

Climate Action

A toolkit for business



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Ibec is Ireland's largest lobby and business representative group. Our purpose is to help build a better, sustainable future by influencing, supporting and delivering for business success. With over 280 employees, Ibec engages with key stakeholders in Ireland and internationally through our six regional offices and our Brussels office, along with an extensive international network in the UK and US.

Ibec positions are shaped by our diverse membership, which range from small to large, domestic to multinational and our 39 trade associations cover a wide range of industry sectors.

As well as lobbying, Ibec provides a wide range of professional services and management training to members on all aspects of human resource management, occupational health and safety, employee relations and employment law.

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Accenture is a talent and innovation led company with 732,000 people serving clients in more than 120 countries. Technology is at the core of change today, and Accenture is one of the world's leaders in helping drive that change, with strong ecosystem relationships.

Accenture combines strength in technology with unmatched industry experience, functional expertise and global delivery capability. Uniquely able to deliver tangible outcomes because of their broad range of services, solutions and assets across Strategy & Consulting, Technology, Operations, Industry X and Accenture Song. These capabilities, together with a culture of shared success and commitment to creating 360° value, enable Accenture to help clients succeed and build trusted, lasting relationships.

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Foreword from Danny McCoy, Ibec CEO

Corporate sustainability has taken on new meaning and importance in recent years. Once largely a matter of environmental compliance and good public image, it now encompasses a wide array of environmental, social and governance (ESG) risks, and has become a question of business value and survival.

Forward thinking businesses are embracing this new version of sustainability and making it a mainstream strategic priority for their organisation. These businesses recognise that investment, talent, and consumers will increasingly flow to businesses that champion the interests of all stakeholders not just shareholders.

Conversely, these businesses recognise that a business-as-usual approach and a failure to end bad ESG practices like environmental mismanagement, could create financial risks, regulatory burdens, and liabilities in the coming years.

While corporate sustainability is much more than an environmental issue, the threat of climate change remains the single greatest challenge facing humankind today. No business can claim to be sustainable if they are not taking meaningful action to address their climate impacts.

Most businesses recognise the overwhelming commercial and societal imperative to reduce their greenhouse gas (GHG) emissions and limit their impacts on the environment. However, knowing where to start remains a major challenge for most small and medium businesses. This task is made even harder by the labyrinth of target setting frameworks, climate pledges, policy initiatives, and commercial offerings jostling for attention.

Ibec has developed this Climate Action Toolkit in collaboration with Accenture to help businesses navigate the labyrinth and develop a best-practice climate action strategy that will meet the needs of all key stakeholders.

Foreword from Hilary O'Meara, Country Managing Director, Accenture

Over the past three years we have witnessed sustainability emerge as one of the core business challenges which is consistently top of mind for executives and Boards across Ireland. Just as the digital revolution transformed how we live and work, so too will sustainability, permeating everything that we do.

Irish businesses are taking steps in the right direction by committing to important initiatives, but many companies are grappling with how they are going to achieve their ambitious targets. We are three years into the decade where we need to deliver and yet emissions in Ireland continue to increase. It is clear we need to move beyond target setting and focus on how to operationalise targets, how to implement carbon reduction initiatives at scale, how to measure and track carbon performance and how to mobilise teams to achieve this. To remain on a trajectory that limits global warming to only 1.5°C, we must transition from intent to action, to avoid catastrophic climate disasters.

We know carbon is not the only topic where Irish businesses are being called to action. Environmental, Social and Governance (ESG) challenges more broadly are significant and varied. We strive for a future where there is balanced performance across all ESG issues, from waste to human rights, inclusion & diversity and privacy to transparency. In this toolkit, we have chosen to focus on decarbonisation as the scale of the challenge is so significant, the window for action so limited and the only way to make progress on meeting our national goals is by working together with urgency.

Reducing carbon emissions requires collective effort, which is not easy but is what's needed to protect the generations that will come after us. Firstly, decarbonisation touches every part of the value chain including warehousing, manufacturing, distribution, and post-consumer disposal. Reducing emissions across the value chain requires radical collaboration between suppliers, manufacturers, retailers, and customers. Secondly, the journey to decarbonisation touches every part of business, from sales and marketing to operations, finance, R&D, and investor relations. Therefore, every business leader needs to understand how they can accelerate their own journey to decarbonisation. Customers, investors, employees, and governments are demanding action and businesses must do all that they can to respond.

Together with Ibec, Accenture is delighted to share learnings, experience, and best practice as part of this Climate Action Toolkit, which can be used by executives to understand the business imperative, and more importantly to develop a best practice approach, to support businesses to deliver on carbon reduction. It provides an overview of key concepts and developments in climate change science and regulation, while also setting out five steps businesses can take on carbon measurement and subsequent reduction roadmap. It also provides additional insights and guidance for four large sectors of the Irish economy.

Every business must be a sustainable business and we hope this toolkit will accelerate the transition not just because it's the right thing to do, but because we believe that it will create one of the most powerful forces for change in our generation.

How to use this toolkit

This Climate Action Toolkit gives businesses the information they need to start their climate action journey and develop an enduring best-practice climate action strategy.

Chapter 1 sets out the responsibilities and commercial imperatives behind climate action and why businesses must make sustainability and climate action a strategic priority for their organisation.

Chapter 2 provides an overview of key concepts and important developments in climate change science, environmental policy and regulation, carbon footprinting, and sustainability reporting. This is essential reading for anybody new to the subject.

Chapter 3 sets out a best practice approach for businesses to develop a robust and enduring climate action strategy. The approach is rooted in the widely respected GHG Protocol Corporate Accounting and Reporting Standard (2004) (hereafter GHG Protocol) and breaks down the journey and tasks an organisation must complete into five steps.

Chapter 4 provides additional insights on the unique challenges, drivers, and developments in four large sectors of the Irish economy:

- food and drink
- commercial and financial services
- the public sector
- technology

The **Appendices** includes an overview of important EU climate and sustainability legislation, a guidance on emission factors for use in Ireland, an illustrative worked example, a glossary of common terms and acronyms, and a Toolkit checklist.

Note: For businesses starting out on their climate journey, it is important they understand the scale of the undertaking. The development of a climate action strategy that aligns with industry best practice requires considerable time, resources, and in many cases, upskilling. This toolkit provides a useful guide for businesses in all sectors. However, because every organisation is different, the emissions profile and climate solutions will differ considerably from one organisation to the next. Consequently, climate strategies by their nature need to be bespoke to each organisation. Further assistance, training and support will likely be required to fully implement the recommended measures and steps set out in this toolkit. Ibec and Accenture are available to provide that additional support where needed.

Executive Summary

The business imperative

Climate change is the single greatest challenge humankind faces today. The scientific evidence is unequivocal. Global temperatures are increasing, our environment is changing, and manmade GHG emissions are the main driver. The only solution is a dramatic global reduction in GHG emissions across all sectors and the transition to a fully carbon neutral world by 2050¹.

Industry worldwide is a major contributor to climate change, with Irish businesses accounting for approximately 18% of Ireland's GHG emissions². This percentage increases significantly when indirect and supply chain emissions driven by industry in sectors like transport, waste management, primary agriculture, and electricity generation are included. Industry has a clear responsibility to transition away from fossil fuels, reduce its own carbon footprint, and use its power and influence to lead the transition to carbon neutrality.

There are also significant commercial and financial imperatives for businesses to act on climate change. Key stakeholders like investors, consumers, business partners, employees, and policymakers are demanding greater transparency and proactivity from businesses on climate change and other environmental, social and governance (ESG) issues. Forward-thinking businesses recognise that corporate sustainability is no longer simply a matter of compliance and good public image. Today it is a question of business value, competitiveness, and survival.

Sustainability reporting

Mandatory sustainability reporting and disclosure obligations are becoming commonplace globally. Within the EU, the new Corporate Sustainability Reporting Directive (CSRD) requires obligated companies to provide detailed information annually on their impacts and approach to sustainability. This includes details about the company's net zero transition planning, sustainability targets, due diligence practices, risk areas, and remedial actions. While the

CSRD is initially focused on large public and private EU undertakings, many SMEs will be impacted indirectly if they are part of an obligated party's supply chains, and some will be obligated directly from 2026.³

Many businesses are also joining voluntary reporting and disclosure regimes – often in response to the demands of investors, consumers, and business partners. Initiatives like the [Global Reporting Initiative \(GRI\)](#), [B Corp](#), and the [UN Global Compact](#) cover the full breadth of ESG matters. Others like the [Science Based Targets Initiative \(SBTi\)](#) and the [Carbon Disclosure Project \(CDP\)](#) focus exclusively on GHG emissions.*

This Toolkit

Most Irish businesses understand the changing demands of stakeholders and these commercial imperatives. They want to play a more positive role in addressing climate change. The challenge is knowing where to start. It can be difficult to navigate the jargon, the multiple climate standards, policy initiatives, target setting frameworks and commercial offerings.

The purpose of this Climate Action Toolkit is to give businesses the essential information they need to begin their climate action journey and develop a best-practice climate action strategy that will meet the needs of all key stakeholders.

The Toolkit includes background information on climate change and climate science,

- explanations of key concepts like carbon footprinting, emissions mitigation and offsetting, and the circular economy

* See Appendix 1 for more information on these initiatives.

- a summary of key developments in climate policy and sustainability reporting,
- guidance on current and forthcoming climate and sustainability legislation
- an easy-to-follow five step process for developing an enduring climate action strategy
- guidance on how to appraise, select, and prioritise emission reduction projects.
- An illustrative worked example

A guide to GHG emissions

Global warming, and the resulting climate change, is caused by the build-up of manmade heat-trapping GHGs. There are 10 GHGs, each with their own chemical and physical properties.

The most important GHGs are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).⁴

To set a carbon footprint is to measure the total GHGs caused by an individual, event, region, product, or organisation. For accounting purposes, the tonnage of each GHG is translated into a carbon dioxide equivalent tonnage (tCO₂e). Carbon footprinting is not easy, as emissions are created in many ways, from fossil fuel combustion and certain chemical processes, to farming, food production and changes in land use.

In recent years, new robust standards for carbon measurement have been created along with new ways of classifying emissions. This has helped create a level playing field and prevent the misrepresentation of carbon impacts, a practice commonly known as greenwashing. The gold standard for carbon footprint measurement is the [GHG Protocol Corporate Accounting and Reporting Standard \(2004\)](#) (GHG Protocol), which forms the basis of this toolkit.⁵

When assessing the carbon footprint or emission inventory of an organisation, GHG emissions can be divided into three broad categories.

- **Scope 1 emissions** are directly created from sources owned or controlled by the company, such as boilers, furnaces, vehicles, or from equipment used in processes like chemical production.
- **Scope 2 emissions** are indirectly created from purchased electricity, heat, cooling, or steam that is consumed by the company.
- **Scope 3 emissions** are indirectly created as a consequence of the activities of the company but occur from sources associated with suppliers and/or customers, hence not owned or controlled by the company.

Five steps to develop a climate action strategy

When developing a best-practice climate action strategy, we recommend businesses follow the cyclical five step process below. The process is cyclical because the policy environment and businesses (and their emissions profile) change over time. Therefore, climate action strategies need regular revision, strengthening, and adjustment. Steps 1 and 2 can happen in parallel.

- **Calculate: Establish a carbon footprint for your business.** An organisation's emissions baseline refers to the emissions produced by all relevant activities at a certain point in time. It is informally called a carbon footprint. It is the starting point against which progress can be measured. This must be set using a credible methodology.
- **Mobilise: Secure business buy-in and prioritise.** The journey ahead will likely require big transformations to the organisation's corporate strategy, growth and investment plans, company culture, supply chains, and day-to-day operations. Therefore, it is critical that the business secure company-wide buy-in and support at this early stage.
- **Commit: Set emissions reduction targets.** Effective GHG management requires target setting. Externally, targets help communicate the business commitment and ambition to tackling climate change. Internally they help drive the transformation of the business and ensure decision making and growth plans align with emissions reduction trajectories.

- **Implement: Develop an emissions reduction roadmap.** To ensure targets are met, businesses must review the existing company strategy and plans to ensure they are fully aligned with the organisation's new climate ambition. This is also the time to develop an emissions reduction roadmap setting out all the interventions the business intends to take to achieve their targets within the specified timeline.
- **Measure & Communicate: Create a measurement and communications plan.** A robust monitoring and measurement system enables regular oversight of progress and the early identification of problems. Regular reporting is also critical to the integrity of the organisation's approach. Reporting can be done through a pre-existing framework like the SBTi or through an annual report.

Sectoral perspectives

Some business sectors face additional challenges, policy intervention, and regulatory oversight. These are typically carbon-intensive industries or sectors with significant influence on the zero-carbon transition. It is also important to recognise that some sectors face unique technological, financial, and non-financial barriers to emissions reduction.

- Food and drink

The agrifood sector accounts for approximately 31% of global GHG emissions.⁶ Emissions in the sector are growing in line with population growth, economic development and changing consumption patterns. The expansion of food production and resulting land-use change is impacting biodiversity and natural eco systems. Meanwhile food waste and the end-of-life disposal of materials and packaging is causing air, soil, and water pollution. Because of these impacts, the sector faces enhanced regulatory oversight and policy intervention.

- Commercial and financial services

Commercial and financial services organisations represent the largest share of Irish businesses and account for approximately 3% of total Irish direct emissions.⁷ These organisations typically have lower Scope 1 and Scope 2 emissions than other business sectors as they are largely low energy operations.

However, businesses in this sector can face significant financial and non-technological barriers. Meanwhile, certain commercial organisations face unique challenges and additional policy oversight because of their influence on the wider economy and the net zero transition.

- The public sector

In Ireland, public sector bodies face significantly greater oversight and policy intervention as they are required to play a leadership and exemplary role in the zero-carbon transition. The sector must reduce thermal and transport emissions by 51% by 2030 on 2016-2018 levels, improve its energy efficiency by 50% by 2030, and become climate neutral no later than 2050. Each public sector body has a responsibility to endeavour to reach the 51% emissions reduction target.⁸

- Technology

Technology encompasses a diverse range of business sectors including engineering, digital services, data storage, and electronics manufacturing. For some technology businesses, the scale of their energy use presents considerable decarbonisation challenges. For others, the growing focus is on reducing Scope 3 emissions caused by the linear growth and mistreatment of end-of-life electronic or electrical goods (e-waste) and packaging.

1



Introduction

Climate change and the responsibilities of business

Climate change is the single greatest challenge humankind faces today. The scientific evidence is unequivocal. Global temperatures are increasing, our environment is changing, and manmade GHG emissions are the main driver.

The atmospheric levels of carbon dioxide (CO₂) reached record levels in 2021 and our planet is now on track for three degrees Celsius of warming by the end of this century. The consequences of climate change include rising sea levels, biodiversity loss, extreme weather events, crop failure, famine, and mass migration. Developing countries with low levels of GHG emissions are the most impacted. The only solution is a dramatic global reduction in GHG emissions across all sectors and the transition to a fully carbon neutral world by 2050.⁹

Industry worldwide is a major contributor to climate change, with Irish businesses accounting for approximately 18% of Ireland's GHG emissions.¹⁰ This percentage increases significantly when indirect and supply chain emissions driven by industry in sectors like transport, waste management, primary agriculture, and electricity generation are included. Major transformations are needed to fully decouple GHG emissions growth from economic development. Industry has a clear responsibility to transition away from fossil fuels, reduce its own carbon footprint, and use its power and influence to lead the transition to carbon neutrality.

The business imperative

There are also significant commercial and financial imperatives for businesses to act on climate change. Key stakeholders like investors, consumers, business partners, employees, and policymakers are demanding greater transparency and proactivity from businesses on climate change and other environmental, social and governance (ESG) issues. Forward-thinking businesses recognise that corporate sustainability is no longer simply a matter of compliance and good public image. Today it is a question of business value, competitiveness, and survival. Businesses that do

not respond to these signals and address bad ESG practices, risk losing investment, competitiveness, and market share. The growing demands of stakeholders on businesses are summarised below.

Investors

Investors are increasingly applying environmental and social considerations and criteria when valuing investment assets and opportunities. This is called *ESG Investing*, and it is one of the fastest growing sectors in finance.¹¹ ESG investing is built on the idea that bad ESG practices could lead to financial risks and liabilities in the future. For example, businesses with carbon-intensive assets and products could be financially strained by punitive climate regulations and carbon pricing measures in the future. Conversely, businesses with clear transition plans are considered better equipped to navigate the upheavals to come. Work is now underway in the EU and the US to develop robust standardised taxonomies and criteria for ESG investing.

In addition, rating agencies are increasingly looking at performance against ESG metrics to assess the credit rating of an organisation. ESG factors that are material to financial performance now play a part in determining the rating given to various entities, meaning that tackling poor ESG behaviours is becoming crucial to the success of an organisation.

Customers

Consumer awareness and concern about environmental impacts is growing and is particularly pronounced in certain markets. Accenture research found that 80% of Irish consumers want to live more sustainably while 70% are more likely to purchase an "eco-friendly" brand.¹² However, there is evidence of an "intention gap" between aspiration and action. Buying

sustainably is not always easy and many consumers, despite aspirations, are still ultimately driven by value, quality, and brand loyalty. 92% of consumers in the Accenture survey feel that business should be taking the lead.

Business partners/customers

Many businesses selling into or working with larger firms are under growing pressure to address their carbon footprint and other ESG risk areas. One reason for this is that larger firms are increasingly subject to mandatory and voluntary reporting and disclosure obligations. And business selling into or working with larger companies can contribute significantly to that business' supply chain emissions and ESG risks. Forward-thinking businesses recognise that a robust climate transition plan could give their organisation a first mover competitive advantage.

