying green products and services as requested by authorities. Analysis of the data presented in Figure 2.8 indicates a predominant focus on policy and regulations (24% in total), followed by initiatives aimed at raising awareness or empowering the market regarding GPP (22%) externalising (16%) and financial support/incentives (16%), based on the number of references received from the respondents. There was substantial input from respondents on this topic, suggesting tangible opportunities for implementation. All suggestions are presented in Table A1.2.

2.5 Case Studies and Good Practices

Case studies and examples of good practices serve as essential tools in advancing GPP within the public

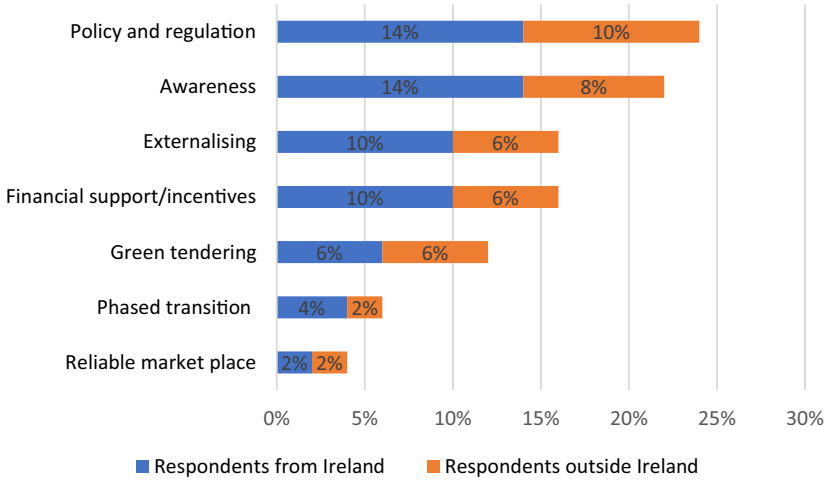

Figure 2.8. Distribution of references (%) to different market improvement areas.

sector. By showcasing real-world applications of GPP principles, these examples provide practical insights and demonstrate the tangible benefits of sustainable procurement. They help illustrate how similar challenges have been addressed, offering potential strategies and lessons learned that other organisations can adapt to their own contexts.

In the GAPS project, the compilation of case studies from Ireland, EU countries and some countries outside the EU was a central component, highlighting successful GPP implementation across diverse sectors, such as energy, transport and construction. Each case study details key elements, including the procurement objectives, environmental criteria used, results, environmental impact and lessons learned. This transparency enables public sector buyers to understand the impact of GPP on operational goals and cost savings and its environmental benefits.

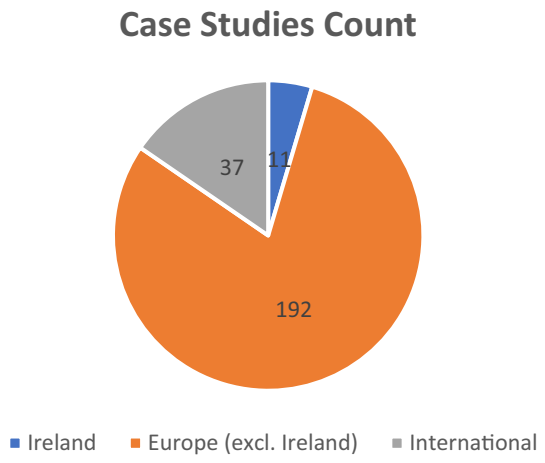

Figure 2.9. Geography-based case study count.

Furthermore, good practices illustrate the feasibility of GPP, counteracting common misconceptions around its complexity and lack of know-how. By highlighting efficient processes, innovative solutions and supportive frameworks, these examples can ease apprehension and encourage more public entities to adopt GPP. Case studies also provide evidence

Table 2.7. Main themes used to categorise GPP case studies

No.	GPP theme
1	Building
2	Cleaning production and services
3	Combined heat and power
4	Copying and graphic paper
5	Electricity
6	Food and catering services
7	Furniture
8	Gardening products and services
9	Indoor lighting
10	Implementing GPP policies
11	Office building, construction, management
12	Office ICT equipment
13	Office supplies
14	Printing products and services
15	Street lighting and traffic signals
16	Road design, construction, maintenance
17	Textiles
18	Transport
19	Waste management and collection
20	Wastewater infrastructures
21	Water-based heaters
22	Other

of market readiness, showing how suppliers have adapted to meet GPP requirements, which reinforces the viability of green procurement.

After thoroughly reviewing various GPP case studies and best practices, a collection of case studies was compiled as part of the project. These include examples from both Ireland and other countries, allowing Irish organisations to adapt effective practices to their own context. More than 270 case studies and best practices were initially identified and screened based on relevance and completeness to capture valuable insights across different sectors. Figure 2.9 shows the distribution of the case studies based on location (i.e. Ireland, Europe or outside Europe).

Following this screening, 240 case studies were selected and categorised through a desktop review into 22 broad themes and 42 enabling factors. To increase the usability of the case studies, a case study finder tool was built; this is discussed further in Chapter 3. Table 2.7 shows how the case studies were categorised to enable a better understanding of their relevance.

The distribution of case studies across the GPP themes is shown in Figure 2.10.

In summary, case studies and documented good practices equip public sector entities with guidance on implementing GPP successfully, providing proven strategies, insights and inspiration that drive the transition to sustainable procurement and support Ireland's environmental objectives.

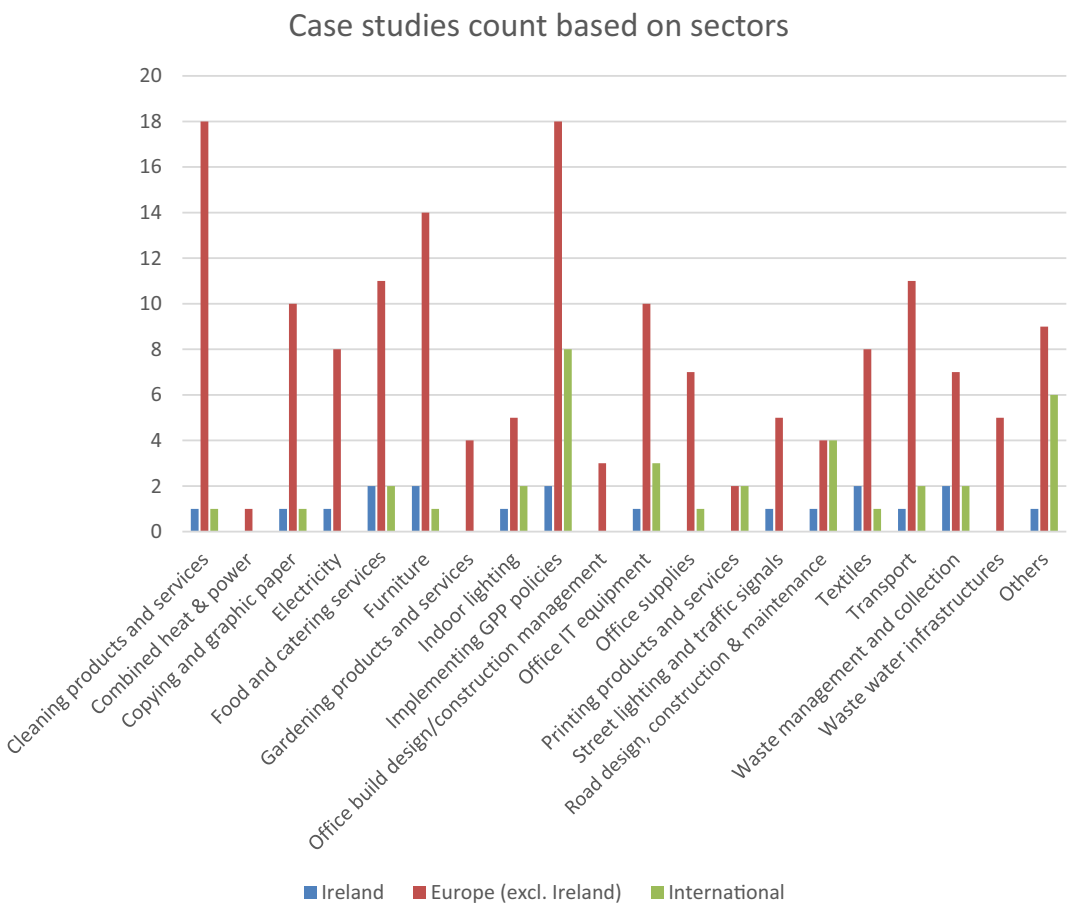

Figure 2.10. Distribution of case studies across GPP themes.

3 Innovative Tools

Building a usable toolkit was one of the main objectives of the project. Three main tools are included in the toolkit and procurers can access them using the GAPS web page (Anagipura *et al*., 2022), hosted on the University of Galway website. The following sections provide further details on each of these tools.

3.1 Carbon Footprint Calculator

The Carbon Footprint Toolkit supports organisations in Ireland in assessing and managing the GHG emissions associated with their organisation. The carbon footprint calculator (Adams and Goggins, 2024a) in this toolkit is based on the GHG Protocol Corporate Standard (WRI, 2024), which is widely recognised and utilised for carbon reporting. This standard includes three types of scope emissions: scope 1 (direct emissions from owned or controlled sources), scope 2 (indirect emissions from the generation of purchased electricity) and scope 3 (all other indirect emissions that occur in a company's value chain) (see Figure 3.1). Within the carbon footprint calculator developed, it was also decided to include as many subcategories as possible (depending on data availability) from scope 1, scope 2 and scope 3 in the carbon footprint, as recommended in the GHG Protocol Corporate Standard.

3.1.1 How to use the tool and support available

The carbon footprint calculator, which is Excel based, is available at https://www.universityofgalway.ie/media/researchcentres/structures/files/heirs/Carbon-Footprint-Calculator.xlsx (Adams and Goggins, 2024a).

