Codema
Dublin's Energy Agency

Trinity College Dublin
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# Scope 3 Emissions Reporting in Ireland

## Guidance Document

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# Scope 3 Emissions Reporting in Ireland

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## Disclaimer

Table of contents

Executive summary ..... 1
Chapter 1: Introduction ..... 2
Current context and rationale ..... 2
Purpose of the document ..... 3
Chapter 2: Literature review ..... 4
Introduction ..... 4
Method ..... 2
The literature on Scope 3 emissions quantification ..... 2
Emissions reporting in SMEs ..... 2
Emissions reporting in local authorities ..... 3
Scope 3 reporting as a challenge and an opportunity ..... 3
Review of emission reporting and quantification standards ..... 4
The Greenhouse Gas Protocol ..... 4
ISO 14064 ..... 8
Key Differences between GHG Protocol and ISO 14064 and Implications for SMEs and Local Authorities ..... 11
Discussion ..... 12
Contribution and conclusion ..... 12
Chapter 3: Review of publicly available tools and databases ..... 13
Introduction ..... 13
Review of tools ..... 13
Review of databases ..... 14
Practical Implications ..... 15
Conclusion ..... 15
Chapter 4: Case studies of Scope 3 emissions calculations and reporting in Ireland and the UK ..... 16
Introduction ..... 16
Universities ..... 16
Overview ..... 17
Key Challenges ..... 18
Key learnings ..... 18
Frog Bikes ..... 19
Overview ..... 19
Key challenges ..... 21
Key learnings ..... 21
Conclusions ..... 22
Chapter 5: Guidance and Conclusion ..... 23
General guidance for SMEs and local authorities in relation to Scope 3 emissions quantification ..... 23
Next steps ..... 25
Final thoughts ..... 25
Appendices ..... 26

# Executive summary

It is well understood that climate change, biodiversity loss and environmental degradation present a critical threat to the planet and humanity's future. Critical thresholds are being broken in climate budgets across the European Union. In order to align with the Paris Agreement's target of limiting temperature increases to 1.5°C, organisations must adopt strategies to reduce their environmental impact, beginning with measuring and reporting their contributions to climate change.

As new regulations and guidelines emerge regarding the reporting of greenhouse gas (GHG) emissions, Irish Small-to-Medium Enterprises (SMEs) and local authorities are under increasing pressure to disclose their emission profiles accurately.

One of the most significant challenges facing SMEs and local authorities is the quantification of Scope 3 emissions. Currently, there is a lack of guidance for Irish SMEs and local authorities on how to quantify Scope 3 emissions.

This document features relevant academic literature, practitioner and policy-oriented documents, online tools and databases, and informal anonymous interviews as information sources, and aims to provide a theoretical background and practical guidance to SMEs and local authorities on Scope 3 emission quantification.

## Key findings

- ***Scope 3 emissions must become a key priority for SME organisations when mandatory reporting comes into action from 2026.***
- ***The Greenhouse Gas Protocol is the recommended standard to utilise when developing an emissions baseline inventory and setting targets for the future. ISO 14064 can be consulted as an alternative.***
- ***Codema will look to provide training workshops on sustainability reporting for sustainability teams, working within SMEs and local authorities in order to support their capacity-building efforts to measure and report their own emissions.***
- ***Codema will keep up to date with the development of new and existing tools/platforms that facilitate and automate Scope 3 data collection, analysis and reporting. Share useful information with other organisations.***
- ***SMEs and local authorities should be encouraged to collaborate along with suppliers, customers, industry groups, and local governments to share resources, knowledge, and best practices.***

# Chapter 1: Introduction

In 2021, Ireland's Climate Action and Low Carbon Development (Amendment) Act 2021 was signed into law, legally committing the country to reducing its greenhouse gas emissions by 51% by the year 2030, with the overarching goal of achieving net-zero emissions by 2050 (Department of the Environment Climate and Communications, 2021). Later that year, the Climate Action Plan 2021 (CAP) was released, detailing sector-specific measures to be taken in order to cut emissions and meet those targets. Since, annual updates to the CAP have been published, disclosing up-to-date critical challenges and measures to be incorporated in order to achieve the set targets.

The Irish economy must undergo extensive and tangible changes to reach these targets. At the heart of the Irish economy are Small-to-Medium sized Enterprises (SMEs).

**The European Union defines SMEs as enterprises with under 250 employees and either an annual turnover of less than €50 million or a balance sheet total of under €43 million (European Commission, 2020). SMEs accounted for 99.8% of businesses in Ireland in 2022. They accounted for more than 43.1% of turnover and almost 41% of Gross Value Added in the same year (Central Statistics Office, 2024).**

Given the value of SMEs to the Irish and EU economies, they play an important role in emission reduction and net-zero target actions.

Similarly, the value of local authorities to the Irish economy is very significant. There are 31 local authorities in Ireland, each one responsible for a specific geographic area. Local authorities provide over 1,000 essential services to the Irish public, including emergency services, business support services, environmental and biodiversity protection services, and many more (Local Government Ireland, n.d.).

Given the significance of local authorities to the physical, cultural, social, and environmental development of communities in Ireland and the crucial role they play in supporting economic development and enterprise (Local Government Jobs, 2025), it is necessary for them to lead by example on net-zero targets and commit to emission reduction actions. The Climate Action Plan denotes that local authorities are responsible for emission reduction across their own assets and infrastructure, in addition to assuming a more expansive role in guiding and helping others to meet their targets (Department of the Environment, Climate and Communications, 2023).

One important action that SMEs and local authorities must take is the measurement and disclosure of their full and comprehensive greenhouse gas emission profiles. Through measurement and disclosure, an organisation can begin to understand its emissions, identify its main sources of emissions, build action plans, and put actions in place to reduce its emissions (United Nations Framework Convention on Climate Change, n.d.).

Additionally, while local authorities are not SMEs, the SME standard would be deemed the most appropriate standard for them to adhere to since the size and reporting capacity of local authorities is closer to that of an SME than a larger company. Currently, there is no set standard for Scope 3 emission quantification in Ireland. The lack of formal guidance creates considerable challenges for SMEs and local authorities, especially where resources and expertise are underdeveloped due to the organisation's size. Therefore, guidance in this area is essential to assist SMEs and local authorities in engaging in meaningful Scope 3 emission quantification measures.

This project is a result of a short-term collaboration between Codema, Dublin's Energy Agency, and Trinity College Dublin (TCD). The project aims to develop a new and publicly available Scope 3 emissions guidance document for use by local authorities and SMEs. The project seeks to conduct a detailed assessment of:

- Extant literature on international best practice of Scope 3 emission quantification, such as the Greenhouse Gas (GHG) Protocol and the International Organisation for Standardisation standard 14064-1 (ISO 14064-1).

- Publicly available calculation tools and databases, and other calculation tools.

- Best practice examples and case studies of scope 3 emissions calculations and reporting in Ireland and the UK.

## Current context and rationale

The global effects of climate change, biodiversity loss and environmental degradation pose an existential threat to life as we know it, our planet and our future. In the hopes of complying with the Paris Agreement's goal of limiting temperature increase to 1.5°C, organisations must investigate, implement and maintain practices to reduce their environmental impact. An important first step is to measure and report the company's impact on climate change (Hettler and Graf-Vlachy, 2024; Lee, 2012; Weinhofer & Hoffmann, 2010).

The Corporate Sustainability Reporting Directive (CSRD) came into effect in January 2023, with the aim of modernising and strengthening the rules of social and environmental reporting of companies in the European Union. The CSRD forms part of the European Green Deal; a suite of policy initiatives introduced by the European Commission in December 2019 in its efforts to "transform the EU into a modern, resource-efficient and competitive economy" (European Commission, n.d.). Large companies and listed SMEs subject to the CSRD must report detailed sustainability data in accordance with the European Sustainability Reporting Standards (ESRS). These standards, created by the European Financial Reporting Advisory Group (EFRAG), specify the criteria for reporting on sustainability issues, including climate change, human rights and biodiversity. Reporting requirements for Scope 3 GHG emissions are outlined in the ESRS E1 Climate Change standard.

Specifically, under Disclosure Requirement (DR) E1-6, companies must disclose their gross Scope 3 GHG emissions to demonstrate the GHG emissions that occur in their upstream (activities involved in acquiring raw materials) and downstream (activities related to distributing and delivering finished products to the end customer) value chains. As highlighted in this standard, Scope 3 emissions will likely make up the majority of a company's GHG inventory (Stanley, 2024).

Originally, the CSRD sustainability reporting requirements were intended to apply to Public Interest Entities, large undertakings (i.e. those meeting two of the following criteria: i. 250+ employees, ii turnover of €50m+, iii balance sheet value of €25m), listed SMEs (excluding micro-undertakings) and by 2029, non-EU parents of subsidiaries with substantial activity in the EU, with a phased approach requiring listed SMEs to compile the appropriate sustainability reports for financial years starting on or after 1st January 2026 (to be published in 2027), SMEs originally had the opportunity to opt out from these requirements until 2028, with appropriate reasoning required.

However, in early 2025, the European Commission published an Omnibus package of simplification measures for sustainability reporting. These measures outlined a two- or three-year delay for the deadline for CSRD reporting. The package also increased the threshold for numbers of employees in companies that are in scope of the CSRD regulations, from 250 to 1000 employees, with either a turnover greater than €50 million or a balance sheet total greater than €25 million. Therefore, SMEs are now outside the scope of the CSRD regulations, thus greatly reducing the number of companies legally required to report in accordance with the regulations.

Whatsmore, most SMEs in Ireland are non-listed, as most SMEs do not meet listing requirements, related to size, revenue, profitability and corporate governance. Instead, SMEs can voluntarily report using the Voluntary SME (VSME) standards to meet growing ESG data demands from investors, large companies, and other stakeholders. These standards were published by the EGRAG for SMEs. Under these standards, SMEs can voluntarily report their GHG emissions in order to meet growing ESG data demands from investors, large companies and other stakeholders. This is particularly relevant in light of the CSRD regulations, because larger companies and listed SMEs that are in-scope for the CSRD regulations have to report on their value chain emissions, to which many non-listed SMEs are connected (Brennan et al., 2024).

