

A green circular logo with a small stem and leaf at the top and bottom, containing the text "CLIMATE CHANGE ADVISORY COUNCIL" in white, uppercase, sans-serif font.

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A scenic landscape photograph showing rolling green hills, a patchwork of fields, and distant mountains under a cloudy sky. In the foreground, there are out-of-focus purple and yellow flowers.

ANNUAL REVIEW 2023

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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 climate-resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.

The Climate Change Advisory Council was established on 18 January 2016 under the Climate Action and Low Carbon Development Act 2015.

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Climate Change Advisory Council – Adaptation Committee

At its meeting on 6 April 2016, the Climate Change Advisory Council established an Adaptation Committee to consider matters relating to climate change adaptation. The Council is required to have an adaptation committee under the Climate Action and Low Carbon Development (Amendment) Act 2021.

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NOTE: Ex officio Council members who are also members of the Committee may, subject to the agreement of the Committee Chair, nominate observers to attend meetings on their behalf. Please see meeting minutes for details of attendance.

Summary

In the spring and summer of 2023 a concerning series of unprecedented climate events have occurred. Multiple global and local records were broken including the warmest daily temperature ever recorded on 7 July, following the warmest June ever recorded. Average sea surface temperatures reached unprecedented levels for June. Temperatures will continue to increase until significant action is taken. This will lead to more extreme weather events in Ireland such as heatwaves, droughts, storms and flooding.

In this Annual Review 2023 the Climate Change Advisory Council says that, at the current rate of policy implementation, **Ireland will not meet the targets set in the first and second carbon budget periods unless urgent action is taken immediately and emissions begin to fall much more rapidly.**

Ireland's first task is to **reduce and ultimately prevent** emissions of greenhouse gases. To support this there must be effective and consistent engagement with communities, ensuring there is a fair and equitable transition, while building and maintaining public support and action.

Detailed key messages, including observations and recommendations for each sector, can be found at the beginning of each chapter of this Annual Review.

Overall recommendations

- ▶ Government must address areas of uncertainty in how Ireland will reduce its emissions. The sectoral emissions ceiling for the Land Use, Land Use Change and Forestry sector must be set, and it must be clear by how much each sector must reduce its emissions.
- ▶ Government needs to identify and remove barriers to policy implementation by ensuring adequate funding and planning reform at scale and speed.
- ▶ Key actions need to be implemented now to prevent longer term damage and increased costs to society and the economy.
- ▶ Government must adopt new approaches to address emission reductions, creating investment and enhancing skills across the economy, particularly in areas such as retrofitting and renewable energy.
- ▶ The establishment of a Just Transition Commission is recommended to ensure that Ireland achieves its climate objectives in a way that is fair and equitable and protects vulnerable people and communities.
- ▶ The Government should support opportunities that reduce emissions and make Ireland better prepared for the impacts of climate change (see Figure ES.1).

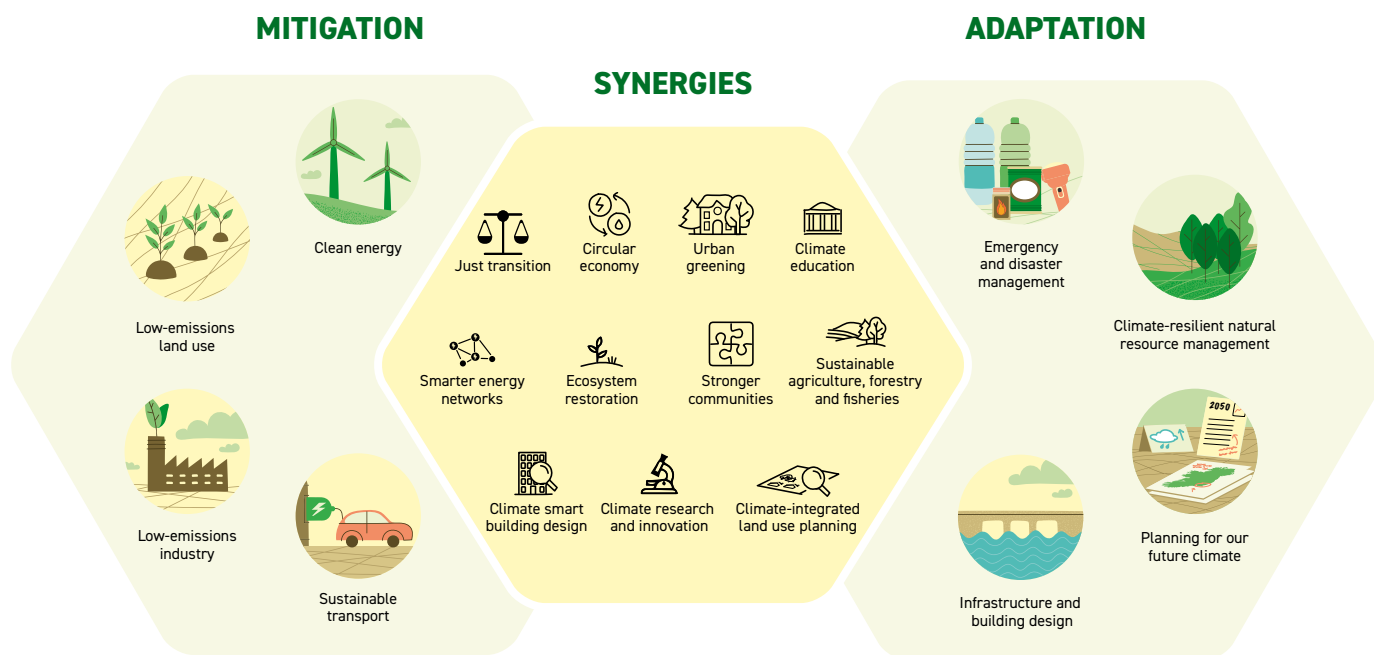


Figure ES-1 Opportunities for synergies and co-benefits from integrated adaptation and mitigation actions. Source: Adapted from New South Wales Government.^[1]

Recommendations for the electricity sector

- ▶ Government needs to conclude work on laying out where and what type of onshore wind should be located across the country.
- ▶ Local authorities need more assistance to help deliver onshore and offshore renewable energy applications more efficiently.
- ▶ It is critical to stop using coal for electricity generation as soon as possible.
- ▶ Electricity storage can form part of the solution towards lowering our electricity emissions. Government needs to give guidelines and incentives to operators to ensure that sufficient levels of storage are rolled out.
- ▶ Laws to support access to smart metering data must be progressed to help consumers better control their energy use

Recommendations for the transport sector

- ▶ Motor Tax should be redesigned to promote energy efficient vehicles and should increase year on year.
- ▶ Government should increase investment in public transport including the electrification of our bus fleet. In addition, there should be a focus on improving the reliability and accessibility of services.

- ▶ The local authority in each of our main cities should introduce park and ride schemes along major roads and plan to reduce the number of public parking spaces.
- ▶ Commuters should be motivated to opt for public transport and active travel. This would include updating the Taxsaver commuter ticket and cycle to work schemes, and the introduction of parking levies at workplaces in our main cities.
- ▶ Locating homes closer to businesses and services can help to reduce our dependency on private cars. The new national planning framework needs to better reflect our climate ambitions.

Recommendations for the enterprise and waste sectors

- ▶ Government should urgently update building regulations to increase the use of timber in construction and also encourage greater usage of lower carbon cement and concrete.
- ▶ Government should work to find ways to help industry to become more energy efficient and less reliant on fossil fuels
- ▶ Public education campaigns and economic incentives for businesses and households are required to achieve targets on food waste and food packaging waste.

Recommendations for the built environment sector

- ▶ More urgency and ambition is required in developing district heating schemes, taking on board lessons from other countries where they already supply a significant proportion of heat.
- ▶ Large energy users, including data centres, should be obliged to supply their excess heat to local communities to support district heating schemes.
- ▶ Budget 2024 should set a target of all social housing being upgraded to a building energy rating of B2 or connected to a district heating network by 2030.
- ▶ The numbers of retrofits being carried out each year needs to increase. Homes that use peat or coal as their main heating fuel should be prioritised.
- ▶ Mortgage providers should be encouraged to offer green mortgage products that align to and support retrofitting schemes.

Recommendations for the agriculture and Land Use, Land Use Change and Forestry (LULUCF) sectors

- ▶ Government should actively support income diversification opportunities for farmers.
- ▶ Government should ensure sufficient supplies of greener forms of fertiliser are available and launch an information programme for farmers.
- ▶ Urgent consideration should be given to the opportunities for roll out of feed additives for dairy farms that reduce methane emissions from cattle.

- ▶ A streamlined process for applications for the new forestry scheme will be needed to ensure speedy implementation.

Recommendations for adapting to the impacts of climate change

- ▶ Government should set out a budget for developing our resilience to the effects of climate change. Given rising sea levels, a Coastal Management Strategy is urgently needed to help actively manage our changing coastlines.
- ▶ Communities, non-governmental organisations and the private sector must be involved in adaptation planning and implementation.
- ▶ An all-island approach to climate action should be developed further, especially for critical infrastructure such as our electricity network and the management of cross-border natural systems such as rivers.

Abbreviations and Acronyms

Abbreviation	Definition
ACRES	Agri-Climate Rural Environment Scheme
AFOLU	Agriculture, Forestry and Other Land Use
AR6	IPCC Sixth Assessment Report
BER	building energy rating
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity
COP	Conference of the Parties
CRU	Commission for Regulation of Utilities
DAFM	Department of Agriculture, Food and the Marine
DECC	Department of the Environment, Climate and Communications
DETE	Department of Enterprise, Trade and Employment
DHLGH	Department of Housing, Local Government and Heritage
EPA	Environmental Protection Agency
ESRI	Economic and Social Research Institute
ETS	Emissions Trading System
EU	European Union
EV	electric vehicle
F-gases	Fluorinated man-made gases with greenhouse gas properties, including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF ₆) and nitrogen trifluoride (NF ₃)
GHG	greenhouse gas
ICE	internal combustion engine
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land Use, Land Use Change and Forestry
MACC	marginal abatement cost curve
NAF	National Adaptation Framework

Abbreviation	Definition
NCAP	National Climate Action Plan
NDCA	National Dialogue on Climate Action
NESC	National Economic and Social Council
NPF	National Planning Framework
NTA	National Transport Authority
OECD	Organisation for Economic Co-operation and Development
OPW	Office for Public Works
RED	Renewable Energy Directive
SAC	special area of conservation
SEAI	Sustainable Energy Authority of Ireland
SMEs	small and medium-sized enterprises
SPA	special protection area
SUV	sports utility vehicle
UNFCCC	United Nations Framework Convention on Climate Change
WAM	'with additional measures' scenario for emission projections
WEM	'with existing measures' scenario for emission projections
WMO	World Meteorological Organization

1 Introduction

The Annual Review 2023 is the seventh annual review carried out by the Climate Change Advisory Council. Each year the Council reviews Ireland's performance during the immediately preceding year (in this case 2022) with regard to achieving the country's national climate aims through climate change adaptation and mitigation, and to complying with EU and international obligations related to climate action.

There has been significant progress nationally in bringing together the excellent work across a multitude of stakeholders in academia through Ireland's Climate Change Assessment, which will be published by the EPA before the end of this year. The four volumes and the synthesis report will contribute significantly to the work of the Council over the coming years.

The Council is concerned that the necessary national actions are not taking place or being enabled at the speed and with the level of coordination across Government and society that is required. In the spring and summer of 2023 a concerning series of unprecedented climate events have occurred. Multiple global and local records were broken, including the warmest daily temperature ever recorded on 7 July, following the warmest June ever recorded. Average sea surface temperatures reached unprecedented levels for June, and Antarctic sea ice reached its lowest extent for June at 17% below average. All this is particularly concerning as the World Meteorological Organization (WMO) announced that the El Niño^a has just taken hold. Ireland is vulnerable and needs to plan for this climate volatility, and for a future based on a significant and rapid reduction in the use of fossil fuels.

The Climate Action and Low Carbon Development (Amendment) Act 2021 ('the Climate Amendment Act') sets out the legal framework for Ireland's transition to a climate-resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy by no later than 2050. This is how national legislation has described and enshrined in law the very principle of climate-resilient development. The Climate Amendment Act sets out a 2030 interim target (-51%), 5-yearly carbon budgets, sectoral emission ceilings, an annually updated Climate Action Plan and a regularly updated Long-Term Climate Action Strategy, a draft of which was published for consultation in May of this year. The Annual Review will assess progress in complying with the carbon budget and each sectoral emission ceiling.

The Annual Review also takes place in the context of welcome developments, both national and international, in the area of biodiversity. The planned creation of a Just Transition Commission is also a very welcome and necessary step in preparing Ireland for a more sustainable future. In the light of these important developments, there is a particular focus on the areas of biodiversity and Just Transition in this report in Chapters 10 and 11, respectively.

^a El Niño and La Niña events are caused by, and contribute to, naturally occurring climate variability. They disrupt the normal patterns of tropical precipitation and atmospheric circulation and are considered to be the opposite phases of air-sea interactions collectively referred to as the El Niño/Southern Oscillation (ENSO).

The Annual Review 2023 reflects the requirements of Section 12 of the Climate Amendment Act and is organised into 11 chapters. The remainder of the report is structured as follows:

- ▶ Chapter 2 contains a summary of Ireland's changing climate and future projections relevant to this subject.
- ▶ Chapter 3 reviews adaptation and Ireland's climate-resilient transition in the existing National Adaptation Framework sectors.
- ▶ Chapter 4 assesses the State's performance and compliance with its national and international obligations and targets for emission reductions.
- ▶ Chapter 5 focuses on the electricity sector.
- ▶ Chapter 6 focuses on the transport sector.
- ▶ Chapter 7 focuses on the built environment sector.
- ▶ Chapter 8 focuses on the enterprise sector.
- ▶ Chapter 9 focuses on agriculture, forestry and other land use.
- ▶ Chapter 10 focuses on aspects of biodiversity and climate.
- ▶ Chapter 11 focuses on the delivery of a Just Transition.