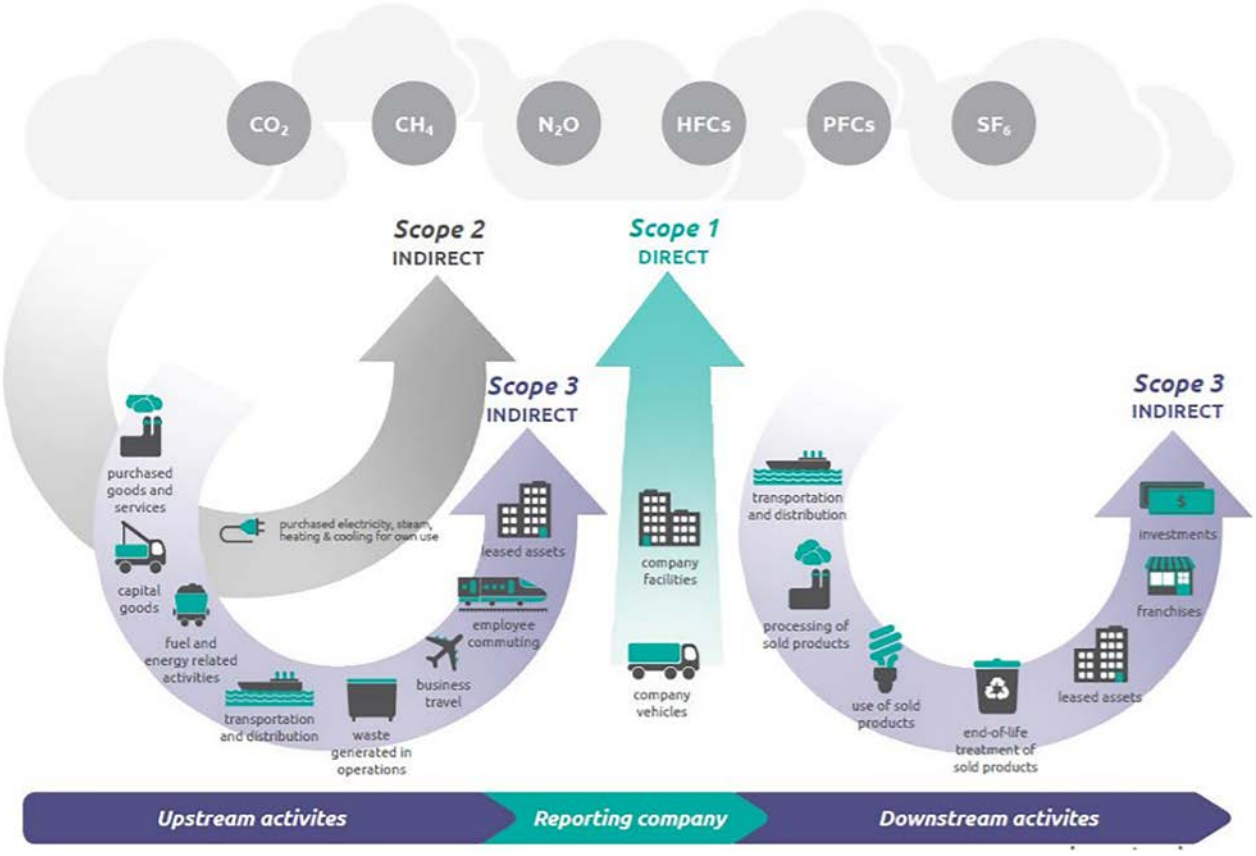

Figure 3.1. Scope 1, 2 and 3 emissions broken into upstream activities, on-site activities and downstream activities. CH_4, methane; CO_2, carbon dioxide; HFC, hydrofluorocarbon; N_2O, nitrous oxide; PFC, perfluorocarbon; SF_6, sulfur hexafluoride.

There are a number of associated informative YouTube videos to support users of the tool (see Figures 3.2–3.4).

Table 3.1 shows a summary of the emission factors used in the calculator, showing the stages that each set of factors covers in terms of life cycle stages

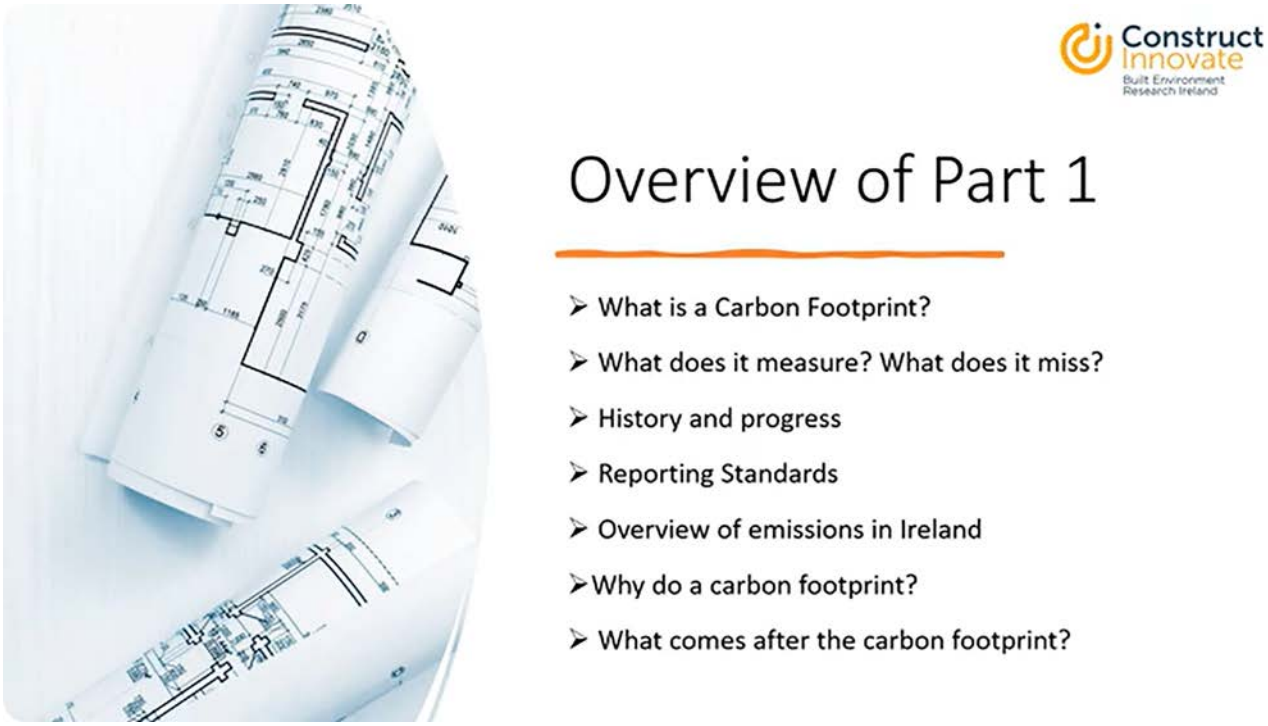

Figure 3.2. Screenshot of the YouTube video "Carbon footprint of an organisation – Part 1: What & why of a carbon footprint". Source: Engineering at University of Galway (2023a).

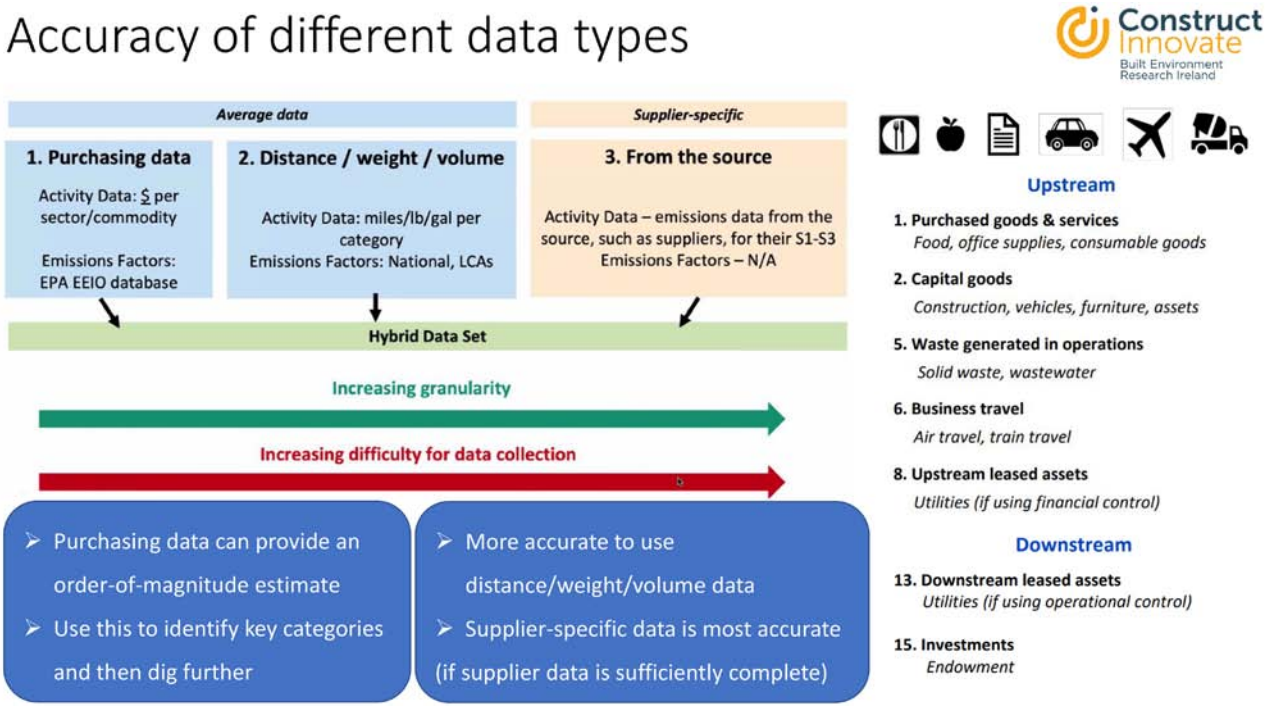

Figure 3.3. Screenshot of the YouTube video "Carbon footprint of an organisation – Part 2: How to carry out a carbon footprint". Source: Engineering at University of Galway (2023b).

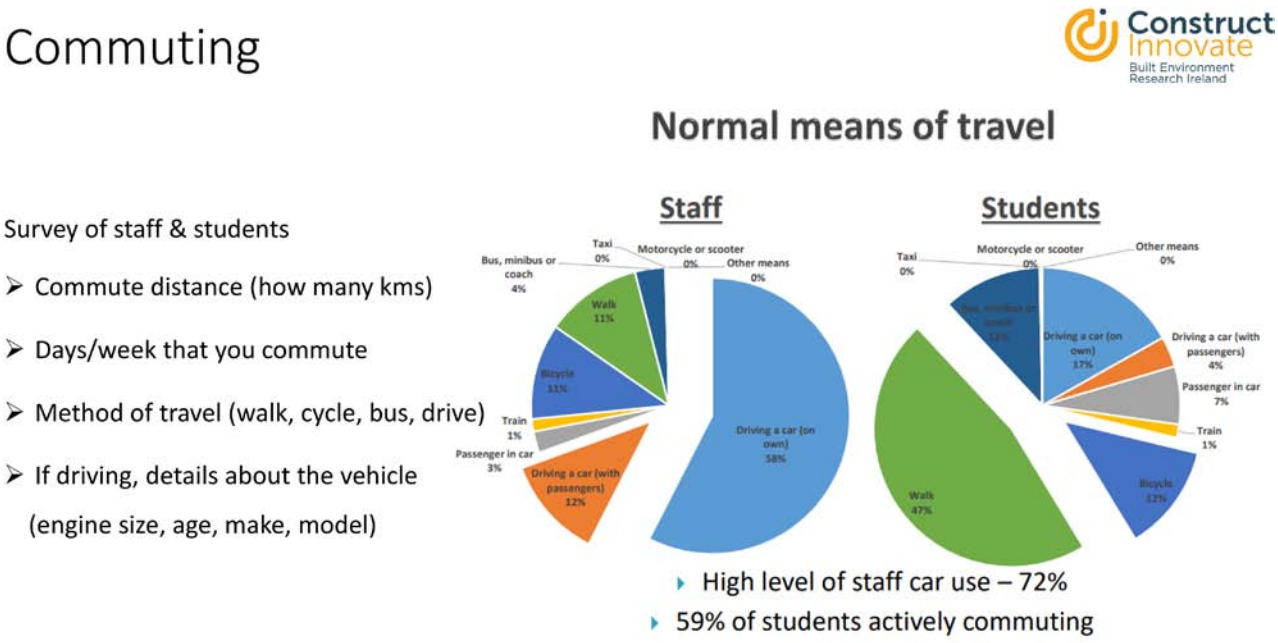

Figure 3.4. Screenshot of the YouTube video "Carbon footprint of an organisation – Part 3: Case study example". Source: Engineering at University of Galway (2023c).