Consequently, despite being outside the scope of the CSRD regulations, non-listed SMEs can still be affected by its reporting obligations. Therefore, it is highly important that Irish SMEs have their organisations' emission profile to hand. To be in line with the VSME guidelines, organisations must report their Scope 1 and 2 emissions, and then, if the organisation decides, it can include its Scope 3 emissions and should refer to the 15 types of Scope 3 emissions set out in the GHG Protocol Corporate Standard and Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

Although participation in the VSMEs is voluntary, SMEs are strongly encouraged to report and disclose their emissions data. There are various reasons for which a non-listed SME would report their emission profile. Firstly, publishing emission reports can improve access to financing for SMEs by satisfying the data needs of investors and financial institutions (EFRAG, 2024) and furthermore as ESG factors are becoming key investment criteria (Stanley, 2024). Secondly, by publishing emissions data, SMEs can strengthen their relationships with various stakeholders, by enhancing transparency and trust. Finally, voluntary emissions data can improve the identification and management of environmental risk for the reporting organisation (Hettler and Graf-Vlachy, 2024).

## Purpose of the document

The purpose of this document is to provide guidance toward a standardised approach for reporting Scope 3 emissions for SMEs and local authorities in Ireland. The document draws on information and learnings from a literature review on current Scope 3 reporting practices, relevant information publicly published by policy bodies, and interviews and conversations with relevant stakeholders, such as university sustainability representatives and sustainability representatives from Irish SMEs. The recommendations outlined toward the document's conclusion arrive from the authors' analyses of these resources. These recommendations are intended to provide useful and practical guidance to SMEs and local authorities on Scope 3 quantification as they take vital steps on their path to net-zero.

# Chapter 2: Literature review

## Introduction

The GHG Protocol's Corporate Standard, which was first issued in 2001 and revised in 2004, outlined a three-scope categorisation for emissions reporting. Three scopes were delineated, in order to account for an organisation's total direct and indirect emissions. The GHG Protocol defines the three scopes as follows; Scope 1 emissions are direct emissions from operations that are owned or controlled by the reporting company. Scope 2 emissions are emissions that are created from the generation of purchased energy, consumed by the reporting company. Scope 2 emissions are labelled as indirect emissions because they result from the activities of the reporting company but actually occur at sources owned or controlled by another organisation.

Finally, Scope 3 emissions represent all of the remaining indirect emissions that are not included in Scope 2 that occur in the value chain of the reporting company, including both upstream and downstream emissions (World Resources Institute and World Business Council for Sustainable Development, 2004).

Upstream emissions are generated as a result of the production of the company's products or services and downstream emissions are generated as a result of the usage and disposal of the reporting company's products or services (World Business Council for Sustainable Development, 2022). All three scopes vary greatly in complexity of reporting. The development of a full corporate GHG emissions inventory, which includes Scope 1, 2 and 3 emissions, enables organisations to understand their full emissions impact across the value chain and concentrate emission reduction efforts in areas that have the highest reduction potential.

The GHG Protocol released a distinct new standard for Scope 3 quantification in 2011. This necessitated separate requirements and guidance, offering a standardised, step-by-step approach instead of focusing solely on a company's internal efforts (Xu and MacAskill, 2024). The primary goal of the Scope 3 reporting document was to help companies understand their full value chain emissions impact. Since, other standards on emissions reporting have emerged, including ISO 14064. These two standards, their differences and their impact on Scope 3 reporting in SMEs and local authorities will be discussed in Section 2.4 below.

Recent progress in the scientific understanding of climate change and GHG emissions has led to a shift in carbon accounting practices. Today, there is a stronger emphasis on measuring and reporting emissions across the entire supply chain, rather than focusing solely on direct emissions (Kaur et al., 2024). However, Scope 1 and Scope 2 emissions are easier to quantify and report, as they lie mostly within the operational sphere of the reporting organisation. Scope 3 emissions, on the other hand, are significantly more complex, and inherently harder to determine, as they require relevant and accurate data from the reporting organisation's entire supply chain (Hettler and Graf-Vlachy, 2024).

Furthermore, existing literature on Scope 3 emissions reporting is highly fragmented, and does not offer a thorough overview. A particular challenge is the fact that findings from Scope 1 and Scope 2 emissions reporting studies are not readily transferable to Scope 3 reporting, due to its more complex nature (Hettler and Graf-Vlachy, 2024).

## Method

The primary objective of this study is to obtain evidence-based recommendations on current international practice in Scope 3 emissions reporting for SMEs and local authorities and identify those most appropriate for the Irish context.

Certain search string combinations were used to gather literature from two prominent academic databases (*Scopus* and *Web of Science*). Both databases were chosen for their reputations of indexing high-quality peer-reviewed journals across a broad multidisciplinary base. Inclusion of academic literature in the review was determined on the basis of a review of each article's abstract. The literature review did not seek to include or exclude any particular industries or geographical locations; but it did seek to focus the search to SMEs and local authorities.

However, as this research area is relatively nascent, the search output numbers were low. Consequently, some general articles about Scope 3 reporting were included, which were not specific to SMEs and local authorities. This was to account for the general Scope 3 reporting context. Other articles about emissions reporting in SMEs and local authorities, that did not specifically address Scope 3 reporting, were also included, to contextualise the emissions reporting practices in those organisation types. The search string used was based on the research aim and was searched for in article titles, abstracts and keywords. Original articles and reports written in English and published up until April 2025 were included.

To supplement the academic articles, the author conducted a general grey-literature search in the areas of Scope 3 reporting in SMEs and local authorities. As a result, practitioner and policy-oriented documents, published by relevant recognised bodies, were also included. The chosen articles were summarised and organised into thematic categories. The research uses a thematic literature review approach, wherein relevant themes are identified, examined and analysed.

The author also conducted a total of four informal interviews with industry practitioners and experts over the course of the project. Insights from these conversations are included as a valuable source of practical information and are referenced in this literature review, and throughout the entire guidance document.

**Once the author had completed this paper, Codema included additional detail for the Dublin Local Authorities (DLAs) and other interested parties.**

## The literature on Scope 3 emissions quantification

This section provides an overview of the current state of literature on Scope 3 emission quantification and reporting for SMEs and local authorities. Firstly, the author presents the literature on general emissions reporting in SMEs and local authorities, before focusing on Scope 3 emission quantification. The author then examines two standards for emission quantification - the GHG Protocol and ISO 14064-1. These two standards were chosen for inclusion in this document as they are among the most widely adapted frameworks for GHG inventory reporting (Yaman, 2024). In addition, the VSME uses the GHG Protocol as a blueprint to explain the concepts and principles related to emissions reporting, and specifies that the reporting organisations may resort to using IS0 14064-1 as an alternative to the GHG Protocol, in the case that it is better suited to the reporting organisation's reporting needs (EFRAG, 2024).

### Emissions reporting in SMEs

SMEs account for 99% of all businesses and provide more than 85 million jobs within the EU (Central Statistics Office, 2024). A recent study conducted on the SME sector in the UK found that Scope 3 emissions can sometimes be up to 11 times higher than emissions from Scope 1 and Scope 2 (Khosravi

et al., 2024). Although the environmental impact of individual SMEs may seem small, the aggregate impact of this sector is very significant. SMEs make a considerable contribution to EU and global emissions. Consequently, SMEs are key players in driving net-zero ambitions directly through emission quantification and minimisation. They can also have a substantial indirect influence on the climate agenda through their relationships with other actors in their value chain, including suppliers, customers and other organisations (Olarewaju et al., 2023).

Despite the significant role they play in the environmental arena, there is no set standard for Scope 3 emission quantification that applies exclusively to SMEs. In a study conducted on the effectiveness of enterprise support to SMEs in achieving net-zero goals in the UK, it was found that Scope 3 emission quantification was one of the main barriers to implementing net zero actions, alongside transition costs and building restrictions (Khosravi et al., 2024).

This was resulting from the calculation and retrieval of data from suppliers and other stakeholders falling outside of the control of the reporting SMEs. Other challenges for SMEs in counting Scope 3 emissions mentioned in the study are the existing gaps in the companies' knowledge of how to measure and manage emissions in the value chain, financial support, complexity of the supply chain, difficulty in obtaining data from suppliers and diversity of the leasing industry (Khosravi et al., 2024).

## Emissions reporting in local authorities

The literature on climate-related actions is still relatively nascent and there is very limited literature on public sector climate-related actions (Ehalaiye et al., 2025). A lack of a common methodology and specificity for the quantification of environmental performance indicators poses challenges to the public sector, particularly in relation to benchmarking practices (Rodrigues et al., 2021). Studies conducted by Argento et al (2019) and Garde-Sánchez et al. (2017), found that the nonfinancial information disclosures in State-Owned Enterprises may be linked to the demands of the organisation's various stakeholders. Ehalaiye et al. (2025) conducted a study on the climate-related disclosure practices in seaports in New Zealand, discovering that diverse stakeholder interests in public sector hybrid organisations (i.e. organisations with significant government control but operating as a commercial enterprise), can encourage managers to prioritise the allocation of resources to interests other than climate-related reporting.

The research further indicated that the three most challenging areas for hybrid organisations were the organisation's processes for managing climate-related risks, metrics such as GHG emissions targets and the impact of climate-related risks and opportunities on business, strategy and financial planning (Ehalaiye et al., 2025).

Furthermore, a lack of clarity and practical applicability of reporting standards poses another challenge to public sector organisations. The complexity and lack of internal capabilities for Scope 3 emission quantification are major barriers to public sector emissions reporting as the complexity of the value chain is often perceived as outside the realm of control of the entity.

## Scope 3 reporting as a challenge and an opportunity

Despite the complexities of Scope 3 reporting, its value should not be overlooked. For many corporations, Scope 3 emissions make up at least 75% of their total carbon emission profile (Hettler and Graf-Vlachy, 2024; Blanco et al., 2016). Accurate emissions reporting is essential for setting reduction targets, which in-turn enable the reporting organisation to reduce its carbon footprint. Implementing robust Scope 3 emission quantification practices can present organisations with

significant decarbonisation opportunities. Researchers have also identified corporate Scope 3 carbon emissions reporting as a supply chain risk management tool (Hettler and Graf-Vlachy, 2024).