In line with Section 12 of the Climate Amendment Act, a list of the activities and meetings of the Climate Change Advisory Council for 2022 can be found online at www.climatecouncil.ie

2 Ireland's Changing Climate and Future Projections

Key messages

Observations

- ▶ 2022 was the warmest year on record in Ireland, characterised by multiple heatwaves and drought events. Projections indicate an increased risk of drought in the coming decades.
- ▶ The best estimate from the IPCC Synthesis Report is that the global temperature increase will reach or surpass 1.5°C above the 1850–1900 pre-industrial baseline in the first half of the 2030s. The threshold could be hit even sooner under a high-emissions pathway.
- ▶ The likelihood and impacts of abrupt and/or irreversible changes in the climate system, including changes when tipping points are reached, increase with further global warming. Examples of tipping points that would affect Ireland include the collapse of the Greenland ice sheet or the collapse of the Atlantic Meridional Overturning Circulation, which includes the Gulf Stream system. Even if global warming levels are kept to 1.5°C, reaching some climate tipping points, and experiencing their associated impacts, may be unavoidable.
- ▶ Deep, rapid and sustained mitigation action and accelerated implementation of adaptation action are required in this decade to reduce projected losses and damage for humans and ecosystems.

2.1. Introduction

This chapter presents a summary of the most recent developments in the understanding of Ireland's climate, how it is changing and how it is projected to change further. This is essential to understanding the urgency for adaptation and mitigation action in both the global and the Irish context.

2.1.1. Summary of recent developments and knowledge

The publication of the IPCC Synthesis Report^[2] in March 2023 provides important information on (i) the current status of and trends in climate change, (ii) future climate change risks and long-term responses and (iii) responses in the near term.

The report states that it is 'unequivocal that human influence has warmed the atmosphere, ocean and land' and that 'widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred'. These changes include:

- ▶ the highest directly observed atmospheric concentrations of carbon dioxide,
- ▶ the last decade being warmer than any period in the instrumental record,

- ▶ unmatched glacial retreat in directly recorded history,
- ▶ sea level rise faster than in any century for at least 3,000 years,
- ▶ ocean warming faster than at any time since the end of the last ice age,
- ▶ ocean acidification at the highest level for 26,000 years.

A substantial emissions gap is identified between global greenhouse gas emissions in 2030 associated with the implementation of nationally determined contributions announced prior to 2021 and those associated with modelled mitigation pathways that limit warming to 1.5°C. The best estimate from the IPCC Synthesis Report is that the global temperature increase will reach or surpass 1.5°C above the 1850–1900 pre-industrial baseline in the first half of the 2030s. The threshold could be hit even sooner under a high-emissions pathway.

It is notable that every increment of global warming will intensify multiple and concurrent hazards, and further increases in global mean sea level and increased ocean acidification and deoxygenation are expected. It is stated that the likelihood and impacts of abrupt and/or irreversible changes in the climate system, including changes when tipping points are reached, will increase with further global warming and that the Greenland and West Antarctic ice sheets will be lost almost completely and irreversibly at sustained warming levels of between 2°C and 3°C, causing several metres of sea level rise.

In this context, the IPCC Synthesis Report calls for deep, rapid and sustained mitigation action and accelerated implementation of adaptation action in this decade to reduce projected losses and damage for humans and ecosystems. It states that several mitigation options are technically viable, are becoming increasingly cost-effective and are generally supported by the public. These include solar energy, wind energy, electrification of urban systems, urban green infrastructure, energy efficiency, demand-side management, improved forest and crop/grassland management, and reduced food waste and loss.

The report also recognises the need for urgent and system-wide transformation across all of society to secure a net zero and climate-resilient future. It further highlights the challenge of limited finance for adaptation and notes that adaptation is yet to progress from planning to implementation in many nations. The role of ecosystem-based adaptation (or nature-based solutions) is cited as a proven, low-cost and readily available option for building resilience to climate change and safeguarding biodiversity, improving health outcomes, bolstering food security, delivering economic benefits and enhancing carbon sequestration.

2.2. Latest scientific evidence for observed and projected climate change

2.2.1. Observed and projected climate changes

In its annual report on the state of the global climate in 2022, the World Meteorological Organization (WMO)^[3] agrees with the findings of the IPCC Synthesis Report with respect to the changing climate. It reports that 2015–2022 were the eight warmest years on record globally, fuelled by ever-rising greenhouse gas concentrations and accumulated heat. Extreme

heatwaves, drought and devastating flooding affected millions of people and cost billions of US dollars in 2022.

Although the global mean temperature in 2022 was only the fifth or sixth warmest ever due to a rare triple-dip cooling La Niña event, the WMO report notes that it is only a matter of time until we experience another warmest year on record. The 10-year average for the period 2013–2022 is estimated to be 1.15°C above the 1850–1900 pre-industrial baseline.

The rate of global mean sea level rise is estimated to have doubled since 1993. Mean sea level has risen by nearly 10mm since January 2020 and achieved a new record high in 2022. The past 2.5 years alone account for 10% of the overall rise in sea level since the start of satellite measurements. The Greenland ice sheet lost mass for the 26th consecutive year, and it rained (rather than snowed) over the high ice cap for the first time in September 2022. Ocean heat was at record levels in 2021 (the latest year assessed), with the warming rate particularly high in the past 20 years. The report also found that marine heatwaves have become more frequent over the late twentieth and early twenty-first centuries. These are characterised by unusually warm water temperatures that persist for extended periods.

The WMO report also focuses on the impacts of climate change and particularly how hazards and weather-related events are driving population displacement and other devastating social and economic consequences. A wide variety of record-breaking extreme climate events occurred in 2022. Record-breaking rain in July and August in Pakistan caused at least 1,700 deaths, affected 33 million people and displaced 8 million people. The total damage and economic losses were estimated at US\$30 billion. Record-breaking heatwaves and droughts affected China and Europe in the summer of 2022 with heat-related excess deaths estimated at over 15,000 in Spain, Germany, the UK, France and Portugal. Daytime temperature in the UK breached 40°C for the first time since records began. The heat and droughts also impacted hydro power generation in Europe, which fell to its lowest level since 2000 and declined by 19% in 2022.^[4] In East Africa, an estimated 37 million people faced acute food insecurity due to the effects of prolonged drought and other shocks. Record-breaking extreme climate events continued into 2023, with extreme flooding events in Auckland and Cyclone Gabrielle leading to a national state of emergency in New Zealand. It was the deadliest cyclone and weather event to hit New Zealand since 1968 and prompted the Government to adopt a new National Resilience Plan worth €3.4 billion focusing on building back better following extreme weather events.^[5]

The Organisation for Economic Co-operation and Development (OECD) report of 2022 on climate tipping points^[6] indicates that worse may be on the way. It highlights that important tipping points are already 'possible' at current levels of warming and may become 'likely' within the Paris Agreement range of 1.5–2°C warming, questioning the previously well-accepted notion that climate tipping points have a low probability of being crossed under low levels of warming.

The OECD report defines a tipping point as a critical threshold beyond which a system reorganises, often abruptly and/or irreversibly, and a tipping element is an Earth system component that is susceptible to reaching a tipping point. Key tipping elements include the collapse of the West Antarctic and Greenland ice sheets, the melting of the Arctic permafrost, the decline of the Atlantic Meridional Overturning Circulation (including the Gulf Stream system) and the dieback of the Amazon forest. A 2023 publication by the Marine Institute^[7] highlights that a slowdown in the Gulf Stream, were it to occur, would lead to a cooling of Ireland's temperate climate, but

global warming is still most likely expected to cause net warming in Ireland. That regional cooling in response to a tipping point cannot be ruled out, reinforces the need to plan for a range of possible outcomes including low-likelihood high impact outcomes associated with tipping points and deep uncertainty.

The collapse of these system components would have major implications for Ireland and countries around the world. The OECD report identifies the need for transformational adaptation even if global warming levels are kept to 1.5°C, given that reaching some climate tipping points and experiencing their associated impacts may be unavoidable.

2.2.2. State of Ireland's climate

Based on Met Éireann's monthly and annual state of the climate reports,^[7, 8] Ireland's climate in 2022 and the first half of 2023 was broadly consistent with the trends observed in the WMO report *State of the Global Climate 2022*. Following 11 consecutive years with temperatures above the long-term average, Met Éireann declared 2022 to be the warmest year on record in Ireland, with multiple heatwaves experienced and December being the only month with below long-term average temperatures.^[8] The all-time highest maximum temperature records for July and August were broken in 2022, with a temperature of 33.0°C recorded in Dublin in July (12.9°C above its 1981–2010 long-term average) and a temperature of 31.7°C recorded in Carlow in August.

The spring and summer of 2022 were drier than average, which had negative consequences for agriculture and wider society. It is notable that 47 separate dry period records (absolute droughts, partial droughts and dry spells^a) were observed at different locations in Ireland during 2022. Of these, 42 were dry spells at 21 stations and five were absolute droughts at five stations. This trend continued in the early months of 2023 with above long-term average temperatures and below long-term average rainfall prevailing across Ireland in January and February. It was the driest February since 1965 at two stations in Meath and Dublin, and an absolute drought was recorded in February at Johnstown Castle, Co. Wexford, while two partial droughts were recorded in Dublin. Countrywide it was the fourth driest February on record (from records going back to 1941).

The majority of annual rainfall totals across the country in 2022 were below their 1981–2010 long-term average, although considerable variability was observed in rainfall events (highest daily rainfall, number of wet and very wet days, etc.). The highest annual rainfall total of 1,678.7 mm was recorded at Valentia in Kerry, which was 107% of its 1981–2010 long-term average. This compared with the lowest of 688.2 mm at Dublin Airport, which was 91% of its 1981–2010 long-term average. The number of very wet days ranged from 17 days at Dublin Airport to 65 days at Valentia in Kerry. It was the driest year since 2011 at both Cork Airport and Roches Point, yet Cork Airport also recorded the highest daily rainfall total of 54.9 mm on 16 October 2022, which was the highest daily rainfall since 2005. March 2023 was also characterised by severe heavy rainfall events and several weather stations (particularly in Dublin, Cork, Mayo and Kerry) recorded their wettest March in recent times and Cork Airport recorded the highest daily rainfall of 34.7 mm on 9 March (its highest daily rainfall for March since 2013).^[9]

^a An absolute drought is a period of 15 or more consecutive days, none of which is credited with 0.2 mm or more of precipitation. A partial drought is a period of at least 29 consecutive days with a mean daily rainfall not exceeding 0.2 mm. A dry spell is a period of 15 or more consecutive days, none of which is credited with 1.0 mm or more of precipitation (i.e. daily total < 1.0 mm).

June 2023 was provisionally the warmest June on record for Ireland. 23 out of 25 of the primary weather stations had their warmest June on record and the average temperature is expected to be >16°C for the first time for June. The marine area also experienced unusually warm temperatures with the warmest June sea surface temperature on record and the north Atlantic experiencing a category 4 'extreme' marine heatwave in parts of the coast off Ireland. The water temperature off Ireland's south west coast was measured at 17.4°C, almost 4°C higher than the average June temperature.

Five winter storm events were recorded in 2022 – Storms Malik and Corrie in January and Storms Dudley, Eunice and Franklin in February – while three further storms were recorded in February, March and April of 2023 (Storms Otto, Larisa and Noa). Storm Eunice brought violent storm force winds, although the storms of 2022 and early 2023 were generally less damaging than those of 2021. The 2023 storms that have affected Ireland to date were named by Météo-France because the strongest winds from those storms missed Ireland to the south. Interestingly, since the start of storm naming in Ireland (2015), 2022 was the first year there were no locally named storms after September and no locally named storms affected Ireland until June 2023.

Wind speeds in December 2022 were lower than normal because of a negative North Atlantic mode^a for the first half of the month. This meant that the North Atlantic jet stream, which guides mid-latitude storm system tracks, was displaced to the south. This kept the stronger winds to below the south of Ireland. These events have considerable implications for wind energy supply and there was a 24% reduction in wind energy generated in December 2022 compared to the previous month.^[10]

2.2.3. Ireland's projected future climate

Met Éireann continues to expand its climate modelling portfolio and is a core partner of the European Centre Earth (EC-Earth) consortium, which develops an IPCC-class Earth system model. It is also partnering with the Irish Centre for High-End Computing on a 4-year research programme to improve EC-Earth's representation of the North Atlantic climate system and to study the impact of changes in this system on Ireland's climate.

The Irish climate-modelling analysis indicates that by mid-century (2041–2060) Irish temperatures are projected to increase by 1–1.6°C compared with the period 1981–2000, with the largest increases in the east of the country. On summer days and winter nights, the average rise in temperatures may surpass 2°C. Ireland may experience approximately half the number of frost and ice days, compared with 1981–2000, while summer heatwaves are likely to become more frequent, particularly in the south of the country. Dry periods in summer are also projected to become more frequent, while heavy rainfall/precipitation events are projected to increase substantially, particularly in autumn and winter. Projections also indicate that the amount of wind energy generated may decrease (<2%) overall in future climate scenarios, storm tracks will change, and the growing season will lengthen. Changes in precipitation and circulation are considerably more

^a The North Atlantic Oscillation is a weather phenomenon over the North Atlantic Ocean of fluctuations in the difference in atmospheric pressure at sea level between the Icelandic Low and the Azores High. A 'positive mode' is where a strong subtropical high is located over the Azores islands in the central North Atlantic while a strong low-pressure system is centred over Iceland, and a 'negative mode' is where weaker high- and low-pressure systems are found over the same locations. During winters governed by the negative mode of the North Atlantic Oscillation, colder conditions are brought to eastern North America and northern Europe mainly by more frequent intrusions of Arctic air.

uncertain than those in temperatures and it is key that practitioners recognise and deal with these uncertainties appropriately.

These results are confirmed and strengthened by similar outputs from earlier modelling studies. Of course, climate change projections, like all projections, are subject to uncertainty, not least because the actions taken or not taken today and over the coming years will impact the state of the climate in the future. It is therefore critical to devise plans for a range of possible climate change scenarios and outcomes to ensure resilience.