Table 3.1. Summary of emission factors used, showing life cycle stages covered and other accuracy details

Scope	Stage	Type	Location	Source
1	Direct-fuel	Activity	Ireland	SEAI, 2024
2	Direct-fuel and T&D	Activity	Ireland	SEAI, 2024
3 – Purchased goods and services	Cradle-to-gate	Spend	Ireland	Ignite Procurement and Backsæther, 2022
3 – Travel modes (flights)	WTT and direct-fuel	Activity	UK	DBEIS, 2021
3 – Travel modes (hotel)	Direct-fuel	Activity	Cities worldwide	DBEIS, 2021
3 – Travel modes (homeworking)	Direct-fuel	Activity	UK	DBEIS, 2021
3 – Travel modes (all other)	Cradle-to-grave	Activity	Europe	Ecoinvent, 2023a
3 – Waste	Direct-fuel	Activity	UK	DBEIS, 2021
3 – Water	Direct-fuel	Activity	UK	DBEIS, 2021

T&D, transmission and distribution.

(i.e. extraction, transport, processing, utilisation and disposal). These phases or groups of these phases are also known as "well-to-tank" (WTT), "direct-fuel", "cradle-to-gate", "cradle-to-grave" and "transmission and distribution", as described below:

- WTT emissions refer to the upstream emissions from the extraction, production, refining and transport of fuels before they are combusted in vehicles or equipment. WTT emissions account for all the environmental impacts associated with making fuel available at the point of use, but not the emissions from the actual use of the fuel itself.
- Direct-fuel emissions encompass the immediate emissions that result from the combustion of fuels during activities like driving, flying and industrial operations. These are the on-site or operational emissions that occur during fuel use and contribute directly to GHG outputs.
- Cradle-to-gate emissions include all impacts from the extraction of raw materials (cradle) up to the point where a product leaves the factory (gate). This stage excludes any emissions that occur during the product's usage, distribution or end-of-life disposal. It is often used to measure the

environmental impact of product manufacturing up to the point where a product is sold or distributed.
- Cradle-to-grave emissions take into account the entire life cycle of a product or service – from raw material extraction (cradle), through production and usage, to disposal (grave). This comprehensive assessment includes all stages: extraction, manufacturing, transport, usage and end-of-life processes such as recycling or landfill.
- Transmission and distribution emissions refer to the losses and associated emissions that occur as electricity is transported from power plants to end users. These emissions stem from energy lost during transmission over power lines and distribution networks. Transmission and distribution losses are scope 2 emissions, which are indirect emissions from purchased energy used by the company.

Table 3.1 also shows whether emission factors are spend-based, activity-based or supplier-specific factors and the level of accuracy in terms of geographical location. A brief description of the methodology behind each set of factors as per the source documentation is also given.

Scope 1

These emission factors include only direct carbon dioxide (CO_2) emissions from the combustion of fuels and do not include indirect or upstream emissions, such as those from extraction, cultivation, transport or processing of fuels (SEAI, 2024).

Scope 2

The "electricity consumption" factor published includes scope 2 emissions (as defined in the GHG Protocol Corporate Standard) from electricity generation, scope 3 emissions from transmission and distribution losses, and own use of electricity at plants (SEAI, 2024). The Sustainable Energy Authority of Ireland does not currently publish WTT factors for electricity, which account for scope 3 emissions from extraction, refining and transport of fuels used for electricity generation.

Scope 3 – purchased goods and services

EXIOBASE calculates emission factors using a detailed, multi-regional input–output approach that integrates global economic and environmental data (Stadler *et al*., 2021). Air emissions are calculated by combining activity data with consolidated emission factors retrieved from the Netherlands Organisation for Applied Scientific Research Emissions Assessment Model (Pulles *et al*., 2007). This model incorporates emission factors from various sources, including the Intergovernmental Panel on Climate Change's Guidelines for National Greenhouse Gas and Air Pollutant Inventories (EEA, 2009; IPCC, 2006) and the Greenhouse Gas and Air Pollution Interactions and Synergies model (Amann, 2009). The Netherlands Organisation for Applied Scientific Research Emissions Assessment Model selects the most appropriate technology for each activity, with the choice reflecting the typical technology level in the country – more efficient technologies are typically applied in Europe compared with developing countries. Inflation is not directly accounted for in the emission factors; however, time-specific factors are selected based on the activity year to maintain temporal accuracy. Inflation is addressed through the use of product- and country-specific deflators, sourced from organisations such as the International Energy Agency, for energy-related data and national accounts for other product categories. These deflators convert current price time series into constant prices, allowing for consistent comparison across time periods. This process ensures that inflationary effects are adjusted, enabling accurate economic and environmental assessments over the years covered by EXIOBASE. The methodology covers emissions for 27 pollutants across key sectors globally, offering consistent time-series data from 1995 to 2022 for 44 countries (including the EU-28) and 5 global regions. Emission factors account for CO_2 equivalent emissions over a 100-year global warming potential. The calculation methodology described above covers cradle-to-gate emissions, in that they aim to cover the extraction, processing and some transport of material streams but do not fully cover transport or include use or disposal phases.

Scope 3 – flights

The methodology for calculating emission factors for air transport involves several key components to ensure accuracy in representing GHG emissions (DESNZ, 2024). Direct CO_2 emission factors for passenger flights are derived by dividing flights into categories of short and long haul based on flight

distance. The data incorporate actual aircraft fuel burn rates and average passenger load factors. For emissions from freight, factors take into account both dedicated cargo services and freight transported on passenger flights, with distinct conversion factors calculated for each. Additionally, emission factors are adjusted to reflect different seating classes, recognising the varying space each class occupies per passenger. Radiative forcing, a multiplier that accounts for the greater climate impact of emissions at altitude, is applied to reflect the full environmental impact of aviation. Last, the methodology factors in non-CO_2 impacts, such as methane and nitrous oxide, to present a comprehensive account of GHG emissions from air transport. The emission factors cover direct-fuel emissions and indirect WTT emissions from air transport, which include upstream emissions from fuel extraction and refining.

Scope 3 – hotel stays

According to the UK government's methodology document (DESNZ, 2024), these emission factors are taken directly from the Cornell Hotel Sustainability Benchmarking Index Tool, produced by the International Tourism Partnership and Greenview (Greenview, 2021). The factors use annual, self-reported emissions data comprising several international hotel organisations. The initiative benchmarks data, by market and segment, on energy, water and carbon emissions from over 27,000 hotels around the world. These are considered direct-fuel factors as they account for emissions from the operational use of electricity and heating in hotels. In terms of location, the data are in an international database that specifies down to the level of individual cities.

Scope 3 – working from home

These factors estimate the incremental energy use from office equipment and home heating by homeworking employees that would not have occurred in an office-working scenario. There are several assumptions used in the estimation of the homeworking conversion factors, as listed in the *2024 Government Greenhouse Gas Conversion Factors for Company Reporting*, which are all based on average UK household statistics (DESNZ, 2024). These are considered direct-fuel factors as they account for emissions from the operational use of electricity and heating at home.

Scope 3 – travel modes (all other)

Ecoinvent calculates emission factors for land transport by considering a full life cycle assessment (LCA) approach (Ecoinvent, 2023b). This includes direct emissions during vehicle operation (e.g. CO_2, methane and nitrous oxide emissions), as well as upstream and downstream processes like fuel extraction and refining, vehicle manufacturing, maintenance and end-of-life disposal. The assessment applies characterisation factors to these stages, converting various emissions and resource uses into impact categories (i.e. global warming potential). This holistic method ensures that all stages of a transport mode's life cycle are covered in the emission calculations. These are considered cradle-to-grave emission factors as they account for the extraction, transport, processing, usage and disposal phases associated with multiple vehicle groups.

Scope 3 – waste

These factors are drawn directly from the UK's Methane Emissions from Landfills Model (MELMod), which contains information on landfill waste composition and material properties, with the addition of collection and transport emissions (DESNZ, 2024). These are considered direct-fuel emissions as they account for emissions directly emitted from the collection and disposal of waste, from the collection trucks, and from the processing/decomposition of waste once it has been delivered.

Scope 3 – water

Conversion factors were calculated based on 2021 data from UK water companies' Carbon Accounting Workbooks (DESNZ, 2024). The Carbon Accounting Workbook data give GHG intensity for each water company from water supply and wastewater treatment, accounting for emissions associated with offices and transport. Therefore, these are also considered direct-fuel factors as they account for emissions directly emitted from the operation of water treatment facilities.

3.2 Carbon Footprint Tool: Purchasing Goods and Services Template

The term “carbon footprint” is commonly known, but less commonly fully understood (Wright *et al*., 2011). Many organisations that estimate their carbon footprint focus on measuring emissions from their own operations and electricity consumption, which accounts for scope 1 and scope 2; basically, an organisation’s gas/oil bill (scope 1) and electricity bill (scope 2). These two scopes are relatively easy to report on, but, as more organisations push to include the final scope (scope 3 – supply chain), it is becoming clear that more often than not this scope makes up a larger portion of an organisation’s carbon footprint than scopes 1 and 2 combined (Helmers *et al*., 2021). Scope 3 is much more difficult to report on, which is part of the reason why organisations opt to report on only scopes 1 and 2 (Valls-Val and Bovea, 2021).

The carbon footprint calculator’s purchasing goods and services template developed in this research is grounded in the GHG Protocol Corporate Standard, which is widely recognised for its robust framework for carbon reporting. This tool purposefully targets scope 3 emissions, which encompass indirect emissions that occur in the supply chain of an institution. Scope 3 emissions are typically the most challenging to measure due to their complexity and the extensive data required. By employing an open-access spend-based methodology, the tool offers a user-friendly and cost-effective solution for public and private sector organisations to establish a carbon footprint baseline.

In addition to establishing a carbon footprint using the carbon footprint calculator, the purchasing goods and services template can be used to conduct a detailed supply chain analysis to identify key areas with high levels of carbon emissions. The supply chain analysis provides insights into the environmental impact of the goods and services procured by a public or private sector organisation, offering a clear picture of the upstream and downstream emissions. By understanding the carbon footprint of their supply chains, an organisation can make informed decisions about sustainable procurement practices and target specific areas for improvement.

3.3 Supply Chain Emissions Evaluation and Management

The Supply Chain Emissions Evaluation and Management (SCEEM) framework is designed to guide organisations through a systematic process of measuring and reducing supply chain carbon emissions. Based on learnings from the hybrid method and supply chain analysis, the framework progresses through three phases – initial rough estimates, detailed analysis and engaged management – each increasing in detail and accuracy. The stages are named after the colours of traffic lights to represent the difficulty and effort associated with each phase. The framework is depicted in Figure 3.5.