Current standards that follow the 3-scope specification merely recommend the inclusion of Scope 3 reporting in carbon accounting practices, rather than requiring it as a mandatory reporting element (Xu and MacAskill, 2024). Furthermore, Ireland's Climate Action Plan 2024 currently does not have a target for Scope 3 emissions reductions for public bodies, despite Scope 3 accounting for the majority of emissions across organisations.

As a result, there are reduced levels of Scope 3 reporting among reporting organisations. Patchell (2018) argues that as long as Scope 3 reporting remains a voluntary activity, firms will only report Scope 3 emissions if they foresee a tangible financial benefit resulting from the reporting. Similarly, researchers have found that regulatory pressure was the strongest factor for firms to perform carbon emissions reporting (Tang and Demeritt, 2018). Given this, if Scope 3 emissions reporting became mandatory, it would be highly likely that organisations would comply accordingly. It could therefore be argued that VSME standards may not provide sufficient motivation for non-listed SMEs and local authorities to provide data. However, as discussed in Section 1.2, there are various motivating reasons for encouraging SMEs and local authorities to follow the VSME standards and provide accurate emissions data. Furthermore, poor reporting resulting from a total or partial lack of inclusion of Scope 3 emissions may skew the image of a firm's emission profile and ultimately slow down supply chain decarbonisation (Hettler and Graf-Vlachy, 2024).

## Review of emission reporting and quantification standards

### The Greenhouse Gas Protocol

The GHG Protocol is a global standardised framework used to measure and manage greenhouse gas emissions from private and public sector organisations ((World Resources Institute and World Business Council for Sustainable Development, 2004). The World Resources Institute and the World Business Council for Sustainable Development first released the GHG Protocol Corporate Standard in 2001, which provides organisations with guidance on how to account for their corporate-level GHG emissions. It has since been updated and now outlines a guidance for organisations for reporting at the organisation level, with specific focus on Scope 1, 2 and 3 emissions. The literature states that the GHG Protocol is the most widely adopted framework for measuring and reporting GHG emissions globally (Onat et al., 2014; Huang et al., 2009; World Resources Institute and World Business Council for Sustainable Development, 2004). The GHG Protocol is in line with the CSRD and VSME standards.

Firstly, the GHG Protocol outlines its list of reporting principles for emission reporting, which are relevance, completeness, consistency, transparency and accuracy. According to the GHG Protocol, the reporting organisation must set appropriate boundaries to the emission inventory, and to avoid double counting. It then defines two main boundary types - organisational and operational. An organisational boundary determines the organisation's entities that will be included in the emissions inventory. This decision is made based on a certain consolidating approach that is consistently used to define the entities and assets included in the emissions count (United States Environmental Protection Agency, 2025). The GHG Protocol outlines two consolidation approaches;

- Control approach: the reporting organisation includes GHG emissions from operations over which it has financial or operational control in its emissions inventory. The organisation has financial control over the operation if it can impact the financial and operating policies of the operation in order to benefit financially. The organisation has operating control over the operation of it, or one of its subsidiaries, has full authority to introduce and implement its own operating policies at the operation.

- Equity share approach: the reporting organisation includes GHG emissions from operations and assets according to its share of enquiry in the operation. The equity share reflects the economic interest of the reporting organisation in the operation.

It is very important that the same consolidation approach is used consistently at all levels of the organisation. An operational boundary determines the Scope 1, 2 and 3 emissions that are associated with the operations owned or controlled by the reporting organisation. This boundary requires the organisation to discover the operations and sources that generate both direct (Scope 1) and indirect (Scope 2 and Scope 3) emissions and make a decision about which Scope 3 emissions to include and/or exclude. The GHG Protocol lists 15 categories in total, as outlined in *Figure 1* below.

Scope 3 emissions can be subdivided into upstream or downstream emissions. Upstream emissions refer to indirect emissions emanating from the use of goods or services purchased or acquired by the reporting organisation, meaning these emissions emanate from the supply chain of the reporting organisation (Anquetin et al., 2022). Downstream emissions refer to indirect emissions created by use of goods and services sold by the reporting organisation, meaning emissions created from the customers' consumption of products sold by the reporting organisation (Anquetin et al., 2022). The GHG Protocol distinguishes between upstream and downstream emissions based on the reporting organisation's financial transactions.

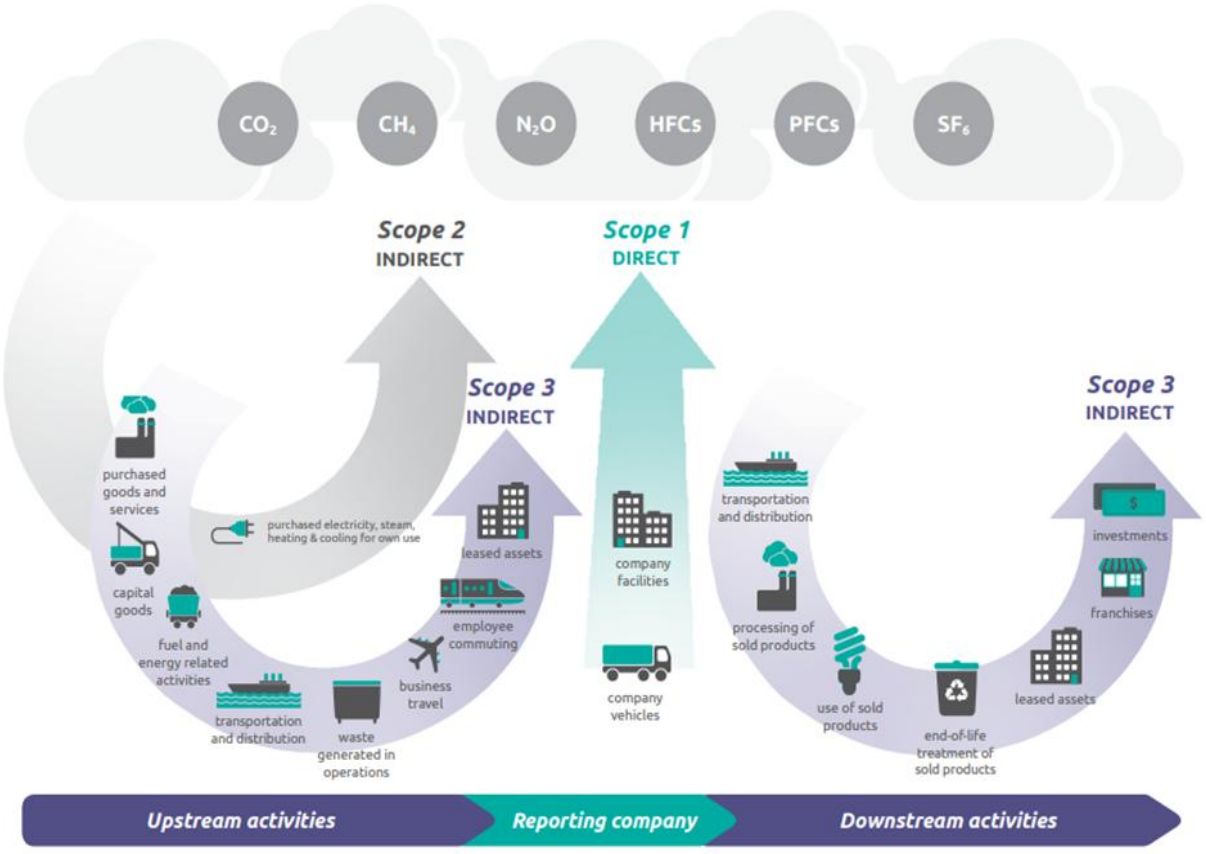


**Figure 1: Overview of GHG Protocol scopes and emissions across the value chain**

World Resources Institute and World Business Council for Sustainable Development, 2004.
Under the GHG Protocol, the reporting organisation's operational boundary defines the list of Scope 3 categories to include in its emission inventory. In order to set the operational boundary, the reporting organisation should map its value chain as a first step. It should pick a predetermined, fixed point in time to allow for the dynamic nature of the supply chain. It must disclose the most significant emission categories, meaning the categories from which activities create the largest portion of emissions.

These categories can vary in each organisation, depending on the organisation's activities, inputs and outputs. Anquetin et al. (2022) refer to this method as a granular approach and classifies the prioritisation and inclusion of the most significant emission categories as a 'bottom-up method'. The reporting organisation must also include a list of inclusions and exclusions in relation to their Scope 3 GHG emission categories. It must explicitly state the emission categories included in the emission quantification process, and those excluded from the same. This information must be supplemented with appropriate justifications, to provide sufficient reasoning for the exclusion of certain categories from the organisation's emission count.

It is important to note that the GHG Protocol outlines a 'time boundary' for Scope 3 emission categories. The actual emissions created as a result of the reporting organisation's categories can occur at the time of the activity (e.g., fuel and energy-related activities), prior to the activity, or after the activity (e.g., future use of sold products). Future emissions encapsulate the emissions that are expected to materialise in future years as a result of the waste generated, investments made, and products sold in the reporting year.

This data should be included in the organisation's emission count. An overview of the three time boundaries of Scope 3 categories is summarised in *Table 1*.

**Table 1: Time boundary of Scope 3 categories**

| Scope 3 Category | Past Year(s) | Reporting Year | Future Year(s) |
|---|---|---|---|
| Time boundary of Scope 3 categories | | | |
| 1. Purchased Goods and Services | | | |
| 2. Capital Goods | | | |
| 3. Fuel- and energy-related activities | | | |
| 4. Upstream transportation and distribution | | | |
| 5. Waste generated in operations | | | |
| 6. Business travel | | | |
| 7. Employee commuting | | | |
| 8. Upstream leased assets | | | |
| 9. Downstream transportation & distribution | | | |
| 10. Processing of sold products | | | |
| 11. Use of sold products | | | |
| 12. End of life treatment of sold products | | | |
| 13. Downstream leased assets | | | |
| 14. Franchises | | | |
| 15. Investments | | | |

The GHG Protocol standard for Scope 3 outlines four methods for Scope 3 emission quantification, which are;

- **Supplier-Specific Method:** The reporting organisation collects product-level cradle-to-gate GHG inventory data from goods or services suppliers, which constitutes as primary data.
- **Average-Data Method:** The reporting organisation collects data on the weight and multiplies by an emission factor which is an industry average number to estimate emissions, which constitutes as secondary data. Examples of average-data methods are in the case studies in Chapter 4.
- **Spend-Based Method:** The reporting organisation collects data on the economic value of goods and services purchased and multiplies it by relevant secondary emission factors. Examples of spend-based methods are in the case studies in Chapter 4.
- **Hybrid Method:** The reporting organisation combines the above methods, depending on available data and resources. As much supplier-specific data as is available should be included. The hybrid method is very commonplace, particularly as organisations struggle to acquire supplier-specific data. The emissions report should specify the methodology used for each category of emissions, and attempts should be made to improve data accuracy over time.