Employees

Employees increasingly want to work for sustainable purpose-driven businesses. In a 2020 Unily survey of 2,000 UK-based office workers, 83% said their employer was not doing enough to be sustainable and tackle climate change, and 65% said they would be more likely to work for a company with robust environmental policies.¹³ One reason for this is a belief that businesses guided by strong values are more likely to care for the wellbeing of their employees. In a world where businesses struggle to compete for talent and skills, robust sustainability credentials may give the organisation added appeal over other employers.

Regulators/Polymakers

Businesses are subject to increasing oversight and regulation on environmental and sustainability matters at national and EU level. The European Green Deal, launched in 2020, serves as the overarching strategy for the European Union to reach Net Zero emissions by 2050. It includes a range of policy initiatives and legislative proposals to help curb GHG emissions growth and drive better corporate behaviour. The Green Deal aims to strengthen existing environmental legislation (the EU Environmental Acquis) and legislate in new areas. In the coming years, businesses will face new obligations under polices created as a result of the European Green Deal, on sustainability reporting,

corporate due diligence, net zero transition planning, eco design, eco labelling, and the right to repair (See Appendix 2).

Other stakeholders

Businesses face increased scrutiny from a range of other stakeholders in civil society including community groups, consumer groups, Non-Governmental Organisations (NGOs), and charities. Some of these organisations routinely spotlight businesses with poor environmental performance, carbon-intensive products and assets, and carbon-intensive expansion plans. Others are actively targeting acts of greenwashing where businesses misrepresent their environmental integrity or the carbon footprint of a product or service. For many NGOs, the focus is as much about non-disclosure than actual environmental performance. For example, the global Carbon Disclosure Project (CDP) publishes a list of publicly listed companies that fail to respond to their annual carbon disclosure request.

The purpose of this toolkit

Most Irish businesses understand these commercial imperatives and want to play a more positive role in addressing climate change. The challenge is knowing where to start. Even for firms with in-house expertise, it can be difficult to navigate the jargon, the multiple climate standards, policy initiatives, target setting frameworks and commercial offerings. The purpose of this Climate Action Toolkit is to give businesses the essential information they need to begin their climate action journey. By following the five steps set out in Chapter 3, business will avoid some of the common pitfalls and build a robust climate action strategy that reflects industry best practice and will satisfy the needs of key stakeholders.



Overview

For users to get the full benefit out of this toolkit, this chapter sets out the basic elements of climate change and some key concepts related to greenhouse gas emissions reduction and company driven climate action.

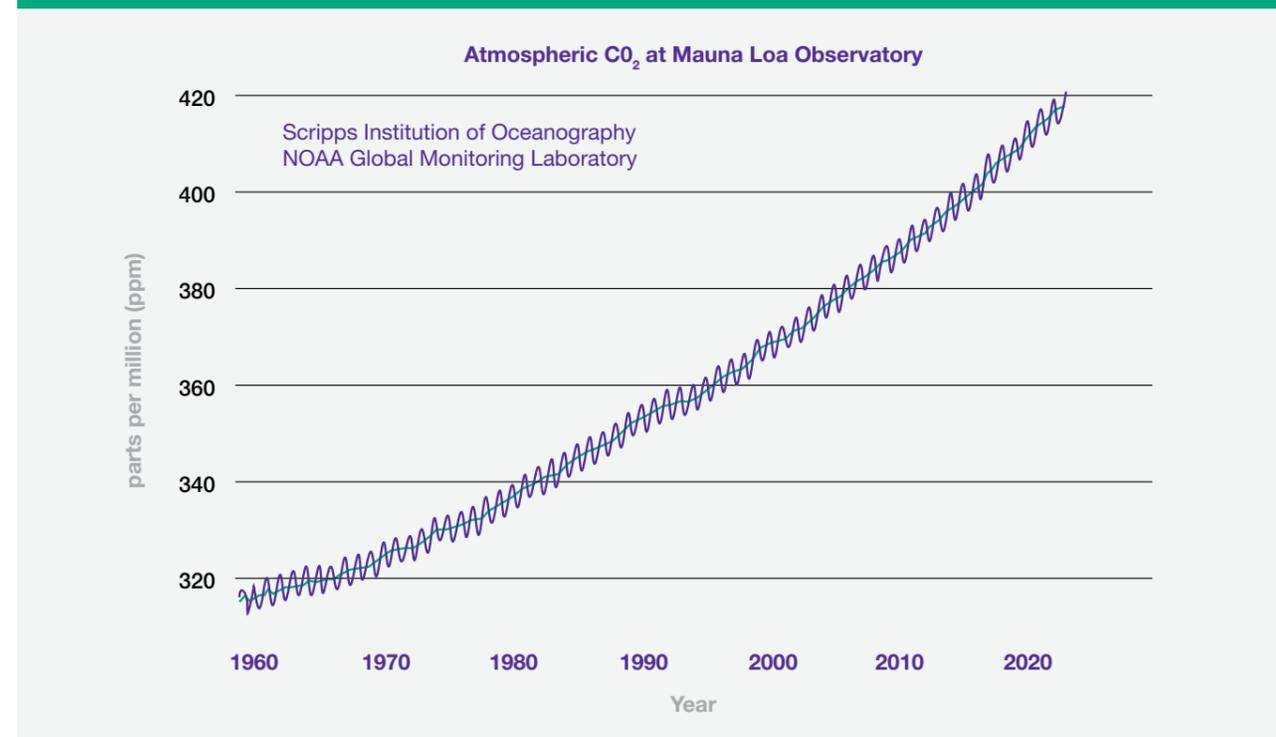
What is global warming?

Global warming is the long-term heating of the Earth's surface observed since the start of the industrial revolution. Global warming is caused by the build-up of manmade heat-trapping greenhouse gases (GHGs). There are 10 GHGs, each with their own chemical and physical properties and hence varying degrees of Global Warming Potential (GWP). Some of these gases can remain in the atmosphere for thousands of years. The most important GHGs are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). Concentrations of these key GHGs in the Earth's atmosphere have increased significantly since the Industrial Revolution

(See Figure 1). CO₂ is now 150% of its value in 1750. These gases are now more abundant in the Earth's atmosphere than any time in the last 800,000 years.¹⁴

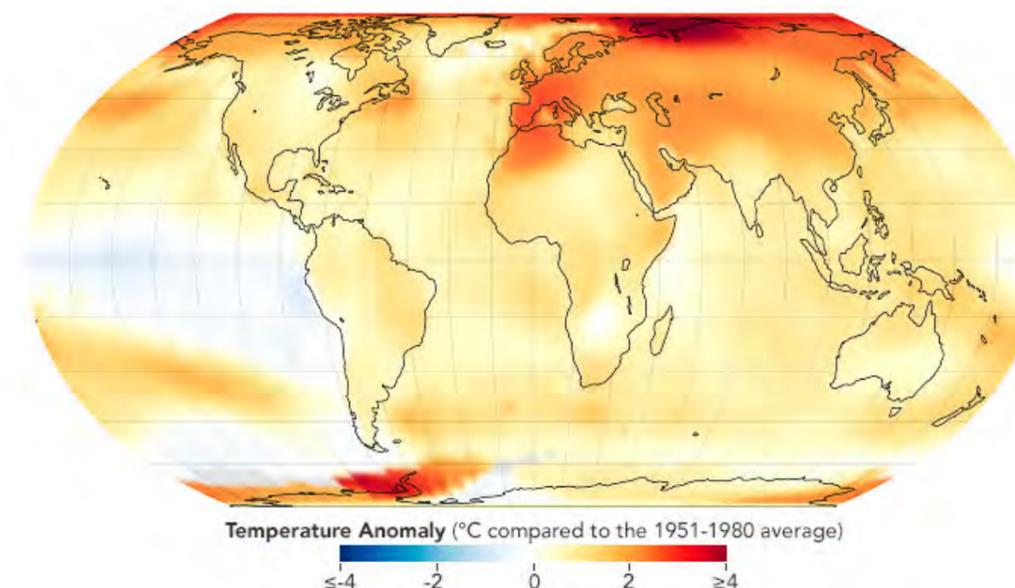
Global warming is best measured in terms of temperature anomalies. A temperature anomaly is a departure from a reference value or long-term average (typically 30 years). Temperature anomaly analysis by NASA's Goddard Institute for Space Studies (GISS) shows that global temperatures in 2022 were 0.89 degrees Celsius (1.6 degrees Fahrenheit) above the average for NASA's baseline period (1951–1980) (See figure 2). This makes 2022 the fifth warmest year on record.¹⁵

Figure 1: Atmospheric CO₂ concentrations as recorded at Mauna Loa Observatory 1960-2022 by the National Oceanic and Atmospheric Administration (NOAA)¹⁶



Note: The CO₂ data on Mauna Loa constitute the longest record of direct measurements of CO₂ in the atmosphere. They were started by C. David Keeling of the Scripps Institution of Oceanography in March of 1958 at a facility of the National Oceanic and Atmospheric Administration (NOAA) [Keeling, 1976]. The red lines represent the monthly mean values, centered on the middle of each month. The black lines and symbols represent the same, after correction for the average seasonal cycle.

Figure 2: Annual Temperature Anomalies 2022 as recorded by NASA's Goddard Institute for Space Studies (GISS)¹⁷



Note: This data visualization shows the 2022 global surface temperature anomaly compared with the 1951-1980 average

What is climate change?

Global warming is causing long term climate change, visible through physical changes to the environment like desertification and rising sea levels, species relocation and extinction, and more frequent extreme weather events. The impacts of climate change are more pronounced in the developing world despite these countries accounting for the smallest share of global GHG emissions. This disparity is commonly known as climate injustice. The societal consequences of climate change include crop failure, poverty, famine, and mass migration.

Climate change mitigation

Climate change mitigation is the reduction and removal of carbon emissions from the Earth's atmosphere to limit climate change. Carbon reduction involves the replacement of fossil fuels with renewables, resource efficiencies, and the use of materials with a low or zero carbon footprint. Carbon removal or sequestration involves the removal of CO₂ from the Earth's atmosphere by restoring and enlarging natural carbon sinks such as forests, peat bogs, and wetlands. A form of carbon removal can also be achieved technologically through Carbon Capture and Storage (CCS). However, this removes carbon before it enters the atmosphere. A combination of carbon reduction and removal

measures will be needed to deliver a "carbon neutral" or "net zero" planet- where all GHG emissions are balanced by removals.

The global policy response

The global response to climate change is coordinated by the United Nations through the United Nations Framework Convention on Climate Change (UNFCCC). 198 countries are party to this Convention and meet annually as the Conference of the Parties (COP). The 2015 COP produced the landmark Paris Agreement which aims to hold global warming to well below 2 °C above pre-industrial levels and pursue efforts to keep it below 1.5 °C. Ireland is one of the 196 signatories to the Paris Agreement. The UNFCCC is supported by the UN Intergovernmental Panel on Climate Change (IPCC) which collates peer-reviewed scientific evidence that provides policymakers with a basis for informed decision-making.

Global Carbon Budget

To meet the Paris Agreement goal of staying below the 1.5°C threshold, the IPCC determined in 2020 that the atmosphere can absorb only another 400 gigatonnes (Gt) of CO₂.¹⁸

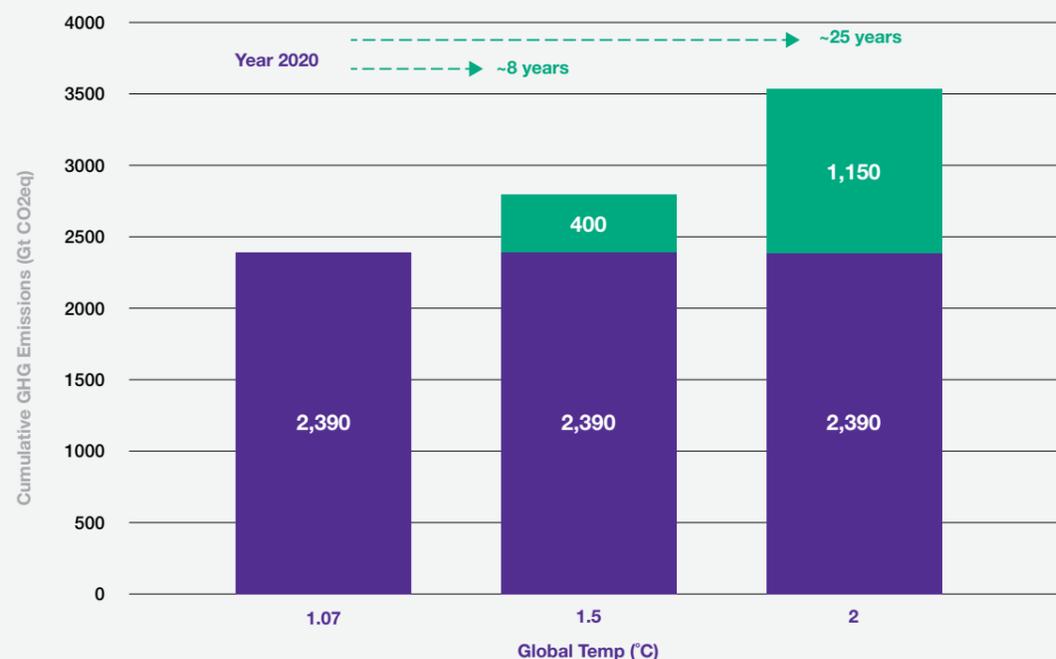
This is known as the global carbon budget. With current emissions trajectories, this budget will be

exhausted in less than six years, as demonstrated by the green element of the first bar in Figure 3 below.¹⁹

Likewise, the budget for staying below the 2°C

threshold is 1,150 Gt which will be exhausted in about 25 years.

Figure 3: Global Carbon Budget



The EU response

Ireland technically negotiated its Paris Agreement commitments as a part of a collective EU contribution. Through the European Green Deal, the EU has made a commitment to deliver net zero emissions by 2050 and reduce EU-wide emissions by 55% by 2030.²⁰ The EU aims to meet this 2030 target in part by reducing GHG emissions in Europe's Emissions Trading System (ETS) sectors (energy production, heavy industry, certain aircraft operations, and maritime transport) by 62%, and by reducing all other non-ETS emissions by 40% through binding Member State targets. To meet these targets, the EU is overhauling and strengthening all relevant energy and climate legislation through the [Fitfor55 process](#). This includes major reforms to the ETS Regulation, the Effort Sharing Regulation, the Renewable Energy Directive, and the Energy Efficiency Directive.

What is the EU ETS?

The EU ETS was launched in 2005 and is the world's largest carbon market. Participation is mandatory for all power stations and industrial sites with a net heat excess of 20 MW across the EU, Norway, and Liechtenstein. This covers around 40% of EU GHG emissions.²¹

The ETS functions as a cap-and-trade market. Participating installations must surrender tradeable permits called Allowances for every tonne of emissions they produce. The number of Allowances made available diminishes every year. The increasing scarcity puts a transparent price on carbon and gives a signal for investment in decarbonisation. There are approximately 100 ETS sites in Ireland, accounting for around 70% of Irish industrial emissions and all power generation emissions.²²

Through the European Green Deal, the sector must reduce emissions by 62% by 2030 compared to 2005 levels. Through the Fitfor55 process, the ETS scope is being expanded to include more aviation operations, and maritime transport. The rules are also being tightened to deliver faster increases to the price of carbon. In the coming years, the ETS will be supplemented by a Carbon Border Adjustment Mechanism (CBAM, placing an import duty on certain products from Third Countries, and a dedicated separate ETS for road transport and building fuels.

Ireland's response

In addition to its EU obligations, Ireland also has its own national targets and policies. The [Climate Change and Low Carbon Development \(Amendment\) Act 2021](#) sets out a legally binding target for Ireland to reduce GHG emissions by 51% by 2030 and achieve net zero emissions by 2050.²³ This ambition is guided by a long term GHG [emissions reduction strategy](#) and driven by annual [Climate Action Plans](#). The ambition demands a decoupling of Irish economic and demographic growth from emissions growth and decarbonisation in all sectors. This is enforced through a process of five-yearly national carbon budgets with very challenging sectoral emissions ceilings. These sectoral ceilings impose an emissions constraint on the economy with all growth required to stay within the allowed emissions envelope. The ceilings only apply at sectoral level – not company level. Most direct emissions by Irish business will be captured and tracked within the “Industry” and “Built environment - Commercial” categories. See Appendix 6 for a breakdown of Ireland's carbon budget and sectoral ceilings. Ireland has also joined a global pledge to collectively reduce methane emissions by 30% over the next decade. This additional target is of particular relevance for Ireland's primary agriculture sector which is responsible for most methane emissions in the State.

What is carbon footprinting?

To set a carbon footprint is to measure the total GHGs caused by an individual, event, region, product, or organisation. The GHGs each have unique physical properties that determine their potency for trapping infra-red radiation. Likewise, their residence time in the atmosphere once emitted depends on their chemical

properties. For accounting purposes, the tonnage of each GHG is therefore translated into a carbon dioxide equivalent tonnage (tCO₂e). For this reason, the word “carbon” is used informally (and incorrectly) as a byword for CO₂ and all other GHGs. A more accurate term for a carbon footprint is a GHG emissions inventory.

Carbon footprinting is not easy, as emissions are created in many ways, from fossil fuel combustion and certain chemical processes, to farming, food production and changes in land use. In recent years, new robust standards for carbon measurement have been created along with new ways of classifying emissions. This has helped create a level playing field and prevent the misrepresentation of carbon impacts, a practice commonly known as greenwashing. The gold standard for carbon footprint measurement is the GHG Protocol Corporate Accounting and Reporting Standard (2004) (GHG Protocol), which forms the basis of this toolkit.

Emissions categories

When assessing the carbon footprint/emissions inventory of an organisation, GHG emissions can be divided into three broad categories (Figure 4). These categories are called “scopes” and are defined for GHG accounting and reporting purposes by the above mentioned GHG Protocol.