3.3.1 Green phase: spend-based estimate

The objective of the green phase is to establish a baseline estimate of supply chain emissions utilising the carbon footprint calculator, based on EXIOBASE3 spend-based emission factors, as included in the Carbon Footprint Toolkit. This calculator provides a quick and broad estimation of emissions by multiplying expenditure data by industry-average emission factors. It is a time- and cost-effective way to get an initial understanding of an organisation’s carbon footprint. The outcome from this phase is a preliminary baseline carbon footprint that identifies major emission sources within the supply chain.

3.3.2 Yellow phase: supply chain analysis

The yellow phase involves refining the supply chain carbon footprint by focusing on high-spend categories, key suppliers and high-emission line items. It involves a detailed supply chain analysis, as described in Adams (2024), to identify low-hanging fruit for improving data accuracy, analysing high levels of emissions in terms of categories, suppliers and line items for areas where activity-based or supplier-specific opportunities may lie. From this, a table of recommended next steps is developed for each significant category, supplier and line item, prioritising actions that can influence procurement policy or increase the baseline accuracy. The yellow phase should result in a targeted action plan that identifies key areas for further investigation in terms of procurement policy and outlines specific

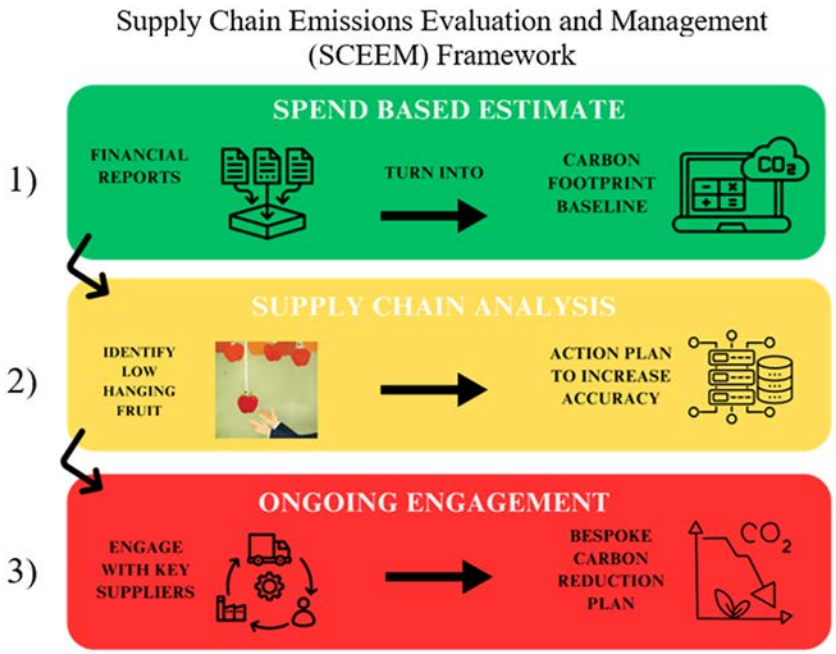

Figure 3.5. SCEEM framework. Source: Adams (2024).

steps to improve the accuracy of the supply chain emissions baseline.

3.3.3 Red phase: ongoing engagement

The red phase aims to implement more detailed and specific emission factors and propose emission reduction strategies. This phase uses the targeted action plan drawn up in the yellow phase to begin investigating the key categories, suppliers and line items. Engaging with suppliers is crucial to this phase to communicate the decarbonisation requirements of public sector organisations from a customer perspective, and also to inquire about sharing/developing supplier-specific emission factors (SSEFs). Supplier-specific factors are the gold standard of emission factors, but also require the most amount of work to obtain. Developing an understanding of suppliers' carbon footprints through direct engagement can be approached in two ways:

- Organisational average factor: calculating emission factors based on the supplier's total carbon footprint divided by revenue, providing a supplier-specific, spend-based factor (i.e. kilogram of carbon dioxide equivalent (CO_2eq)/€ spent on goods/services from supplier A).
- Product-specific LCAs: obtaining cradle-to-grave emission factors for individual products, offering detailed insights into the emissions associated with manufacturing, use and end-of-life stages. Note that these must be specific to the factory/organisation that the products are being procured by to be considered supplier specific. If LCAs are calculated at a global level across all factories within a company, these are considered activity-based LCAs. Activity-based emission factors incorporate material-based emission factors suitable for specific sectors or use available product carbon footprints from suppliers. Activity-based emission factors are useful for some sectors of spend, although they are more appropriate for material-heavy sectors and become less applicable as products move further away from raw material extraction.

The organisational average factor has the benefit of having one calculation that can be applied to anything purchased from the relevant company, whereas LCAs have to be calculated for each individual product. It also has the advantage of being representative of its industry and location at the time of calculation, in terms of a spend-based factor. This could be compared with the environmentally extended input–output analysis (national average) spend-based factors or with other companies in the same industry that also have an organisational average factor calculated. The product-specific LCAs have the advantage of highlighting exactly what it is about a product that creates its

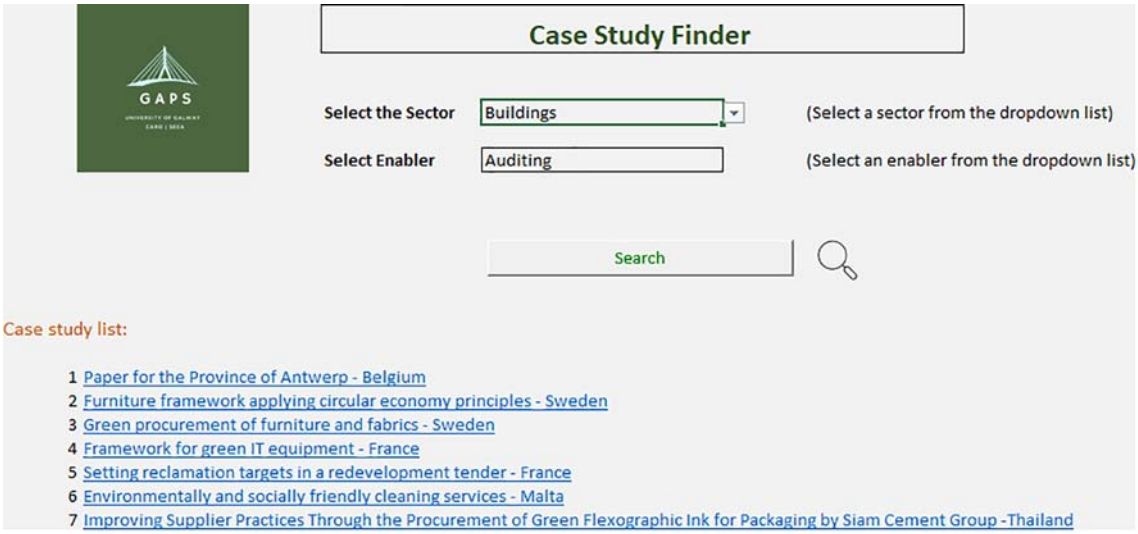

Figure 3.6. Interface of the case study finder tool. IT, information technology.

impact, whether that be manufacturing, use phase or end of life, etc. These have different implications for decarbonisation plans. Through ongoing engagement with key stakeholders in the supply chain, this phase builds a comprehensive and accurate supply chain emissions inventory that supports ongoing management and reduction efforts, enabling the institution to develop and implement effective decarbonisation plans. The SCEEM framework, shown in Figure 3.5, emphasises a step-by-step progression towards more detailed and accurate emissions measurement and management, moving from broad estimates to engaged and detailed strategies.

3.4 Case Study Finder Tool

As discussed in Chapter 2, a case study finder tool has been developed within the GAPS project, with a database of successful GPP implementations from Ireland and outside the country, allowing users to explore real-world examples relevant to GPP across 22 broader sectors (Figure 3.6). This tool promotes learning from proven practices, enabling organisations to adopt innovative approaches confidently. This tool is available at https://www.universityofgalway.ie/structures/projects/gaps/.

Each of the 240 case studies is categorised under 22 themes and 42 specific enablers (see Table A1.3 for the complete list of enablers), allowing users to filter by the criteria most relevant to their needs. This broader categorisation means that, rather than searching through hundreds of examples, procurers can immediately narrow the search to a targeted set of case studies that align with specific objectives, sectors or sustainability goals.

4 Real-world Testing and Results

4.1 Stakeholder Round-table Sessions

Two stakeholder round-table meetings were conducted to discuss different topics related to GPP with the identified stakeholders. Participants were invited based on the GAPS stakeholder list created with the help of all partner organisations in the project, and communication took place through GAPS social media platforms. Key activities at the two stakeholder round-table meetings included identifying the barriers and challenges faced by participants and providing a platform for discussing potential solutions collaboratively; enriching discussion with the GAPS tools; and discussing the issues identified. The following key activities were accomplished during these two meetings:

- what support participants needed from the GAPS project team was discussed;
- what information and assistance participants needed in GPP was discussed;
- participants were informed about the carbon footprint calculator and other GAPS tools;
- barriers to and challenges in implementing the carbon footprint calculator within an organisation were identified.

These sessions helped to optimise the GAPS toolkit by addressing practical implementation issues and areas that need to be addressed within the project. The key areas that participants in round-table meetings requested support for in GPP are given in Figure 4.1.

4.2 Application of the Carbon Footprint Calculator

The carbon footprint calculator was used to estimate the carbon footprint of University of Galway, including scope 1, 2 and 3 emissions – see section 5.1 for the results. By reporting on scope 3 and capturing the impact of the supply chain, organisations have a baseline to begin with in terms of materials management. This section follows the methodology described in the SCEEM framework in Figure 3.5, ensuring that a full picture of the supply chain is captured before moving towards more accurate calculations and decarbonisation strategies. The spend-based method serves as a first step, followed by substituting activity-based emission factors and SSEFs where possible.

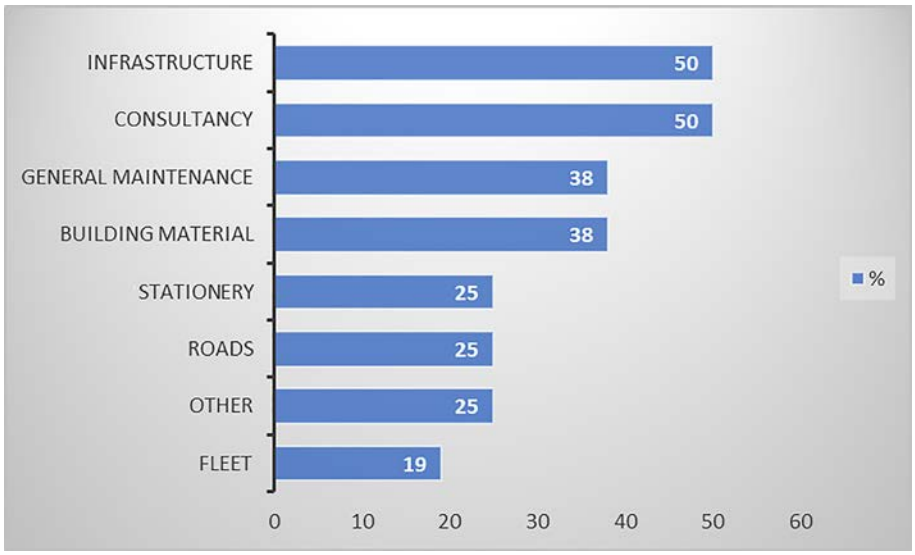

Figure 4.1. Key areas that participants requested support for in GPP.