In conclusion, the GHG Protocol provides a structured approach to identifying and reporting Scope 1, 2 and 3 emissions. Scope 3 emissions, as outlined in the standard, represent a significant and complex category of indirect emissions that occur throughout an organisation's value chain. These emissions can be divided into 15 upstream and downstream categories, depending on whether they arise from the supply chain or the consumption of products by customers.
The GHG Protocol provides detailed guidance to organisations on how to measure their Scope 3 emissions, emphasising the importance of setting clear operational boundaries and providing various quantification methods. By carefully mapping the value chain and prioritising the most significant emission categories, SMEs and local authorities can enhance the accuracy and transparency of their Scope 3 reporting, in order to make a promising contribution to emission reduction efforts in Ireland.

## ISO 14064

The ISO 14064 is a three-part international standard which was originally released in 2006 by the International Standardisation Organisation (ISO). The standard was drafted as an output of a four-year long development process involving 175 experts from 45 countries, who recognised the need for a formal standard in the area of GHG emissions reporting (Wintergreen and Delaney, 2006). The international component of ISO 14064 is significant, as it can provide guidance to various kinds of organisations, regardless of their operating region.

The standard was updated in 2018 and is a member of the ISO 14060 family, which is a set of GHG standards that aim to provide clarity to organisations on how to quantify, monitor, report, validate and verify their GHG emissions and removals, as well as how to develop and implement GHG management strategies, plans and mitigation actions (Wintergreen and Delaney, 2006). *Figure 2* illustrates the relationships between the various standards in the 1SO 14060 family. A general objective of ISO standards is to encourage international cooperation, by facilitating communication on technical issues between industry, government, consumers and other actors (Wintergreen and Delaney, 2006).

ISO 14064 denotes the minimum requirements for reporting GHG inventories, which create a consistent composition against which credible verification and auditing can be performed. The standard is divided into three parts, and each part has an individual technical focus (Borja, 2025). Part

one, ISO 14064-1 explains the concepts and requirements involved in the development of GHG inventories at the organisation-level. The standard outlines a framework to assist with the determination of the organisation's boundaries, the quantification of an organisation's GHG emissions and the identification of actions that an organisation could undertake to manage and reduce its GHG emissions.

Additionally, it details recommendations for organisations on inventory quality management, reporting, internal auditing and the organisation's responsibilities for verification activities. ISO 14064-2 outlines a framework to assist with the quantification and monitoring of GHG levels for projects that aim to reduce emissions of sequester carbon. ISO 14064-3 details requirements for the validation and verification of the organisation's GHG reports (Borja, 2025).

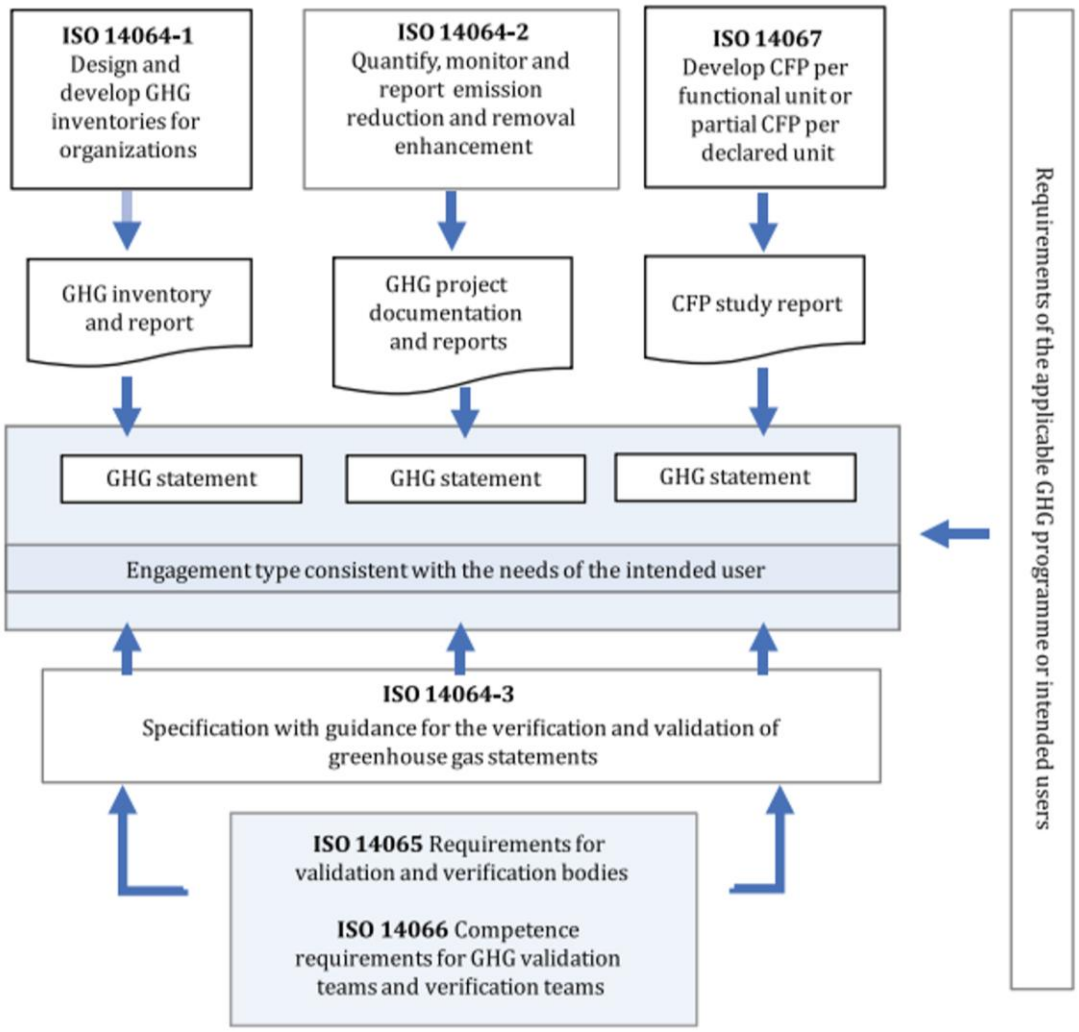


**Figure 2: Relationship between the ISO 14060 family of GHG standards**

ISO 14064-1 combines emissions data across an organisation's entire operations. Firstly, it outlines the standard's principles of relevance, completeness, consistency, accuracy and transparency. It demarcates three key steps required to develop an organisation's emissions profile, as per *Figure 3*.


**Figure 3: ISO 14064-1. Three key elements to develop an organisation's emissions profile**

Similar to the GHG Protocol, ISO 14064-1 requires an organisation to set two boundaries - organisational and operational. It divides emissions into six emission categories (International Organisation for Standardisation, 2018);

- Category 1: direct GHG emissions and removals from the reporting organisation's activities (e.g., burning fuel).
- Category 2: indirect emissions from energy (e.g., electricity).
- Category 3: indirect emissions from transportation (e.g., business travel).
- Category 4: indirect emissions from products used by the company (e.g., raw materials).
- Category 5: indirect emissions from the use of the company's products (e.g., end-of-life emissions).
- Category 6: indirect emissions from all other sources.

Categories 3, 4, and 5 correspond to the GHG Protocol's Scope 3 emissions, which the GHG Protocol divides into 15 separate subcategories. As per ISO 14064-1, an organisation's emissions inventory must always include Category 1 and 2 emissions. The emissions in Categories 3 to 6 are optional, similar to the GHG Protocol.

With respect to quantifying the organisation's emissions inventory, the organisation must firstly clearly identify its various sources of emissions, as per the categories above. It should state the methodology and emission factors it intends to use and collect data accordingly. It should then apply the methodology to calculate its material emissions. The emissions quantified for each category should be consolidated within the organisation's operational boundaries, but direct and indirect emission sources should be reported separately (Wintergreen and Delaney, 2006).

Finally, when reporting its emissions, the organisation must state its organisational boundary, the emission counts from each of its operational categories, and the methodologies used to calculate the emissions from each category. It must state and explain the categories it excluded from the calculation of its emissions inventory. It should also state whether verification was undertaken, which particularly relates to part three of the standard, ISO 14064-3.

Similar to the GHG Protocol, it compares emissions data in the current reporting year with emissions data from a base year. It focuses on consistent quantification and reporting of emissions and emphasises the need for third-party verification.

The ISO 14064 is less commonly cited for emissions reporting than the GHG Protocol. This might be due to the fact that it is a relatively new standard, especially when compared with the GHG Protocol. However, it can be applied by both public sector organisations, such as local authorities, and private sector organisations, such as SMEs. For both private and public sector organisations, ISO 14064-1 details the steps that are necessary to compile a credible and accurate emissions report that can be compared to other organisations' emissions inventories.

## Key Differences between GHG Protocol and ISO 14064 and Implications for SMEs and Local Authorities

As explored above, both frameworks are intended to assist organisations in their efforts to measure and report their GHG emissions, in line with the VSME guidelines. Notwithstanding the similarities between these standards, they also have a variety of distinct features. The aim of this section is to describe the key differences between these two standards.

1. **Approach to Guidance**

The GHG Protocol serves as a general guidance tool for organisations to measure their GHG emissions. It outlines a set of guidelines to provide organisations with information on relevant tools, emission factors, calculation methods, and best practices examples that can be employed to quantify their emissions. In this regard, the GHG Protocol takes a significant practical approach to guidance and provides the reporting organisation with a substantial amount of useful and practical information (e.g., explicitly defines the 15 Scope 3 categories). Conversely, ISO 14064-1 is a more structured and procedural standard. It offers more choice to the reporting organisation in relation to its methodology and thus facilitates the basis of the methodology on organisation-specific needs. As such, ISO 14064-1 does not carry the same element of practicality that is offered by the GHG Protocol. This practicality might be particularly useful for SMEs and local authorities that are only recently beginning to acquire the capabilities and capacities necessary to measure and report their GHG emissions.