This year, Met Éireann will release its standardised climate projections for Ireland as part of the TRANSLATE project. This dataset, which combines both national and international climate projections, will provide the most comprehensive snapshot of Ireland's future changes in temperature and precipitation across a range of scenarios. For the first time in Ireland, TRANSLATE will also provide information on threshold-based global warming levels (1.5°C, 2°C, 2.5°C, 3°C, 4°C). This enhances the climate service information available to adaptation decision-makers, helping to strengthen decision-making under uncertainty.

2.2.4. Climate impacts for Ireland

The National Climate Objective requires Ireland to be climate resilient by no later than 2050. The latest modelling by Met Éireann for the period 2041–2060 (outlined above) provides greater clarity on how climate change is likely to impact Ireland by then. The implications of this for the productive sectors of the economy, such as agriculture, forestry and fisheries, as well as critical infrastructure, water resources and flood risk management, and health, are far reaching and need to be planned for accordingly.

The IPCC in its Working Group II contribution to the Sixth Assessment Report of 2022^[12] identified four key climate change risks for Europe, which are briefly expanded on here for the Irish context:

1. Health of humans and ecosystems – a diverse range of impacts on the health care system is expected, including risks to human health from heatwaves, more exposure to vector-borne diseases, changes in aeroallergens due to changes in the growing season, physical and mental health impacts from disaster events, and climate anxiety. Marine and terrestrial ecosystems and species are likely to be affected by geographical species range shifts, habitat loss, food web changes, disease outbreaks and increased water temperatures.
2. Changes in stresses on crops, trees and livestock due to the combined effects of increasing heat and droughts and changes in rainfall patterns – changed conditions are likely to increase the length of the growing season and could open up opportunities for new crops. Increased outbreaks of diseases and pests are expected. Increased heavy rainfall/precipitation events are likely to worsen soil compaction and run-off on agricultural land.
3. Water scarcity – particularly in the summer months, this has the potential to have cascading impacts^a across other sectors, such as agriculture, forestry and other land use, and the functioning of critical infrastructure.

^a Cascading impacts from extreme weather/climate events occur when an extreme hazard generates a sequence of secondary events in natural and human systems that result in physical, natural, social or economic disruption, whereby the resulting impact is significantly larger than the initial impact.^[11]

4. Effects of extreme weather events and sea level rise on people, infrastructure and economies –cities vulnerable to sea level rise and flood events, such as Dublin, Cork, Limerick and Galway, need to strengthen their flood defences. Vulnerable critical infrastructure needs to be made more resilient to climate change so that cascading impacts are avoided.

3 Adaptation Progress in Ireland

Key messages

Observations

- ▶ Inadequate human and financial resources for adaptation are key challenges reported by sectors and local authorities. Detailed information on the budget for, costs of and investment requirements for adaptation is lacking across central and local government.
- ▶ Measures to build resilience are still largely small scale, reactive, incremental and underfunded, with most focusing on immediate impacts or near-term risks. The disparity between today's levels of adaptation and those required persists in large part because of the lack of specific public funding and limited investment from the private sector.
- ▶ Improved focus on mainstreaming adaptation in plans, policies, programmes and strategies is evident, but more urgency is needed in implementation to deliver meaningful impacts on the resilience of critical infrastructure and systems, communities and ecosystems.
- ▶ Our critical energy infrastructure is vulnerable to the impacts of climate change, and these may create cascading impacts to the economy and society. The increasing shift towards electrification will accentuate this risk. There is a need to invest now to ensure that existing and planned energy infrastructure is made more resilient.
- ▶ The need to integrate adaptation and mitigation actions is increasingly recognised and offers significant potential to realise co-benefits and maximise resourcing.
- ▶ Strengthening of governance structures documented in the National Climate Action Plan 2023 (including strengthening the role of the Climate Action Delivery Board) is an important development, as the need for coordinated climate action necessitates strong governance and leadership to deliver on Ireland's climate ambitions.
- ▶ The significant potential of Climate Ireland is still to be realised, and its collaboration with Met Éireann on the National Framework for Climate Services is a key development to improve data availability and to assist stakeholders to plan for uncertain scenarios.

Recommendations

- 3.1. Previous Council recommendations remain critical, namely that an adaptation budget is set for 2030 and an assessment of what is required to make Ireland resilient by 2050 and beyond is undertaken, based on agreed consistent criteria. Specific funding for adaptation is needed from relevant departments, regulators and local authorities. Investment from the private sector is essential to leverage the level of public finance currently available for adaptation.
- 3.2. Erosion, sea level rise and coastal storm events are being magnified by the changing climate. A clear and fit-for-purpose Coastal Management Strategy is urgently needed to help actively

manage our changing coastlines and to support communities, businesses and households most at risk to build resilience.

- 3.3. To measure the mainstreaming and impact of adaptation actions, it is recommended that a set of national adaptation indicators be established over the coming 12 months. The use of measurable key performance indicators and timelines should also be strengthened in the next set of guidelines for sectoral adaptation plans, and the implementation of these plans should be monitored and evaluated regularly.
- 3.4. It is essential that the Department of the Environment, Climate and Communications ensures policy coherence between the new National Adaptation Framework, the next iteration of sectoral adaptation plans and the local authority climate action plans that are currently under development.
- 3.5. There is a greater need for a mixture of top-down and bottom-up approaches and to engage communities, non-governmental organisations and the private sector in adaptation planning and implementation. This should be promoted through the new National Adaptation Framework, the next iteration of sectoral adaptation plans and the local authority climate action plans.
- 3.6. The importance of an all-island approach to climate action is well documented and should be developed further, especially in relation to critical infrastructure and the management of cross-border natural systems.

3.1. Introduction

Globally, adaptation has not received the same level of attention as climate change mitigation in terms of policy development, resourcing and delivery.^[12, 13] The United Nations Framework Convention on Climate Change (UNFCCC) global stocktake, implemented to track progress towards achieving the three global goals of the Paris Agreement – mitigation, adaptation and support – is helping to highlight the importance of adaptation action. Moreover, it is raising its profile and helping to tackle the methodological, empirical, conceptual and political challenges of assessing adaptation action.^[13] The process will culminate in 2023 at the 28th Conference of the Parties (COP28) in the United Arab Emirates with the aim of adopting a framework to guide the achievement of the global goal on adaptation.

Concurrently, Irish adaptation policy development and implementation is entering an important phase as the Government works towards the publication of a revised National Adaptation Framework (NAF), and the drafting of Local Authority Climate Action Plans, combining adaptation and mitigation actions. The drafting of Ireland's first National Climate Change Risk Assessment will also provide a much-needed coherent climate change risk management framework (due to be completed in Q1 2025). Moreover, the development of updated Sectoral Adaptation Plans (to be completed in Q2 2025) will provide the opportunity to bring in the new NAF revisions. Notably, there has been a welcome provision of human resources and capacity-building in the adaptation area across sectors, with the appointment of climate action officers and climate action coordinators across local authorities and the continued support of the Climate Action Regional Offices (CAROs).

Highlighting the strong synergies and links between adaptation and mitigation action is a key theme identified in the National Climate Action Plan (NCAP) 2023, which also more centrally acknowledges the importance of biodiversity, nature-based solutions and Just Transition in the climate action space.

The concepts of adaptation and resilience are inter-related concepts, and it is helpful to understand the subtleties of each and how they work together (see Box 3-1).

Box 3-1 Adaptation and resilience defined

Adaptation is characterised by a set of actions and processes that help societies to adjust to the impacts of adverse changes.

Resilience is more associated with a perspective and way of thinking that advocates system-wide changes including a range of solutions to enhance social, human, natural, physical and financial capacities; forward-looking and anticipatory planning for long-term capacity-building; and enhancing the ability to absorb shocks and recover from their impacts.^[14]

3.2. Key developments in international adaptation

This section provides an overview of relevant policy-facing reports and plans published over the review period from other jurisdictions and through inter-governmental organisations. It discusses examples of recent developments specific to adaptation policy development offering lessons for Ireland. A particular focus is given to work that articulates the key issues and topics identified over the last 12 months. Topics covered include the challenges of integrating adaptation and mitigation, tracking adaptation progress, investment needs for adaptation, Just Transition planning and support, and identifying barriers to ecosystem-based adaptation.

3.2.1. Integrating adaptation and mitigation

The IPCC's AR6 Synthesis Report acknowledges the strong complementarity of adaptation and mitigation in climate action.^[2] In particular, Figure SPM.7 in the summary for policymakers identifies the multiple opportunities for scaling up climate action (Figure 3-1). The left-hand panel shows climate responses and adaptation options assessed for their multidimensional feasibility at the global scale, in the near term and up to 1.5°C global warming. The term response is used in addition to adaptation because some responses, such as migration, relocation and resettlement, may or may not be considered to be adaptation. Forest-based adaptation includes sustainable forest management, forest conservation and restoration, reforestation and afforestation. WASH refers to water, sanitation and hygiene. Six feasibility dimensions (economic, technological, institutional, social, environmental and geophysical) were used to calculate the potential feasibility of climate responses and adaptation options, along with their synergies with mitigation. For potential feasibility and feasibility dimensions, the figure shows high, medium or low feasibility. Synergies with mitigation are identified as high, medium and low.

Figure 3-1 illustrates the co-benefits or synergies of working across adaptation and mitigation options in tandem. It highlights strong complementarity between the two in areas including the provision of resilient power systems, biodiversity management and ecosystem connectivity, sustainable land use and urban planning, disaster risk management, and livelihood diversification.

There are multiple opportunities for scaling up climate action

a) Feasibility of climate responses and adaptation, and potential of mitigation options in the near-term

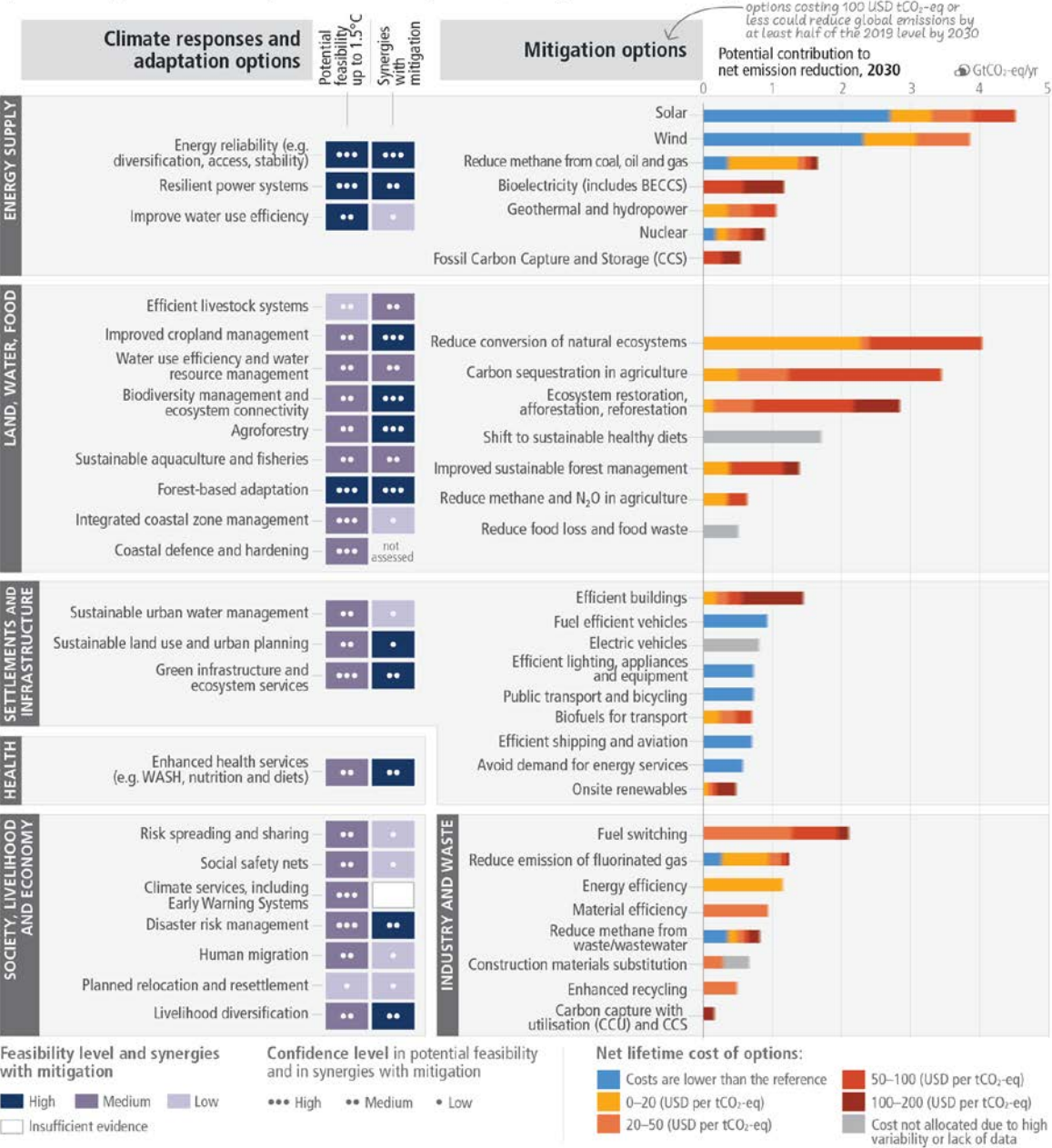


Figure 3-1 Multiple opportunities for scaling up climate action. Source: Panel (a) of Figure SPM.7 from IPCC, 2023, Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (Core writing team, H. Lee and J. Romero (eds.)). IPCC, Geneva, Switzerland (in press). Reproduced with the permission of the Intergovernmental Panel on Climate Change.^[15]

3.2.2. Tracking adaptation progress

The global goal on adaptation aims to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change. Under the Glasgow–Sharm el-Sheikh work programme, a series of workshops are following a structured approach to discuss limiting the adverse impacts, risks and vulnerabilities associated with climate change, as well as enhancing adaptation action and support. Ebi *et al.*^[16] highlight the need for relevant indicators, approaches, targets and metrics, where available, to assess progress towards the global goal on adaptation at national and global levels. In their UN-led World Adaptation Science Programme policy brief on the global goal on adaptation, Ebi *et al.* also recommend adaptive capacity evaluation, through self-assessment targeting the climate hazards prioritised by each country, for all relevant human and natural systems. They also promote flexibility to reflect the country-driven nature of adaptation and the specific contexts of national circumstances in each country.^[16]

The UK Climate Change Committee has published a number of insightful reports from an adaptation perspective, including its March 2023 report documenting progress in adapting to climate change.^[17] Its adaptation progress report presented three key messages: (i) the second National Adaptation Programme has not adequately prepared the UK for climate change, with limited evidence found of the implementation of adaptation at the scale needed to fully prepare for the climate risks facing the UK; (ii) the impacts from extreme weather in the UK highlight the urgency of adapting to climate change, with the record-breaking temperatures in summer 2022 bringing unprecedented numbers of heat-related deaths, wildfire incidents and significant infrastructure disruption; and (iii) the next UK National Adaptation Programme must make a step change. It must be much more ambitious than its predecessors in order to focus on the delivery of effective adaptation.