4.2.1 Supply chain stakeholder engagement

University of Galway contacted 145 of its suppliers via email, which represented 80% of the university's procurement activity by spend. A template email was sent three times over 4 weeks (2 weeks apart). The email explained the project and requested answers to the following questions:

- Do you have an SSEF or other relevant emissions data available?
- If not, would you or a representative from your company be interested in attending a carbon footprint workshop to calculate your company's specific emission factor?

If any supplier emission data were available, they were collected via email and full scope 1, 2 and 3 carbon footprint information and the organisation's revenue requested. In cases where companies were reluctant to share financial information, they were asked to perform the calculations themselves and share the final SSEF with us. Figure 4.2 contains a pie chart showing the response rate (21%). Making up this 21%, 8% (11 suppliers) had carbon footprint information available and were willing to share and 11% (16 suppliers) had no carbon footprint information available, but showed an interest in attending a workshop in order to attain carbon footprint information for their organisation. Nine suppliers followed through with sharing some degree of their carbon emissions data via email. One supplier of the original 11 dropped out of the project and another pointed us to the product carbon footprints that were published on its website (Dell). As shown in Table 4.1, three suppliers were in the BUILD (building construction) product code category, one in LAB (laboratory supplies and services), three in COMP (computer products and services), one in SERVE (professional services) and one in CATER (catering). For the rest of this report, these suppliers are referred to by the numbers assigned in Table 4.1 (i.e. E1–E9).

For the 16 suppliers that did not have emissions data, but showed an interest in engaging, we scheduled an online or an in-person carbon footprint workshop. An email provided guidance for data collection to be completed before the workshop. During the workshop, suppliers were guided through inputting the data into the carbon footprint calculator and addressing any queries. At the end of the workshop, suppliers were asked to divide their final carbon footprint figure by their company's annual revenue for the year in question and share the final SSEF with us. Table 4.2 shows the 10 suppliers that made it through the workshops (note that 6 suppliers dropped out). As seen in Table 4.2, four suppliers were in the BUILD product code category, one in LAB, one in COMP, two in SERVE, one in PRINT (printing) and one in STAT (stationery). For the rest of this report, these suppliers are referred to by the numbers assigned in this table (i.e. W1–W10).

As noted, the engagement process with the supply chain yielded emissions data from 19 suppliers across various sectors. Figure 4.3 illustrates the level of detail provided by each supplier, emphasising their contributions to different emission scopes (scope 1, scope 2, scope 3 – purchased goods and services, scope 3 – commuting, scope 3 – business travel, scope 3 – waste).

Figure 4.3 includes percentage values, represented by green data bars, indicating the proportion each emissions category contributed to the suppliers' overall carbon footprint. Suppliers E1, E3, E5, E7 and E9 provided total carbon footprint values, but did not

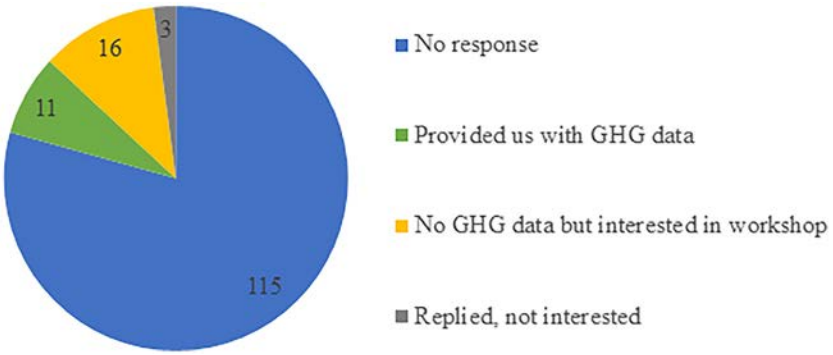

Figure 4.2. Responses to supply chain email engagement.

Table 4.1. First-round responses (email request for emissions information)

No.	Location	Sector	University of Galway product code category	EXIOBASE category
E1	Galway	Integrated security	BUILD	Other services
E2	Galway	Construction contractors	BUILD	Construction work
E3	Dublin	Cleaning and facilities management	BUILD	Other services
E4	Dublin	Medical products	LAB	Rubber and plastic products
E5	Dublin	ICT services	COMP	Computer and related services
E6	Germany	Medical products and services	COMP	Computer and related services
E7	Dublin	Edtech products	COMP	Office machinery and computers
E8	Dublin	Marketing and media services	SERVE	Other business services
E9	Armagh	Catering supplies	CATER	Meat/vegetable products (average)

Edtech, education technology.

Table 4.2. Second-round responses (invitation to the in-person/online carbon footprint workshops)

No.	Location	Sector	University of Galway product code category	EXIOBASE category
W1	Galway	Landscaping	BUILD	Products of forestry, logging and related services
W2	Galway	Waste management	BUILD	Collected and purified water, distribution services of water
W3	Sligo	Security services and equipment	BUILD	Other services
W4	Galway	Construction contractors	BUILD	Construction work
W5	California, USA	Laboratory products	LAB	Medical, precision and optical instruments, watches and clocks
W6	London, UK	Cloud management service	COMP	Computer and related services
W7	Galway	Corporate law firm	SERVE	Public administration and defence services, compulsory social security services
W8	Dublin	Sustainable procurement consultants	SERVE	Other business services
W9	Galway	Printing and marketing	PRINT	Printed matter and recorded media
W10	Dublin	Office supplies wholesaler	STAT	Wood and products of wood and cork (except furniture), articles of straw and plaiting materials

specify which emissions categories were included in their calculations and so are marked with a “Y” for “yes”, indicating inclusion without specific figures. The data show considerable variation in scope proportions among suppliers. Significant scope 3 data were provided by only six suppliers, all of which attended the workshops (W1, W3, W4, W8, W9, W10). Any other scope 3 figures provided were minimal, highlighting the prevalent lack of reporting on scope 3 emissions. The row at the bottom of Figure 4.3 shows the average portion each scope contributed to in this sample set of suppliers. On average, scope 1 was the largest category at 34%, followed by scope 3 purchased goods and services at 28% and scope 2 at 19%.

Commuting and business travel contributed 11% and 6%, respectively, while waste was just 2%. Emailed suppliers predominantly provided only scope 1 and 2 emissions data, with six out of nine also providing revenue information. Workshop attendees showed much more comprehensive scope 3 coverage, but less engagement in providing revenue data, with only 3 out of 10 providing this information. Overall, revenue information was provided by 9 of the 19 suppliers, enabling the calculation of 9 SSEFs. One supplier (E4) calculated the scope 2 emissions associated with its service to the university and divided that by the associated revenue it had taken in from the university. This does not represent a full SSEF, as the full scope

Supplier Number	PC Category	(tCO2e) S1	S2	S3 - PG&S	S3 - Commute	S3 - Bus Travel	S3 - Waste	Revenue?
E1	BUILD	Y	Y			Y		Y
E2	BUILD	94%	5%			1%		Y
E3	BUILD	Y	Y		Y	Y		Y
E4	LAB	59%	41%					
E5	COMP	Y	Y					
E6	COMP	54%	46%					Y
E7	COMP	Y	Y					Y
E8	SERVE	100%	0%					Y
E9	CATER	Y	Y					
W1	BUILD	71%			29%			Y
W2	BUILD	89%	11%					
W3	BUILD	12%		88%				
W4	BUILD	75%	2%	23%				
W5	LAB	100%						
W6	COMP	2%	98%					
W7	SERVE		100%					
W8	SERVE	17%	14%	38%	26%	1%	3%	
W9	PRINT	5%	11%	66%	14%	2%	2%	Y
W10	STAT	37%	13%	7%	2%	36%	5%	Y
Average		**34%**	**19%**	**28%**	**11%**	**6%**	**2%**	

Figure 4.3. Supply chain engagement results: emissions information from 19 suppliers showing the level of data provided, scope proportions and whether or not the supplier provided revenue information. PC, product code; PG&S, purchased goods and services; S1, scope 1; S2, scope 2; S3, scope 3; tCO_2e, tonnes for carbon dioxide equivalent; Y, yes.

of emissions is not covered; however, this factor has been included alongside the other nine that were calculated for comparison in section 4.2.1. The results from this data collection process highlight the diverse carbon footprint profiles and reporting capabilities of the suppliers. This emphasises the need for tailored engagement strategies to improve data accuracy and completeness across the supply chain.

4.2.2 Spend-based versus supplier-specific emission factors

The comparison of SSEFs and spend-based emission factors for 10 suppliers across five sectors reveals substantial differences between the two approaches, as shown in Figure 4.4.

In most cases, SSEFs provided a much lower estimate of emissions than spend-based factors derived from EXIOBASE. Using the spend-based factor as the control value, we can calculate the percentage difference between the supplier and spend factor. This allowed us to group the SSEFs into three groups, as shown in Table 4.3.

Group A (close to spend value) contains suppliers from the STAT (W10) and PRINT (W9) product code categories, associated with stationery supplies and printing services. Referring back to Figure 4.3, it can be seen that W10 and W9 filled in emissions data for scopes 1, 2 and 3, suggesting that these carbon footprint reports are more complete than those of the other suppliers in the figure. The SSEF of W10 is just 4% lower than the spend-based factor, and that of W9 is 30% lower. Unfortunately, even though

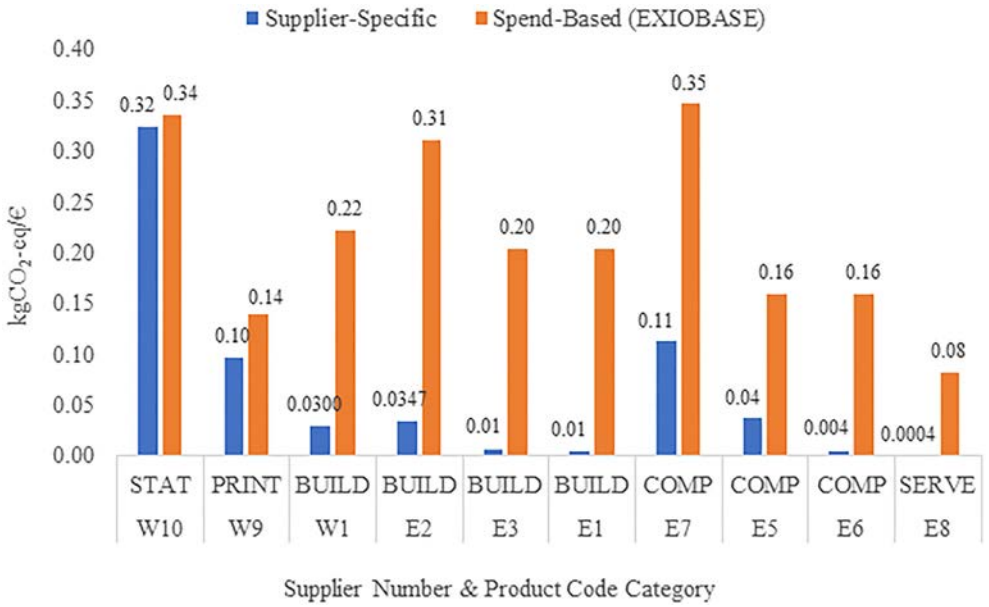

Figure 4.4. Comparison of supplier-specific and spend-based emission factors for 10 suppliers and 5 sectors.

these are the most comprehensive reports produced from this engagement study, they do not represent a complete carbon efficiency figure due to the missing supply chain elements in their reports. The EXIOBASE categories matched with these suppliers were:

- W9 – printed matter and recorded media;
- W10 – paper and paper products.