2. **Approach to Verification**

As part of its sustainability strategy, an organisation might seek to obtain third-party verification of its emissions report in order to verify the accuracy of its data, methodologies and calculations. Under the GHG Protocol, third-party verification is optional. The standard recognises that verification of Scope 3 emissions is often very challenging, as data must be of reliable quality to be considered for verification. On the other hand, third party verification is essential for organisations seeking formal certification under ISO 14064. The third part of the standard, ISO 14064-3 sets out the principles, conditions and requirements necessary for the reporting organisation to obtain validation and/or verification of their GHG emission assertions and reports (Borja, 2025).

3. **Approach to Scope 3 Quantification**

As explained above, Scope 3 emissions are labelled differently in both standards. The GHG Protocol clearly defines 15 categories of Scope 3 emissions. ISO 14064-1 defines 6 categories, of which 4 represent indirect emissions not from energy (i.e., Scope 3 emissions). The level detail and examples provided by the GHG Protocol for Scope 3 emissions may prove more helpful for the SMEs and local authorities as they begin their emissions reporting journey.

## Discussion

Although the standards and protocols analysed in Section 2.4 provide general organisation-level guidance and specific frameworks for the emission quantification, there is a clear gap in methodological guidance for accurate emissions reporting among SMEs and local authorities. Moreover, there is a knowledge gap for SMEs and local authorities in Scope 3 emissions reporting. SMEs are incredibly diverse and exhibit different practices in relation to emission quantification and environmental issues generally. Therefore, there is a staunch need for sector-specific guidance targeted at SMEs, and, by extension, local authorities. Each of the interviewees mentioned that they required external advice to some capacity when completing their emissions reports, either in the form of expert advice from researchers and professionals or in the form of consultancy services from a dedicated firm.

The interviews also indicated that managerial and leadership support is another key consideration for SMEs and local authorities. Scope 3 reporting requires a high level of data exchange, internally between company actors and externally across actors in the reporting organisation's value chain.

Additionally, although ISO 14064 is in line with the CSRD and VSME guidelines, and gaining ISO 14064 certification can generate a myriad of benefits for the reporting organisation, all of the cases and reports related to SMEs and local authorities analysed as part of this report cited the GHG Protocol as the organisation’s referenced framework for emission quantification and reporting. It is likely that the prevalence of the GHG Protocol in this area is attributable to its longstanding reputation within the emission quantification field. It must be noted that an organisation could use both of these standards together, due to their complementary nature.

The reporting organisation could benefit from the GHG Protocol’s more detailed guidance, particularly in relation to Scope 3 reporting, which, as discussed in Section 2.4, is a major challenge for SMEs and local authorities. It could also follow ISO 14064’s verification process, if third-party verification is an important objective for the organisation. Integrating the individual strengths of each standard could engender significant progress for the reporting organisation in relation to its emissions reporting quality, however this may not be in scope for SMEs and local authorities at this point in time.

## Contribution and conclusion

Chapter 2 highlights the significant role that SMEs and local authorities play in driving net-zero ambitions, particularly through the quantification and reduction of Scope 3 emissions. As SMEs account for the majority of businesses within the EU, their collective environmental impact is substantial. Local authorities operate within local and regional communities and thus play a vital role in local economies. Despite the importance of addressing Scope 3 emissions, SMEs and local authorities face several challenges in accurately measuring and managing these emissions. These include difficulties in obtaining data from suppliers, the complex nature of supply chains, a lack of clear methodologies for Scope 3 emissions quantification, which is further compounded by the voluntary nature of Scope 3 reporting. These challenges may all contribute to limited engagement from SMEs and local authorities in quantifying Scope 3 emissions.

However, the significant impact that SMEs and local authorities have on local, regional and national emissions and economies, strongly implicates them to engage in emission quantification and reduction practices. This chapter also reviewed two of the most widely adopted standards for emissions quantification, the GHG Protocol and ISO 14064-1. Both standards provide frameworks for emissions reporting in organisations, and SMEs and local authorities could employ either standard, or indeed reap the benefits of the complementary nature of the standards, as they attempt to build a methodology for emissions quantification.

# Chapter 3: Review of publicly available tools and databases

## Introduction

This chapter contains a brief overview of a number of calculation tools and databases for emissions quantification that materialised as a result of a search conducted on a public database. The objective of this chapter is to provide some practical information to SMEs and local authorities on some of the resources available to assist them in their emissions assessment.

## Review of tools

For the purposes of this document, a tool is defined as a method, software or framework that can provide practical and technical assistance to an organisation for quantifying and reporting their emissions.

> Emerald Power and Future Planet are two Irish organisations that produce emissions reporting software.

Emerald Power offers carbon reporting software that is designed to help businesses track, monitor and reduce their carbon emissions by collecting and storing data in one single source of truth. It is aimed at mid-market companies and thus could prove ideal for SMEs. The company has assessed the challenges that SMEs face with ESG, and its offering is compliant with many global standards, including the CSRD and the GHG Protocol.

The software covers all three scopes of emissions and automates the carbon data collection process by using AI-powered analysis of financial statements. It then categorises transactions, detects emission sources, and uses accurate, up-to-date emission factors to quantify emissions (Emerald Power, 2025). Future Planet offers software that automates carbon emissions calculations, maintaining multiple emissions tables linked to all sources of activity to present GHG results across Scopes 1, 2 and 3 to reflect all activity in the value chain. The platform is aligned with many global standards and frameworks, including ESRS and VSME. Future Planet also offers consultancy services on emissions management (Future Planet, 2025).

Notwithstanding the benefits these tools can offer for SMEs and local authorities, it is not necessary to outsource emission quantification practices. There are many tools and databases available to help organisations to quantify, report and manage their emissions independently. Carbon calculators are one such tool. A carbon calculator is a programme that calculates an organisation's carbon footprint based on the amount of carbon produced by its individual activities (Environmental Protection Agency, 2025).

There are numerous calculators publicly available for SMEs and local authorities to use. The SME Climate Hub advertises three calculators. The Small Business Carbon Calculator is a simple tool for a business that is starting to measure its emissions and is designed to help an SME identify emission hotspots. The Advanced Business Carbon Calculator is a more comprehensive calculator, more suited towards larger SMEs and allows for the incorporation of data from various sites. Finally, the Scope 3 Specific Calculator is a platform that translates procurement data into Scope 3 emission counts. This is particularly useful for organisations that are prioritising inclusion of Scope 3 emissions, which, as discussed above, is the largest source of emissions for organisations.

## Review of databases

This section provides an overview of the databases of emission factors that are available to SMEs and local authorities. An emission factor is a representative value that relates the quantity of a pollutant that is being released into the atmosphere because of a certain activity to the activity itself, in order to estimate the emissions created as a result of the activity. The emission factors are simply an average of available data of acceptable quality and are not specific to the organisation (United States Environmental Protection Agency, 2025).

When calculating its own Scope 3 emissions, an organisation can use different emission factors, depending on the Scope 3 category that is being calculated and the availability of data. An organisation should use credible sources of information when conducting its emissions count, and it should conduct due diligence on the emission factors it uses, as this will have a significant impact on its emission calculation outcomes. Some examples of factors that may be particularly relevant for Irish SMEs and local authorities are listed below in *Table 2*.

**Table 2: Emissions factors databases relevant to Irish SMEs and local authorities**

| Organisation | Logo | Description |
|---|---|---|
| Emissions factors databases relevant to Irish SMEs and local authorities | | |
| Sustainable Energy Authority of Ireland (SEAI) | seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND | The SEAI provides databases of emission factors for common fuel and energy types in Ireland. |
| Department for Environment Food and Rural Affairs (DEFRA) | Department for Environment Food & Rural Affairs | DEFRA provides emissions factor databases, which are particularly useful for calculating emission from energy use, water consumption, waste disposal, recycling and transport activities. Although not Irish data, the proximity of the UK to Ireland means that UK-based data is likely to be relatively similar to Irish data, and thus, regionally reflective. |
| US Environmental Protection Agency's GHG Emission Factors Hub | UNITED STATES ENVIRONMENTAL PROTECTION AGENCY | This hub provides emissions factor data that is updated annually. Although the data is US-based, and potentially not entirely representative of Irish emissions, it provides very useful emission factors for numerous Scope 3 emission categories and therefore proves advantageous for Irish SMEs and local authorities. |
| Intergovernmental Panel on Climate Change (IPCC) | ipcc INTERGOVERNMENTAL PANEL ON climate change | The IPCC Emissions Factor Database provides an open library of emission factors. |

## Practical Implications

The author compiled the information obtained because of this review into *Figure 4*, outlining the three main options that are currently available to SMEs and local authorities, when deciding on a process to quantify their Scope 1, 2 and 3 emissions. This review of tools and databases for emissions quantification is most relevant for Option 1, where an organisation would design its own methodology for emissions reporting.