- **Scope 1 emissions** are directly created from sources owned or controlled by the company, such as boilers, furnaces, vehicles, or from equipment used in processes like chemical production.
- **Scope 2 emissions** are indirectly created from purchased electricity, heat, cooling, or steam that is consumed by the company. These emissions are indirectly emitted by organisations but can be controlled depending on the amount of energy procured.
- **Scope 3 emissions** are indirectly created as consequence of the activities of the company but occur from sources associated with suppliers and/or customers, hence not owned or controlled by the company. These emissions can be difficult to identify and measure because of data gaps and supply chain complexities. For this reason, many target setting and disclosure frameworks give SMEs

flexibility on Scope 3 emissions. However, because they can form a major part of an organisation's

overall footprint, there is increasing focus on Scope 3 reductions.

Figure 4: Scope 1, 2 and 3 Emissions²⁴

Upstream value chain		Company Operated	Downstream value chain	
Scope 3		Scope 1	Scope 3	
Indirect emissions from upstream stages		Direct emissions - controlled facilities		
Daily commute of employees	Purchase of materials and services	Company owned vehicles	Investments in joint ventures M&A, holding companies	Transportation and distribution
Embedded emission in buildings & equipment	Emissions linked to fossil fuel extraction, T&D losses, energy	Combustion of natural gas and other fuels in owned facilities	Emissions because of selling & usage of product	End-of-life disposal and treatment of sold products
Embedded emissions in leased buildings, vehicles, assets	Employee air and rail travel, car rentals (business travel)	Scope 2	Emissions from franchises	Leased Assets
Transportation and distribution	Scrap/Waste generated in the production facilities	Indirect emissions from procured energy		
Capital Goods		Purchase of electricity and heat in company owned facilities		

Carbon offsetting

Offsetting is a form of accounting where purchased carbon credits are used to balance continued emissions production by an organisation, place, event, or even an individual or household. These credits typically relate to carbon reduction or removal projects happening elsewhere, often in the developing world. The total volume of GHGs emitted by the entity remains unchanged unless the purchase of credits is used to drive additionality in mitigation (hence an overall emissions reduction). As a rule, offsetting should be a last resort, restricted to hard-to-mitigate sectors where carbon reduction opportunities are technologically or financially challenging. There are also restrictions on the use of offsetting as a tool in emissions reduction frameworks like the SBTi. Offsetting is also prohibited in domestic legislation as a means for Ireland to meet its national emissions reduction targets, although trading of certain compliance credits between EU member states is allowed.

Climate change and the role of the circular economy

A key driver of climate change is the inefficient, non-circular use of finite natural resources. The global economy is built on a linear take-make-waste consumption model where raw materials are collected, transported, transformed into products, used, and then discarded as waste. GHGs emissions are created at each stage and the problem is getting worse.

Global material consumption has trebled from 92 billion tonnes in 1970 to 26.7 billion tonnes in 2017. This is in line with population and economic growth. Waste volumes have also surged. Today we generate approximately 2bn tonnes of municipal waste every year with 37% entering landfills and waterways. Municipal waste is set to grow by 70% by 2050.²⁵

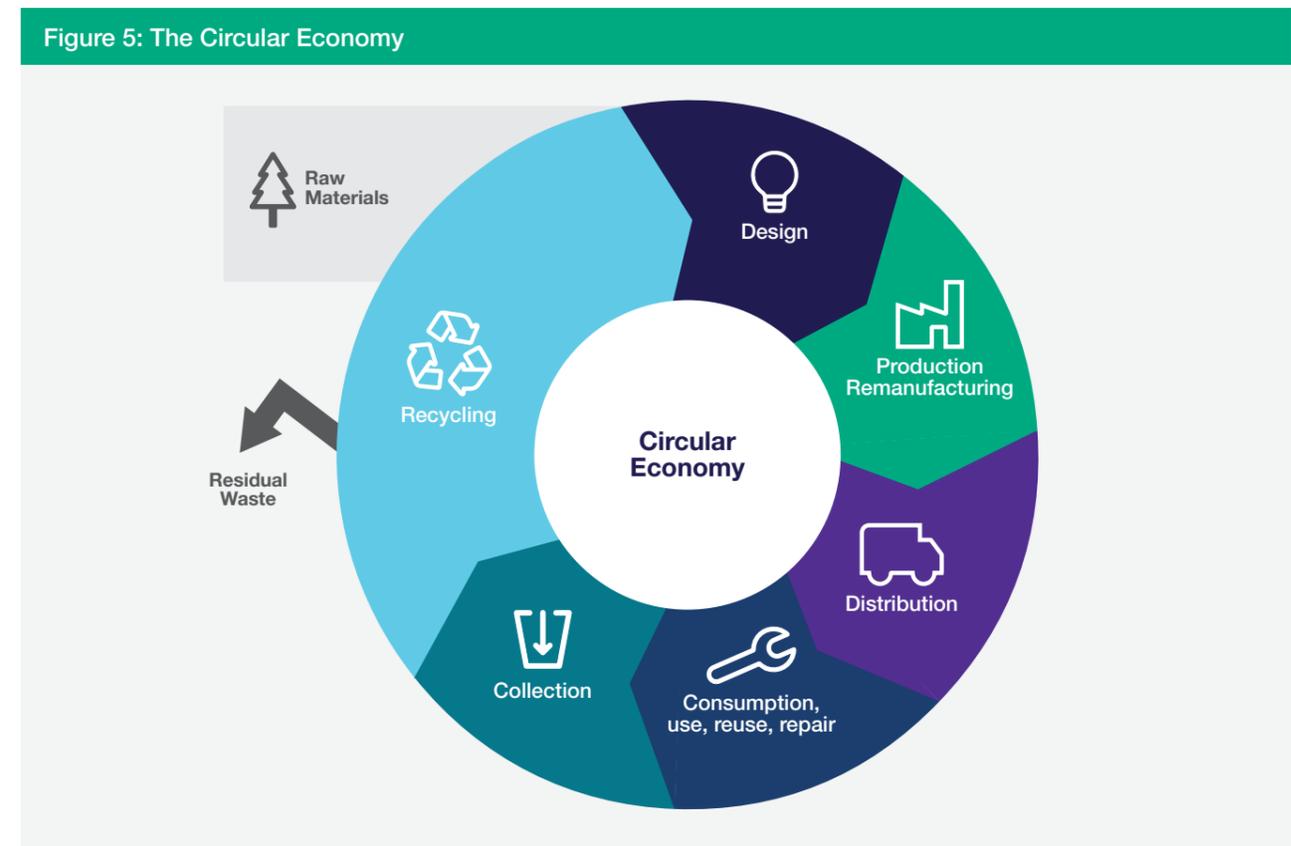
The solution is reduced consumption and the transition to a circular economy where resources are used to their maximum value and form part of an enduring cycle of reuse, recovery, and regeneration. For

businesses this requires innovations in how products are designed, produced, and used by consumers. According to Eurostat, Ireland has one of the lowest levels of circularity in the EU.²⁶ Government policy is to bring it above the EU average, approximately a six-fold increase.

This is much more than a climate change issue. The resources exploitation itself can damage local habitats and biodiversity while the mismanagement of end-of-life waste pollutes our air, waterways and landbanks.

This in turn damages delicate ecosystems, biodiversity, and public health. The transition to a circular economy therefore brings multiple benefits.

Because GHG emissions are officially counted at the point of production not consumption, there are significant GHG emissions associated with activity in Ireland unrecorded. A planned 2023 review of Irish GHG emissions on a consumption basis will help bridge this gap and strengthen the link between national climate and circular economy goals.²⁷



Voluntary sustainability reporting

There is a growing menu of sustainability reporting and disclosure initiatives for businesses to choose from. The space is very cluttered and can be difficult to navigate. Some of these initiatives like the GRI, B Corp, and the UN Global Compact cover the full breadth of ESG matters. Others like the SBTi and the CDP focus exclusively on GHG emissions.* On top of this, there are many sector and country specific initiatives and pledges. When selecting a framework, businesses must be guided by its materiality and relevance, the target audience, stakeholder demands,

*See Appendix 1 for more information on these initiatives.

and critically, in-house capacity to carry out what could be a significant undertaking. Before signing up to a framework, it is best practice to carry out a formal "materiality assessment" mapping the most relevant ESG risks, activities, and opportunities across the organisation.

Mandatory sustainability reporting

Mandatory sustainability reporting and disclosure obligations are becoming commonplace globally. Within the EU, the new Corporate Sustainability Reporting Directive (CSRD) requires obligated

companies to provide detailed information annually on their impacts and approach to sustainability.²⁸

This includes details about the company's net zero transition planning, sustainability targets, due diligence practices, risk areas, and remedial actions. Obligated companies must also disclose how much of their turnover and expenditure is "sustainable" as defined by the EU's Taxonomy for sustainable activities. The CSRD, when transposed, will apply to all large public and private EU undertakings, with a phased implementation. Many SMEs will be impacted indirectly if they are part of an obligated party's supply chains, and some will be obligated directly from 2026. Meanwhile, the Sustainable Finance Disclosure Regulation (SFDR) places additional disclosure obligations on financial market participants, financial advisers, and certain financial products.²⁹

Organisational emissions and product-level emissions

This toolkit focuses on organisational emissions and the development of a company-wide climate action strategy. However, many firms would like to measure and possibly market the carbon footprint and life cycle emissions of a particular product or service. This is a separate undertaking and typically follows the development of an organisation-wide footprint and climate strategy. Businesses interested in this topic should consult the GHG Protocol's "The Product Life Cycle Accounting and Reporting Standard" and consult life cycle emissions databases like *ecoinvent*.³⁰ However, it is advisable that businesses first map their wider organisational footprint using the five steps set out in the next chapter.

What is ESG?

ESG stands for environmental, social and governance. The acronym was first used by investors applying ESG considerations and criteria when valuing investment assets and opportunities. Today it is used more widely in the business world where it has become a framework for organisations to manage their overall corporate sustainability. A good ESG or sustainability strategy enables organisations to address their bad ESG practises and risk areas in a systematic way. ESG encompasses a wide range of issues from climate action to human rights and employee wellbeing. Because of this, organisations beginning their ESG journey are required to carry out a "materiality assessment" of all ESG areas. This helps determine the areas of greatest exposure and ensures the organisation prioritises the right issues. This Climate Action Toolkit can be used to support the climate aspects within an ESG strategy.

3



Climate Action
Strategy Development
– Five Steps

Overview

In this chapter we set out a best practice approach for your business to develop a robust and enduring climate action strategy. This approach is rooted in the GHG Protocol.

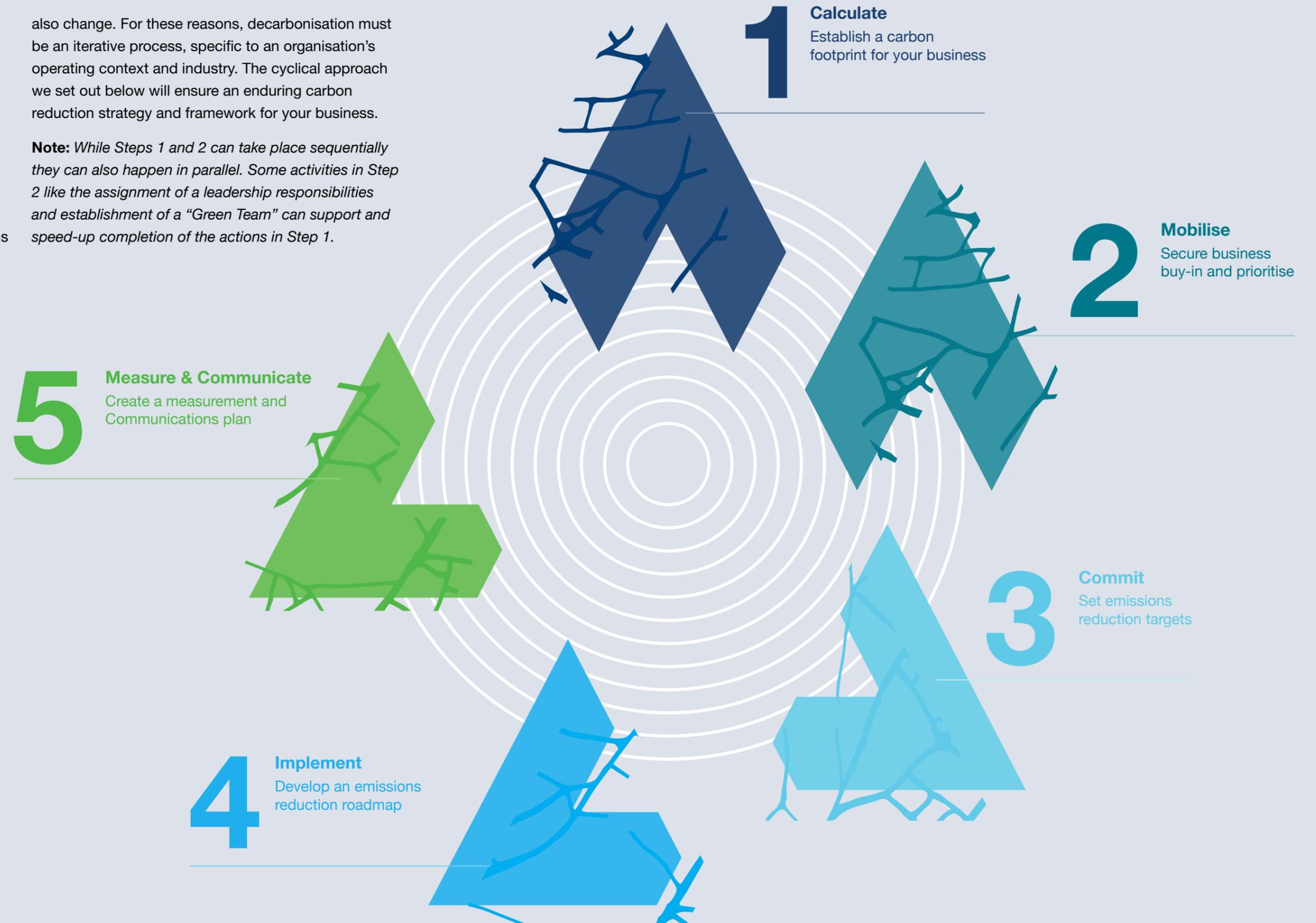
In this chapter we break down the journey and tasks you need to complete into five steps (See Figure 6). This approach begins with the establishment of an emissions baseline, takes you through target setting and strategic implementation, and concludes with the measurement, monitoring and communication of your progress.

The approach is cyclical. This is because businesses and their emissions profile change over time. New products, services, suppliers, customers, and locations can all impact GHG volumes. Policy and regulation

also change. For these reasons, decarbonisation must be an iterative process, specific to an organisation's operating context and industry. The cyclical approach we set out below will ensure an enduring carbon reduction strategy and framework for your business.

Note: While Steps 1 and 2 can take place sequentially they can also happen in parallel. Some activities in Step 2 like the assignment of a leadership responsibilities and establishment of a "Green Team" can support and speed-up completion of the actions in Step 1.

Figure 6: A five-step approach to reducing organisational GHG emissions



1

Calculate

Establish a carbon footprint for your business

Overview

A company's GHG emissions baseline refers to the emissions produced by all its activities at a certain point in time. It is informally called a carbon footprint but more accurately called a GHG emissions inventory.

A GHG emissions baseline is the starting point against which progress can be measured. A company's emissions baseline must be set using a respected and credible methodology. This will give the business verifiable emissions data, enabling them to participate in carbon disclosure frameworks, set reduction targets, address emissions drivers, and monitor progress.

When setting a baseline, a business must first define its business and operational boundaries, identify all GHG emissions sources across the organisation, and then calculate the total volume of emissions for a given year or period.

Choose a base year

Businesses should choose a base year for which verifiable emissions data is available or use an average of several consecutive years. When selecting the base year, businesses must bear in mind that future business and operational changes and/or the emergence of more accurate data could alter the company's emissions profile requiring a recalculation of the base year. This would include a major structural change like an acquisition or divestment, the outsourcing or insourcing of emitting activities, or changes to the emissions factors used to quantify the GHG emissions produced by a given activity.

Set organisational boundaries

Businesses need to set their organisational boundaries. This is important because it allows the business to establish and consolidate its emissions footprint for the selected base year. This is not always straightforward as business operations can vary considerably in their legal and organisational structure. Businesses can be wholly owned operations, incorporated and non-incorporated joint ventures, subsidiaries, and cooperatives.

There are two established approaches to setting organisational boundaries. Under the **equity share** approach, a company accounts for GHG emissions from operations according to its share of equity in the operation. This approach reflects economic interest. Under the **control approach**, a company accounts for 100% of GHG emissions from operations over which it has control. Control can be defined in either financial or operational terms. If the reporting company wholly owns all its operations, its organizational boundary will be the same whichever approach is used.

Set operational boundaries

Once a company has set its organisational boundaries, they must set their operational boundaries. The operational boundary defines the scope of direct and indirect emissions within the organisational boundaries. This task involves identifying emissions associated with the organisation's operations, categorizing them as direct and indirect emissions, and deciding what emissions categories should be included or excluded in the inventory based on business goals and stakeholder demands. To complete this task, businesses must recognise the most common emissions sources and understand the difference between Scope 1,2 and 3 emissions as summarised in the previous chapter

Identify emissions

GHG emissions typically occur from the following sources.

- i. stationary combustion: the combustion of fuels in stationary equipment like boilers, engines, furnaces, incinerators etc
- ii. mobile combustion: the combustion of fuels in transportation devices like cars, trucks, airplanes, forklifts, and ships.

- iii. process emissions: emissions from physical or chemical processes such as CO₂ from the calcination step in cement manufacturing
- iv. fugitive emissions: intentional and unintentional from equipment leaks or fugitive emissions from refrigeration units, pits, wastewater treatment, coal piles etc
- v. Biogenic and LULUCF emissions: methane emissions caused by enteric fermentation in primary agriculture and CO₂ emissions from Land Use, Land-use Change and Forestry (LULUCF).