The UK Climate Change Committee also published an updated adaptation monitoring framework to assess the effectiveness of adaptation action across the UK.^[18] Three of the key principles of the framework are: (i) a stronger focus on the delivery and implementation of adaptation action, rather than risk assessment and planning; (ii) a more integrated response to systemic and interacting climate risks; and (iii) a more aligned assessment framework across the Climate Change Committee's mitigation and adaptation progress reporting.

3.2.3. Investment needs for adaptation

The UK Climate Change Committee published a report setting out investment for a well-adapted UK in February 2023.^[19] The report makes the case for significant investment to build resilience to climate change in the UK. It states that investment from public and private sectors will be needed, and that currently there are barriers to investment in adaptation, particularly from the private sector, and this is limiting the ability to prepare for climate change. The critical role that the UK Government holds in supporting adaptation investment is also noted. Areas identified for targeted action by Government to support investment in adaptation include clarifying adaptation goals and roles for investment, creating markets that value adaptation outcomes, strengthening corporate disclosure regimes, empowering financial regulators and public finance institutions to address physical climate risks, and helping to unlock investment through public financial institutions.

3.2.4. Just Transition planning and support

Developed under the EU Just Transition Fund, after approval by the Government of Ireland, the European Commission adopted Ireland's Territorial Just Transition Plan and associated programme, on 15 December 2022.^[20, 21] The plan and associated programme identify the most negatively affected territories in Ireland, provide an assessment of the transition challenges for each of the territories identified, set out development needs and objectives, look for best practice governance mechanisms, and identify programme-specific indicators of results.

3.2.5. Ecosystem-based adaptation and nature-based solutions

A stakeholder dialogue report on ecosystem-based adaptation was published in April 2023 by the United Nations Environment Programme, providing detailed information on the barriers to ecosystem-based adaptation.^[22] The work draws on a survey and regional stakeholder dialogue with global and regional adaptation networks in Africa, Asia-Pacific, and Latin America and the Caribbean. Three main categories of barriers were identified: (i) a lack of awareness of the critical role of natural assets in underpinning resilience and a limited availability of knowledge and evidence to help make the case for working with nature; (ii) policy and regulatory environments and governance challenges that influence the attractiveness and feasibility of using these approaches; and (iii) the limited access to finance for applying and scaling up nature-based solutions.^a

The World Bank has produced a timely report assessing the benefits and costs of nature-based solutions for climate resilience.^[23] The report targets project developers by providing guidelines that detail the benefits and costs of nature-based solutions at a project level. It presents eight real-world case studies featuring a range of ecosystems and geographies to help support actionable approaches to unlock more funding and financing, to design projects with better outcomes and to improve the ability to measure the economic impact of investments in nature-based solutions for climate resilience.

3.3. Key developments in Irish adaptation policy

Key developments in Irish adaptation policy can be tracked through actions as indicated in the annex of actions for Climate Action Plan in NCAP 2023. These actions cover a wide range of sectors and require strong governance and leadership through the Climate Action Delivery Board to ensure that they are completed on time and deliver the necessary impacts. Eight headline adaptation measures are articulated and specific actions are identified under the adaptation theme:

1. updating adaptation policy in line with climate legislation and the NAF review,
2. ensuring the climate resilience of flood risk management policies,
3. building the resilience of coasts to climate change,
4. developing climate services and improving climate data availability,
5. developing early warning systems,
6. improving the climate resilience of infrastructure,

^a Nature-based solutions are defined and further discussed in section 10.3.4.

7. building the climate resilience of health systems,
8. increasing awareness of the need to take climate adaptation measures (see Annex of Actions to NCAP 2023.^[24])

Other adaptation actions can also be found across sectors in the NCAP 2023 Annex of Actions.

Policy actions identified as especially pivotal, under these eight headline measures and across the annex, include AD/23/1, the identification of a methodology for the use of climate indicators in the sectoral adaptation planning process (for delivery in Q3 2023). This work will be critical to support adaptation monitoring and evaluation as articulated under the global goal on adaptation. The annex also lists developing a new NAF (AD/23/20, to be completed in Q4 2023) to draft stage to go out for public consultation in line with Aarhus Convention requirements. Significant revisions to strengthen the NAF have been called for, with a comprehensive submission made by the Climate Change Advisory Council in its 2022 Annual Review. The development of new sectoral adaptation plans, in line with updated sectoral adaptation guidelines (AD/25/1), is listed for completion in Q2 2025.

The development of options for the delivery of a National Implementation Strategy for Nature-based Solutions (AD/23/4) is scheduled for delivery by Q4 2023. This strategy will provide an important means of setting out the appropriate application of nature-based solutions in the portfolio of adaptation options and, if effective, will help to support a key element of the National Climate Objective for Ireland to be biodiversity rich by no later than 2050. The scoping report on coastal change management (AD/23/6) was due to be published by the end of Q1 2023. This is a critical first step in providing a framework for developing Ireland's much-needed National Coastal Management Strategy. The publication of the strategy is eagerly awaited by communities, business and households at risk from the impacts of coastal erosion, which is accelerating in many regions.

A number of actions (AD/23/7, AD/23/7/A and AD/23/8) refer to the inter-related components to develop climate services and improve climate data availability that will be integral when developing our National Climate Change Risk Assessment, sectoral adaptation plans and local authority climate action plans. Specifically, those are operationalising TRANSLATE project outputs (AD/23/7 and AD/23/7/A, due in Q3 2023 and Q4 2023, respectively) and the development of the Climate Ireland portal as Ireland's climate information platform as part of the National Framework for Climate Services (AD/23/8), which was delivered in Q1 2023.

The development of Ireland's first Climate Change Risk Assessment (AD/25/2) by Q1 2025 will set out the priority impacts of climate change for Ireland and help to support risk-based decision-making to proactively manage Ireland's present and future climate risks. The establishment of a Just Transition Commission (JT/23/1), due by Q2 2023, should provide advice to the Government to ensure that Just Transition principles are realised, including the principle that individuals and communities are equipped with the skills to benefit from the decarbonisation of our economy and the costs will need to be shared equitably.

The health-related impacts of climate are significant. It is welcome to see action AD/23/16, to develop a new public health heatwave plan and seek to ensure more uniform system-wide planning for heatwaves by Q4 2023, and AD/23/17, to build the knowledge base required to improve health infrastructure resilience to severe weather events – severe wind, heatwaves, flooding and

extreme cold snaps – by Q4 2023. The production of guidance on the assessment of adaptation measures and the development of climate change adaptation plans for past and new flood relief schemes (AD/23/2) by Q4 2023 will also be critical in building resilience to climate change into the flood management system. Lastly, the development of local authority climate action plans (PS/23/6), due for publication by Q1 2024, will be pivotal in delivering climate action across adaptation and mitigation at the local authority level.

3.4. Adaptation Scorecard 2023

The third edition of the Climate Change Adaptation Scorecard was undertaken by the Climate Change Advisory Council Secretariat with support from its Adaptation Committee. The scorecard was adopted in 2021 and its main aim is to monitor progress in the implementation of sectoral and local adaptation plans and the National Adaptation Framework of 2018. It is based on a questionnaire that is sent to the nine sectors with sectoral adaptation plans as well as local authorities and the Department of the Environment, Climate and Communications (DECC) as the lead department for the implementation of the National Adaptation Framework.

3.4.1. Introduction to the scorecard

The 2023 Adaptation Scorecard monitored adaptation progress across sectors over the previous 12 months only (April 2022 to March 2023) and responses to the questionnaire were received from all sectors. The questionnaire covers the following three adaptation criteria:

1. **Risk prioritisation and adaptive capacity.** Identified risks are being addressed and monitored, adaptive capacity is increasing, knowledge gaps are being addressed and regular monitoring of performance of the sectoral adaptation plans is taking place.
2. **Resourcing and mainstreaming.** Appropriate human and financial resources are being put in place, human capacity is being developed, long-term decisions are taking account of the future climate and adaptation is being mainstreamed into policies, plans, strategies, programmes and frameworks.
3. **Governance, coordination and cross-cutting issues.** Systemic coordination is in place across sectors, impactful actions are integrated and implemented within the NCAPs, emerging and cross-cutting issues are being addressed, and good coherence with other policies is evident.

3.4.2. Method employed

The assessment of the questionnaires was led by officials from the Climate Change Advisory Council Secretariat with the Adaptation Committee members serving as a review panel and providing oversight. The Secretariat carried out the assessment and marked the questionnaires against set evaluation criteria. The questionnaire responses received were also shared with the review panel of Adaptation Committee members to finalise the assessment. The following section presents an overview of the results and analysis.

3.4.3. Results

Table 3-1 presents the overall results for the 11 sectors and their results for the three categories.

Table 3-1 Adaptation Scorecard 2023 results for all 11 sectors

Sector (department/office responsible)	Risk, prioritisation and adaptive capacity	Resourcing and mainstreaming	Governance, coordination and cross-cutting issues	Overall	Trend ^a
1. Flood risk management (OPW)	Advanced	Good	Good	Good	↔
2. Transport (DoT)	Advanced	Moderate	Good	Good	↑
3. Built and archaeological heritage (DHLGH)	Good	Good	Good	Good	↑
4. Local government (CCMA)	Good	Good	Good	Good	↔
5. Agriculture, forestry and seafood (DAFM)	Moderate	Good	Moderate	Moderate	↑
6. National adaptation framework (DECC)	Moderate	Moderate	Moderate	Moderate	↔
7. Water quality and services infrastructure (DHLGH)	Limited	Moderate	Moderate	Moderate	↔
8. Communications networks (DECC)	Limited	Moderate	Limited	Limited	↔
9. Electricity and gas networks (DECC)	Moderate	Limited	Limited	Limited	↑
10. Health (DoH)	Limited	Limited	Limited	Limited	↔
11. Biodiversity (DHLGH)	No progress	Limited	Limited	Limited	↑

^a Trend compared with overall result in 2022.

CCMA, County and City Management Association; DAFM, Department of Agriculture, Food and the Marine; DHLGH, Department of Housing, Local Government and Heritage; DoH, Department of Health; DoT, Department of Transport; OPW, Office of Public Works.

Please note that the analysis presented below is abridged. A fuller version of the findings and observations for each sector can be found in a separate assessment report on the Climate Change Adaptation Scorecard, published concurrently with the Annual Review.

3.4.4. Scorecard findings

The scorecard exercise remains an important method for gathering information and tracking progress in adaptation actions. The main conclusions from the third Adaptation Scorecard, which have informed some of this chapter's key recommendations, are that:

1. An overall improvement is evident in terms of the performance ratings of the sectors across the different categories of the scorecard. The strongest progress is evident in terms of risk, prioritisation and adaptive capacity but also in the area of mainstreaming, particularly mainstreaming climate change adaptation into plans, policies, programmes and strategies.

2. While the noted improved focus on mainstreaming adaptation by some sectors in plans, policies, programmes and strategies is to be welcomed, the impacts and results of this positive change will be realised only in the coming years and will depend on the effective implementation of these frameworks. There is limited evidence of the levels of urgency necessary in implementing concrete adaptation actions and delivering impacts.
3. Inadequate human and financial resources for adaptation are key challenges reported by the sectors and local authorities in their responses to the questionnaires. Detailed information on the budget for, costs of and investment requirements for adaptation remains limited across sectors and local authorities, and this needs to be addressed.
4. The need for better understanding of vulnerabilities to risks and the impacts of climate change linked to modelling and projections remains evident. Considerable gaps exist in understanding the effects of climate change on species and ecosystems, productive agricultural systems, forests, wetlands and the marine environment, as well as on human systems.
5. The performance of sectors in the implementation of sectoral adaptation plans is mixed. Although all sectors provided feedback on the implementation of their plans, there are clear deviations in terms of the standard of the action plans contained within the sectoral adaptation plans. There is in most cases an absence of key performance indicators and timelines to allow quantifiable measurements of the overall performance of the various departments. This aspect should be strengthened in the next set of guidelines for the sectoral adaptation plans, and regular monitoring and evaluation of their implementation should be carried out. Clarity on delivery of actions will also help underpin and support financial support for adaptation measures.
6. Strong internal governance structures, with leadership buy-in, were found to be an important enabler for the successful implementation of the sectoral adaptation plans, resource mobilisation and effective cross-sectoral engagement. Steering groups and other coordination structures are of fundamental importance to oversee the implementation of the sectoral adaptation plans, monitor progress, take remedial measures (where needed), identify new priorities and start planning for the development of new sectoral adaptation plans.
7. The absence or non-functioning of strong internal coordinating structures was closely linked to poor performance and non-achievement of the actions outlined in the sectoral adaptation plans. The shift towards a project management approach to monitoring, reporting and evaluation of adaptation actions was noted in the transport sector and is to be encouraged.
8. There was encouraging evidence of several sectors taking proactive measures such as gap analyses and reviews of sectoral adaptation plans to address emerging issues and opportunities. Several sectors demonstrated initiatives to explore and capitalise on nature-based solutions and actions to help conserve biodiversity. These are for the most part at an early stage and need to be expanded. Limited consideration of distributional impacts is also evident across the sectors, and this needs to be addressed so that those most vulnerable to climate change are prioritised in interventions.