Group B (relatively close to spend value) is split between suppliers from the BUILD (W1 and E2) and COMP (E7 and E5) categories. In terms of SSEFs, W1 was 87% lower than its spend-based factor and E2 was 89% lower. Referring back to Figure 4.3 once again, we can see that these suppliers represent partially completed carbon footprints, with most of the emissions coming from scope 1. W1 included commuting in scope 3 and also did not have any scope 2 emissions due to the nature of its landscaping work. However, purchased goods and services need to be included here to capture the impact of materials used. E2 shows most emissions in scope 1, with a small amount of scope 2 and business travel emissions reported. Again, purchased goods and services really need to be included to capture the impact of their supply chain, suggesting that these SSEFs are so much lower than the spend-based emission factors because they are not capturing the full impact.

E7 is a supplier of education technology products and services, whereas E5 supplies high-speed internet and ICT shared services to the Irish education sector. E7's SSEF was 67% below the EXIOBASE factor and E5 was 75% below. Looking at Figure 4.3, neither of these suppliers provided detailed emissions data. E7, a supplier of Apple products, provided Apple's environmental progress report, which shows a full scope 1, scope 2 and scope 3 figure for Apple on a global scale. By dividing this total carbon footprint figure by Apple's total revenue for the same year, we get the SSEF of 0.11 kilograms of CO_2eq/€ for money spent on Apple products, as shown in Figure 4.3. A difference of 67% shows that this SSEF is closer to the spend-based method than most others, likely due to the inclusion of a full scope 1, 2 and 3 carbon footprint report. However, due to the fact that this figure has been calculated at the level of Apple globally, it is more closely comparable to an activity-based emission factor than an SSEF, as it does not directly capture the

Table 4.3. SSEF groups based on difference to spend-based values

Supplier	Group	Group description	Difference
W10, W9	A	Close to spend value	<30%
W1, E2, E7, E5	B	Relatively close to spend value	65–90%
E3, E1, E6, E8	C	Not close to spend value	>97%

processes that occur in the factory that manufactures the products the university procures from supplier E7. Supplier E5 calculated an emission factor specific to the University of Galway, by adding up the electricity consumed by their routers on the university campus. This electricity consumption figure was converted into tonnes of CO_2eq and divided by the total spend that these routers cost the university over the year. This is not an ideal figure as it misses the supply chain of the supplier and the material and energy costs to create the routers and is, therefore, not accurately representative of supplier E5's carbon efficiency. The EXIOBASE factors that were assigned to these suppliers were:

- E2 – construction work;
- E5 – computer and related services;
- E7 – office machinery and computers;
- W1 – products of forestry, logging and related services.

Group C (not close to spend value) contains suppliers in the categories of BUILD (E3 and E1), COMP (E6) and SERVE (E8). E3 is a cleaning and facilities management provider. E1 is a security and facility services company. Again, neither of these suppliers provided specific emissions data, as seen in Figure 4.3, although there was some coverage of business travel by both and of commuting by supplier E3, and so some level of scope 3 was captured but not all. For supplier E3, it would be crucial to include the chemicals and cleaning products consumed in the supply chain of their operation. Similarly, for supplier E1, the products it provides to customers need to be included in the carbon footprint report (e.g. security cameras).

E6 is a German-based medical imaging and information processing company. This supplier provided only scope 1 and 2 emissions data as these were the only data available, and so the resulting SSEF is not fully representative.

E8 is a large marketing and communications group based in Ireland. Again, this supplier provided only scope 1 and 2 data and, hence, the SSEF is a degree of magnitude smaller than the spend-based factor. The EXIOBASE factors that were assigned to these suppliers were:

- E1 – other services;
- E3 – other services;
- E6 – computer and related services;
- E8 – other business services.

This comparison illustrates the complex nature of capturing the impact of an organisation's supply chain. It presents the case for each company or organisation to create its own unique route for supply chain decarbonisation, which involves ongoing engagement with suppliers.

5 Results and Impact

5.1 Carbon Footprint Report – University of Galway

A carbon footprint report calculated University of Galway's GHG emissions for scopes 1, 2 and 3 from 2017 to 2023, using 2017 as the baseline (Adams and Goggins, 2024b). The report clearly shows that emissions associated with purchasing products and services (under scope 3) have a significant impact on the university's overall GHG emissions. The university is actively identifying these hotspots and working to minimise its environmental impact through sustainable procurement.

5.1.1 Key findings and scope of emissions

Using the GHG Protocol Corporate Standard (WRI, 2024), emissions across three scopes were estimated:

- scope 1 – direct emissions from on-site fuel combustion and university-owned vehicles;
- scope 2 – indirect emissions from purchased electricity;
- scope 3 – other indirect emissions, including emissions from commuting, waste and procured goods and services.

Figure 5.1 shows the GHG emissions, in terms of tonnes of CO_2eq, for the university for the years

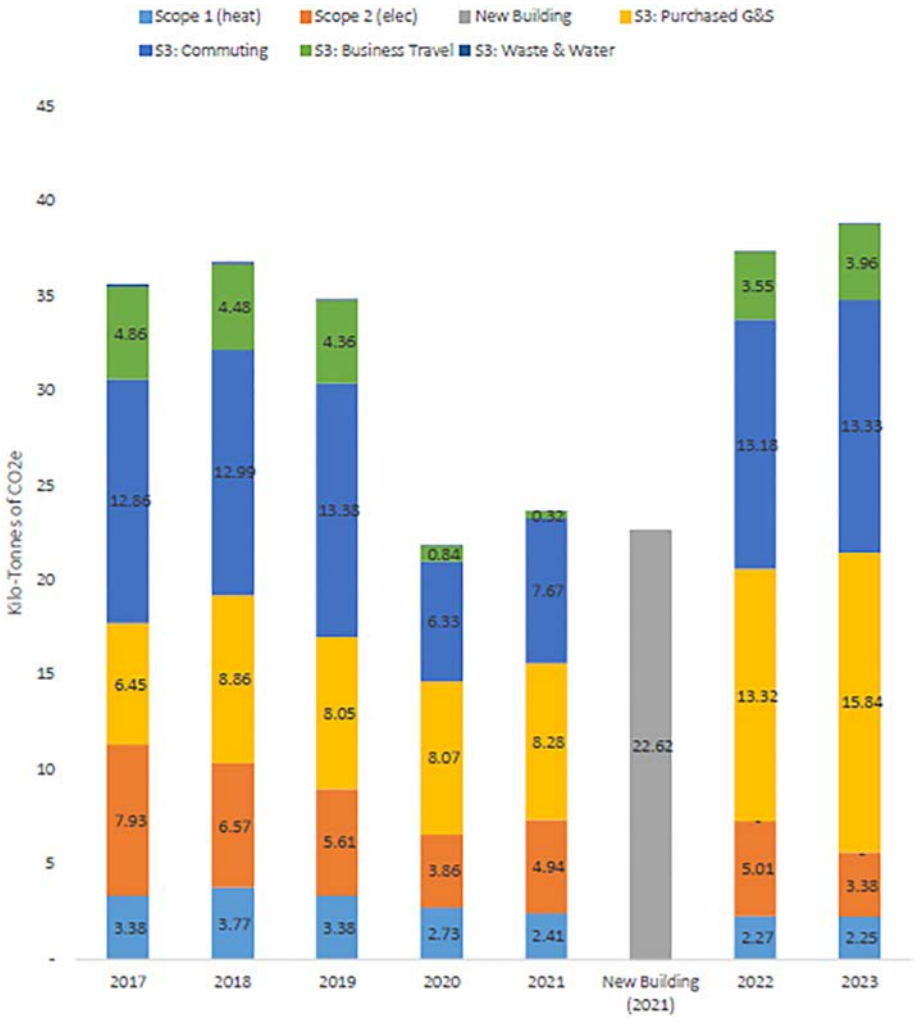

Figure 5.1. University of Galway carbon footprint 2017–2023, showing 2021 outlier (new building). G&S, goods and services; S3, scope 3.

2017 to 2023, broken down by the aforementioned three scopes. It can be seen that commuting represented the largest source of scope 3 emissions, followed by emissions from purchased goods and services. The study also highlighted the substantial emissions impact of major construction projects, emphasising the importance of sustainability in capital projects and infrastructure planning.

5.1.2 Methodology and tools used

Emissions were calculated using the following set of tools and methodologies:

- Spend-based calculations: by linking expenditure data to industry-standard emission factors, emissions for procured goods and services were estimated, providing a baseline for sustainable procurement.
- Carbon footprint calculators: specific calculators were utilised for categories like waste management, commuting and business travel, enhancing accuracy in each emission category.
- Commuting data collection: surveys on commuting habits helped to quantify the emissions generated by student and staff travel, offering a clear picture of transport impacts.

5.1.3 Implications for green public procurement

This assessment has practical implications for GPP, highlighting actionable steps for reducing emissions:

- Informed procurement choices: identifying high-emission categories allows public institutions to prioritise sustainable suppliers and services, particularly in high-impact areas like transport and construction.
- Sustainable infrastructure planning: the impact of large-scale projects underscores the importance of considering life cycle emissions and integrating sustainable practices in capital investments.
- Ongoing emission monitoring: regular assessments and updates to emission factors ensure that GHG inventories stay relevant and reflective of current procurement and operational practices, fostering continual improvement.

5.2 Sustainability Procurement Practices at University of Galway – Case Study

A case study was developed collaboratively with University of Galway's Procurement and Contracts Office (PCO) to identify how structured sustainable procurement practices can support public sector organisations in adopting GPP principles (Anagipura and Goggins, 2024).

The University of Galway used a number of documents to set up GPP guidelines and instructions for the university's procurement staff. Figure 5.2 shows the documents related to the implementation of GPP within the university.

5.2.1 Policy development and framework

The university formalised its commitment to sustainable procurement through its sustainability strategy (2021–2025). The PCO spearheaded this initiative by developing a sustainable public procurement handbook (PCO, 2023), drawing inspiration from the EPA's green criteria documents. The handbook provides procurement staff with standardised procedures and sustainability criteria, particularly for professional services, ensuring that

Figure 5.2. Summary of documents used in the policy development at University of Galway.

every purchasing decision reflects the university's environmental values.

The university established a supplier charter, which is a key document published by the university to clearly communicate its expectations to suppliers (University of Galway, 2023). This charter outlines expectations for sustainable practices, helping businesses understand how to align with the university's values of openness, respect, excellence and sustainability. The charter encourages engagement with small and medium-sized enterprises, enhancing inclusivity within the supply chain.

5.2.2 Implementation of sustainable procurement

- Sustainable public procurement criteria consultation: staff are required to review relevant sustainability criteria before initiating any tenders.
- Sustainability marks allocation: a minimum of 10% of evaluation marks in tender assessments is allocated to sustainability considerations.
- LCC: applicable contracts require life cycle cost assessments to understand long-term environmental impacts.
- Contract clauses: sustainability monitoring and reporting clauses are mandatory in all contracts.
- Market engagement: engaging the market is essential when there are uncertainties about suppliers' ability to meet sustainability standards.