Categorise emissions

Once all operational emissions have been identified, the business must categorise them as direct or indirect i.e., Scope 1,2 or 3.

- i. As a first step, a company should identify its direct emissions sources in each of the five source categories listed above.
- ii. The next step is to identify indirect emissions sources from the consumption of purchased electricity, heat, or steam. Almost all businesses generate indirect emissions due to the purchase of electricity for use in their processes or services
- iii. Finally, a company should identify other indirect emissions from a company's upstream and downstream activities including any emissions associated with outsourced/contract manufacturing, leases, or franchises not included in scope 1 or scope 2.

Top Tip: Establish a Green Team

It is best practice for organisations to establish an internal group or Green Team to support and guide the development and implementation of the climate action strategy. This group could be chaired by the project leader and should bring together expertise from different parts of the organisation e.g., facilities and engineering, finance, human resources, compliance and risk, sales, marketing etc. This group can help at this early stage with the identification of emissions drivers. Later it can form an important sounding board and expert group for the identification of decarbonisation opportunities, implementation risks,

and business and employee impacts. A diverse group will also assist the collection of data needed to support the Measurement and Communications Plan.

Decide what emissions to include

Scope 1 and 2 emissions must be included in an organisation's emissions baseline without exception. However, a company can decide to exclude Scope 3 emissions in certain circumstances. Scope 3 emissions are harder to map, monitor, and mitigate against. Consequently, many reporting and target-setting frameworks give SMEs flexibility when accounting for and reporting Scope 3 emissions.

Scope 3 emissions may also be omitted for some companies if the associated footprint is a small portion of the overall emissions inventory. For example, the SBTi has specified that if Scope 3 emissions account for less than 40% of total emissions, they do not need to be included within a company's target.³¹

Starting with Scope 1 and 2 allows the business to better understand the baselining process and develop an understanding of what is involved.

Calculate GHG emissions

Once a company has identified where its emissions are coming from, they must then calculate them. There are 3 different ways to calculate emissions.

1. Most businesses calculate their emissions using documented emissions factors. An emissions factor is a rate given to convert activity data into GHG emissions and express those GHG emissions in terms of CO₂ equivalence (tCO₂e).
2. Two less common calculation approaches are the direct measurement of GHG emissions and the mass balance approach.

Below we set out the steps a business should take when using the more common approach using documented emissions factors.

a. Collect activity data

The business must start this process by collecting activity data for all their identified emissions sources during the selected base year. Standard business

metrics are used to quantify these activities. For example, km travelled by company vehicles, metered electricity consumption, litres of oil used to heat a building, kg of a certain raw material used in the manufacture of products.

b. Select emissions factors

Business must then select the most accurate and appropriate emissions factors available. There is a wide range of emissions factors for businesses to choose from. They are developed by international organisations, government departments, state agencies, industry bodies, energy companies (typically found on energy bills), and businesses. Emissions factors for fuel use and common business activities like air travel can be easily found. But reliable emissions factors for very specific technical activities may be hard to find.

Emissions factors vary considerably in their accuracy. The IPCC grades or tiers emissions factors according to their accuracy and underlying methodological complexity. Tier 1 emissions factors are considered the least accurate and are based on country or sector level data. Tier 2 and 3 emissions factors are more accurate and developed using detailed and measured data.

Businesses can use a combination of tiers when setting their baseline. For most businesses, Tier 2 emissions

factors data should be readily available for calculating their Scope 1 and 2 emissions. However, Tier 2 and 3 emissions factors for Scope 3 emissions can be hard to find. Whatever emissions factors are selected, it is important to be transparent about the tiers used when calculating an emissions baseline. While it is acceptable to only use Tier 1 and Tier 2 emissions factors, businesses should strive to enhance the accuracy of the emissions factors they use over time as new information becomes available.

The SEAI provides country level (Tier 2) energy emissions factors for most Scope 1 and 2 emissions producing activities. While not Irish-specific, the UK's Department for Business, Energy & Industrial Strategy (BEIS) provides a more comprehensive catalogue, including emissions factors for travel, freight, upstream energy production (well-to-tank), material use, waste disposal and hotel stays. These two resources are updated regularly and are a good starting place for Irish SMEs. The SEAI's 2022 emissions factors are reproduced in Appendix 3 for your reference. Appendix 5 includes a list of other useful data sets and resources.

c. Calculate using emissions factors

Once activity data is collected and the emissions factors have been selected, the business can calculate its emissions baseline using the formula below.

Figure 7 - GHG Emissions Calculation Formula³²

Formula	Activity Data	x	Emissions Factor*	=	GHG Emissions
Example for calculating emissions for use of diesel in a company car.	e.g. 5 Litres of Diesel consumed in a company car in outbound logistics activity		e.g. 1 Litre of Diesel = 2.7 kg CO ₂ eq		e.g. 13.5 kg CO ₂ eq emitted

Additional Resources

To help with the calculation process, the [GHG Protocol](#) provides several cross-sector and sector-specific GHG calculation tools and guidance documents. These tools have been peer-reviewed and are regularly updated. They are essentially electronic preprogrammed **Excel** spreadsheets where company level activity data and emissions factors can be inserted. They are accompanied by **Word** guidance documents brining companies through the calculation process above only in more detail. These tools are optional. Businesses can choose to use third party software or develop their own spreadsheets if preferred.

Note: Emissions calculation in multi-site businesses

There are two approaches for calculating baseline emissions in multi-site organisations.

- a. **Centralised:** individual sites report activity/ fuel use data (such as quantity of fuel used) to the corporate level, where GHG emissions are calculated.
- b. **Decentralised:** individual sites collect activity/ fuel use data, directly calculate their GHG emissions using approved methods, and report this data to the corporate level.

The difference between these two approaches is in where the emissions calculations occur (i.e., where activity data is multiplied by the appropriate emissions factors). Under both approaches, staff at corporate and lower levels of consolidation must take care to identify and exclude any scope 2 or 3 emissions that are also accounted for as scope 1 emissions by other facilities, business units, or companies included within the organisational boundary. This ensures quality data and prevents underreporting or double counting of emissions.



2

Mobilise

Secure business buy-in and prioritise

Once a business has established an accurate baseline, the foundation is laid for the setting of emissions reduction targets and the development of a robust decarbonisation strategy.

However, before progressing further, it is critical that the business secure company-wide buy-in and support for the journey ahead. To meet the organisation's climate ambitions, big transformations will likely be needed to the organisation's corporate strategy, growth and investment plans, company culture, supply chains, and day-to-day operations.

Climate leadership

Leadership from the top is critical. The CEO, Senior Management Team and Board must be fully committed to the company's climate agenda and the new direction the business is about to take. This is not always easy. The implementation of certain emissions reduction interventions could bring increased costs, reducing available capital for other projects.

Certain business expansion projects or investments that have been in motion for a long time may need to be substantially reviewed and Board members will need to balance their fiduciary responsibility with the company's climate and broader sustainability goals. The following activities can help secure buy-in at all levels of the organisation.

Training and upskilling

Customised training can help secure buy-in and support to meet company climate goals. It is important that staff understand why change is necessary and how decisions big and small can impact the company's emissions profile. Training will be needed at all levels. However, in the early stages, the focus should be on enhancing climate and sustainability literacy at Board and Senior Management level. The leadership needs to understand the changing imperatives and risks facing business as set out in Chapter 2 of this document. At Board level, fiduciary responsibilities have changed with the emergence of new climate related risks and threats. Programmes such as Ibec Academy's ESG Competent Boards™ Certificate and Designation (GCBD) can help build this necessary climate and sustainability literacy.

Review company strategy and growth plans

Senior management must develop a thorough understanding of how their business contributes to climate change, and in turn how climate change and the policy response to climate change impacts their business. This concept is called "double materiality" and it is already well established in investment and financial services circles. Forwarding thinking businesses are embracing this concept and updating their risk register and risk mitigation strategies accordingly.

Management needs to become familiar with the main emissions drivers and understand how growth in all its forms (increased sales, new sites, bigger budgets) can increase emissions. But management also needs to learn how growth and emissions reduction are not mutually exclusive. As set out in Chapter 2, it is in the business' commercial and financial interest to become more sustainable.

Management needs to adopt a new low/zero carbon attitude when making decisions. Again, this is not easy. Often, the benefits of decarbonisation are overshadowed by the immediate costs. A practical way of addressing this challenge is to develop an internal upward carbon shadow price which businesses can then factor into investment decisions and business operations.

Assign leadership responsibilities

The CEO is ultimately responsible for the delivery of organisational climate goals. However, for greatest impact, climate goals, metrics and considerations needed to be embedded in all leadership roles at C-suite level, and ideally at all levels within the organisation. The same applies if the business has a wider sustainability or ESG strategy. For example, a Chief Finance Officer could take ownership of carbon reporting, while the responsibility for reducing emissions within supply chains could fall to whoever covers procurement.

Embedding sustainability across leadership roles can be supported and supplemented with the creation of a Chief Sustainability Officer (CSO). A CSO typically has day-to-day responsibility for the coordination and implementation of the organisation's climate or sustainability strategy. For greatest impact, they should have a direct line to the CEO, be able to work closely with other C-Suite leaders, be present when major decisions are made, have the capacity to bridge gaps in the organisation, and see sustainability in its widest sense, encompassing all material ESG matters. The CSO could also be the project leader for the climate action strategy and chair the Green Team.

Establish a Green Team

It is best practice for organisations to establish an internal group or Green Team to support and guide the development and implementation of the climate action strategy. This group could be chaired by the project leader and should bring together expertise from different parts of the organisation e.g., facilities and engineering, finance, human resources, compliance and risk, sales, marketing etc. This group can help with the identification of emissions drivers, decarbonisation opportunities, implementation risks, and business and employee impacts. A diverse group will also assist the collection of data needed to support the Measurement and Communications Plan (Step 5).

Engage employees

Decarbonisation is a major culture change project, and like any change in business it requires company-wide buy-in to be successful. In addition to training and upskilling, businesses should consider internal communication campaigns reminding employees of the company strategy and offering practical advice on how to cut emissions in their day-to-day activities. Businesses could also consider reward and incentive schemes at team or individual level, and competitions to develop new lower carbon processes and products. Providing teams with the capacity to embed emissions reduction in their working day, as opposed to making it an additional task in an already busy schedule, will increase the likelihood of success.



3

Commit

Set an emissions reduction target

Target Setting

Effective climate action requires setting a GHG emissions reduction target. Emissions reduction targets set out the organisation's climate ambition.

Externally they help communicate the business commitment to tackling climate change. Internally they help drive the transformation of the business and ensure decision making and growth plans align with emissions reduction trajectories.

The GHG Protocol sets the gold standard for target setting. By sticking to the guiding principles in the GHG Protocol, companies can be confident that their targets will be scientifically robust and will meet the demands of key stakeholders. The process set out below is rooted in the GHG Protocol's guidance on target setting.

1. Decide on a target-setting framework

Business can set their target independently, in cooperation with sectoral peers, or as part of a pre-existing target-setting framework or initiative like the SBTi. The value of participating in an established target setting framework with known methodologies is that they can secure instant trust and credibility among

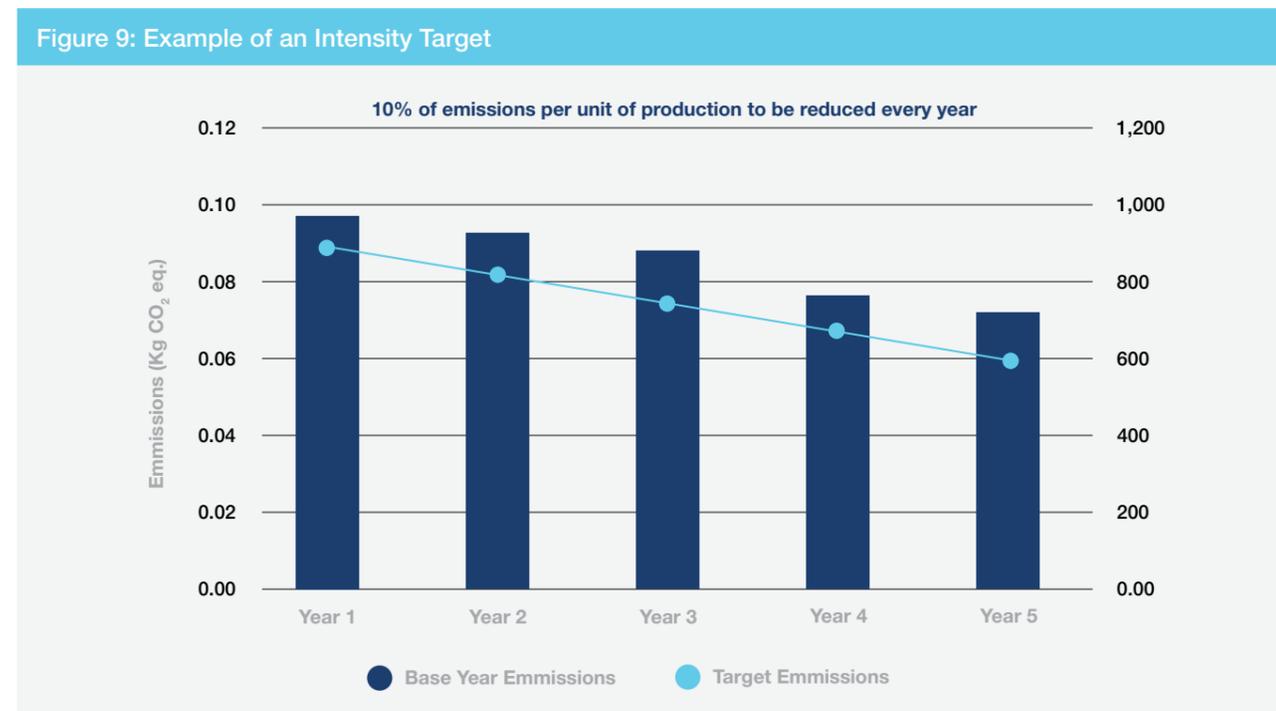
stakeholders. Initiatives like SBTi also have strong brand recognition, provide useful marketing collateral to participants, and offer sector specific resources and training. Appendix 1 contains a summary of the main corporate sustainability frameworks including target setting initiatives.

2. Decide on the target type

There are two broad types of GHG targets: absolute and intensity-based. An absolute target is usually expressed in terms of a reduction over time in a specified quantity of GHG emissions to the atmosphere, the unit typically being tonnes of CO₂e per annum. An intensity target is usually expressed as a reduction in the ratio of GHG emissions relative to another business metric. This could be the output of the company (e.g. tonne CO₂e per tonne of product, per kWh of energy used, per tonne of passenger or freight mileage) or some other metric such as sales, revenues or office space. See examples of the two approaches below

Figure 8: Example of an Absolute Target





Both absolute targets and intensity targets have benefits and drawbacks.

- **Absolute targets** are designed to reduce a specified amount of GHGs from the atmosphere. However, they do not allow comparison in terms of operational efficiency. Emissions can decrease due to a reduction in production, not because of a company's climate action performance. Also, they can be difficult to achieve when a company is expanding. Absolute targets are increasingly favoured by NGOs and target setting frameworks.
- **Intensity targets** reflect GHG performance improvement and do not usually require target base year recalculations for structural changes. Critically, however, they do not ensure that absolute GHG emissions will be reduced, only the intensity of emissions from operations have been reduced. If operations increase in scale, GHG intensity can drop while absolute emissions increase. In some cases, where the emissions intensity decreases due to improved process efficiency, there may be a 'rebound effect' whereby production unit costs also decrease, and customer demand may be stimulated because of competitive pricing.

3. Decide on the target boundary

The business must define which GHG emissions, geographic operations, emissions sources, and activities are to be covered by the target. The target and operational boundary can be identical, or the target may address a specified subset of the emissions sources included in the company inventory. For example, Scope 1 and 2 emissions only.

4. Choose the target base year

Targets must be set in relation to past emissions in a way that is credible and transparent. While it is possible to use different years for the emissions baseline year and the target base year, it usually makes sense to use the same year for both.

There are two approaches a business can take.

- A fixed target base year: Most GHG targets are defined as a percentage reduction in emissions below a fixed target base year (e.g., reduce CO₂ emissions 40% below 2018 levels by 2030). It is also possible to use a multi-year average target base year.
- A rolling target base year: With a rolling target base year, the base year rolls forward at

regular time intervals, usually one year, so that emissions are always compared against the previous year (e.g., reduce CO₂ emissions by 2% every year compared with the previous year from 2023 to 2030).

5. Define the target completion date

This will determine if the target is short or long-term. Long-term targets with ten-to-thirty-year timelines facilitate long-term strategic planning, while five-to-ten-year targets may be more practical for organisations with shorter planning cycles. It is best practice to have both long and short-term targets.

6. Define the length of the target commitment period

This is the period during which emissions performance is measured against the target. It ends with the target completion date. Businesses can choose a single year commitment period (e.g., 2030 compared to 2020) or a multi-year commitment period (e.g., 2028-2033 compared with 2020). The multi-year approach helps mitigate the risk of unpredictable events in one particular year influencing performance against the target.

7. Decide on the use of offsets and credits

A GHG reduction target can be met entirely from internal reductions at sources within an organisation's target boundary or by using offsets that are generated from GHG reduction or removal projects external to the target boundary. The use of offsets may be appropriate when the cost of internal reductions is too high and opportunities for reductions are technologically limited. Within target setting frameworks, there are usually strict rules on how much of a target can be met through offsets and credits. When reporting on the target, it should be specified whether offsets are used and how much of the target reduction was achieved using them.

8. Establish a target double-counting policy

This step addresses double-counting of GHG reductions and offsets, as well as allowances issued by external trading programmes. It only applies to companies that engage with GHG offset trading or

have corporate target boundaries that interface with other companies' targets or external programmes.