9. There is a greater need for a mixture of top-down and bottom-up approaches and for involving communities, non-governmental organisations and the private sector in adaptation planning and implementation.

3.5. Identified gaps

The following section identifies through a review of adaptation policy and planning three critical gaps for adaptation in Ireland: adaptation finance, policy coherency and coastal management.

3.5.1. Adaptation finance

Adaptation finance is heavily reliant on public sector funding where the investment profile is often longer and the return uncertain. Mitigation initiatives, where the risk profile and investment timelines are more certain, generally receive more private sector financing. The increased level of urgent adaptation actions and their costs needs to be recognised now. Mitigation and adaptation initiatives must be aligned now to meet increasing adaptation risks that public sector funding alone will not be able to deliver. Private sector financing is currently the cornerstone of vital infrastructure, developing supply chains and building markets and working alongside the public sector in the delivery of key development projects. This enabling ecosystem needs to be encouraged to enhance and increase adaptation funding conditions where the long-term nature and level of uncertainty of return on investment currently results in market failure. To deliver this rebalancing the following are required: (i) stronger political commitment to adaptation – leading by example with clear definitions of adaptation budgeting and impact, including designated adaptation budget spending; (ii) better data collection and analysis of climate risk measures and identification of overlap/interaction between adaptation and mitigation to potentially de-risk projects through Government agencies and increase the overall level of finance available for adaptation; and (iii) development of institutional capacity in both public and private financial sectors to increase both the risk awareness and the appetite for longer term climate-related investment proposals. A longer term view will be essential in securing adequate funding for adaptation investment, especially for potential significant capital expenditure.

3.5.2. Policy coherency

It is important to note that policy coherency or policy alignment is an issue of ongoing concern in relation to adaptation policy development timelines. This is particularly relevant in relation to the development of the new local authority climate action plans, which are due to be finalised by February 2024. Key policy updates including the new NAF (due for completion by Q4 2023), and Ireland's first National Climate Risk Assessment (due Q1 2025) would ideally be in place before the development of the local authority climate action plans. While the sectoral adaptation plans (due for completion by Q2 2025) will benefit from policy updates reflected in the new NAF, the timing will be challenging if they are to reflect the outputs of the National Climate Risk Assessment. In highlighting these policy coherency issues, policymakers are advised to take the steps necessary to ensure that the next cycle of policies and plans can have their timelines adjusted to provide national-level policy frameworks and guidance in advance of drafting sectoral- or local authority-level plans. In addition, policy coherency opportunities exist to ensure that the Just Transition principles are articulated in climate policy. Failure to do so will increase the likelihood of locking in and increasing societal inequalities, including maladaptation.

3.5.3. Coastal management

The publication of a scoping report on coastal change management (due Q1 2023) is badly needed to help develop Ireland's first National Coastal Management Strategy. As Ireland experiences increased erosion, sea level rise and coastal storm events magnified by the changing climate, coastal communities need a clear and fit-for-purpose strategy to help actively manage changing coastlines.^[25] There is a clear need for indicators to measure changes to the coastal environment, including erosion and accretion (accumulation of sediment), as well as changes to natural coastal features such as sand dunes and salt marshes.^[25, 26] Moreover, it is vital that Ireland's revised NAF and National Implementation Strategy for Nature-based Solutions should give strong consideration to protecting the Irish coastline.

3.6. Council Resilience Team engagements and commissioned research

In November 2022, the Council's Resilience Team held two round-table events focused on the issues of metrics for tracking climate change adaptation, and nature-based solutions.

On 28 November 2022, a hybrid round-table event focused on the topic of operationalising adaptation monitoring and evaluation. Participants from the New Zealand Climate Change Commission, the United Nations Development Programme and the Irish Climate Change Advisory Council Secretariat, as well as Adaptation Committee members, focused their presentations and discussions around three leading questions:

1. What does success look like in adaptation/resilience building?
2. Which data are needed to create success?
3. What monitoring and evaluation frameworks can support this?

Participants emphasised the necessity of a long-term goal or vision with a series of signposts to guide the way and to track progress towards adaptation action. Securing the buy-in and engagement of the community voice was considered important for success, especially for those communities vulnerable to climate change.

When considering data needs there was a concern that it is necessary to redefine the information that is needed and to look at more people-centred processes and activities. The focus on data and numbers can exclude people who will ultimately be the drivers of success. Therefore, there is a need to identify, through risk assessments and other means, the values that are needed to drive success. These qualitative data were considered important to identify.

Lastly, the need for monitoring and evaluation frameworks to integrate both the drivers and the impacts of climate change was highlighted, as was the need to integrate the elements of both mitigation and adaptation, which are sometimes separated in legislation.

On 29 November 2022, an in-person round-table event took place at Trinity College Dublin on the topic of nature-based solutions for climate action. The event brought together policymakers and researchers from across the island of Ireland, as well as the adaptation lead from the New Zealand Climate Change Commission and pre-recorded interventions from New Zealand researchers, to explore the synergies between climate change adaptation action and nature-based

solutions. Some of the key observations from the guided discussion included the suggestion to develop a strategic plan around 'naturescapes', or broader landscapes where nature-based solutions could be scaled up and aggregated for maximum benefits. A call for increased funding and clearly communicated pathways to access funding to support the future implementation of nature-based solutions was also recommended. Lastly, the broader need to build up an evidence base to support the development of nature-based solutions was highlighted, especially to convince stakeholders such as engineers and economists.

On 17 May 2023, a workshop on climate-resilient critical infrastructure took place online. The workshop facilitated three breakout sessions with participants from a range of backgrounds; each session discussed a different theme:

1. assessing critical infrastructure resilience to current and projected extreme climate related events and their impacts,
2. identifying information gaps that need to be filled in order to achieve energy resilience,
3. identifying barriers to systemic coordination and ensuring that there is good coherency with other policies.

Key recommendations informed by the discussions will be published and provide insight from practitioners, academics and policymakers on how Ireland can build resilience across critical infrastructures into the future on the island of Ireland.

The Council also commissioned a study to examine Irish adaptation research and provide recommendations on ways to improve adaptation action and impacts in relation to the current Irish funding landscape. The report makes four recommendations:^[27]

1. Consolidate and streamline the Irish research funding architecture.
2. Reduce the reliance on short-term competitive funding and correspondingly increase the longer term core funding for research institutions.
3. Increase the alignment of climate adaptation practitioner needs, such as those related to implementation processes, participation and governance at the community level, and research output.
4. Harmonise Irish and European research reporting standards.

A scoping study on data collection requirements to inform strategies for sustainable agriculture at farm level was also undertaken by Macken-Walsh *et al.*^[28] The authors make an urgent call for the production of multidisciplinary social science to provide an evidence base to guide the effectiveness of rapidly diversifying sustainability programmes and projects. The main recommendation of the report is the establishment of a social science data platform to provide policymakers with an evidence-based decision support tool in relation to achieving national impact in the promotion of sustainable practices at farm level.

4 Mitigation – National and International Contexts

Key messages

Observations

- ▶ Based on provisional estimates of emissions reported for 1990–2022, and other indicators, emissions in Ireland have largely rebounded from the impact of COVID-19 restrictions. Emissions in 2022 were just 2.7% below 2018 levels having reduced by a modest 2% relative to 2021.
- ▶ Based on the most recent EPA projections of the 'with additional measures' scenario the following risks for Ireland have been identified:
 - ▶ the carbon budgets agreed for 2021–2025 and 2026–2030 will be exceeded
 - ▶ failure to meet obligations under the EU Effort Sharing Regulation
 - ▶ no access to the forest and land flexibility under the Land Use, Land Use Change and Forestry (LULUCF) Regulation in order to comply with the EU Effort Sharing Regulation.
- ▶ High growth, high inflation, high interest rates, supply chain issues and skills shortages in key sectors risk delays in making decisions to invest in low-carbon transitions on the ground.

Recommendations

- 4.1. The unallocated emissions reductions set out in National Climate Action Plan (NCAP) 2023, and the delay in setting a sectoral emissions ceiling for the LULUCF sector, continue to create uncertainty. Increased ambition within and across sectors is necessary to achieve the overall objectives.
- 4.2. Government must redouble efforts to accelerate the deployment and prioritisation of key mitigation measures across departments and their agencies to make up lost ground.
- 4.3. The Council strongly recommends that urgent action is taken to reform and resource planning, licensing and regulatory systems across all levels of Government to achieve the level of investment, particularly in infrastructure, required to reduce emissions at the pace required by 2030.
- 4.4. Delays in the implementation of critical actions which make a meaningful contribution to the reduction of emissions in the near term mean that steeper emission reductions will be required in the future in order to remain within the carbon budgets. Government departments need to analyse and communicate the expected annual reductions in emissions in response to implementation of policy. In this way, progress can be monitored, with critical delays and underperformance identified and addressed.

4.5. Government must increase and better coordinate efforts to support all members of society in making the transition through the prioritisation, adequate resourcing and delivery of meaningful dialogue and engagement with civil society to help individual and societal behavioural change.

4.1. Progress in governance

While there is an urgent need to accelerate the pace of implementation in achieving Ireland's climate objectives, it is important to acknowledge that significant progress has been made in terms of Ireland's governance and policy development on climate change and reducing emissions. It is useful to make a comparison between the situation Ireland faced prior to the first NCAP (2019), the most recent projections published by the EPA and the indicative progress based on the ambition in NCAP 2023. Figure 4-1 demonstrates the impact of the step-up in the description, design and implementation of ambitious policies and measures that has occurred in recent years. The most recent EPA 'with additional measures' (WAM) projections indicate that the current policies and measures in place, or in the planning process, provide credible actions that can achieve upwards of a 33% reduction in emissions by 2030 relative to 2018. This is in sharp contrast to the mere 11% reductions projected in 2019. Nevertheless, there is not sufficient detail in NCAP 2023 to reflect the full ambition of the plan in projections, and therefore a substantial gap

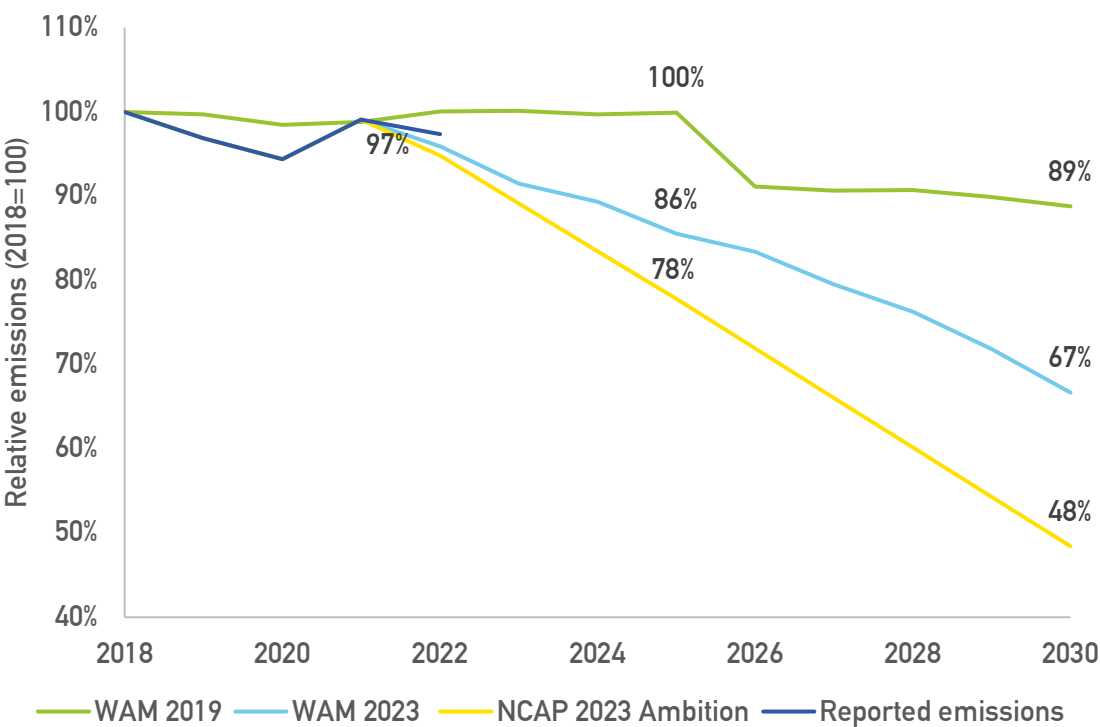


Figure 4-1 Comparison between the projected emission reduction based on policies and measures reflected in the EPA 'with additional measures' scenarios published in 2020 (2019–2040) and in 2023 (2022–2040) and the pathway implied by the indicative emission reduction targets published in NCAP 2023, based on sectoral emission ceilings.^[29, 30–32]

remains between projections and the hoped for reductions in emissions. However, the EPA provisional emissions inventory indicates that 2022 emissions were higher than the WAM scenario projection.

The rate of delivery of NCAP actions by the end of 2022 stood at 79% in aggregate. Delays in reducing emissions today mean that steeper emission reductions will be required in the future in order to remain within the carbon budgets. Government departments need to develop forecast trajectories of emissions so that the impacts of delays can be monitored and managed.

4.2. Progress on carbon budgets

The most recent EPA projections suggest that it is very likely that Ireland will exceed the limit set in the first carbon budget. In addition, given the slow pace of emission reductions across the whole economy, it seems likely that Ireland will also exceed the second carbon budget (see Table 4-1).

Table 4-1 Summary of reported and projected emissions compared with carbon budgets for the period 2021–2030 (Mt CO₂ eq). Projected emissions are extracted from the most recent EPA ‘with additional measures’ scenario

Carbon budget period	Sectoral emissions ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	295	137	194	331	36
2026–2030	200	–	280	280	80
2021–2030	495	137	474	611	116

Box 4-1 Emission projection scenarios

What do ‘with existing measures’ (WEM) and ‘with additional measures’ (WAM) scenarios in emissions projections mean?