This structured approach ensures that the PCO staff consistently apply GPP principles, helping to standardise sustainable procurement across the institution.

5.3 Results

Since implementing these guidelines in May 2023, over 85% of the university's contracts have incorporated green criteria, reflecting significant progress in aligning procurement practices with sustainability objectives. Additionally, the university's recent GHG assessment highlighted that emissions from purchased goods and services are a major contributor to its carbon footprint (Adams and Goggins, 2024b). As a result, the university is actively targeting these areas to reduce its environmental impact through sustainable procurement.

5.4 Lessons Learned

The university's experience implementing sustainable procurement practices highlighted several key lessons. Continuous training on sustainable procurement is essential for building expertise among procurement staff, ensuring consistent application of green principles. Cultivating a culture of voluntary compliance, where staff see sustainable practices as beneficial rather than as a duty, has further promoted acceptance of the new guidelines. The supplier charter has been especially valuable in supporting small local suppliers, guiding them to align with the university's sustainability expectations and enhancing inclusivity within the supply chain. Although some resistance to these changes was initially encountered, providing clear guidance and support has helped ease the transition, fostering a smoother implementation of sustainable procurement processes.

6 Communication

The project's findings and resources were shared with the broader research and policy community via the Civil Engineering Research in Ireland conference, different GPP community-based events across Ireland and peer-reviewed articles, as well as through workshops with climate action coordinators in local authorities, webinars, newsletters, embedment in training courses and short recorded explainer videos. These contributions aim to inspire further advancements in sustainable procurement practices and policymaking.

7 Conclusion and Policy Recommendations

The GAPS project is a major step forward in helping Ireland's public sector go green. By creating a user-friendly toolkit, studying real-world examples and providing tools such as the carbon footprint calculator and case study finder tool, the project tackles the main hurdles to GPP: lack of awareness, perceived costs and inconsistent environmental standards.

The project also focused on sharing knowledge through workshops, events and consultations with both public and private sector organisations. By showcasing successful green procurement stories from Ireland and the EU, the project highlights the significant environmental, economic and social benefits of sustainable purchasing.

Research and expert feedback identified key challenges and opportunities in advancing green procurement. These included the complexity of incorporating sustainability into procurement processes and the need for better support for eco-friendly suppliers. To address these issues, the project offers practical recommendations and tools.

The creation of a comprehensive toolkit that enables the calculation of an organisation's carbon footprint and the analysis of supply chains is a pivotal step towards achieving the objective of this research – to guide opportunities to lower the carbon intensity across the diversity of applications presented by the public sector. The toolkit was developed to tackle the significant barriers of data difficulties and cost constraints, which often hinder effective carbon management in the public sector.

By aligning with Ireland's Climate Action Plan, EPA guidelines and the European Green Deal, the GAPS project provides a clear path for Irish public sector organisations to adopt and promote green procurement.

7.1 Policy Recommendations

Identifying policy recommendations was one of the project's main targets. The survey findings and policy practice report described in Chapter 2 highlight the main policy recommendations that will help to uplift GPP in Ireland.

- **Strengthen GPP policy mandates:** align GPP criteria more closely with national and EU climate action plans by mandating GPP practices across all public sector procurements. This can be achieved by setting minimum requirements for sustainability criteria in public contracts, prioritising high-impact sectors like construction, ICT and energy. However, as per the *Buying Greener: Green Public Procurement Strategy and Action Plan 2024–2027*, inclusion of green criteria is now mandatory for the Irish public sector from 2025 (DECC, 2024). Nonetheless, these requirements still need to be clearly monitored and their implementation strengthened.
- **Getting political support for GPP:** the significance of aligning public procurement with political priorities is crucial, as has been confirmed by several case studies. These instances illustrate how GPP initiatives can function as potent instruments for advancing political agendas concerning sustainability, climate action and economic development. It is necessary to harmonise the political process with practical implementation, underscoring the need for robust political commitment in Ireland.
- **Enhance capacity building and training:** expand training programmes for procurement officers on GPP practices such as LCA and LCC methodologies. Ongoing professional development will enable procurement staff to better understand, evaluate and implement sustainability criteria, ensuring more consistent GPP adoption.
- **Establish a central GPP resource hub:** create a centralised online platform that hosts resources, case studies, tools and templates related to GPP. This hub would serve as a connecting platform for both procurers and suppliers to understand GPP requirements and directly contact different government bodies for procurement inquiries. Also, this can include catalogues, training materials and eco-label product lists to make GPP convenient for both suppliers and procurers.

- **Provide financial incentives and support for suppliers:** offer grants or subsidies to encourage suppliers to adopt green practices, particularly small and medium-sized enterprises. This can help build a more robust green market and support suppliers in meeting the growing demand for sustainable products and services.
- **Strong implementation:** since some policies are already in place, policy implementation and enforcement need to be stronger in Ireland. This deficiency has resulted in a decrease in the utilisation of green criteria during the procurement process by public sector organisations.
- **Promote market engagement and supplier collaboration:** facilitate regular market engagement events, such as green market fairs or supplier round-table meetings, to foster collaboration and knowledge exchange between public buyers and suppliers. These events can increase supplier readiness, helping them better understand and respond to public sector sustainability requirements. In order to effectively accomplish this, key performance indicators can be implemented within the organisations.
- **Monitor and report GPP progress:** implement systematic reporting on GPP implementation and its impacts. Public sector entities should be required to document their GPP activities and their contributions towards Ireland's climate goals, offering transparency and fostering accountability. These need to be thoroughly examined to reach meaningful decisions for the coming years.
- **Support research and innovation in sustainable procurement:** encourage and fund research initiatives that explore new tools, methodologies and technologies in GPP. Supporting innovation in areas like LCA, eco-labelling and sustainability metrics will contribute to the continued evolution of GPP practices.

By strengthening GPP policies, expanding training and supporting green suppliers, Ireland can set a strong example of sustainable public spending. This will not only support Ireland's own climate goals but also support the creation of a more sustainable market within the country. Through consistent sustainable procurement practices, Ireland's public sector can drive positive change, encouraging green innovation, reducing environmental impacts and building a more resilient, low-carbon economy that benefits current and future generations.

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Appendix 1

A1.1 Complete Questionnaire for the Survey

All questions included in the survey are shown in Table A1.1. Furthermore, Table A1.1 includes the type of question, to make it easier to identify the way the responses were imported to the NVivo software.

A1.2 References under Market Development Code

Identifying the support that can be provided to the market was another important part of the survey.

Table A1.2 shows the opinions given by the participants for the final question shown in Table A1.1.

A1.3 List of Enablers Used in the Case Study Finder Tool

Table A1.3 shows the 42 enablers identified in the case study finder tool.

Table A1.1. Complete questionnaire for the survey

No.	Question	Type of question
Contact details		
1	Enter your name	Open
2	Email address	Open
3	Organisation/workplace	Open
4	Country	Open
5	What is your role/expertise in the organisation? (Select from the list)	Open/closed
Questions related to barriers or challenges		
6	Have you been involved in green procurement or are you currently involved in green procurement? (Yes/no)	Closed
7	What are the main barriers or challenges you faced/face regarding the implementation of green procurement?	Open/closed
Questions related to tools and resources		
8	What tools or resources do you find useful in procuring more greenly? (Select from the list)	Closed
9	Are there any tools or resources that are not available to you that you feel would help?	Open
Questions related to policy recommendations		
10	Do you think any policies or regulations regarding green procurement need to be changed or adopted?	Closed
11	If “yes”, what are they?	Open
Other questions		
12	Are there any case studies (green procurement) that you are aware of in your organisation or outside of it?	Closed
13	If “yes”, please explain.	Open
14	Our focus is more than often on how we can procure more greenly. But how do you think we can support the market to offer greener products and services so that when we procure these options are available?	Open

Table A1.2. All references under market development

Reference no.	Experts' opinion on policy changes
Policy and regulations	
1	"From the demand side, GPP should be the norm (if not through policy then through well thought out regulation), with fines levied on CAs who do not comply (i.e. when there were several green products on the market, but they continue to choose a non-green option). Fines accrued should go to a central fund that can provide financial support to market participants to switch to environmentally friendly alternatives, or to research around the same, through grants"
2	"Having legal requirements for producing greener products would have an impact on the procurement of greener products"
3	"In comparison to other EU Member States, Ireland is significantly behind in its implementation of GPP policy. Many issues will be addressed under the soon-to-be adopted GPP Strategy and Action Plan 2023–2027. However, the Irish government should look to establish continued engagement with the public sector to ensure shortfalls and issues in the implementation of GPP are addressed. Doing so will help to address concerns around market shortfalls"
4	"By increasing consumer-side demand for greener products through policies that make it easier to grade"
5	"Stricter rules to make the market move. Also for the buyers!"
6	"Government level framework for the companies to set requirements for green targets for their products and services"
7	"Making national guidelines and common criteria"
8	"Clear legal provisions regarding green procurement and incentives for economic operators"
9	"Legal changes to organic and fair"
10	"Adopting a SPP/GPP policy"
11	"Disincentivising or taxing products that are not considered green"
Awareness	
1	"Promoting the use of green procurement in the private sector would increase the availability of greener options. The public sector should demonstrate and publicise successful green procurement projects and lead by example"
2	"Get out there and tell them! Awareness is next to zero until tender turns up"
3	"Market Engagement is also important in informing the market of the public body's intention to procure more sustainable, low carbon products and services going forward and to give assurances to the market about GPP requirements in future contracts"
4	"The suppliers we meet are not aware of how they green their products and how to market their green credentials"
5	"We need to activate a dialogue with companies about our GPP intentions. Create meetings, training, listening to difficulties and opportunities from their perspective"
6	"Build awareness across industry of the future expansion in GPP so that the market can adapt its offering and create opportunities for selling sustainable products and services"
7	"Training on economic operator"

Table A1.2. Continued

Reference no.	Experts' opinion on policy changes
8	"Notifying the market in advance of the intention to buy green, consulting on potential GPP criteria to be applied, and seeking feedback on how bidders would be able to demonstrate compliance/performance under these criteria"
9	"Holding open days/information sessions with contractors can also help"
10	"Market dialogue (not the technical one, but a partnership one) with companies goes a long way so that they know what public buyers want beforehand/in advance and can prepare their offering accordingly"
11	"Information! Flagging the introduction of green procurement to suppliers"
Externalising	
1	"For the supply side, one method would be to ensure the cost of non-green options are reflective of the cost to human and environmental health, through product/service life cycle and carbon foot-printing analysis"
2	"So whatever metric we decide to use to measure the environmental impact of goods/services, it has to be applicable across the industry. This could mean that we end up using different metrics for different industries, depending on the emission factors available"
3	"I think the market could be supported by the creation of a reporting framework for each industry, so that competitors all follow the same reporting standard and can be compared fairly"
4	"Certify and deploy non-virgin materials and by reducing the subsidies given to less green products where costs of decommissioning or disposal are borne exclusively by consumers and environmental costs of production are distributed globally"
5	"Scope 3 emissions are the Number 1 area we need to focus on. Suppliers need access to centrally approved methods of CO_2 measurement to enable reporting of the CO_2 associated with the products and services they sell. What gets measured gets managed"
6	"Actually, we would need objective tools to assess objectively the level of sustainability of what we purchase (so as to compare the offers)"
7	"Legal incentives, increase the transparency of green approach, how to report harmonious"
8	"Products with lower carbon emissions"
Financial support/incentives	
1	"From the demand side, GPP should be the norm (if not through policy then through well thought out regulation), with fines levied on CAs who do not comply (i.e. when there were several green products on the market, but they continue to choose a non-green option). Fines accrued should go to a central fund that can provide financial support to market participants to switch to environmentally friendly alternatives, or to research around the same, through grants"
2	"Supports to be introduced through LEO offices in Local Authorities"
3	"There would be a transition in the market itself that might require government supports and/or incentives of some sort to aid this transition"
4	"They need market supports and incentives so that they can make the most of their products"
5	"Create funding channels for green conversion of production and delivery (goods and services) and certification"
6	"Clear legal provisions regarding green procurement and incentives for economic operators"