9. Decide on the target level

The decision on setting the target level should be informed by all the previous steps. Additional considerations include:

- the reduction opportunities available
- mitigation costs and return on investment criteria
- Future growth, expansion, and relocation plans
- Board/Senior Management support
- The targets set by industry peers and competitors
- Existing environmental or energy plans
- The accuracy of the emissions baseline
- Alignment with national sectoral ceilings and Paris Agreement goals
- The rules of the target-setting framework (if selected)

10. Verify target

Once baseline emissions have been calculated and reduction targets have been selected, it is best practice to secure independent verification from an accredited third party. Verification is an objective assessment of the accuracy and completeness of reported GHG information and the conformity of this information to pre-established GHG accounting and reporting principles. Independent external verification is a good way of ensuring transparency and securing the confidence of key stakeholders.

If the company is participating in an existing target-setting framework, verification is normally done by the selected organisation. There are also many specialist organisations that do this as a professional service. When selecting a verifier, it is important that they are accredited and can show previous experience and competence in undertaking GHG verifications, an understanding of GHG issues including calculation methodologies, some familiarity with the sector, and a capacity to understand the unique emissions driving activities of the business.

4

Implement

Develop an emissions reduction roadmap

With decarbonisation goals set, it is now time to focus on business transformation. To ensure targets are met, businesses must review the existing company strategy and plans to ensure they are fully aligned with the organisation's new climate ambition.

This is also the time to develop an Emissions Reduction Roadmap setting out all the interventions the business intends to take to reduce emissions and achieve their targets within the specified timeline.

Developing a Mitigation Roadmap

An effective emissions reduction roadmap is critical to the delivery of an organisation's climate goals. A good roadmap will set out all the interventions the business will take to reduce its emissions in the agreed timeframe. Mitigation roadmaps will include both small interventions like efficiency improvements that lead to marginal emissions savings, and large interventions, like boiler replacements, that lead to significant reductions. Emissions roadmaps must have a clear timeline and be sufficiently agile to deal with unexpected events, new innovations, and changing business needs or goals.

1. Identify mitigation options

The first step in developing a roadmap is the identification of emissions reduction or mitigation options. To do this, it is recommended that the organisation use the expertise of its Green Team to review its baseline emissions inventory. Bringing in internal and external subject matter experts at this stage can also provide an objective review of the inventory list, the largest emissions drivers, barriers, and potential solutions.

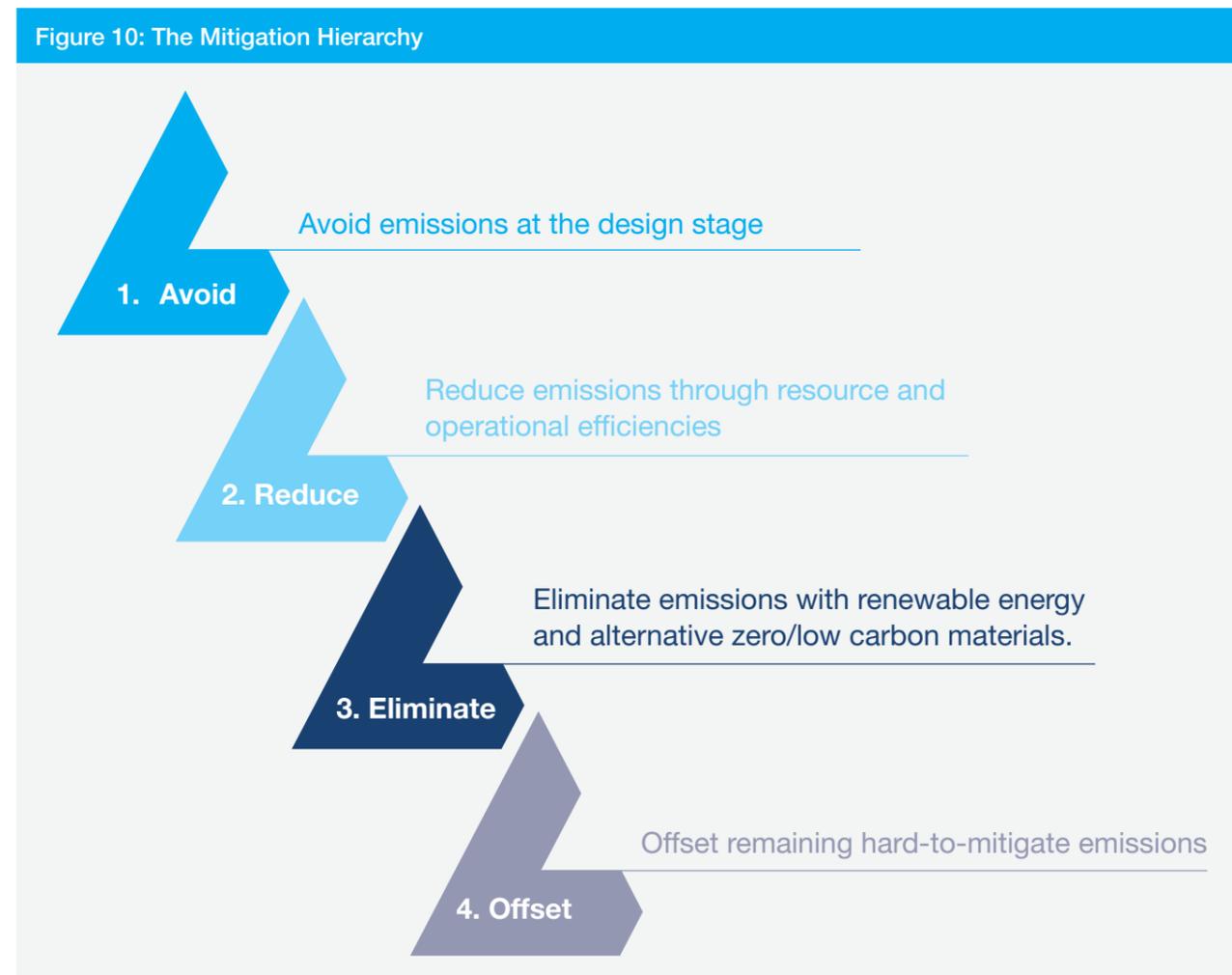
When considering mitigation opportunities, it is important that businesses recognise that not all interventions are physical projects or internal operational changes. Significant emissions savings can be made, especially in Scope 3, through collaboration with suppliers, service providers, customers, neighbouring businesses, and sectoral peers.

When deciding on the actions to take, companies should consider the following questions:

- Will this intervention reduce emissions and by how much?
- Will the reductions be sustained permanently or over a period of time?
- Does this intervention undermine long term targets? Is it overly focused on short term gains?
- What is the cost of this solution, and does it make financial sense?
- Have we considered more cost-effective solutions to this particular emissions challenge? (See mitigation hierarchy below)
- Are there barriers to implementation?
- Are there risks associated with a particular intervention?
- Are there co-benefits beyond emissions savings e.g., reduced costs, enhanced resilience, greater employee wellbeing, increased share value, a good story to tell?

2. Prioritise interventions using the Mitigation Hierarchy

Before choosing and implementing any projects to reduce emissions, companies should consider the mitigation hierarchy to ensure they see the most return for their efforts and are prioritising the right solutions. There are four steps:



GHG Emissions Avoidance: Through sustainable and considerate design principles, emissions sources can be avoided before they're created. This eliminates the requirement to follow any further steps in the GHG emissions reduction hierarchy. This can be achieved by looking at a business's supply chain to understand where emissions may emerge and identify solutions to avoid them. For example, office design, company location, haulage requirements, and choices in relation to the procurement of GHG intensive raw materials can all play a role in GHG avoidance.

GHG Emissions Reduction: Reduce or replace own emissions by using less resources, optimising operations and using different sources of energy or materials. Depending on an industry's emissions profile and inventory, the area with the biggest emissions impact can be reviewed and assessed to understand how to reduce their emissions. Examples include

energy efficiency, recovery of waste heat, optimising transport logistics, and modernising equipment.

GHG Emissions Elimination: This approach involves the elimination of GHG emissions through the use of climate friendly alternatives in the business and value chain. For example, switching to renewable electricity or gas to eliminate fossil oil consumption. Another example might be a change in the raw materials used to make products and packaging, particularly if this facilitates the use of secondary raw or repurposed materials.

GHG Emissions Offsetting (removal): Offsetting reduces GHG emissions in one location to compensate for emissions elsewhere. By balancing emissions-causing activities and emissions-reducing activities, net atmospheric GHG emissions do not increase at the global level. This could slow, limit, or even help reverse climate change but it is not a substitute for cutting

greenhouse gas emissions. Offsetting is an option for businesses that have already maximized the gains made through avoidance, elimination and reduction, and businesses that face technological or significant financial barriers to delivering emissions mitigation.

3. Agree a timeline for implementation

Once a business has identified the most appropriate mitigation options it is time to set out a pathway and timeline for completion.

The roadmap must have clear milestones, where projects and tasks are completed in sequence and evenly distributed across the proposed timeline. It should be transitional and progressive, creating a sense of momentum that avoids front or backloading the plan with unattainable steps.

While many businesses would like to tackle the biggest emitters immediately through a major investment in new technology, it is advised that businesses first look at the low hanging fruit and more cost-effective interventions. For many organisations, these low-cost measures can deliver surprising emissions and cost savings.

4. Review regularly

Critically, the roadmap must be agile and subjected to constant review. Disruptive market forces, new legislation, and innovations can quickly undo plans demanding substantial rewrites and the incorporation of alternative emissions reduction measures.

Additional resources and supports

Irish businesses have access to wide range of resources and state supports which can help identify and finance mitigation interventions. The Department of Enterprise Trade and Employment (DETE) hosts an online [ClimateToolkit4Business](#) which can help direct companies to the climate and energy supports of most relevance to their business and sector. That toolkit also includes a carbon footprint calculator.

Because direct and indirect energy use is typically the biggest driver of emissions for SMEs, businesses can also engage directly with the SEAI. The SEAI provides an energy audit service which can help identify

mitigation capacity and offers solutions and training modules to upskill employees on how to better manage energy use.

For businesses determined to cut their Scope 3 emissions through innovation and the design of more sustainable products and services, there are several training courses on offer through Ibec, the SEAI, CIRCULÉIRE, Skillnets, and third level organisations. Businesses looking to collaborate with research partners to develop more circular or zero carbon products and services can find support through [Knowledge Transfer Ireland](#).

Finally, businesses should not underestimate the power of sustainable procurement in influencing suppliers and securing more sustainable raw materials and service providers. Most corporate sustainability and target setting frameworks provide useful guidance on how to integrate sustainability into corporate procurement policies. ISO 20400 provides the go-to standard for sustainable procurement.

5

Measure & Communicate

Create a measurement and communications plan

A robust monitoring, reporting, and communication system is critical to the success of an organisation's decarbonisation strategy. This enables regular oversight of progress, the early identification of challenges, and the communication and disclosure of progress to key stakeholders.

If an organisation is subject to a mandatory disclosure obligation or is participating in a voluntary framework, they will need to follow very specific rules on measurement and reporting. If this is not the case, businesses will have some flexibility in deciding what to measure and how to communicate their progress with stakeholders. Below we set out the best-practice approach.

Measurement and internal reporting

Organisations must develop an internal measurement and internal reporting system that captures relevant, accurate, and auditable data regarding the implementation of their climate strategy. Some of the data collected will be for internal use and guidance only.

Key Performance Indicators (KPI) and metrics will form an important part of this process. The KPIs selected must be relevant to the business and reflect the emissions drivers and decarbonisation opportunities identified in steps one and four. The worked example in Appendix 4 includes a table of common KPIs.

When selecting KPIs and setting up the data capture system, organisations must remember that the data may need to be audited by third party verifiers. To ensure the quality and accessibility of the data, organisations should involve personnel familiar with financial reporting and/or other forms of non-financial reporting. If a Green Team has been set up, it can play a key role in guiding the selection of KPIs and in securing the necessary data from different parts of the organisation.

Setting up this system, selecting and collecting relevant KPIs across the business typically requires considerable work. However once set up and understood by employees, the regular capture and updating of data should become straightforward and normal business practice. Where the data is being

collected manually, the organisation should consider automation to improve quality, business efficiency, accessibility, and usability for reporting and analysis purposes.

Progress review

Frequent internal reviews of progress will allow for the early identification of problems, help prevent project drift, and ensure the organisation is on course to meet its targets. For example, progress could be reviewed at monthly intervals by the Green Team and quarterly at senior management meetings.

Communication and reporting

The public disclosure of company emissions and the reporting of progress is critical to the credibility and integrity of the organisation's approach. In fact, for many NGOs, the disclosure and transparency of climate impacts is as important as emissions reduction itself.

Making sure all stakeholders can access these reports, and that the language and terminology is communicated clearly is of paramount importance. It is best practice to publish this information yearly in the form of an annual sustainability report along with other material ESG matters. Increasingly businesses are publishing such a report alongside or as an integrated part of their company's annual report. By doing this, the business is sending out a strong message regarding its approach and its prioritisation of non-financial sustainability or ESG issues.

Businesses can also choose to disclose their emissions and progress through a pre-existing framework or initiative like the SBTi or the GRI. The main voluntary frameworks are summarised in Appendix 1. When selecting a framework, the businesses must be guided by its materiality and relevance, the target audience, stakeholder demands, and in-house capacity.

The disclosure and reporting of emissions and climate goals is also fast becoming a mandatory requirement for many businesses. Within the EU, the CSRD requires certain companies to provide detailed information annually on their impacts and approach to sustainability. More details about the CSRD and other pertinent EU reporting legislation can be found in Appendix 2.

An enduring cycle

The five-step approach set out above is cyclical. It is envisaged that the five steps be repeated by the organisation on a regular basis with the process become more familiar and less demanding each time. There are several reasons why the process must be repeated. These include:

- A baseline emissions recalculation due to structural changes or the availability of more accurate data and emissions factors
- Changes to the organisational boundaries, increasing or decreasing operational GHG emissions
- A business decision to include Scope 3 emissions in the inventory, target, or both.
- The identification of new mitigation options and technologies
- New demands from stakeholders on emissions reduction and disclosures
- New climate and emissions reporting legislation
- Increased climate ambition by the organisation

4

Overview

The five steps set out in the previous chapter are relevant to all businesses regardless of size or sector. However, some business sectors face additional challenges, policy intervention, and regulatory oversight.

These are typically carbon-intensive industries or sectors with significant influence on the zero-carbon transition. It is also important to recognise that some sectors face unique technological and financial barriers to emissions reduction. In this chapter, we set out some additional insights on the drivers, decarbonisation challenges, and policy developments in four key sectors of the economy:

- food and drink,
- commercial and financial services
- the public sector,
- technology

This chapter should be seen as supplementary reading to the five-step process set out in the Chapter 3.

1. Food and drink

Overview

The agrifood sector faces significant challenges in the transition to net zero emissions. The sector accounts for approximately 31% (16.5 billion tonnes of CO₂eq) of global GHG emissions.³³ Emissions in the sector are growing in line with population growth, economic development, and changing consumption patterns. The expansion of food production and resulting land-use change is also impacting biodiversity and natural eco systems. Meanwhile food waste and the end-of-life disposal of materials and packaging is causing air, soil, and water pollution. Because of these environmental impacts, the sector faces enhanced regulatory oversight and policy intervention.

Decarbonisation Challenges

Food and drink businesses (producers, manufacturers, wholesalers, and retailers) typically face the same Scope 1 and Scope 2 emissions experienced by other

business sectors i.e., energy related emissions driven by the stationary and mobile combustion of fossil fuels. It is the Scope 3 supply chain emissions that make this sector unique. Globally, upstream primary agriculture, land use change, and deforestation make up 64% of the sector's total emissions with the balance coming from food processing, distribution, and food waste etc.

The GHG emissions footprint of agricultural products can vary considerably and is largely determined by the biological nature of the product and the production methods, inputs, and local impacts. The transport of produce from farm to fork typically plays a smaller but not insignificant factor. Transport emissions unsurprisingly constitute a bigger share of total emissions in naturally low emissions products. This effectively means that eating local does not always guarantee lower GHG emissions.

For animal products, emissions are primarily created through the production of animal feed, the production and application of fertilisers, water use, and enteric fermentation (a natural methane producing process in the digestive system of ruminant animals). Reducing the emissions associated with enteric fermentation is extremely challenging and presents one of the biggest mitigation barriers for the sector. For non-animal produce, the main drivers are typically water use and the production and application of fertilisers. A common emissions driver for both animal and non-animal food production is deforestation and the disturbance of existing carbon sinks.

Because the nature of food production differs across countries, the emissions associated with a particular product can differ considerably around the world. For example, Ireland's temperate climate allows for longer periods of grassland grazing, giving Irish beef and dairy production greater emissions efficiency over

exclusively feed-based systems. Conversely, it is more carbon efficient to produce and import some products into Ireland because our climate does not allow for their sustainable production.

Key policies and regulation

EU policy and legislation

The EU's Farm to Fork Strategy is the key pillar in the European Green Deal project aimed at accelerating GHG emissions reduction in the food and drink sector.³⁴ It also has ambitions to reverse biodiversity loss, ensure food security, preserve food affordability, and increase the international competitiveness of the sector. The strategy includes regulatory and non-regulatory initiatives. The flagship regulatory initiative is the development of a new legislative framework for sustainable food systems (FSFS).³⁵ This is modelled on the General Principles of Food Safety Law (Regulation (EC) No 178/2002) and will create an enabling framework to ensure that all foods placed on the EU market increasingly become sustainable through a 'socially responsible value chain'. The FSFS will include:

- definitions (e.g., food system, sustainable food system, food environment, food system actors, sustainability analysis, sustainable diets, traceability for sustainability),
- minimum sustainability standards for foods/food operations,
- responsibilities of food systems actors,
- sustainability labelling,
- minimum mandatory sustainability criteria for public procurement,
- monitoring and enforcement.