The WEM scenario assumes no additional policies and measures beyond those already in place by the end of the latest national greenhouse gas inventory year (2021) at the time of the projection's compilation.

The WAM scenario assumes implementation of the WEM scenario in addition to, based on current progress, further implementation of planned Government policies and measures adopted after the end of the latest inventory year. In the case of the latest projections (published in June 2023), this includes the implementation of Ireland’s NCAP 2023. This plan sets out the programme of policies and measures aiming to steer Ireland towards achieving its decarbonisation goals.

The analysis presented in the Carbon Budget Technical Report,^[33] supporting the Council's proposals for carbon budgets, acknowledged that the implementation of new and enhanced policies and measures would take time to impact emissions. This is particularly because most of the necessary interventions involve investment and, of its nature, investment takes time to deliver. However, a failure to take action early has negatively impacted the prospects for meeting the cumulative target to 2030.

The Council will reflect seriously on the implications of failure to remain within the carbon budgets, especially with respect to the additional burden this will place on future carbon budgets, particularly the third carbon budget, 2031–2035, and the emissions reduction pathways consistent with the National Climate Objective to 2050.

The Government published the agreed sectoral emissions ceilings for each sector except Land Use, Land Use Change and Forestry (LULUCF), for the two carbon budgets periods, 2021–2025 and 2026–2030, in September 2022. However, the Government has acknowledged that these ceilings do not assign responsibility for all the necessary emission reductions required to meet the constraints of the overall carbon budgets. The large unallocated reduction for the period 2025–2030 is a cause for concern. The difficulty in assigning these additional reductions arises from the challenge of identifying the specific policies and measures that can be implemented within this timeframe. Nevertheless, it is urgent that the unallocated reductions are assigned, attached to relevant sectors and policies, and an accelerated programme of implementation put in place. NACP 2023 includes a commitment to address the unallocated emission reductions by the end of 2023. Any extension of this deadline dilutes policy signals and would significantly delay progress on keeping within the carbon budgets.

A major barrier to Ireland meeting its objective of reducing greenhouse gas emissions at rates consistent with the carbon budgets is the current regulatory systems applying in many sectors. It is the responsibility of Government to deal with this; however, NACP does not respond adequately to these barriers. This is not to underestimate the challenges in addressing these issues, which can involve national and EU legislative reform and perhaps raise other legal questions.

The Council strongly recommends that urgent action is taken to reform and adequately resource licensing and regulatory systems across all levels of Government to help secure the changes in infrastructure needed to support the level of investment required to enable the reduction in emissions at the pace required by 2030. A number of these licensing and regulatory concerns are explored further in relevant sectoral chapters. The general recommendation requires authorities to consider when these barriers arise and address them. For example, section 5.4.1 outlines that many existing wind farms are due to seek an extension of their planning consent or to repower their on-site technology, and the Council is recommending that a simplified and swift permit-granting process for these lifetime extension and repowering applications must be implemented to guard against a loss of existing onshore capacity.

4.3. Indicators

The EPA National Emissions Inventory represents the latest provisional data available on emissions.^[32] Table 4-2 provides additional indicators of activity to inform the analysis of macroeconomic drivers of trends in emissions.

Table 4-2 Economy-wide indicators 2018–2023

	Unit	2018	2019	2020	2021	2022	2023
National emissions without LULUCF	Mt CO ₂ eq	63.7	61.1	58.9	62.0	60.8	
National emissions with LULUCF	Mt CO ₂ eq	69.9	67.7	66.0	69.3	68.1	
Percentage change in national emissions relative to 2018	%		–3.1	–5.6	–0.9	–2.7	
Annual change in emissions	%		–3.1	–2.6	5.0	–1.8	
National CO ₂ emissions	Mt CO ₂	44.2	43	41.1	43.8	43.2	
Population	Thousands	4,857	4,921	4,977	5,011	5,100	
Modified GNI at constant prices	€m	207,312	212,597	204,859	233,281	248,880	
GHG intensity (GHG/GNI)	kt CO ₂ eq per €m	0.34	0.32	0.32	0.30	0.27	
GHG per capita	t CO ₂ eq per capita	14.4	13.8	13.3	13.8	13.3	
CO ₂ intensity (CO ₂ /GNI)	kt CO ₂ per €m	0.21	0.20	0.20	0.19	0.17	
CO ₂ per capita	t CO ₂ eq per capita	9.1	8.7	8.3	8.7	8.5	
Consumer Price Index (2016 = 100)	%	101	102	102	104	112	
CPI (housing, energy) (2016 = 100)	%	107	111	109	116	139	
Interest rates							
Commercial loans	%	2.3	2.4	2.3	2.5	3.0	4.8
Household loans	%	7.2	7.9	7.5	7.3	7.4	7.5
Deposit rates	%	0.0	0.0	–0.1	–0.4	0.2	2.5

CPI, Consumer Price Index; GHG, greenhouse gas; GNI, gross national income.

4.4. National long-term strategy

Under the Paris Agreement, 2015, all Parties were invited to communicate, by 2020, their mid-century, long-term low greenhouse gas emission development strategies. The Regulation on the Governance of the Energy Union and Climate Action ((EU) 2018/1999) set out a process for the EU Member States to prepare these strategies and new strategies every 10 years thereafter. In April 2023, Ireland published its long-term strategy, on the basis of analysis and public consultation undertaken in 2019.^[34] However, given the important climate policy developments since then, the Government has decided to undertake a second public consultation. This will form the basis for preparing an updated strategy by the end of this year as committed to in the Annex of Actions that accompanied NCAP 2023.

The Council submitted a detailed letter to the Minister for the Environment, Climate and Communications, in response to a formal request for advice, on 19 June 2023, which is available on the Council's website.^[35] Some of the Council's key points include:

- ▶ The need to more fully articulate the national climate objective. It is important that the finalised long-term strategy explains, in greater detail, how Ireland's national ambition will achieve no additional impact on global average temperature over the longer term and demonstrates how this represents a fair share in terms of Ireland's contribution to the overall global effort.
- ▶ The need for a Vision for Ireland – a reference document in which Ireland sets out what kind of future is envisaged. This should be underpinned by the best understanding of how the country is likely to develop over the coming decades and reflect best understanding of the range of futures that could unfold.
- ▶ The need for detailed analysis of the multiple potential scenarios and pathways by which Ireland may achieve its climate objectives.

The Council also provided advice on long-term perspectives and approaches required for the design and development of policies related to specific sectors, including transport, built environment, industry, agriculture and land use.

4.5. EU obligations

In its recent publication, the EPA observed that 'it is projected that Ireland can meet its original EU Effort Sharing Regulation target of a 30% emission reduction by 2030 (compared to 2005) if all measures and flexibilities, including the LULUCF flexibility, are used. Reaching the new 42% EU emission reduction target will require full and rapid implementation of Climate Action Plan 2023 measures and further measures to be implemented.' The analysis from the EPA suggests that there is significant risk that the policies and measures described in the WAM scenario are not sufficiently well developed to ensure achieving EU targets.

The period to 2030 is a time of transition with respect to EU reporting and accounting rules as the systems and targets are realigned to reflect the forward-looking perspective of new EU climate policy, incorporating assessment of climate neutrality and net zero greenhouse gas emissions. During this transition, the design and structure of various mechanisms and flexibilities are also in transition. This has increased the complexity of assessing progress with respect to

Ireland's EU obligations. This situation is most acute with respect to reporting and accounting in the LULUCF sector. It is not possible to assess with complete confidence whether Ireland is projected to remain compliant with its obligations under the LULUCF Regulation in the period to 2025. There is a risk of failing to meet the 'no debit' rule in the period to 2025 under the regulation. This would result in limited access to the forest and land flexibility in order to comply with the Effort Sharing Regulation until 2025. Thereafter, in the period from 2026 to 2030, EU LULUCF accounting rules have been simplified and Ireland's emission reduction target more clearly defined (see Chapter 9).

Other aspects of the EU legislative programme in support of the European Green Deal and 'Fit for 55%' package objectives are still under development, including some of the important circular economy packages. In the Annual Review 2022, the Council noted that 'The Irish position in the negotiations is understood to be broadly supportive.' The Council would support a greater level of transparency on the Government's positions on specific topics. Ireland should support the greatest level of ambition at EU level, based on robust analysis of Ireland's shared responsibility to contribute to global climate action.

4.6. Primary energy supply into Ireland's economy

The annual National Energy Balance analysis published by the Sustainable Energy Authority of Ireland (SEAI) provides a useful insight into economy-wide progress towards the decarbonisation of Ireland's energy use.^[36] Figure 4-2 clearly shows the impact of the COVID-19 restrictions in reducing the energy supply in 2020, which effectively recovered to pre-COVID-19 levels in 2022. The displacement of fossil fuels has been very gradual, from 98% of the energy supply in the early 1990s to fossil fuels still dominating at 87% of the energy supply in 2022.

Projections based on the full implementation of the policies and measures detailed in NCAP 2023 envisage a major acceleration in the rate of decarbonisation, with fossil fuels accounting for only 57% of energy supply by 2030 despite the overall supply remaining effectively constant, as seen in Figure 4-3.

High growth, high inflation, high interest rates, (see Table 4-2) and low unemployment rates exacerbate supply chain issues, and skills shortages in key sectors risk delays in making decisions to invest in low-carbon transitions across the economy.

4.7. Bioeconomy and circular economy

There is a need for an integrated approach to climate action, the bioeconomy and the circular economy.

The transition to a low-carbon, climate-resilient economy will see the emergence of greater and more efficient use of renewable resources across all sectors, which will require a systems-based approach to planning and development. As an example, it is useful to consider supply chains and material use in the built environment sector that will rely on the coordination of action across the agriculture, land use, industry, transport, energy and waste sectors to optimise the economic and social return from the transition.

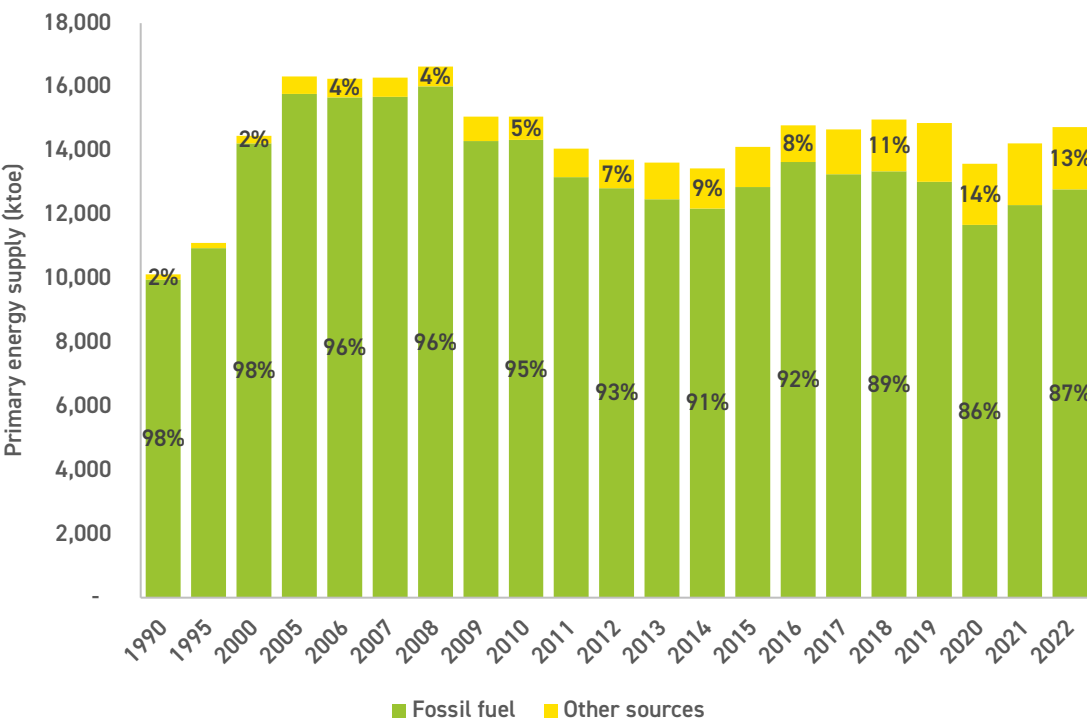


Figure 4-2 Primary energy supply 1990–2021 and interim primary energy supply 2022. Fossil fuel is the sum of coal, peat, oil and natural gas. Other sources is the sum of renewables, non-renewable waste and electricity via interconnection.^[37]

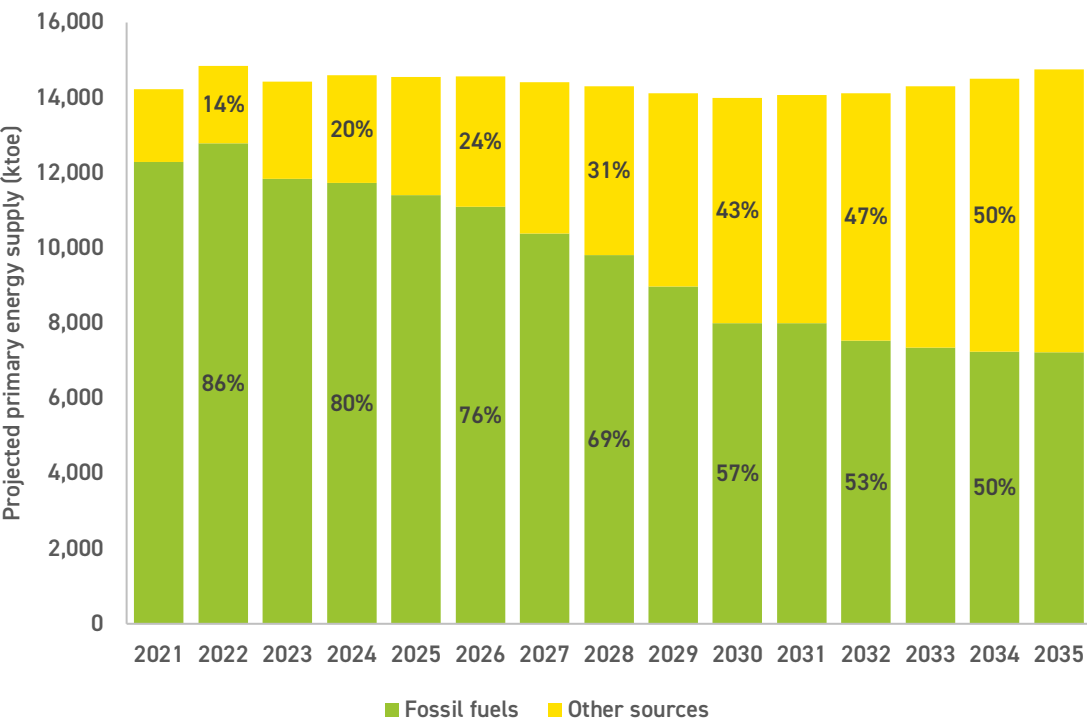


Figure 4-3 Projection of primary energy supply based on a high rate of implementation of the 'with additional measures' scenario.^[38]

Figure 4-4 shows an idealised schematic representation of the operation of an integrated bio-based and circular system. However, at each stage, it is critical that infrastructure exists to ensure that materials flow from one use to the next. There is a critical role for Government to enable the rapid, robust development of markets and infrastructures on the basis of appropriate standards, regulations, skills and knowledge.