Table A1.2. Continued

Reference no.	Experts' opinion on policy changes
7	"Legal incentives, increase the transparency of green approach, how to report harmonious"
8	"Supplier readiness – Support for SME"
Green tendering	
1	"Put more weight on this criteria and improve our capacity to check if the supplier fulfil his contractual obligations"
2	"Our role is to make ecologically friendly production economically interesting for them. To do this we have to change our vector from 'buy at the best price right now' to 'buy at the best price globally' taking into account the whole lifecycle of product/service. We need to weigh more our sustainable development criteria, include mode mandatory ecological articles (clauses) in our legal documentation"
3	"Commence by including a small percentage of award criteria marks in tenders for green/sustainable solutions"
4	"Making these types of products visible, starting by setting an example of green purchasing by public companies"
5	"Sends the message that the organisation is committed to sustainable procurement and explains the approach to be taken"
6	"Clearly explaining that while the green products might sometimes be more expensive, the weighting of the tender assessment will balance that by inclusion of green criteria"
Phased transition	
1	"Commence by including a small percentage of award criteria marks in tenders for green/sustainable solutions. This will incentivise tenderers to "think" green and develop and innovate low carbon solutions without excluding any tenderers from the procurement process at an early stage of GPP implementation"
2	"By creating demand. Markets work in a way that when there is demand and a possibility to compete with green options, then companies will create those options"
3	"Supplier readiness – Support for SME"
Reliable market	
1	"Create a reliable marketplace where demand and supply can meet and where buyers and project leaders have the possibility to research the market"
2	"Centralised listing of products/services"

CA, contracting authority; LEO, local enterprise office; SME, small and medium-sized enterprises; SPP, sustainable public procurement.

Table A1.3. List of enablers identified in case studies

No.	Enabler
1	Appraisal
2	Auditing
3	Awareness
4	Centralised procurement
5	Collaboration
6	Communication
7	Concurrent design
8	Dissemination
9	E-procurement
10	Eco labels
11	Energy efficiency enhancement
12	Energy performance services
13	Environmental indicators
14	E-platforms
15	Expert involvement
16	Feedback
17	GPP database
18	GPP tools
19	Guidelines
20	Incentivisation
21	Innovative approach
22	Joint framework
23	Knowledge transfer
24	Legal mandate
25	Long-term contracts
26	Low organisational resistance
27	Supportive management
28	Market approach
29	Market readiness
30	Monitoring
31	Normative
32	Partnerships
33	Pilot project
34	Policy
35	Political support
36	Previous expertise
37	Promotions
38	Social criteria
39	Supply chain
40	Standardisation
41	Technology transformation
42	Training

Abbreviations

EU	European Union
GAPS	Identification of Effective State-of-the-art Green Public Procurement Policy and Practice for the Irish Public Sector
GHG	Greenhouse gas
GPP	Green public procurement
ICT	Information and communications technology
LCA	Life cycle assessment
LCC	Life cycle costing
OGP	Office of Government Procurement
PCO	Procurement and Contracts Office
SCEEM	Supply Chain Emissions Evaluation and Management
SDG	Sustainable Development Goal
SSEF	Supplier-specific emission factor
WTT	Well to tank

An Ghníomhaireacht Um Chaomhnú Comhshaoil

Tá an GCC freagrach as an gcomhshaol a chosaint agus a fheabhsú, mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaol a chosaint ar thionchar díobhálach na radaíochta agus an truaillithe.

Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

Rialáil: Rialáil agus córais chomhlíonta comhshaoil éifeachtacha a chur i bhfeidhm, chun dea-thorthaí comhshaoil a bhaint amach agus díriú orthu siúd nach mbíonn ag cloí leo.

Eolas: Sonraí, eolas agus measúnú ardchaighdeáin, spriocdhírithe agus tráthúil a chur ar fáil i leith an chomhshaoil chun bonn eolais a chur faoin gcinnteoireacht.

Abhcóideacht: Ag obair le daoine eile ar son timpeallachta glaine, táirgiúla agus dea-chosanta agus ar son cleachtas inbhuanaithe i dtaobh an chomhshaoil.

I measc ár gcuid freagrachtaí tá:

Ceadúnú

- Gníomhaíochtaí tionscail, dramhaíola agus stórála peitril ar scála mór;
- Sceitheadh fuíolluisce uirbigh;
- Úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaithe;
- Foinsí radaíochta ianúcháin;
- Astaíochtaí gás ceaptha teasa ó thionscal agus ón eitlíocht trí Scéim an AE um Thrádáil Astaíochtaí.

Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaoil

- Iniúchadh agus cigireacht ar shaoráidí a bhfuil ceadúnas acu ón GCC;
- Cur i bhfeidhm an dea-chleachtais a stiúradh i ngníomhaíochtaí agus i saoráidí rialáilte;
- Maoirseacht a dhéanamh ar fhreagrachtaí an údaráis áitiúil as cosaint an chomhshaoil;
- Caighdeán an uisce óil phoiblí a rialáil agus údaruithe um sceitheadh fuíolluisce uirbigh a fhorfheidhmiú
- Caighdeán an uisce óil phoiblí agus phríobháidigh a mheasúnú agus tuairisciú air;
- Comhordú a dhéanamh ar líonra d'eagraíochtaí seirbhíse poiblí chun tacú le gníomhú i gcoinne coireachta comhshaoil;
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaol.

Bainistíocht Dramhaíola agus Ceimiceáin sa Chomhshaol

- Rialacháin dramhaíola a chur i bhfeidhm agus a fhorfheidhmiú lena n-áirítear saincheisteanna forfheidhmithe náisiúnta;
- Staitisticí dramhaíola náisiúnta a ullmhú agus a fhoilsiú chomh maith leis an bPlean Náisiúnta um Bainistíocht Dramhaíola Guaisí;
- An Clár Náisiúnta um Chosc Dramhaíola a fhorbairt agus a chur i bhfeidhm;
- Reachtaíocht ar rialú ceimiceán sa timpeallacht a chur i bhfeidhm agus tuairisciú ar an reachtaíocht sin.

Bainistíocht Uisce

- Plé le struchtúir náisiúnta agus réigiúnacha rialachais agus oibriúcháin chun an Chreat-treoir Uisce a chur i bhfeidhm;
- Monatóireacht, measúnú agus tuairisciú a dhéanamh ar chaighdeán aibhneacha, lochanna, uiscí idirchreasa agus cósta, uiscí snámha agus screamhuisce chomh maith le tomhas ar leibhéil uisce agus sreabhadh abhann.

Eolaíocht Aeráide & Athrú Aeráide

- Fardail agus réamh-mheastacháin a fhoilsiú um astaíochtaí gás ceaptha teasa na hÉireann;
- Rúnaíocht a chur ar fáil don Chomhairle Chomhairleach ar Athrú Aeráide agus tacaíocht a thabhairt don Idirphlé Náisiúnta ar Ghníomhú ar son na hAeráide;
- Tacú le gníomhaíochtaí forbartha Náisiúnta, AE agus NA um Eolaíocht agus Beartas Aeráide.

Monatóireacht & Measúnú ar an gComhshaol

- Córais náisiúnta um monatóireacht an chomhshaoil a cheapadh agus a chur i bhfeidhm: teicneolaíocht, bainistíocht sonraí, anailís agus réamhaisnéisiú;
- Tuairiscí ar Staid Thimpeallacht na hÉireann agus ar Tháscairí a chur ar fáil;
- Monatóireacht a dhéanamh ar chaighdeán an aeir agus Treoir an AE i leith Aeir Ghlain don Eoraip a chur i bhfeidhm chomh maith leis an gCoinbhinsiún ar Aerthruailliú Fadraoin Trasteorann, agus an Treoir i leith na Teorann Náisiúnta Astaíochtaí;
- Maoirseacht a dhéanamh ar chur i bhfeidhm na Treorach i leith Torainn Timpeallachta;
- Measúnú a dhéanamh ar thionchar pleananna agus clár beartaithe ar chomhshaol na hÉireann.

Taighde agus Forbairt Comhshaoil

- Comhordú a dhéanamh ar ghníomhaíochtaí taighde comhshaoil agus iad a mhaoiniú chun brú a aithint, bonn eolais a chur faoin mbeartas agus réitigh a chur ar fáil;
- Comhoibriú le gníomhaíocht náisiúnta agus AE um thaighde comhshaoil.

Cosaint Raideolaíoch

- Monatóireacht a dhéanamh ar leibhéil radaíochta agus nochtadh an phobail do radaíocht ianúcháin agus do réimsí leictreamaighnéadacha a mheas;
- Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha;
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta;
- Sainseirbhísí um chosaint ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

Treoir, Ardú Feasachta agus Faisnéis Inrochtana

- Tuairisciú, comhairle agus treoir neamhspleách, fianaise-bhunaithe a chur ar fáil don Rialtas, don tionscal agus don phobal ar ábhair maidir le cosaint comhshaoil agus raideolaíoch;
- An nasc idir sláinte agus folláine, an geilleagar agus timpeallacht ghlan a chur chun cinn;
- Feasacht comhshaoil a chur chun cinn lena n-áirítear tacú le hiompraíocht um éifeachtúlacht acmhainní agus aistriú aeráide;
- Tástáil radóin a chur chun cinn i dtithe agus in ionaid oibre agus feabhsúchán a mholadh áit is gá.

Comhpháirtíocht agus Líonrú

- Oibriú le gníomhaireachtaí idirnáisiúnta agus náisiúnta, údaráis réigiúnacha agus áitiúla, eagraíochtaí neamhrialtais, comhlachtaí ionadaíocha agus ranna rialtais chun cosaint chomhshaoil agus raideolaíoch a chur ar fáil, chomh maith le taighde, comhordú agus cinnteoireacht bunaithe ar an eolaíocht.

Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaoil

Tá an GCC á bainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóir. Déantar an obair ar fud cúig cinn d'Oifigí:

1. An Oifig um Inbhunaitheacht i leith Cúrsaí Comhshaoil
2. An Oifig Forfheidhmithe i leith Cúrsaí Comhshaoil
3. An Oifig um Fhianaise agus Measúnú
4. An Oifig um Chosaint ar Radaíocht agus Monatóireacht Comhshaoil
5. An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tugann coistí comhairleacha cabhair don Ghníomhaireacht agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair imní agus le comhairle a chur ar an mBord.

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