Irish policy and legislation

Ireland has set challenging statutory emissions reduction targets for 2030 and 2050. And through the system of rolling carbon budgets and sectoral emissions ceilings, all economic growth must take place within a constrained emissions envelope. While the targets and emissions ceilings apply at sector-level rather than company level, businesses will be impacted by this regime through changes in agrifood and enterprise policy, public expenditure, and industry supports.

Food processors and manufacturers fall within the "industry" ceiling and must therefore reduce industry-wide emissions by 35% by 2030 relative to 7 MtCO₂eq in 2018. Ireland's primary agricultural sector meanwhile must reduce GHG emissions by 25% by 2030 relative to 237 MtCO₂eq in 2018 while also reducing nitrogen use to 300,000 tonnes in the same timeframe.³⁶

Ireland's Food Vision 2030 Strategy is the main policy driver for the agrifood sector over the next ten years and will play a critical role in helping the sector meet these ambitious targets and deliver a world leading Sustainable Food System (SFS). The strategy is not only concerned with climate change. Sub targets are being set to help the sector meet other environmental goals in forestry, fisheries, organic farming, and food waste.³⁷

Ireland is also a signatory to the Global Methane Pledge initiative which aims to collectively reduce global methane emissions by 30% over the next decade.³⁸ The reason for this prioritisation of methane emissions is that although a tonne of emitted methane has a Global Warming Potential 27 times higher than CO₂ over the course of a century, it contributes 84 to 86 times more during the first twenty years. While other sectors like energy and waste contribute to Irish methane emissions, most Irish methane emissions are driven by enteric fermentation at farm level.

Meeting these targets will mean new targeted interventions and supports for farmers and food and drink businesses. Critically, farm-level interventions will need to focus on emissions avoidance and reduction solutions like on-farm diversification, changes to animal breeding, the adoption of protected urea, and on-farm efficiency measures.

Under the terms of Ireland's carbon budget regime, it is not possible to use carbon removals in the land sector to meet the sector's targets. The reason for this is that Ireland's land-use sector (LULUCF) is its own individual sector, has been classified as a net carbon source since 1990, and will soon be set its own emissions reduction and removal targets.³⁹ However, the EU is developing a new regime to support farm-level carbon sequestration or "carbon farming".⁴⁰ How this "carbon farming" regime will tie in with Ireland's national climate agenda and carbon budget system has yet to be determined.

GHG Protocol Land Sector and Removals Guidance

The GHG Protocol Land Sector and Removals Guidance explains how companies should account for and report GHG emissions and removals from land management, land use change, biogenic products, carbon dioxide removal technologies, and related activities in GHG inventories, building on the Corporate Standard and Scope 3 Standard. A first draft of this guidance was published in 2022 with a final version expected in Q4 2023. The new guidance will help organisations better understand and disclose the GHG emissions and removal impacts of land management, land use change, biogenic products and other CO₂ removal activities. It will also help inform mitigation strategies, progress removals and set more scientifically robust targets.⁴¹

SBTi FLAG Guidance

The SBTi Forest, Land and Agriculture (FLAG) Target setting guidance (2022) provides the world’s first standard method for companies in land-intensive sectors to set science-based targets that include land-based emission reductions and removals.⁴² It offers a common, robust, science-based understanding on how much and how quickly a company needs to cut its land-related emissions in line with the Paris Agreement’s goal to limit global warming to 1.5°C. FLAG will have a major impact on companies operating in the following sectors that have set or plan to set science based targets;

- Forest and paper,
- food production,
- food and beverage processing,
- food and staple retailing,
- tobacco
- Other sectors where FLAG emissions are 20% or more of your total scope 1, 2 and 3 emissions.

It is intended that the SBTi FLAG Guidance be read in conjunction with the GHG Protocol Land Sector and Removals Guidance (see above). Therefore, the FLAG guidance will be updated in the coming months to align with final version of the GHG Protocol Land Sector and Removals Guidance (expected in Q4 2023).

Additional supports and resources

There is no single resource mapping the GHG emissions associated with different agricultural products. The reason for this is that even for the same product, emissions can vary considerably according to geography, climate, inputs, energy use etc. It is always recommended that firms try to find accurate emissions data at source rather than depend on any default global or regional emissions factors. Businesses can access life cycle data on certain products using the databases set out in table 1.

Table 1 Additional resources for calculating agrifood emissions

Name	Description
AGRIBALYSE®	provides references data on the environmental impacts of agricultural and food products through a database built according to the Life Cycle Analysis (LCA) methodology. While the data is focused on production in France. It can be used as a first approach for organisations our food supply outside France and adjusted according to local factors.
Bord Bia Carbon Footprint Model	Through the Bord Bia audit process, individual farms can obtain information on their farm’s carbon footprint
Bord Bia Origin Green	Origin Green is Ireland’s national food and drink sustainability programme. Open to producers, manufacturers, retailers, and food service operators, the programme sets measurable sustainability targets and supports organisation’s to produce food and drink in a more sustainable way.

Name	Description
Bord Bia Sustainable Quality Assurance Schemes	Bord Bia administers Sustainable Quality Assurance Schemes for beef, lamb, dairy, pigmeat, poultry, eggs, feed, fresh produce, mushroom compost & casing manufacturers and ornamental plant producers.
Protocol Land Sector and Removals Guidance	The GHG Protocol Land Sector and Removals Guidance explains how companies should account for and report GHG emissions and removals from land management, land use change, biogenic products, carbon dioxide removal technologies, and related activities in GHG inventories, building on the Corporate Standard and Scope 3 Standard. (Final version expected Q4 2023)
SBTi’s FLAG Guidance	The SBTi’s FLAG Guidance provides the world’s first standard method for companies in land-intensive sectors to set science-based targets that include land-based emission reductions and removals.
Teagasc	Ireland’s agriculture and food development authority provides resources, research, signposting services, and knowledge sharing tools for farmers on climate action and sustainable farming.
The ecoinvent Database	a Life Cycle Inventory (LCI) database that supports various types of sustainability assessments. It contains more than 18’000 activities and process.
The LCA GLAD	The Life Cycle Initiative’s Global Life Cycle Analysis Data Access network (GLAD) is a platform providing LCA data sets from different providers including ecoinvent and Agribalyse.

2. Commercial and financial services

Overview

Commercial services organisations (financial services, retail, hospitality, public sector, and professional services) represent the largest share of Irish businesses and account for approximately 3% of total Irish direct emissions.⁴³ These organisations typically have lower Scope 1 and Scope 2 emissions than other business sectors as they are largely low energy operations. Emissions in this sector predominantly relate to direct and indirect fossil fuel use for space heating and cooling. As such, the pathway to reduce Scope 1 and Scope 2 emissions in these sectors can be relatively

straightforward with few technological barriers. However, businesses in this sector can face significant financial and non-technological barriers. Meanwhile, commercial organisations involved in investment management, financial advisory, and lobbying face unique challenges and additional policy oversight because of their influence on the wider economy and the net zero transition.

Decarbonisation challenges (Scope 1 and Scope 2)

Most Scope 1 and 2 emissions in this sector are driven by the heating and cooling of commercial buildings. Within Ireland’s carbon budget regime, these businesses largely fall within the “Built environment - Commercial” ceiling and must collectively reduce GHG

emissions by 45% by 2030 relative to 2 MtCO₂e in 2018. In practice this means bringing one third of all commercial properties up at least a B+ BER rating by 2030.

The EU's review of the Energy Performance of Building Directive (EPBD) is driving major changes to building standards across Europe. In the coming years, all new commercial buildings will need to meet the Nearly Zero Energy Building (NZEB) Standard, and in the future the Zero Energy Building (ZEB) standard.⁴⁴

While some businesses may be able to meet their company Scope 1 and 2 targets by simply moving into a new NZEB or ZEB premises, most businesses will need to retrofit/upgrade their existing premises. This will require major efficiency upgrades and the replacement of fossil fuel systems with heat pumps, district heating, and renewable gas solutions. And with most commercial office buildings leased rather than owned by the occupier, this will require joint landlord-tenant cooperation and financing which can be difficult. Meanwhile, businesses working in protected buildings will need derogations or rule changes.

SEAI resources and supports like the Support Scheme for Energy Audits, the EXEED Certified Grant, the Non-Domestic Microgen Grant, and the Support Scheme for Renewable Heat (SSRH) will all play a vital role in enabling these commercial retrofits.

Decarbonisation challenges (Scope 3)

For most commercial organisations, business travel is the main driver of Scope 3 emissions. Flights are typically the biggest driver within this category. An average passenger flying from London to New York produces 1070 kg CO₂e¹. This is the equivalent of an average car driving from Paris to Istanbul and back. Published emissions factors for first and business class can be up to three or four times higher than economy or coach. For many commercial organisations, even small changes to business air travel policy, the promotion of rail where appropriate, and the prioritisation of virtual meetings can deliver significant emissions savings. For others, air travel is simply unavoidable, and emissions will remain high until the aviation sector itself decarbonises. And while the sector does have [long term plans](#) to transition to net

zero emissions, emissions offsetting may be necessary in the short-medium term.

For land-based travel, car journeys by customers and employees are the main emissions driver. The average petrol car on the road produces the equivalent of 174g of CO₂/km, while a diesel car produces 166g of CO₂/km. Businesses can significantly reduce these Scope 3 emissions by incentivising the use of electric vehicles, promoting active modes like walking and cycling, carpooling, and public transport. For businesses considering a relocation or an expansion, customer and employee access to public transport, recharging points, and cycling infrastructure should be major considerations, particularly as new restrictions on private car use emerge in the coming years.

Sustainable Finance

Financial services organisations face unique oversight and regulation because of their financial power and capacity to influence climate change and the net zero transition beyond their own organisational and Scope 3 boundaries. The EU has therefore made sustainable finance a key priority in the European Green deal. Their goal is to end greenwashing and redirect capital away from carbon-intensive activities to renewable energy and climate solutions.

In 2020, the EU introduced a landmark piece of legislation establishing a classification system or "Taxonomy" clearly defining what activities at NACE Code level can be considered environmentally sustainable. It is intended that this Taxonomy will become more restrictive and comprehensive over time.

In 2021, the Sustainable Finance Reporting Directive (SFRD) entered into force. It imposes comprehensive sustainability disclosure requirements on key financial market participants and certain products including investment and mutual funds, insurance-based investment products, and private and occupational pensions. More detail on the Taxonomy and SFRD can be found in Appendix 2.

The Public Sector

Overview

Public sector bodies typically face the same emissions drivers and decarbonisation challenges experienced by commercial organisations i.e., energy related emissions produced by the stationary and mobile combustion of fossil fuels. However, in some countries including Ireland, the public sector faces significantly greater oversight and policy intervention as they are required to play a leadership and exemplary role in the zero-carbon transition.

In Ireland's carbon budget regime, the public sector is spread across different emissions categories with most emissions falling within the "commercial buildings" and "transport" ceilings. However, the sector faces more restrictions than its private sector counterparts and must meet more challenging energy efficiency, renewable, and emissions reduction targets.

In addition, certain public bodies have been identified as playing a critical role in enabling the decarbonisation of other sectors. For example, a local authority must both address its own carbon footprint and actively help the local community transition.

Climate targets

In Ireland, the public sector must reduce thermal and transport emissions by 51% by 2030 on 2016-2018 levels, improve its energy efficiency by 50% by 2030, and become climate neutral no later than 2050. Each public sector body (see table 2) has a responsibility to endeavour to reach the 51% emissions reduction target with progress measured at sectoral level and tracked through the SEAI's Monitoring & Reporting system.

To meet these goals, public bodies must

- Implement the Public Sector Climate Action Mandate (*Select public bodies only*)
- Strengthen climate governance frameworks in public sector bodies
- Increase climate literacy in the public sector
- Implement policies to decarbonise the public sector vehicle fleet

- Procure only Zero Emissions Vehicles from the end of 2022 onwards where available and practicable
- Retrofit public sector buildings
- Fully implement green public procurement in the public sector

Table 2 - Ireland's Public Sector Bodies

Ireland's Public Sector Bodies ²
Civil Service
Commercial and non-commercial State Bodies
State-owned financial institutions
The Defence Forces
An Garda Síochána
Health Service Executive and Voluntary Hospitals
Local and Regional Authorities
Schools, Education & Training Boards (ETBs) and centres for education
Universities and colleges
Other organisations, including charities in receipt of 75% or more of their funding from the public sector

The Public Sector Climate Action Mandate

The Public Sector Climate Action Mandate is a new initiative highlighting the main climate action objectives and obligations on public bodies. It applies to all public bodies covered by public sector decarbonisation targets, except for Local Authorities, Commercial Semi-State Bodies, and the School Sector (where sector-specific mandates will apply).

¹ Calculated using DEFRA Emissions factors

² The definition of public sector body for the purpose of tracking emissions is based on that used in S.I. No. 426/2014 – European Union (Energy Efficiency) Regulations 2014.

Climate Action Roadmaps

Each public sector body to which the mandate applies, must develop a Climate Action Roadmap, setting out how it will meet its energy efficiency and emissions reduction targets.

Public sector bodies will update their roadmaps each year, in line with the mandate which is reviewed annually. The SEAI and the EPA have published guidance for preparing roadmaps. The first iteration of the guidance focuses on energy management. The next iteration of the guidance will be updated to include wider climate action. Public sector bodies are encouraged to avail of the SEAI's Partnership Programme for support in implementing the mandate.

Energy efficiency and building retrofits

The public sector has a target of improving its energy efficiency by 50% by 2030. To meet this ambition, many public body buildings (of which there are 12,500 in total), will need to undergo deep retrofits. In addition to building efficiency upgrades, this will also involve the roll out of renewable heat options (heat pumps, biomass, and district heating). A revised Public Sector Energy Efficiency and Decarbonisation Programme will be launched to support the delivery with finance coming from the Public Sector Pathfinder Programme and the National Development Plan. Energy Performance Contracts (EPCs) are also expected to play a key role and guidance and financial support for public bodies using EPCs will be developed.

Alignment with the 2021 Climate Act

The 2021 Climate Act gives legal underpinning to climate action by the public sector and requires all public bodies to perform their functions in a manner consistent with the national climate ambition. This means that decision making, expenditure, and planned growth by public bodies must be climate smart and not lead to a lock-in of emissions that would breach our national carbon budgets. The Act also demands that public bodies play an enabling role helping other sectors transition. This is especially relevant for local authorities, government departments, energy, transport, and waste management organisations. Local authorities are expected to play a pivotal role in this respect through spatial planning, the delivery of public services and transport, the provision of social housing, and the maintenance of biodiversity.

Greener Public Procurement

One way the public sector can play a leadership role is through more effective "green procurement". The public sector is a significant buyer of goods and services and has the potential to influence a wide array of small and medium sized firms. To progress this, the Office of Government Procurement has developed a Green Public Procurement (GPP) Criteria Search tool in the public sector and will review and update Green Tenders (Action Plan on Public Procurement) for greener public sector purchasing.

Shadow Price of Carbon

To help public bodies make climate smart investment decisions, changes have been made to the Public Spending Code.⁴⁵ Every public investment project with a value above €20 million must conduct a full analysis on all the potential costs and benefits associated with that project using the PSC rules. In 2019, the government tripled the price of carbon that is applied in the code. With Ireland now targeting faster and deeper decarbonisation, the Department of Public Expenditure and Reform (DPER) is now working with University College Cork's MaREI Centre to increase the shadow price of carbon. This approach reflects best practice in the private sector where the financial risks and opportunities related to climate change are becoming a key part of companies' risk management and strategic planning processes.

4. Technology

Overview

Technology encompasses a diverse range of business sectors including engineering, digital services, data storage, and electronics manufacturing. Most Scope 1 and 2 technology emissions are driven by direct and indirect on-site energy use. Within Ireland's carbon budget regime, these emissions fall within the "Industry", "Built Environment- Commercial" and "Electricity" categories. For some technology businesses, the scale of their energy use presents considerable decarbonisation challenges. For others, the growing focus is on reducing Scope 3 emissions caused by the linear growth and mistreatment of end-of-life electronic or electrical goods (e-waste) and packaging.

E-waste and the circular economy

Waste from Electrical and Electronic Equipment (WEEE) or e-waste is one of the fastest growing waste streams in the developed world. The UN projects that by 2030 there will be 74Mt of e-waste globally. Irish households are producing on average 52.4kg of e-waste per household, the third highest in Europe after Norway and the UK.⁴⁶ Within Europe, less than 40% of e-waste is recycled. In addition to this being a poor use of resources, the mistreatment of e-waste is also creating significant ancillary environmental challenges. Batteries and electronic goods contain heavy metals, such as mercury, cadmium, and lead, that can pollute soil and water and are dangerous to human health.

Recovery and recycling

Until recently, the focus at EU and Irish level was on recycling. The EU WEEE Directive (2012/19/EC) aims to ensure that e-waste is collected and managed in an environmentally friendly way. It sets an overall e-waste collection target (which increased to 65% in 2019) and sets individual targets for the reuse, recovery, and recycling of six different e-waste categories: temperature exchange equipment, screens, lamps, large equipment, small equipment, and small IT equipment. There are additional regulations and obligations on producers of e-waste containing batteries. The results to date have been mixed. While Ireland is recovering more e-waste than ever before (64,856 tonnes/ 60% in 2021), efforts to increase collection are being outpaced by the growth of e-waste placed on the market.⁴⁷ Ireland has now fallen short on its 65% target two years running.

The transition to a circular economy

Ultimately, recovery and recycling alone will not be sufficient to keep pace with the volume of e-waste being placed on the market. Greater efforts are needed to ensure technology products remain in circulation for longer. Accordingly, The EU's Circular Economy Action Plan (2015) and Ireland's Circular Economy Programme 2021-2027 both single out e-waste and batteries as priority areas in the transition to a circular economy.

Under the Green Deal, the EU is proposing new battery legislation, eco labelling, right-to-repair, and eco design rules. The latter is of critical importance with up to 80% of a product's environmental impact determined at the design stage.