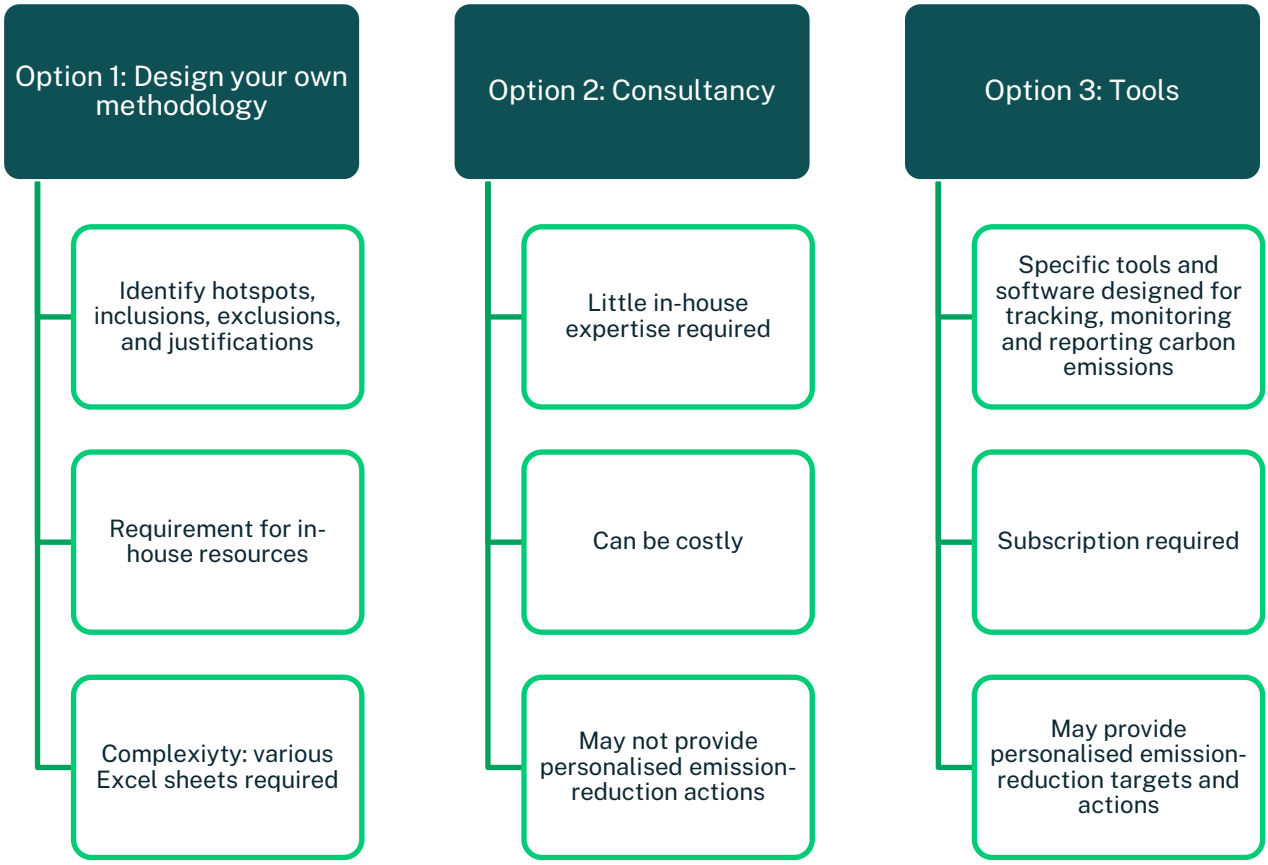


**Figure 4: Three options for quantifying emissions.**

## Conclusion

This chapter briefly reviewed some of the tools and databases that are available to SMEs and local authorities to help them to quantify their GHG emissions. Due to resource constraints, this chapter only reviewed a very small number of tools and databases that are available to SMEs and local authorities. There are many more public resources available.

# Chapter 4: Case studies of Scope 3 emissions calculations and reporting in Ireland and the UK

## Introduction

The inclusion of the following case studies in this document is intended to provide examples of Scope 3 quantification efforts in Ireland and the United Kingdom and to provide real-life context to the findings from the literature review and desktop review of Chapter 2 and Chapter 3. The first case study reviews the carbon footprint reports from three universities in Ireland. Universities were chosen for inclusion due to their significance as centres of learning, innovation and impact at local, national and international levels. Additionally, universities share an element of 'public service' with local authorities and can therefore be deemed as an appropriate case for comparison and knowledge-sharing.

The second case study follows the story of a UK-based SME, Frog Bikes, a children's bike manufacturer with a strong commitment to sustainability. This SME is an exemplary case on the SME Climate Hub website, which is a non-profit global initiative that provides support to SMEs in their climate action efforts. This SME was chosen for inclusion as it identified challenges related to quantifying Scope 3 emissions and outlined some future actions to increase Scope 3 accuracy over time. It was also recognised as a UN Climate Change High Level Champion for its Race to Zero campaign (Drew, 2024).

## Universities

Ireland's Climate Action Plan 2024 charges the public sector with the responsibility of *'leading by example'* in order to achieve an absolute emissions reduction of 51% by 2030 (Department of the Environment, Climate and Communications, 2023). There are eight university members in the Irish Universities Association. Collectively, those eight institutions constitute the fourth largest emitter of GHG in the Irish public sector (Irish Universities Association, 2024).

The aim of this section is to gain insight into the methodologies employed by three Irish universities - Trinity College Dublin (TCD), University of Galway (UoG), and Dublin City University (DCU) - to quantify Scope 3 carbon emissions across their operations. This section references the Carbon Footprint reports of the three universities and uses the most recent reports that were publicly available at the time of writing. These reports are as follows: 'Trinity College Dublin Carbon Footprint Report 2021-2022' (Trinity College Dublin, 2024), 'University of Galway Carbon Footprint Report 2017-2023' (Goggins and Adams, 2023), and 'DCU Campuses Carbon Footprint 2020&2021 Summary Report' (Fahy, 2022). All reports are fully referenced in the bibliography at the end of this document.

## Overview

Firstly, each of the three universities employed the GHG Protocol Corporate Standard methodology in order to quantify its emissions. A first step in this methodology is setting the organisational and operational boundaries of the reporting organisation for the purposes of the emissions report. Each of the three organisations selected the financial control methodology, meaning the reporting organisation calculates the GHG emissions generated by the operations over which it has financial control. UoG's report states that this choice was made based on the accessibility of financial data, however it recognises that the GHG Protocol recommends the combination of a control approach with the equity share approach, for a more thorough analysis.

In relation to its operational boundary, only Scope 1 and 2 emissions are mandatory as per the GHG Protocol, however each university included Scope 3 emissions in their emissions inventories. Each university only included the most relevant Scope 3 categories. UoG used the GHG Protocol's Scope 3 evaluator tool to assist with the prioritisation of Scope 3 categories as per their relevance. A summary of the Scope 3 categories included in the report, and tools used to quantify the emissions from each of these categories, is provided below.

- **Category 1 Purchased Goods and Services:** All three institutions employed the spend-based methodology to quantify emissions from purchased goods and services. Both TCD and DCU used the Quantis (GHG Protocol) Scope 3 evaluator tool, whereas UoG used EXIOBASE-3 to calculate these emissions. This category represents the largest or second largest category of emissions for each institution, meaning its significance should not be overlooked in terms of reduction efforts. Additionally, each of the universities recognise the importance of improvising the accuracy of this category over time, by moving towards incorporating more supplier-specific data.

- **Category 2 Capital Goods:** TCD and UoG used the spend-based method to quantify emissions generated by capital goods. As per category 1, TCD used the Quantis Scope 3 Evaluator tool and UoG used the EXIOBASE3 database. Again, this was a significant emissions hotspot for these institutions and should be prioritised in terms of emission reduction efforts.

- **Category 3 Fuel- and Energy-Related Activities (not included in Scope 1 and 2):** The GHG Protocol recommends including emissions in Scope 3 that are linked to Scopes 1 and 2 but not reported there, typically from transmission and distribution losses of imported electricity. In Ireland, the SEAI's "Electricity Supply Efficiency" accounts for these losses, meaning Scope 3 emissions from electricity transmission are covered in Scope 2. However, the DEFRA Well-to-Tank emissions factors from other fuels could also be employed here, for further accuracy. TCD used these emissions factors to calculate its emissions for this category, which totalled 2,774 tonnes of $CO_2$ for the reporting period.

- **Category 4 Upstream Transportation and Distribution:** TCD employed spend-based methodology, using the Quantis Scope 3 evaluator to calculate this category of emissions.

- **Category 5 Waste generated in operations:** All three reports detailed the use of DEFRA conversion factors for quantifying emissions from waste.

- **Category 6 Business travel:** Each university compiled travel data provided by the appropriate administrative college division, and applied the appropriate emission factor to the data, depending on the type of flight, class destination and other factors.

- **Category 7 Employee commuting:** Each university compiled data on student and staff commuting from surveys, scaled the numbers up using the total staff and student numbers, and applied emission factors to the data.

## Key Challenges

These reports bring to light some of the challenges that SMEs and local authorities face when attempting to quantify their Scope 3 emissions.

- **Limited access to data:** The reports acknowledge that supplier-specific data is likely to yield more accurate emissions reporting; however, such data remains difficult to obtain due to inconsistent disclosure practices. Furthermore, the Quantis Scope 3 Evaluator, a widely used tool for estimating upstream emissions, was decommissioned in 2023 owing to its reliance on outdated emission factors. Consequently, these organisations are now faced with the challenge of developing new, methodologically sound approaches for calculating emissions from Purchased Goods and Services.

- **Data inconsistencies:** As evidenced in these reports, data inconsistencies across suppliers and reporting systems present a significant barrier to accurate emissions accounting, as variations in data formats, methodologies, and reporting frequency hinder comparability and reliability in Scope 3 calculations. For example, TCD's report mentions that data inconsistencies posed a challenge when quantifying travel emissions (e.g., ferry transport was not invoiced with kilometres, and some taxi invoices did not include travel distance, however, the university overcome this challenge by estimating figures using the expenditure and the average of €1.96/km calculated in the SEAI M&R submission.

- **Difficulties with benchmarking:** As we saw above, given the voluntary nature of Scope 3 reporting, each organisation chooses which categories to include/exclude. Given the individuality of each organisation's emission report, it is difficult to compare one organisation with another, for benchmarking purposes, as some organisations may include more Scope 3 categories than others.

## Key learnings

- Analyse emissions changes over time: The reporting organisation should provide some information on changes in emissions year-on-year and provide context to the reductions and/or increases over time. (e.g., recognising the impacts that the Covid-19 pandemic has had on gross emissions).

- Include Scope 3 emissions: Each of the reports in this case study referenced the fact that Scope 3 reporting is optional under the GHG Protocol, however, given the substantial impact of Scope 3 emissions on an organisation's overall emission profile, each of the universities included Scope 3 in their methodologies. Furthermore, they highlight the importance of encouraging other organisations to adopt a methodology to report Scope 3 emissions also.

- Be clear about organisational boundary approach and its implications: The reporting organisation should explicitly state the organisational boundary it is using, and be very clear about entities that are included in the current scope of that boundary. The three universities in this case study used the financial control approach when setting their organisational boundaries. With this approach, the organisation should list the entities from which financial data was taken for the purposes of the report.
- Strive for constant improvement: The reporting organisation should constantly strive to include as many Scope 3 categories as possible in the report, which in turn increases the accuracy of the report. One example of this in the case study is DCU including emissions from Student Academic Travel and Purchased Goods and Services in this report, where previously they had not included emissions from these categories.