4.8. Citizen engagement

The Council welcomes the Government's focus on citizen engagement in both NCAP 2021 and NCAP 2023. The importance of building societal trust in climate action requires a well-designed process that ensures the effective communication of scientific evidence, explanation of policy proposals and the opportunity for society to provide feedback to Government systems.

The National Dialogue on Climate Action (NDCA) is the designated primary vehicle for providing public and stakeholder exchanges to help drive climate action. In 2022, the NDCA reported^[40] on a significant body of work by delivering:

- ▶ Climate Conversations 2022 with over 4,300 people participating,
- ▶ National Climate Stakeholder Forum events with over 300 participants,
- ▶ the first National Youth Assembly on Climate with over 40 young people participating,

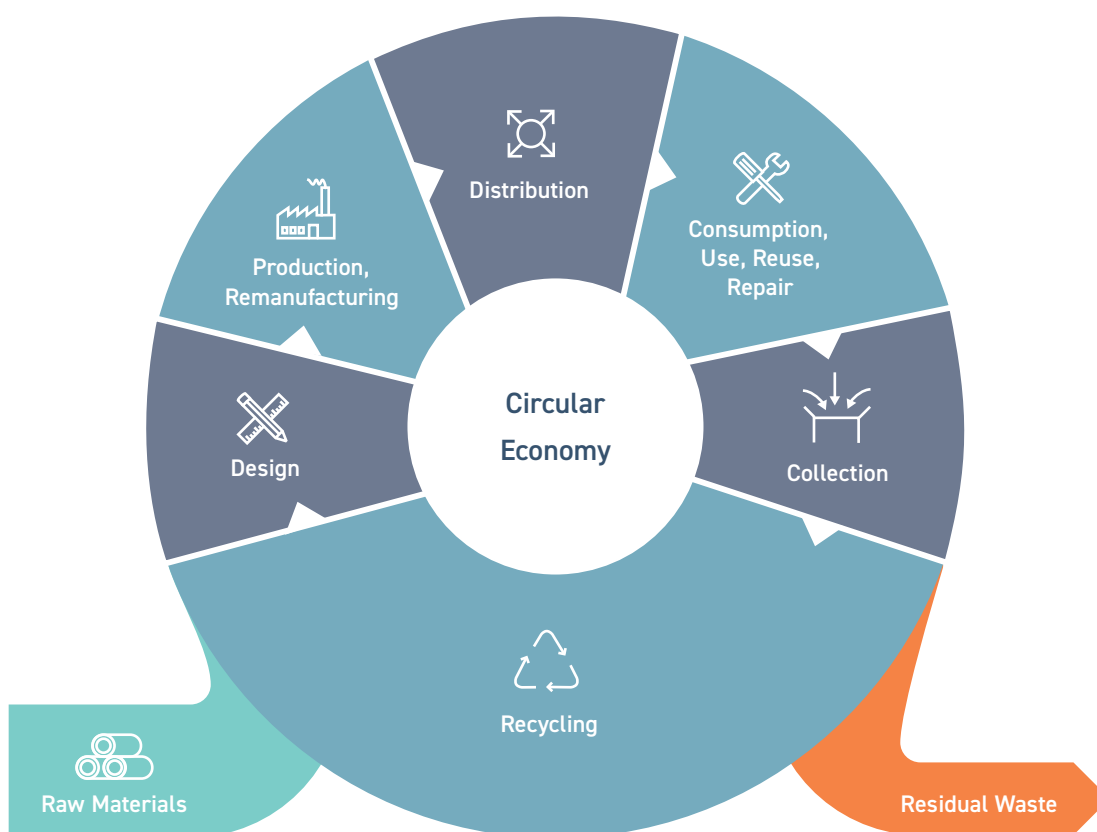


Figure 4-4 Schematic representation of the circular economy supporting the low-carbon transition.^[39]

- ▶ the EPA's 'Climate Change in the Irish Mind' study engaging over 4,000 people to provide a nationally representative dataset on attitudes and behaviours towards climate change,
- ▶ the EPA's Climate Conference 2022 and climate lecture series,
- ▶ three meetings of the National Social and Behavioural Advisory Board.

The Citizens' Assembly on Biodiversity Loss in 2022 was also a significant step forward in highlighting the very real impacts of climate change on biodiversity loss and provided a platform for citizens to feed back their recommendations to Government.

Key findings from the EPA-funded 'Climate Change in the Irish Mind' study identified that 96% of Irish people agree that climate change is happening.^[41] While that work clearly maps the understanding of climate change in Ireland, the system must now move to respond to the challenges identified to provide individual and societal agency in adopting measures to further the national transitional objective. This could be better signalled in the NCAP actions to ensure the visibility of key recommendations.

Once identified, the barriers to individual and societal action need to be moved quickly from the citizen engagement space to the policy arena to ensure that the system responds and measures are implemented quickly to ensure a rapid transformation. This will also help build and maintain the public support and action needed to help Ireland address climate challenges.

Additionally, drawing public attention to the vision for 2050 is important. Demonstrating the potential impacts of climate, particularly the severity of weather events and what life could look like with and without climate action will help Irish society understand the climate challenge and potentially influence positive behavioural change.

The momentum forged by the NDCA in 2022 must not be lost but must be built on to increase citizen engagement on climate issues. The Council notes the NDCA's programme of engagement and public participation, as outlined in NCAP 2023, with the emphasis on supporting climate literacy to drive behavioural change.^[24] Critical to the programme's success are sufficient resources to ensure its delivery of outputs in 2023 and executing and reporting on the feedback loop, as set out in the NCAP, to demonstrate its effectiveness.

Additionally, the Government's focus on a coordinated approach to climate communications is a welcome development; however, it is currently lacking in detail. In NCAP 2023, action number CZ/23/1*^[24] signals coordinated communications from the centre of Government with the Department of the Taoiseach leading these activities. While this is an 'ongoing' and also a legacy action item, the disjointed nature of the climate content on [gov.ie](https://www.gov.ie) should be addressed as a priority to help complement other actions around climate literacy and citizen engagement.

5 Electricity

Key facts^a

Total emissions:

9.8 Mt CO₂ eq

% Change from previous year:

-2.0%

% SEC consumed 2021–2025:

49.3%

Expected emissions

as % of SECs 2021–2030:

123.0%

^a Note on the colour coding of observations in the key facts:

Comparing emissions in 2021 and 2022, green indicates a greater than 2% decrease in emissions; amber indicates that emissions increase or decrease by less than 2%; red indicates a greater than 2% increase in emissions.

Considering the percentage of consumption of the first sectoral emission ceiling (SEC) 2021–2025, green indicates less than 38% of sectoral emission ceiling emitted; amber indicates between 38% and 42% of sectoral emission ceiling emitted; red indicates greater than 42% of sectoral emission ceiling emitted.

Considering the outlook for maintaining emissions within sectoral emission ceilings to 2030, based on the sum of reported emissions in 2021 and provisional estimates for 2022 and the 'with additional measures' scenario projections to 2030, green indicates that total emissions are projected to be greater than 2% below combined sectoral emission ceilings; amber indicates that total emissions are projected to be within 2% of the combined sectoral emission ceilings; red indicates that total emissions are projected to be greater than 2% above the combined sectoral emission ceilings.

Key messages

Observations

- ▶ Emissions in the electricity sector were 10.1 MtCO₂eq in 2022, compared with 10.3 MtCO₂eq in 2021. However, both 2021 and 2022 saw increases in emissions due to a return to using more carbon-intensive fuels and increasing demand for electricity.
- ▶ 49.3% of the sectoral emission ceiling for the electricity sector has already been expended during the first 2 years of the first 5-year carbon budget period (2021–2025). This is largely attributable to the increased emission intensity of electricity and growing demand.
- ▶ EPA projections indicate that under the 'with additional measures' scenario the electricity sector will exceed its 2021–2025 sectoral emissions ceiling by 5.2 MtCO₂eq and its 2026–2030 sectoral emissions ceiling by 8.2 MtCO₂eq.

Recommendations

Accelerate renewable energy generation

- 5.1. The Renewable Electricity Spatial Policy Framework and the revised onshore wind energy development guidelines are crucial and should be published by Q3 2023 at the latest to provide the necessary spatial planning guidance to support the scaled-up deployment of renewable electricity across the country.
- 5.2. An Bord Pleanála, local authorities, the Maritime Area Regulatory Authority, the National Parks & Wildlife Service and other agencies must be sufficiently resourced to process the volume of onshore and offshore planning applications and associated grid infrastructure in line with the statutory timeframes for planning decisions.
- 5.3. A streamlined and swift permit assessment process for lifetime extension and repowering of existing onshore renewables in line with RePowerEU timelines must be implemented to guard against a significant loss of existing onshore capacity.

- 5.4. Action to facilitate hybrid technology grid connections and 'private wire' networks has been delayed and must be prioritised and delivered by Q4 2023.

Accelerate flexibility

- 5.5. The failure to deliver the necessary generation capacity in the context of a forecast increase in electricity demand has undermined previous commitments to close the Moneypoint coal-fired generation plant in 2025. It is critical to phase out the use of coal in electricity generation in the near term and focus on the necessary revision of the capacity market to ensure that 2GW of new flexible gas-fired generation (which is green hydrogen ready) is delivered on time.
- 5.6. The Commission for Regulation of Utilities review of the regulatory treatment of storage, due later this year and including licensing and market incentives, is crucial for increasing the flexibility of Ireland's electricity system and must be delivered on time. Further policies are essential to incentivise short- and long-duration storage to balance and optimise electricity demand and variable renewable generation.

Demand management

- 5.7. The Council regrets the delay in publication of the Electricity Demand Side Strategy, which was originally due in 2022, and urges that it is available not later than Q4 2023. This strategy is fundamental to achieving Ireland's electricity sector decarbonisation targets and the Council calls on the multiple Government departments and agencies involved in collaboration with industry to swiftly and efficiently implement the strategy.
- 5.8. Targets for 20–30% demand side flexibility, particularly for large energy users such as data centres, should be based primarily on shifting demand to times when the output of renewable energy from the system is high and avoid the use of on-site high-emission generation.
- 5.9. A clearer legislative basis to support the widest possible access to smart metering data needs to be progressed as a matter of urgency to address a significant barrier to the uptake of time-of-use tariffs.
- 5.10. A review of the effectiveness of initiatives such as the 'Beat-the-Peak' pilot schemes and the 'Reduce Your Use' campaign should be conducted.

5.1. Introduction

The electricity sector, or the 'energy industries sector' as defined in the National Inventory Report, is the third largest sector by emissions in Ireland and comprises emissions data from a total of 15 electricity generating stations, a single oil refinery, two peat briquetting plants, one natural gas production platform and one natural gas refinery. The successful decarbonisation of the electricity sector will play an important role in the decarbonisation of other sectors through electrification, including transport, heating and industry, which also implies that total electricity demand will increase substantially from present levels. In addition, the link between greenhouse gas emissions and geopolitics, fossil fuel dependence, security of supply, and volatile and high prices have created additional challenges for this sector in recent years.

The electricity sector has been set one of the smallest sectoral emission ceilings and the steepest decline in emissions of all sectors with emission ceilings of 40MtCO₂eq for the first carbon budget period (2021–2025) and 20MtCO₂eq for the second carbon budget period (2026–2030)

(Table 5-1). This equates to a headline target of a 75% reduction in emissions in the sector from 2018 levels by 2030, which will be achieved by increasing the share of renewable electricity to 80%, encompassing 9 GW of onshore wind capacity, at least 5 GW of offshore wind capacity and 8 GW of solar photovoltaic capacity, supported by a range of actions set out in NCAP 2023.

Table 5-1 Required level of decarbonisation in the electricity sector^a for carbon budget periods 2021–2025, 2026–2030 and 2021–2030 (Mt CO₂ eq)^[29,31,32]

Carbon budget period	Sectoral emission ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	40	19.7	25.9	45.6	5.6
2026–2030	20	–	28.2	28.2	8.2
2021–2030	60	19.7	54.1	73.8	13.8

^a As defined under the sectoral emissions ceilings, i.e. public electricity and heat production, solid fuels and other energy industries, and fugitive emissions.

5.2. Inventories and projections

Emissions from the energy industries sector were 10.1 Mt CO₂ eq in 2022, a decrease of 1.8% from emissions in 2021, which were 10.3 Mt CO₂ eq (Figure 5-1). This 1.8% decrease is due to reductions in coal, oil and peat use in electricity generation. However, emissions have not yet returned to the lower 2019 levels pre-COVID-19, and this 1.8% reduction is not sufficient for the electricity sector to stay within its sectoral emission ceiling by 2025. Elevated emissions from electricity generation during 2021 and 2022 are attributable to increased use of more carbon-intensive fuel along with less renewable energy as well as an increasing demand for electricity.