The 2023 review of GHG emissions on a consumption basis will help strengthen the link between national circular economy and climate action goals.

Electricity decarbonisation

While technology industries are not the only large users of electricity, it is one of the fastest demand sectors. This is in part due to the rapid digitalisation of the global economy and the need for additional data storage capacity. Data centres provide the foundation for almost all online activity including social networking, virtual meetings, messaging and apps, retail, banking, travel, media, and public service delivery such as healthcare and welfare. However, data centres need significant power to operate- primarily for keeping the servers cool.

In Ireland, EirGrid projects that by 2031, 28% of all electricity demand is expected to come from data centres and other new large energy users.⁴⁸ With the electricity sector required to reduce GHG emissions by 75% by 2030 under the carbon budget regime, new more sustainable ways of meeting this increased demand will be needed.

Businesses with high scope 2 electricity emissions will have a vested interest in the decarbonisation of the national grid and the development of new wind and solar projects. With Ireland targeting an 80% renewable share by 2030, scope 2 emissions should fall over the next decade (assuming similar levels of electricity use). However, businesses may also decide to skip ahead and secure 100% renewable electricity directly from a renewable energy developer through a Renewable Energy Corporate Power Purchase Agreement (ReCPPA). These contracts can also enable businesses to better hedge and manage electricity costs during periods of price volatility. Business can also develop on-site renewable generation and electricity storage.

Appendix 1 – Voluntary Frameworks, certifications, and standards

Overview

This is a non-exhaustive list of established voluntary reporting frameworks, certifications, and standards related to climate action, corporate sustainability, and ESG.

The Global Reporting Initiative (GRI)	The GRI is an independent international organisation that provided standards for organisations to measure, understand, and report their impacts on the economy, environment, and society. The GRI Standards are an easy-to-use modular system comprising universal standards, sector standards (industry specific), and topic standards (specific to certain areas of materiality).
The Sustainability Accounting Standards Board (SASB)	The SASB Standards are a set of Industry Standards guiding the disclosure of financially material sustainability information by companies to their investors. The 77 SASB Standards provide detailed industry-specific disclosure topics and metrics.
The UN Global Compact	The UN Global Compact is an UN-led initiative that supports companies to: 1) align their strategies and operations with ten universal principles related to human rights, labour, environment, and anti-corruption, and 2) take actions that advance societal goals and the implementation of the Sustainable Development Goals (SDGs).
The Taskforce on Climate Related Disclosures (TCFD)	Launched in 2015 by the Financial Stability Board (FSB), the TCFD aims to help identify the information that companies should disclose to support investors, lenders, and insurance underwriters in appropriately assessing and pricing climate related risks and opportunities.
The Carbon Disclosure Project	The Carbon Disclosure Project (CDP) is a not-for-profit organisation that runs the global disclosure system for investors, companies, cities, states, and regions to measure & manage their environmental impacts. There are approximately 300 firms active in Ireland that are assessed under the CDP.
The GHG Protocol	The GHG Protocol provides globally standardised frameworks, standards and tools to help organisations, associations and governments in measuring GHG emissions from public and private sector operations. The GHG Protocol Corporate Accounting and Reporting Standard (2004) is the gold standard for corporate emissions accounting, target setting and reporting.
The Science Based Targets Initiative (SBTi)	SBTi is a partnership between the CDP, the UNGC, the World Resource Institute (WRI) and the World Wildlife Fund (WWF). It provides a framework for firms to set independently verified medium and long-term emissions reduction targets in line with the Paris Agreement. For Irish companies, it allows direct membership in the Business in the Community Low Carbon Pledge.
The Business in the Community Low Carbon Pledge	The Low Carbon Pledge is an initiative of BITC Ireland requiring signatory companies to set science-based carbon emissions reduction targets by 2024, which must include their entire carbon footprint (Scope 1, 2 & 3) and be in line with the Paris Agreement and the latest IPCC findings.
B Lab/B Corp Certification	B Lab is a non-profit network aimed at transforming the global economy to benefit all people, communities, and the planet. It is best known for certifying B Corporations, which are companies that meet high standards of social and environmental performance, accountability, and transparency on factors from employee benefits and charitable giving to supply chain practices and input materials.

Appendix 2: A summary of EU sustainability and climate legislation - Part 1

	The Corporate Sustainability Reporting Directive (CSRD)	The EU Corporate Sustainability Due Diligence Directive (CSDDD)
Status	In force	In development
What is it?	A rewrite and strengthening of the Non-Financial Reporting Directive (NFRD). This law requires certain businesses to disclose detailed information annually about their environmental, social and governance policies and impacts.	Establishes a corporate due diligence duty requiring certain businesses to identify, prevent, mitigate, and end actual and potential adverse human rights and environmental impacts in their operations, value chains, and in the operations of their partners.
Purpose	Ensure greater transparency within industry and encourage firms to address unsustainable practices and increase sustainable investment.	Foster sustainable corporate behaviour and anchor human rights and environmental considerations in businesses operations and corporate governance.
Obligated companies	<p>Large EU companies: EU entities or an EU consolidated group that exceeds at least two of the following three thresholds: (1) a balance sheet total of €20 million; (2) net turnover of €40 million; and/or (3) an average of 250 employees during the financial year. This is applicable for Publicly listed companies, reporting 2024 results in 2025, and all others (e.g. privately held) reporting 2025 results in 2026.</p> <p>From 2029, Non-EU undertakings, reporting 2028 results, that meet the following threshold requirements: (1) €150m+ in EU annual turnover for the trailing two financial years; and (2) at least one subsidiary that is a large undertaking (or listed entity that is not a micro undertaking) or EU branch that generated net turnover of €40m+ in the prior financial year,</p> <p>Listed SMEs – small and medium-sized undertakings with securities admitted to trading on an EU regulated market (excluding micro undertakings).</p>	<p>Group 1 (two years following entry into force): EU limited liability companies with 500+ employees and a global net turnover of €150m+ and Non-EU companies with 500+ employees and a net turnover generated in the EU of €150m+</p> <p>Group 2 (four years following entry into force): EU limited liability medium-sized companies with 250+ employees and global net turnover of €40m+ where 50%+ of this new turnover was generated in “high-impact” sectors. Non-EU limited liability medium-sized companies with 250+ employees and a net turnover generated in the EU of €40m+ (c.1,400 companies) where 50%+ of this new turnover was generated in “high-impact” sectors.</p> <p>“High-impact” sectors include textiles, agriculture, food production, forestry, metal product manufacturing and the extraction of minerals.</p>
Extra Details	Companies subject to the CSRD will have to report according to European Sustainability Reporting Standards (ESRS). These will be finalised by the end of 2023. The CSRD also makes it mandatory for companies to have an audit of the sustainability information that they report.	This legislation will be a companion piece to the CSRD. However, it goes beyond reporting in its imposition of due diligence accountability. Large businesses must also develop climate transition plans aligned with the 2015 Paris Agreement 1.5 degrees target. Critically, the proposed legislation explicitly assigns implementation responsibilities to company directors.
Key takeaway for business	<p>Mandatory CSRD reporting will be introduced in phases with the largest firms required to apply the new rules in the 2024 financial year, for reports published in 2025. There will be a requirement for an audit to provide at least ‘limited assurance’ in relation to this reporting.</p> <p>Obligated firms must become familiar with new reporting requirements and begin preparing a report to meet compliance. The CSRD is also an opportunity to develop a comprehensive sustainability plan. External support and expertise may be needed to assist with this work.</p>	Obligated firms will need to carry out a thorough mapping exercise of their operations and value chains and develop a strategy to address risk areas. External support and expertise may be needed to assist with this work.

	The Emissions Trading System Directive	The Industrial Emissions Directive (IED)
Status	In force - being strengthened through Fitfor55	In force - being strengthened through EU Green Deal
What is it?	Provides the legislative foundation for the EU ETS, the world’s biggest carbon market. The legislation is being strengthened as part of the EU Green Deal and Fitfor55 reforms.	Sets out EU-wide rules on emissions limits, the determination of best available technologies (which determine emissions limits), public participation in decision-making, and environmental inspections.
Purpose	Drive investment in energy efficiency and renewable energy by imposing an upward carbon price on Europe’s heaviest emitters.	Ensure protection of human health and the environment by reducing harmful industrial emissions across the EU.
Obligated companies	<p>Participation is mandatory for all power stations and industrial sites with a net heat excess of 20 MW across the EU, Norway, and Liechtenstein. This covers around 40% of EU GHG emissions. The scope is currently being expanded to include aviation, shipping, road transport fuels, and building fuels.</p>	All businesses undertaking a set list of activities of environmental significance. (See Annex 1 of the Directive). Activities include fuel combustion, waste management, animal slaughtering, and chemical production. The IED only covers GHG emissions for obligated non-ETS installations.
Extra Details	Companies must surrender permits for every tonne of emissions they produce. The volume of permits reduces each year, putting a price on carbon. Certain sectors are given free permits as they are at risk of carbon leakage. The ETS will be supplemented by a Carbon Border Adjustment Mechanism, placing an import duty on certain products from Third Countries.	The legislation demands that obligated parties adhere to a fully integrated approach, accounting for their total environmental performance. Undertakings are required to comply with the legislation and operate in accordance with a permit granted by their national authority. In Ireland this is the Environmental Protection Agency (EPA).
Key takeaway for business	ETS obligated installations will face increases to the carbon price. Some firms will lose free permit allocations. Aviation and shipping will face new responsibilities and costs. Importers of carbon-intensive products may see costs increases.	Obligated firms will already be familiar with the IED rules and their requirements as EPA licensed companies. But the legislation is being strengthened, and licensees need to become familiar with the new proposals .

Appendix 2: A summary of EU sustainability and climate legislation - Part 2

	The Sustainable Finance Disclosure Regulation (SFDR)	The EU Taxonomy for sustainable activities
Status	In force	In force- Being expanded through secondary legislation
What is it?	Imposes comprehensive sustainability disclosure requirements covering a range of environmental, social & governance metrics on the financial services sector – at entity and product level.	Establishes a classification system defining which business activities can be considered environmentally sustainable.
Purpose	Improve transparency in the market for sustainable investment products and prevent greenwashing.	Prevent greenwashing, provide transparency to investors, and direct investment to recognised sustainable activities.
Obligated companies	Applies to financial market participants, financial advisers, and certain financial products including investment and mutual funds, insurance-based investment products, and private and occupational pensions.	The Taxonomy is relevant to all businesses seeking to attract and retain investment, and businesses with activities outside the Taxonomy. But it is of immediate relevance to obligated parties under the CSRD and financial market participants.
Extra Details	Requires three types of disclosure: pre-contractual disclosure, website disclosure and periodic reporting. Requirements also include implementing a policy on integration of sustainability risks into the investment decision making and remuneration policies. Products being marketed as sustainable/ green face additional requirements.	A business activity is considered sustainable if it contributes substantially to one of six identified environmental objectives, without doing significant harm to any of the other objectives. Strict criteria (TSC) are being set for each objective through secondary legislation. CSRD/NFDR obligated companies must also disclose how much of their turnover, CapEx and OpEx is Taxonomy compliant.
Key takeaway for business	Obligated financial market participants should already be familiar with the SFDR rules. But in May 2022, the European Commission provided additional guidance and clarification on the rules. From 1 January 2023, new Regulatory Technical Standards supporting the law apply.	CSRD obligated firms need to map their business activities against the Taxonomy. Firms with activities outside the Taxonomy need to undertake a risk analysis and begin long-term diversification and transition planning.

	Environmental performance of products & businesses	The Eco-design for Sustainable Products Regulation
Status	In development	In development
What is it?	Proposed legislation requiring companies to provide additional information to consumers and substantiate their environmental claims using a new EU-wide methodology.	A rewrite and strengthening of the Ecodesign directive. This law set EU-wide standards and minimum requirements for products being placed on the internal market.
Purpose	Prevent greenwashing and make environmental claims reliable, comparable, and verifiable across the EU	Reduce the negative life cycle environmental impacts of new products through strengthened design requirements.
Obligated companies	Legislations will focus on all firms making sustainability claims and using vague terms like eco, green etc. in their labelling or marketing.	All products – except food, animal feed and medicines. Initial focus will be on “high impact” sectors with gaps in sustainability rules, such as textiles, furniture, mattresses, tyres, detergents, paints, and lubricants, as well as iron, steel, and aluminium.
Extra Details	Companies will have to substantiate claims using an EU methodology called Product Environmental Footprint (PEF). PEF measures the environmental performance of a product or organisation throughout the value chain, from the extraction of raw materials to the end of life, using 16 environmental impact categories.	The framework will include new rules at product level on issues like product durability, reusability, upgradability and reparability, the presence of substances that inhibit circularity, energy and resource efficiency, recycled content, remanufacturing and recycling, and environmental footprints. To support compliance and enhance transparency, all products will need a machine-readable digital passport.
Key takeaway for business	Businesses using unverified or vague sustainability claims on their labelling and in their marketing needs to become familiar with the PEF process.	Businesses manufacturing and trading in high impact sectors (see above) need to become familiar with new rules and ensure compliance with the new design standards.

Appendix 3: SEAI Energy Conversion and Emissions Factors

Overview

Most businesses calculate their GHG emissions using documented emissions factors. An emissions factor is a rate given to convert activity data into GHG emissions and express those GHG emissions in terms of CO₂ equivalence (CO₂e). Irish businesses can use the energy emissions factors published by the Sustainable Energy Authority of Ireland or the emissions factors provided by their energy suppliers. The SEAI emission factors from January 2023 are listed below. However, as these change, businesses are advised to visit the SEAI website directly. Before applying the emission factors, businesses may need to

convert their energy use into a different unit e.g., from Joule (J) to Kilowatt hour (kWh). Below you will also find energy conversion factors to help you complete this task.

Energy Units

Energy is delivered in many different fuels and sources and can be expressed in terms of volume, mass, energy or emissions. Using the conversion factors below, it is possible to express each fuel or energy source in common units of energy or emissions so that they can be compared and aggregated

Energy unit types	
Joule (J):	Joule is the international unit of energy
Kilowatt hour (kWh):	This is the conventional unit of energy that electricity is measured by and charged for commercially
Tonne of oil equivalent (toe):	This is a conventional standardised unit of energy (41.868 GJ), and is defined on the basis of a tonne of typical oil having a net calorific value of 41,868 kJ/kg. A related unit is the kilogram of oil equivalent (kgoe), where 1,000 kgoe = 1 toe.

Calorific Values	
Gross Calorific Value	GCV indicates the total amount of heat released by the complete combustion of a unit of fuel. It is also sometimes called Higher Heating Value (HHV) or Higher Calorific Value (HCV).
Net Calorific Value	NCV is determined by subtracting the heat of vaporization from the GVC/HCV. NCV is also sometimes called lower heating value (LHV) or lower calorific value (LCV)

Energy Conversion Factors			
To	toe	MWh	Gj
From	Multiply by		
Toe	1	11.63	41.868
MWh	0.086	1	3.6
Gj	0.02388	0.2778	1

Emission factors

The table below shows emission factors for CO₂ per unit of energy for particular fuels. Definitions of energy units (toe and J) and net calorific values (NCV) appear above. TJ stands for terajoule or 1012 joules. Values for Petroleum Coke, Milled Peat, Natural Gas and Electricity change annually.

Fuel	tCO ₂ /TJ (NCV)	gCO ₂ /kWh (NCV)
Liquid Fuels		
Gasoline / Petrol	70.0	251.9
Kerosene	71.4	257.0
Jet Kerosene	71.4	257.0
Gasoil / Diesel	73.3	263.9
Residual Oil / Fuel Oil	76.0	273.6
LPG	63.7	229.3
Naphta	73.3	264.0
Petroleum Coke 2021	94.1	338.7
Solid Fuels and Derivatives		
Coal	94.6	340.6
Milled Peat 2021	119.6	430.5
Sod Peat	104.0	374.4
Peat Briquettes	98.9	355.9
Natural Gas 2021	56.4	202.9
Electricity 2021	96.6	347.8

Appendix 4 Worked Example: A Craft Brewery

About the business

Company A is a craft brewery in the northwest of Ireland. They have grown considerably since the company launched in 2012. They have big plans to grow domestic market share and expand into export markets. Increasingly the company is being asked by their customers about their sustainability and carbon footprint. The business has recently been awarded Origin Green certification from Bord Bia and under this initiative has made commitments on resource efficiency and community engagement. But they do not have a climate reduction plan or sight of their carbon footprint. Company A wants to develop a climate action strategy that will help it reduce its emission over time and grow the business in a more sustainable way. The owners believe this is essential to keep customers, grow market share, and ultimately keep down operating costs.

Key steps taken by the business

Calculate: Establish a carbon footprint for your business

Company A began their journey by developing a comprehensive emission baseline or carbon footprint for the year 2019. They selected this year because it was the most recent year with accurate data not affected by the Covid pandemic. They would also use this as the base year for a future target.

As a fully owned private limited company with a single site, they had no issues setting their organisational boundaries. The company carried out an audit of all emissions sources within its boundaries and classified these emissions by scope (See table below for main emissions drivers). On completion they decided to exclude their Scope 3 emissions until they had more data and experience.