## Frog Bikes

Frog Bikes is a UK-based SME, specialising in children's bikes, that was founded in 2013. It recently released its 'Annual Emissions Report 2023'. The full reference for this document can be found in the bibliography. The aim of this section is to provide an overview of the methodology for emission quantification outlined in that report, with a particular focus on the company's efforts toward quantifying its Scope 3 emissions.

### Overview

Frog Bikes began the journey of measuring its carbon footprint in 2019. The company joined the United Nations' 'Race to Zero' in 2021, publicly committing to halving its emissions by 2030, and achieving net zero emissions by 2050. The company claims that committing publicly to net zero holds the company accountable and encourages other actors in its supply chain to commit to emission quantification and reduction actions also.

The company uses its 2019 emissions as a baseline. It follows the Greenhouse Gas Protocol to measure its Scope 1, 2 and 3 emissions, uses an Enterprise Resource Planning (ERP) system to record its activity data, and applies various publicly available emissions factors to quantify its emissions.
As shown in *Figure 5* below, the report outlines the emissions quantification methodology utilised by Frog Bikes to measure its Scope 1, 2 and 3 emissions, and explicitly states the emission categories it included and excluded from its total emission count.

Although this is important for transparency, there are numerous Scope 3 categories which were exclusions from the emission count, such as supplier manufacturing processes, waste at head offices, and end-of-life treatment. It is likely that this carries significant impact in relation to the accuracy of the emissions profile. However, the company explains that these exclusions are primarily resulting from difficulties in accessing data, which is a tangible issue that many SMEs face, as outlined in Chapter 2. The report also states that the company hopes to reduce these exclusions over time, as more precise data becomes available.

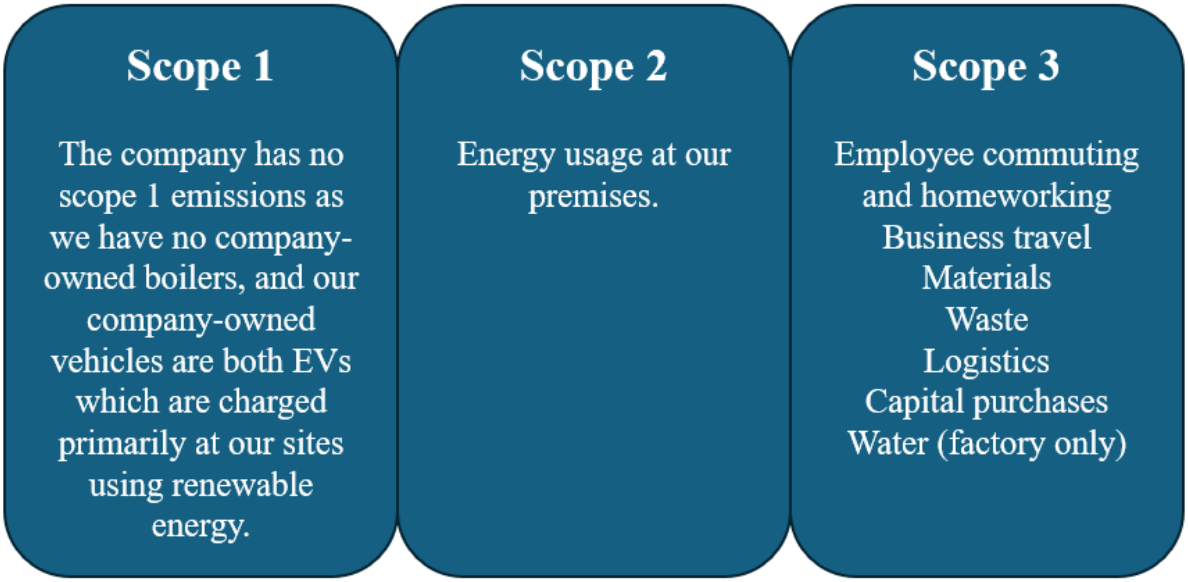


**Figure 5: Frog Bike's Methodology for Emission Quantification**

The report reveals that, on average, each bike currently manufactured by the company creates 93 kg of $CO_2$ emissions, of which 92% are from raw materials and components, 1% are from logistics, 4% are from staff travel and 3% are from outbound logistics. As demonstrated in *Figure 5*, Frog Bikes included seven Scope 3 categories in its emission profile. A brief description of the methodology employed to quantify the emissions pertaining to each category is outlined below:

- **Employee Commuting and Home Working**: The calculation of emissions for employee commuting used data extracted from a staff survey, from which data on the average number of commuting days per week, the commute distance and the emission rating of the vehicles were gleaned. The calculation of emissions for home working included data obtained from a staff survey, using estimations of the number of hours employees spent working from home and whether they were entitled to a renewable electricity tariff. DESNZ emission factors were then used to calculate the electricity used. The GHG Protocol's market-based method was referenced in order to exclude electricity emissions for the employees who were in receipt of renewable energy tariffs.

- **Business Travel:** This category was divided into two parts. Firstly, data was gathered on the emissions created by sales representatives in their work journeys. This was calculated by finding the number of miles travelled in the year and the emission rating of the sales reps' vehicles. The second part of this calculation related to emissions created by business travel from the team at Frog Bikes' head office. In order to calculate emissions, information was gathered on the number of flights taken per year in the employees' line of business, along with the destinations of those flights. Additionally, mileage claimed in expenses was added to this figure, which was multiplied by a standard UK car emission rate.

- **Materials:** Frog Bikes employed the GHG Protocol's average-data method to calculate the emissions of this category. It multiplied the weights of materials used by the industry-average of emissions per material type based on publicly available data. It is important to note that in this report, the company increased the scope of the materials included in the calculation of this category in comparison with previous years. For example, it included the emissions created from the sale of spares and accessories. This is a positive indicator of development and improvement in accuracy in the quantification of its Scope 3 emissions.

- **Inbound Logistics:** Again, Frog Bikes used the GHG Protocol's average-data method to calculate the emissions created through the shipping of materials inbound. It used a global average of maritime freight emissions for the mileage generated by transporting products from Asia to the UK, and multiplied this by the weight of materials being transported. It repeated this process for the very small percentage (<1% by weight) of materials that were transported inbound by air.

- **Outbound Logistics:** In order to calculate the emissions generated by transporting finished products, Frog Bikes employed the average-data method, by categorising its sales by regions and using the average mileage of trips from its factory to each of the regions in which its products were purchased. It then multiplied the mileage by the relevant industry average emissions factor for each transport method. Most finished products were transported by road or sea, with a small minority transported by air.

- **Waste:** Frog Bikes separates its waste by categories on-site at its factory and reports its waste by weight across these various categories. In this report, it was found that 88% of its weight was recycled and 12% constituted general waste. By using the average-data method, Frog Bikes applied the relevant DESNZ emissions factors to calculate the total emissions generated in this category.

- **Capital Purchases:** In 2023, Frog Bikes purchased a new cardboard crinkling machine, which would allow it to reuse up to 70% of the cardboard from suppliers. To calculate the emission burden of this capital purchase, its weight was multiplied by its main material, steel. Although this increased the company's annual emissions by 346 kg of $CO_2$, the machine is for sustainable practice and can facilitate the effective reuse of used cardboard.

- **Water (factory only):** Frog Bikes collects data on water usage at its factory. To calculate the emissions of the water usage, it uses the relevant DESNZ emission factors for the water supply and wastewater. It elected to exclude water usage at the head office from this calculation, as it shares the office space with other tenants and organisations and therefore found that it would be difficult to designate an accurate count to the company and it found that it probably has a minimal impact on the total emissions of the company.

The report details the list of emission factors it used in the above calculations, most of which are UK-based, which should be relatively accurate as the company is based in the UK. The report also indicates some of the actions the company has taken to increase accuracy in its emission quantification overtime. Some examples include using more accurate weight data for the materials used, expanding its emission profile to include emissions generated from the sale of spare parts and accessories and the collection of emissions data on factory waste. As a result of improved accuracy and emission profile expansion, reported emissions increased incrementally on the emissions of the previous year.[1] This can be seen as a positive development however, as more precise data contributes to more effective emission reduction strategies.

## Key challenges

This case study highlights some of the main challenges that SMEs face when attempting to quantify their Scope 3 emissions.

- Limited access to data: Obtaining accurate data from suppliers was mentioned throughout the report as a challenge for Frog Bikes. Gaining access to accurate emissions data is a major challenge for SMEs, largely due to limited in-house resources and expertise. The difficulty in accessing accurate data is particularly pertinent for Scope 3 categories, as data is required from actors along the value chain, which adds further complexity to the data collection process. To overcome this issue, Frog Bikes used the GHG Protocol's hybrid method, by combining market-based methods and average-data methods to calculate emissions in different categories. As explored above, the supplier-specific method is the most accurate method. Nevertheless, hybrid methods serve as promising initial methods and should be used until supplier-specific data becomes more accessible to SMEs.

## Key learnings

In spite of these challenges, this case also provides examples of best-in-class actions that other SMEs can echo in their efforts to quantify their emissions.

- **Be specific:** The reporting organisation should provide as much detail as possible when describing its methodology. Notwithstanding the fact that Frog Bikes excluded some Scope 3 categories from its emission profile, it did provide detail pertaining to the categories it excluded and justified those exclusions. It also provided information on the included categories. For example, it explicitly described who was included in the staff count for business travel, stating that although the company's sales representatives are self-employed agents, they were included in the business travel figure. Furthermore, Frog Bikes explicitly the year it used as its baseline year, from which to examine reduction efforts. This year should be representative of the company's actual operations and provide a realistic picture of the company's actual emissions. Frog Bikes did not give a justification for the use of 2019 as its baseline year in this report; however this might be good practice for SMEs.

[1] Reported emissions per bike increased by 2.5% between 2022 and 2023.

- **Provide progress updates:** The progress of Frog Bikes in relation to emission quantification and reduction was detailed in this report, which assists the reader to monitor high-level information regarding the company's actions.