Company A decided to calculate their Scope 1 and 2 emissions by using documented emission factors from the [SEAI website](#). They also secure funding from the SEAI to carry out a professional energy audit of their site. They gathered metered data on their boiler and

electricity usage in 2019 and applied the relevant Tier 2 emission factors provided by the SEAI. To assist them with this process, they consulted the GHG Protocol and used the [online calculator](#). When they calculated their overall Scope 1 and 2 baseline, they discovered that 65% of their emissions were driven by the oil boiler, 35% by electricity use, and 5% by the diesel vans. The main carbon drivers are set out below:

Carbon Footprint – Key Drivers	
Scope 1 Emissions	1 oil boiler to create steam, 3 company diesel vans,
Scope 2 Emissions	Electricity for milling, refrigeration, and packaging etc
Scope 3 Emissions	Upstream hop and cereal production, upstream road and marine freight, embedded carbon in glass, aluminium, cardboard, On-site water use, wastewater treatment, downstream transport and distribution, downstream packaging waste, staff commutes

Mobilise: Secure business buy-in and prioritise

With full sight of their carbon footprint and the biggest drivers, the company commenced a comprehensive emission reduction programme and accompanying staff engagement policy. The CEO assigned direct responsibility for delivery to the Chief Financial Officer who is also responsible for wider sustainability and reporting matters. To help secure company-wide support, a meeting was held where staff were encouraged to ask questions, submit ideas, and raise any concerns regarding business and operational impacts. All staff were encouraged to join a training session designed to help employees understand the company's main emission drivers.

The business reviewed its growth strategy and projects already in development. They concluded that substantial changes were needed, particularly with how the business used energy. They determined that a more

sustainable business model was ultimately required to secure customer satisfaction and continued business growth.

Commit: Set emissions reduction targets

Company A assessed their emission reduction potential and the return on certain low and zero carbon investments. They determined that they could potentially reduce absolute Scope 1 and 2 emissions by 88% by 2030 on 2019 levels and take some initial actions to reduce their scope 3 emissions. The company wanted to set a net zero target for 2050, but they were uncertain about their ability to go beyond 88% at this stage. They will revisit their ambition in two years' time.

They decided to set their targets through the SBTi using the streamlined route for SMEs. Participation in SBTi also enabled easy participation in the Carbon Disclosure Project, the Business in the Community Low Carbon Pledge, and automatic inclusion in the We Mean Business Coalition. A one-time-fee of €1000 was paid to SBTi. SBTi accepted this ambition as being in line with the Paris Agreement commitment to keep global warming below 1.5 degrees.

Implement: Develop an emissions reduction roadmap

With targets set and full sight of the biggest emissions drivers, the company developed an emissions reduction roadmap. They started by reviewing the findings of their energy audit. They also held several workshops with staff. Soon they were able to develop a comprehensive long list or "wish list" of solutions.

Once the long list of mitigation options was complete, they selected and prioritised the solutions that delivered the greatest return on investment and had the shortest payback. They were also careful to prioritise solutions according to the mitigation hierarchy (See page #). They then took time to set out a timeline and roadmap for the implementation of the various interventions.

Energy efficiency improvements

Company A identified that energy efficiency improvements to equipment and the buildings were of utmost priority and cost positive. This included

new insulation, timers on boilers, the installation of smart sensors, new lighting equipment, and changes in employee behaviour. They calculated that energy efficiency improvements would reduce their Scope 1 and 2 emissions by 15%.

Oil boiler replacement

With energy efficiency maximised they would then be able to replace their oil boiler with a new appropriately sized biomass woodchip boiler. This required a sizeable upfront investment, but they would qualify for tariff support through the SEAI's Support Scheme for Renewable Heat (SSRH). They calculated that this alone would reduce their Scope 1 and 2 emissions by an additional 55%.

Electricity solutions

The energy audit recommended that they apply for the new Non-Domestic Microgeneration Support Scheme which would help them finance a new solar PV system on site. They calculated that an optimally sized Solar PV installation could supply 30% of the brewery's electricity load or up to 60% if combined with battery storage. If fully implemented, they could further reduce their Scope 1 and 2 emissions by 18%. With their initial focus on the development of the biomass boiler, they decided to put this intervention on hold for two years. In the meantime, they would pay a premium to their energy supplier for a guarantee of 100% renewable electricity.

Diesel vans replacement

While they wanted to replace their diesel vans with fully electric vehicles (BEVs), the diesel vans were only recently purchased and therefore this was financially prohibitive. They would revisit this option in two years' time.

Scope 3 solutions

While Scope 3 emissions were not included in their emissions baseline or target with SBTi, they did make a commitment to reduce these emissions where possible. By engaging with their suppliers and other craft breweries, they began to learn more about their supply chain impacts. Through an industry trade association, they started a project to better quantify Scope 3 emissions in the sector, including the emissions associated with hops and cereal production.

They identified that a change over from glass bottles to aluminium cans could reduce their emissions substantially. They also worked out that they could reduce the volume of packaging and adopt more easily recyclable materials without increasing costs substantially. They are also now partnering with a local third level institution to research alternate uses for organic waste material from the brewing process.

**Measure & Communicate:
Create a measurement and communications plan**

Company A has a clear measurement and reporting framework to help monitor progress, prepare for challenges, and communicate its commitment and

activities to key stakeholders. Because they are participating in the SBTi and the CDP, they must follow specific rules on monitoring and reporting. In return, they can use these internationally recognised brands to market their product and company and secure new business.

Considerable work was needed to develop an internal reporting system and metrics that were accurate and auditable. However, once set up, updating the data was straightforward.

In measuring progress, they have set clear KPIs. Some of the data collected is used for internal purposes only. See table below.

Purpose	KPIs Identified
Internal Reporting	<ul style="list-style-type: none"> • Scope 1 Emissions • Scope 2 Emissions • Scope 3 Emissions <best efforts> • Units of electricity utilised • % of electricity from renewable sources • % of self generated electricity • % of recyclable production materials • Cost of production materials per unit • % of recyclable packaging • Cost of packaging materials per unit • Litres of Transport fuel consumed • % of green fuel
External Reporting	<ul style="list-style-type: none"> • Scope 1 Emissions, reduction & plan • Scope 2 Emissions, reduction & plan • Specific initiatives in each area and in Scope 3 reduction

It was decided that there will be a review of the progress against the plan as part of the monthly management meetings. Also, it was agreed to add a sustainability report section in the annual report to summarise company’s progress to external stakeholders.

Next steps

The business now has an enduring and agile climate action strategy with clear targets, timelines, and lines of responsibility. It is envisaged that this will be strengthened and refreshed over time. The relatively small scale of the business has enabled good information sharing and company-wide buy-in. The business is growing and has plans to enter the apple cider market and develop its own orchard. They have engaged specialist consultants to work out the emission impacts of this new business venture, recognising that the trees will sequester carbon and cider production requires only minimal thermal heat.

Appendix 5 Additional resources and supports for business

Name	Description
AGRIBALYSE®	provides references data on the environmental impacts of agricultural and food products through a database built according to the Life Cycle Analysis (LCA) methodology.
Bord Bia Global Sustainability Insights	In 2021, Bord Bia conducted global research to help businesses understand and respond to changing sustainability demands for food and drink products.
Climate Action Plan 2023	The Climate Action Plan 2023 (CAP23) is the second annual update to Ireland's Climate Action 2019. This plan provides background analysis to Ireland's climate challenge, and sets out the targets, carbon budgets, and policy measures needed to meet Ireland's climate goals.
The Climate Action Regional Offices	The four CAROS provide regional support and resources to local governments in the implementation of national climate policy.
ClimateToolkit4Business	A platform for Irish businesses to input business and utility data and receive an approximate carbon footprint and customised support and advice.
Digitalisation and Energy – IEA Report	Digitalisation & Energy is a report by the International Energy Agency's analysing how digitalisation could transform the world's energy systems.
Enterprise Ireland – Green Start	Enterprise Ireland's Green Start programme assists businesses with projects that improve environmental performance through greater resource efficiency.
EPA Resources	Ireland's Environmental Protection Agency monitors Ireland's environmental health and publishes regular updates and data on GHG emissions, recycling and waste management, the progress towards a circular economy, air and water quality, and other industrial emissions.
Ibec Academy	The Ibec Academy provides a range of accredited, short, and customised training for companies on ESG and corporate sustainability.
IDA Go-Green	IDA's 'Go Green' offers provides client companies support in adopting sustainable practices that can help enhance environmental performance, reduce costs, and meet stakeholder demands.
Knowledge Transfer Ireland	KTI provides advice to organisations on how to begin a collaboration with research partners. Their RD&I Funding Tool helps organisation's find the supports and incentives most relevant to their business according to size, sector, and research area.

Name	Description
Protocol Land Sector and Removals Guidance	The GHG Protocol Land Sector and Removals Guidance explains how companies should account for and report GHG emissions and removals from land management, land use change, biogenic products, carbon dioxide removal technologies, and related activities in GHG inventories, building on the Corporate Standard and Scope 3 Standard. (Final version expected Q4 2023)
Repak	Repak is an environmental not-for-profit organisation set up to help member businesses meet their legal obligation to recycle the packaging they place on the Irish market. They also provide advice and support to member businesses on how to enhance their sustainability.
SBTi's FLAG Guidance	The SBTi's FLAG Guidance provides the world's first standard method for companies in land-intensive sectors to set science-based targets that include land-based emission reductions and removals.
SEAI – Business Supports and Grants	Ireland's national sustainable energy authority provides expert advice and training on energy management and decarbonisation and administers several business energy support schemes including the Energy Audit Grant, the Support Scheme for Renewable Heat, and the EXEED Certified.
SEAI GHG emissions and conversion factors	The SEAI publishes a set of GHG emissions factors and energy conversion factors which can be used by Irish organisations when calculating their emissions baseline.
Teagasc	Ireland's agriculture and food development authority provides resources, research, signposting services, and knowledge sharing tools for farmers on climate action and sustainable farming.
The Climate Change Advisory Council	The Climate Change Advisory Council is an independent advisory body tasked with assessing and advising on how Ireland can achieve the transition to a low carbon, climate resilient and environmentally sustainable economy.
The ecoinvent Database	ecoinvent's Life Cycle Inventory (LCI) provides data on the life cycle emissions of more than 18,000 activities and process. A paid service.
The Intergovernmental Panel on Climate Change	The IPCC is the United Nations body for assessing the science related to climate change. It also prepares comprehensive Assessment Reports about the state of scientific, technical and socio-economic knowledge on climate change, its impacts and future risks, and options for reducing the rate at which climate change is taking place.
The LCA GLAD	The Life Cycle Initiative's Global Life Cycle Analysis Data Access network (GLAD) is a platform providing LCA data sets from different providers including ecoinvent and Agribalyse.
UK BEIS GHG emissions conversion factors	The UK's Department for Business, Energy & Industrial Strategy (BEIS) provides a comprehensive catalogue of GHG emission factors which can be used by UK and international organisations.

Appendix 6 – Ireland’s Sectoral Emission Ceilings as approved by Government on 28 July 2022

Note: (Figures for MtCO₂eq for 2018 and 2030 have been rounded. This may lead to some discrepancies)

Sector	2018 Baseline (MtCO ₂ eq.) ¹	Sectoral Emissions Ceilings for each 5-year carbon budget period (MtCO ₂ eq.)		Emissions in final year of 2021 - 2025 carbon budget period (MtCO ₂ eq)
	2018	2021-2025*	2026-2030*	2025*
Electricity	10	40	20	6
Transport	12	54	37	10
Built Environment - Residential	7	29	23	5
Built Environment - Commercial	2	7	5	1
Industry	7	30	24	6
Agriculture	23	106	96	20
LULUCF ²	5	xxx	xxx	xxx
Other (F-Gases, Waste & Petroleum refining)	2	9	8	2
Total	68	xxx	xxx	xxx
Legally binding Carbon Budgets and 2030 Emission Reduction Targets*	-	295	200	-
Annual unallocated Emission Savings in 2030	-	-	5.25 ⁵	-
Unallocated Savings 2026-2030 ⁶			26	

¹ Million tonnes of carbon dioxide equivalent

² Finalising the sectoral emissions ceiling for the LULUCF sector has been deferred for up to 18 months from July 2022 to allow for the completion of the Land-use Review

³ Following finalisation of the sectoral emissions ceilings for the LULUCF sector, 5-year economy-wide total figures will be available

⁴ As provided by section 6A(5) of the Climate Action and Low Carbon Development (Amendment) Act 2021

⁵ Unallocated savings on an economy-wide basis in 2030 (final year of second carbon budget period), before factoring in net LULUCF sector emissions

⁶ Unallocated savings on an economy-wide basis in the second 5-year carbon budget period from 2026-2030, before factoring in net LULUCF sector emissions

Reduction in Emissions in final year of 2021 - 2025 carbon budget period compared to 2018 Baseline	Emissions in final year of 2026-2030 carbon budget period (MtCO ₂ eq)	Reduction in Emissions in final year of 2026-2030 carbon budget period compared to 2018 Baseline
2025	2030	2030
-40%	3	-75%
-20%	6	-50%
-20%	4	-40%
-20%	1	-45%
-20%	4	-35%
-10%	17.25	-25%
xxx	xxx	xxx
-25%	1	-50%
xxx	xxx	xxx
-	34	51%
-	-	-

Appendix 7- Glossary of Acronyms

°C	Degrees Celsius
AD	Anaerobic Digestion
BER	Building Energy Rating
BITC	Business in the Community
CAP	Climate Action Plan
CARO	Climate Action Regional Office
CCAC	Climate Change Advisory Council
CCS	Carbon Capture and Storage
CDP	Carbon Disclosure Project
CH ₄	Methane
CO ₂	Carbon Dioxide
CO ₂ eq.	Carbon Dioxide Equivalent
COP	Conference of the Parties
CRU	Commission for the Regulation of Utilities
CSDDD	Corporate Sustainability Due Diligence Directive
CSRD	Corporate Sustainability Reporting Directive
DECC	Department of the Environment, Climate and Communications
DETE	Department of Enterprise, Trade, and Employment
DPER	Department of Public Expenditure and Reform
EED	Energy Efficiency Directive
EGD	European Green Deal
EI	Enterprise Ireland
EPA	Environmental Protection Agency
EPBD	Energy Performance of Buildings Directive
ESG	Environment, Social and Governance
ETS	Emissions Trading System
EU	European Union

EV	Electric Vehicle
EXEED	Excellence in Energy Efficient Design
F-Gases	Fluorinated Greenhouse Gases
GCV	Gross Calorific Value
GFC	Gross Final Consumption
GHG	Greenhouse Gas
GOs	Guarantees of Origin
GPP	Green Public Procurement
GRI	Global Reporting Initiative
GW	Gigawatt
GWh	Gigawatt-Hour
GWP	Global Warming Potential
HCV	Higher Calorific Value
HGV	Heavy Goods Vehicle
IDA	Industrial Development Agency
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organisation for Standardisation
KPI	Key Performance Indicator
Kt	Kiloton
kW	Kilowatt
kWe	Kilowatt Electric
kWh	Kilowatt-Hour
LCF	Lower Calorific Value
LEU	Large Energy User
LULUCF	Land Use, Land Use Change and Forestry
MACC	Marginal Abatement Cost Curve Analysis,
MaREI	Research Centre for Energy, Climate, and Marine Research and Innovation
MtCO ₂ eq.	Million Tonnes of Carbon Dioxide Equivalent
MW	Megawatt

N₂O	Nitrous Oxide
NCV	Net Calorific Value
NGO	Non-Governmental Organisation
NOAA	National Oceanic and Atmospheric Administration (United States)
NZEB	Nearly Zero Energy Building
PSO	Public Service Obligation
PV	Photovoltaic
ReCPPA	Renewable Energy Corporate Power Purchase Agreement
RED	Renewable Energy Directive
RESS	Renewable Electricity Support Scheme
RESS	Renewable Electricity Support Scheme
SASB	Sustainability Accounting Standards Board
SBTi	Science Based Targets Initiative
SDGs	Sustainable Development Goals
SDGs	The Sustainable Development Goals
SEAI	Sustainable Energy Authority of Ireland
SFI	Science Foundation Ireland
SI	Statutory Instrument
SME	Small and Medium-Sized Enterprise
SSRH	Support Scheme for Renewable Heat
TCFD	Taskforce on Climate Related Disclosures
tCO₂	Total Carbon Dioxide
TJ	Terajoule
TW	Terawatt
TWh	Terawatt-Hour
UNFCCC	United Nations Framework Convention on Climate Change
UNGC	UN Global Compact
WEEE	Waste Electrical and Electronic Equipment/e-waste
ZEB	Zero Energy Building

Appendix 8: Climate Action Toolkit Checklist

Step	Key Actions	Completed ?
Step 1: Calculate Establish a carbon footprint for your business	Choose a baseline year	
	Set business boundaries	
	Set operational boundaries	
	Identify GHG emissions drivers	
	Categorise GHG emissions according to their Scope	
	Decide what emissions to include	
	Collect activity data	
	Select emission factors	
	Calculate GHG emissions using emission factors	
	Step 2: Mobilise Secure business buy-in and prioritise	Review company strategy and growth plans
Embed climate priorities within the organisation's culture		
Roll out training and upskilling programmes		
Embed climate action metrics and considerations in management		
Assign climate action leadership responsibilities		
Establish a Green Team		
Consider the creation of a Chief Sustainability Officer (CSO)		
Consider establishing an internal carbon pricing policy		
Engage employees through internal communications, workshops, consultations, incentives, competitions, and reward programmes etc.		

Step	Key Actions	Completed ?
Step 3: Commit Set emissions reduction targets	Decide on a target-setting framework if required	
	Decide on the target type	
	Decide on the target boundary	
	Choose the target base year	
	Define the target completion date	
	Define the length of the target commitment period	
	Decide on the use of offsets and credits	
	Establish a target double-counting policy	
	Decide on the target level	
	Verify target	
Step 4: Implement Develop an emissions reduction roadmap	Identify mitigation options	
	Prioritise interventions using the Mitigation Hierarchy	
	Agree a timeline for implementation	
	Review regularly	
	Research relevant State decarbonisation supports	
Step 5: Measure & Communicate Create a measurement and communications plan	Identify relevant mandatory and voluntary reporting obligations	
	Establish an internal measurement and internal reporting system	
	Select relevant KPIs for internal and external use	
	Set up a data capture system	
	Consider automation to improve data collection efficiency	
	Carry out frequent internal progress reviews	
	Decide how, where, and when to disclose emissions and progress	
	Determine if participation in a disclosure framework is appropriate	

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