- **Analyse and communicate changes and challenges:** The report describes some of the challenges faced by the cycling industry in 2023, which had a negative impact on the market demand for bikes. In response, Frog Bikes reduced the number of bikes manufactured for the year. This led to a decrease in emissions corresponding to categories with variability in costs, such as materials. However, categories with more fixed costs, such as employee commuting, remained stable. Therefore, despite achieving a decrease in the company's total emissions, emissions per bike increased slightly. Such analysis of emission quantification represents an important step for SMEs to take. It is vital for SMEs to understand and communicate the changes and trends of their emission profiles and translate that information to emission reduction strategies.

- **Devise future strategies**: In this report, Frog Bikes provides various future scenarios that align with its emission reduction targets. It details the emissions per bike estimates of bikes containing different material makeups, as per *Figure 6* below. This can serve as a useful visual for target-setting and can act as an incentive to persist with emission quantification and reduction efforts.

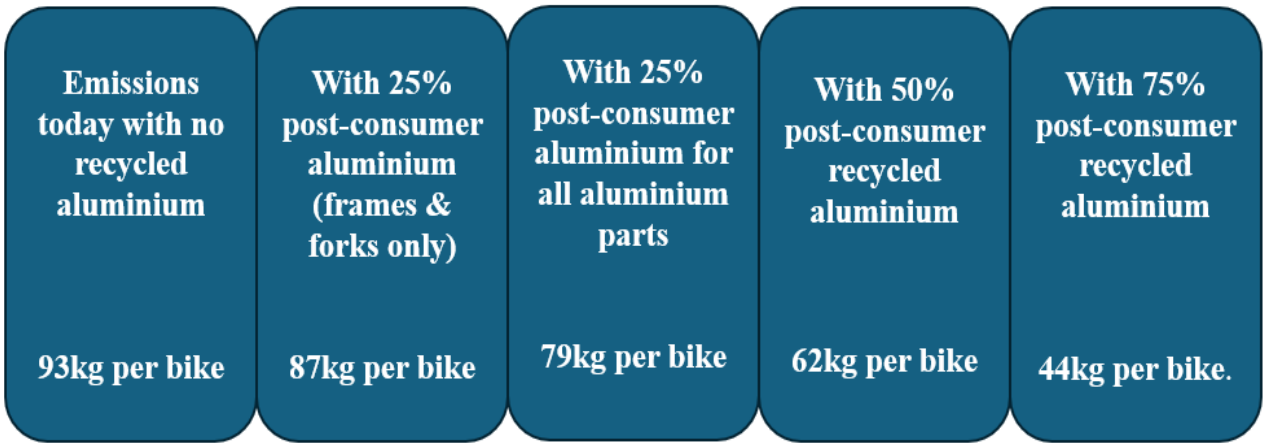


**Figure 6: Frog Bike's commitment to a greener future**

## Conclusions

This section used two case studies to provide relevant information on the methodologies used by organisations in Ireland and the UK. The case studies underlines various key learnings and actions that SMEs and local authorities can take when attempting to quantify their Scope 3 emissions. The cases also highlight the challenges that SMEs and local authorities face when quantifying Scope 3 emissions. Many of these challenges were explored in Section 2.3. These case studies provide a real-world example of these challenges.

# Chapter 5: Guidance and Conclusion

## General guidance for SMEs and local authorities in relation to Scope 3 emissions quantification

Based on learnings from the literature review, tools and databases review, relevant case studies, and informal interviews with subject-matter experts and practitioners, the following points have been compiled to offer clear and concise guidance to SMEs and local authorities on how to begin the process of quantifying their Scope 3 emissions.

1. **Become familiar with the legal and regulatory requirements relevant to the reporting organisation and its chosen standard for emission quantification.**

    - Examine the relevant documents pertaining to the chosen standard. The reporting organisation should use the same standard for all three scopes to ensure consistency of reporting.
    - Consider whether a specific individual or group with in-depth knowledge is required to take on the responsibilities of emission quantification, or whether acquiring external consultancy services from certified consultancy organisations would be more suitable.

2. **Outline the categories of Scope 3 emissions that are material and particularly relevant to the operations of the organisations.**

    - Define the highest-emitting categories or hotspots that will require particular focus for emission quantification and reduction efforts.
    - Check with colleagues (e.g., financial colleagues) to see if the most accurate and important categories have been included as material.
    - Compose a plan for collection of emissions data, detailing the expected sources of data, methods to collect the emissions data and time boundaries in which to collect the data.

3. **Define a methodology for Scope 3 emission quantification.**

    - Due to the lack of sector-specific guidance in this area, the reporting organisation should outline its own methodology, including the methods employed to collect Scope 3 emission data, the tools and emission factors used to quantify emissions, and the databases and systems used to store and share the data.
    - Use credible sources and conduct due diligence on the tools and emission factors employed to calculate the emissions. Only use emission factors that are supplied by credible sources and reputable organisations (e.g., SEAI energy conversion factors, DEFRA conversion factors etc).
    - The reporting organisation should make every effort to be fully transparent and honest about its methodology and should clearly define its inclusions, exclusions and potential gaps and limitations.

4. **Define the value chain and important actors.**

    - Leaders and managers can facilitate improved data exchange and ensure that the reporting organisation receives accurate data by strengthening its relationships with key value chain partners.
    - SMEs are often part of the supply chain of larger companies, many of which face pressures to decarbonise their operations. Therefore, SMEs have a responsibility to put pressure on those companies to provide meaningful data. However, they also have an opportunity to be seen as a leader in environmental change. This leadership mindset can be used as a differentiating factor for the SMEs and set it apart from competitors as an active agent of change. However,

organisations should be very careful and never use it as a greenwashing opportunity. Always be transparent and honest.

5. **Communicate with other SMEs and local authorities.**

   - One major theme that emerged from the literature was the importance of knowledge-sharing. The areas of emission quantification and ESG reporting are still relatively nascent, however, they are also incredibly important.
   - One way for SMEs and local authorities to learn about this area and improve their reporting practices is to engage in knowledge-sharing and resource-sharing activities with other local authorities and SMEs.
   - Collaboration can facilitate the identification and implementation of different practices in scope 3 quantification as well as provide organisations with new ideas on how to reduce their environmental impact through gaining information on different renewable energy solutions, best net-zero practices, technologies, and funding opportunities.

6. **Remember that the benefits of environmental reporting and emission reduction reach far beyond the reporting organisation.**

   - By being honest, using credible sources of data, and reporting as much as possible, SMEs and local authorities can have an impact on the entire value chain and be a leader on environmental issues.

7. **Be persistent and include as much information as possible.**

   - Organisations may face barriers when first identifying its methodology; barriers such as those explored in the literature review in section 2 of this document.
   - However, once an organisation defines and uses its original methodology, scope 3 reporting should become more straightforward over time. The first attempt at scope 3 emission quantification will most likely include a great deal of learning. Remember that the most important thing is to include as much information as possible about Scope 3 emissions.

8. **Set realistic, but ambitious targets.**

   - Set a base year: Choose a year that is representative of the general emission output of the organisation. For example, 2020 would likely have an unrepresentative baseline due to the COVID-19 pandemic.
   - With the completion and release of every new emissions report, the reporting organisation should set emission reduction targets, in line with the overall environmental strategy and targets of the company (in line with legal requirements).
   - It is important to note that comparison of emissions between reporting organisations in different sectors is quite difficult. This is especially relevant for SMEs, given the diversity of their operations. An organisation should make reduction targets based on its own emissions in the past.

## Next steps

This section highlights some recommendations for next steps that Codema can undertake in order to assist SMEs and local authorities to start generating full emission profiles, with particular focus on Scope 3 emissions.

- Provide training workshops on sustainability reporting for sustainability teams, working within SMEs and local authorities in order to support their capacity-building efforts to measure and report their own emissions.

- Keep up to date with the development of existing and new tools and platforms that facilitate and automate Scope 3 data collection, analysis and reporting. Share useful information with organisations.

- Encourage SMEs and local authorities to collaborate with other SMEs and local authorities, as well as suppliers, customers, industry groups, and local governments to share resources, knowledge, and best practices. Through partnerships, supply chain engagement, and knowledge-sharing networks, SMEs can identify opportunities to reduce emissions. Collaboration can also help organisations to access funding, technology, and expertise that may otherwise be out of reach, enabling more effective and scalable sustainability efforts (Olarewaju, 2023). Codema could also encourage supplier engagement to facilitate industry-wide data-sharing platforms, in order to streamline reporting across value chains.

- Scope 3 categories vary widely by industry. Codema could share industry-specific examples of cases of SMEs in high-impact sectors that are quantifying their Scope 3 emissions, to provide insights for other organisations.

## Final thoughts

This research contributes to the understanding of these challenges and identifies potential solutions for improving Scope 3 reporting practices. It underscores the need for enhanced support for SMEs and local authorities in managing emissions across value chains and highlights the significance of accurate Scope 3 data in driving supply chain decarbonisation. This document was created in order to provide SMEs and local authorities with some guidance as they attempt to take their first steps towards creating a full, transparent and accurate emissions profile. In order to do so, Scope 3 emissions quantification must become a key priority for organisations.

# Appendices

## Table of figures and tables

Figure 1: Overview of GHG Protocol scopes and emissions across the value chain ..... 5
Figure 2: Relationship between the IS0 14060 family of GHG standards ..... 9
Figure 3: ISO 14064-1. Three key elements to develop an organisation's emissions profile ..... 9
Figure 4: Three options for quantifying emissions. ..... 15
Figure 5: Frog Bike's Methodology for Emission Quantification ..... 19
Figure 6: Frog Bike's commitment to a greener future ..... 22

Table 1: Time boundary of Scope 3 categories ..... 7
Table 2: Emissions factors databases relevant to Irish SMEs and local authorities ..... 14

## Abbreviations

| | |
|---|---|
| CSRD | Corporate Sustainability Reporting Directive |
| DEFRA | Department for Environment, Food & Rural Affairs |
| US EPA | United States Environmental Protection Agency |
| FCC | Fingal County Council |
| GHG | Greenhouse Gas |
| IPCC | Intergovernmental Panel on Climate Change |
| ISO | International Standards Organisation |
| SME | Small-to-Medium Enterprise |
| TCD | Trinity College Dublin |
| UoG | University of Galway |
| WBCSD | World Business Council for Sustainable Development |
| WRI | World Resources Institute |

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