The latest EPA projections indicate that emissions from the energy industries sector are projected to decrease by 60% from 10.3 to 4.2 Mt CO₂ eq over the period 2021–2030 (Figure 5-2). The assumptions for the WAM scenario include:

- ▶ Renewable energy generation will increase to approximately 80% of electricity consumption by 2030, based on an expansion in wind energy and other renewables in line with NCAP 2023.
- ▶ A total of 1.7 GW of storage is to be in place, including Turlough Hill pumped storage.
- ▶ Up to 5.7 TWh of biomethane is to be produced by 2030.
- ▶ 1.2 GW of new flexible gas-fired generation is included.

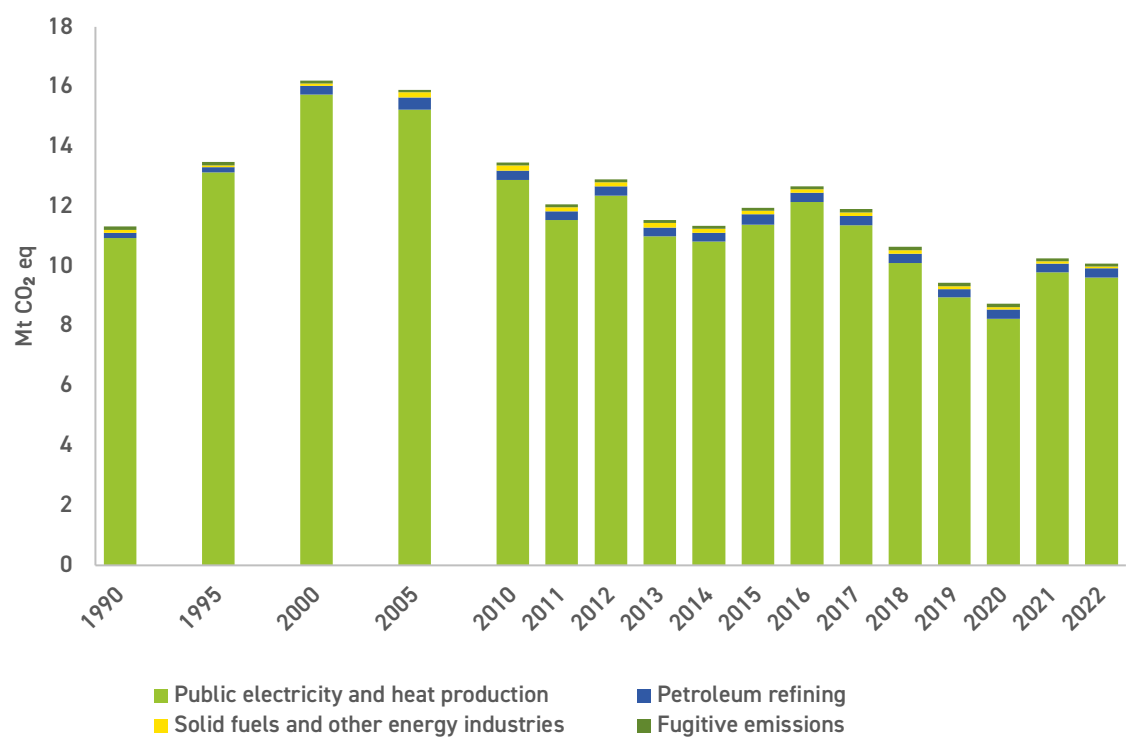


Figure 5-1: Trend in energy industries sector emissions between 1990 and 2022.^[32]

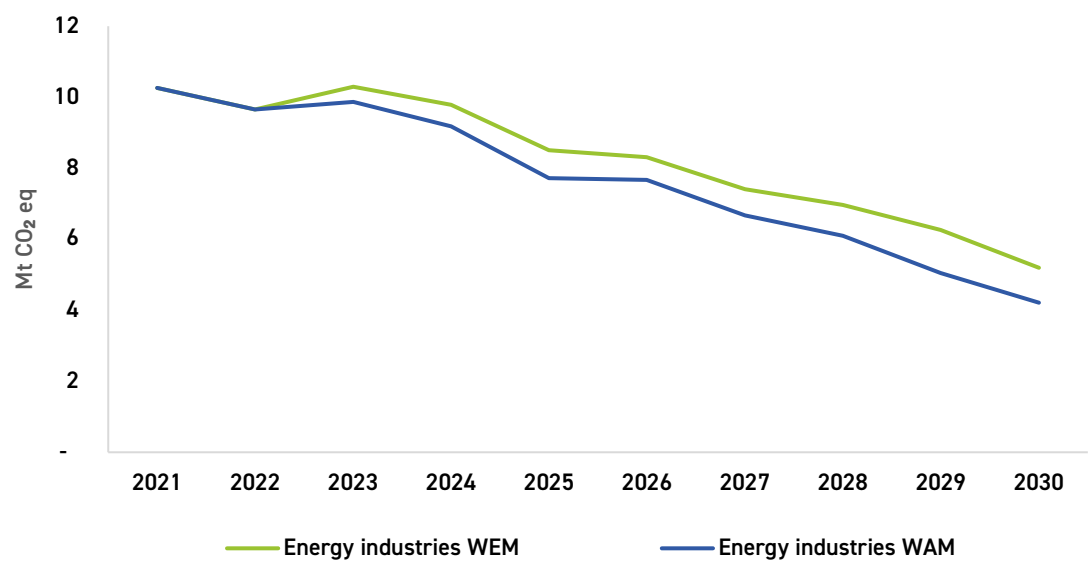


Figure 5-2 Greenhouse gas emission projections from the energy industries sector under the ‘with existing measures’ and ‘with additional measures’ scenarios between 2021 and 2030.^[31]

5.3. Indicators

The EPA National Emissions Inventory represents the latest official data available on emissions. However, a broader suite of indicators can be used to provide a more detailed picture on emission trends in the electricity sector (Table 5-2).

Table 5-2 Indicators of the transition of the electricity sector for 2015–2022. ^[32, 42–45]

Name	Unit	2015	2016	2017	2018	2019	2020	2021	2022
Sectoral emissions ^a	Mt CO ₂ eq	12.0	12.7	11.9	10.6	9.4	8.7	10.3	10.1
Final electricity consumption	GWh	26,576	27,155	27,742	28,900	29,083	29,331	30,921	31,622
Emissions from peat- and coal-fired electricity generation	Mt CO ₂	7.0	6.8	5.8	4.2	2.6	1.8	3	2.8 ^b
CO ₂ intensity of electricity	g CO ₂ /kWh	486	501	455	387	336	309	348	331
Share of renewables as a % of demand	%	27.3	25.5	29.6	33.1	37.6	42.3	35.0	38.6
Share of coal as % of demand	%	16.9	15.9	12.2	7.0	1.6	2.1	8.2	7.0
Share of peat as a % of demand	%	8.8	7.9	7.2	6.8	6.1	2.9	1.0	0.7
Share of oil as % of demand	%	1.4	1.0	0.5	0.5	0.9	1.2	4.4	3.2
Onshore wind capacity	MW	2,447	2,795	3,312	3,667	4,087	4,297	4,307	4,502
Offshore wind capacity	MW	0	0	0	0	25	25	25	25
Solar photovoltaic capacity	MW	0	0	0	0	0	0	0	360
Zero emission gas capacity	MW	0	0	0	0	0	0	0	0

a The 'energy industries sector', as defined in the National Inventory Report.

b Based on SEAI projections.

5.4. Analysis

5.4.1. Accelerate renewable energy generation

The council welcomes the increased targets for onshore wind and solar power set out in NCAP 2023, as accelerated deployment of onshore renewable electricity generation will be crucial for the electricity sector to meet its sectoral emissions ceiling for the first carbon budget period, covering 2021–2025. Ireland's installed wind capacity increased by an average of 12% (about 300 MW) each year from 2009 to 2019 but has slowed since to 180 MW of added capacity in 2020 and 32 MW of added capacity in 2021.^[46] Nevertheless, 2022 was a major milestone for the connection of renewables to the electricity system, representing the most renewable generation

capacity installed in a single year to date, with 360 MW of grid-scale solar power and a total of 688 MW of renewables connected to the electricity system.^[44] However, the current rate of connecting renewables will need to more than double to meet NCAP 2023 targets for 9 GW of onshore wind and 8 GW of solar power connected to the electricity system by 2030, which for context equates to a further approximately 1,500 MW of onshore renewables connected to the electricity system on average each year.

Many existing renewable energy installations are due to seek an extension of their planning consent or to repower their renewable energy technology on site. Existing planning consent is granted for 20–25 years from commissioning when in reality most windfarms have the potential for over 30 years of operational life.^[47] Ideally, no operational life would be imposed by planning conditions, or alternatively planning consent should be extended to 35 years from commissioning. The first repowering application was granted in 2021, with 25 turbines replaced with up to 13 turbines with a capacity of 4–6 MW each and up to 180 metres tip height increasing the overall generating capacity from 15 MW to 70 MW. However, the first application for an extension for continued operation for a further 15 years with no modifications to the existing wind farm was refused in 2023 on the basis of the continued displacement of hen harriers from what had been suitable habitat prior to the wind farm development. The Council is concerned that many of the older fleet of onshore wind farms will lose their planning consent and that a significant loss of existing onshore wind capacity will need to be taken in to account in net 2025 and 2030 onshore targets (see Chapter 10 for further information on biodiversity). The recast Renewable Energy Directive (RED II) outlines the facilitation of the repowering of existing renewable energy plants by ensuring a streamlined and swift permit assessment process not exceeding 1 year. REPowerEU shortens this permitting deadline from 1 year to 3 months for repowering projects that increase capacity by up to 15% and do not need grid reinforcements; for larger repowering projects, the timeline has been shortened from 1 year to 6 months. In addition, under REPowerEU, environmental impact assessments will be limited to the changes to the site, replacing previous requirements to follow similar assessment processes as for a brand new facility. Barriers to and the administrative burdens of the extension of consents for existing wind turbines and repowering of sites should be urgently removed, and a simplified and swift permit assessment process for the lifetime extension and repowering of existing onshore renewables in line with REPowerEU timelines is needed to guard against a significant loss of existing onshore capacity.

In the wake of the Russian invasion of Ukraine, the European Commission introduced a temporary emergency regulation to accelerate the roll-out of renewable energy on 19 December 2022.^[48] The regulation aims to ensure faster permitting and includes provisions to simplify the roll-out of fast-track connections to grids. Most importantly, it was agreed that 'the planning, construction and operation of plants and installations for the production of renewable energy is presumed to be in the overriding public interest'.^[49] The quantity of planning applications necessary to achieve the NCAP 2023 targets, along with the essential expansion and upgrading of the electricity grid, represents a significant challenge to the planning system. Economic and Social Research Institute (ESRI) research indicates a cost to electricity consumers and increased emissions arising from delays in the planning system, with costs being 10% lower and carbon emissions 3.4% lower in a modelled system without delays.^[50, 51] With limited time remaining to meet the 2030 targets, the ability of the system to process the applications required is under scrutiny. Resources are urgently needed in An Bord Pleanála, local authorities, the Maritime Area Regulatory Authority (MARA), the National Parks & Wildlife Service (NPWS) and other agencies

to process the volume of onshore and offshore planning applications and applications for associated grid infrastructure in line with the statutory timeframes for planning decisions. The Renewable Electricity Spatial Policy Framework is crucial and should be published by Q3 2023 at the latest to provide the necessary spatial planning guidance to support the scaled-up deployment of renewable electricity across the country. Equally, local authority climate action plans and development plans will need to be updated in early 2024 to provide for a plan-led approach to renewable development consistent with national targets. In addition, the new revised onshore wind energy development guidelines should be well articulated to provide clarity for developments and need to be published as soon as possible to support the delivery of onshore wind energy targets.

Community engagement is essential for critical infrastructure projects, as it promotes transparency, trust and collaboration,^[52] leading to better outcomes for both the project and the community it serves. Research has highlighted that community engagement on infrastructure is critical for future decarbonisation targets and that flexibility is needed to respond to different community contexts.^[53] EirGrid's and SONI's grid development strategy, 'Shaping Our Electricity Future', identified a range of actions and projects that need to be delivered to support the development of infrastructure, enabling technologies and systems to support onshore renewables and accommodate offshore wind energy.^[54] EirGrid has recently completed analysis to update Shaping Our Electricity Future to accommodate 80% renewables by 2030 and align it with carbon budgets and sectoral emission ceilings for electricity.^[55] Fully visible and unequivocal political support is needed for EirGrid's grid development strategy, which will reinforce the electricity grid to increase capability by building new infrastructure and upgrading existing equipment. In the shorter term, it is crucial to remove barriers to the installation of renewables and flexible technologies without the need to build new grid infrastructure, including hybrid technology (wind/solar/storage) grid connections and developing a policy on 'private wire' networks. Action to facilitate hybrid technology grid connections and 'private wire' networks has been delayed and must be prioritised and delivered by Q4 2023 as set out in NCAP 2023 in order to maximise the use of the existing grid infrastructure and to accelerate the connection of new renewable generation and associated storage.

The Council welcomes the provisional results of the first offshore wind auction under the Offshore Wind Renewable Electricity Support Scheme (ORESS 1).^[56] Over 3GW of capacity from phase 1 projects has been procured at an average price of €86.05/MW, which represents the largest volume of renewable electricity Ireland has ever procured at auction and marks a breakthrough moment for the future of Ireland's offshore wind sector.^[57] The successful projects are expected to apply to An Bord Pleanála before the end of the year, and it is critical that An Bord Pleanála has the resources and expertise necessary to properly process these applications as quickly as possible. The Wind Energy Ireland National Ports Study^[58] identified a deficit in terms of the ability of the existing port infrastructure in Ireland to serve the offshore renewable sector. The study highlighted that only Belfast's D1 facility is entirely suitable for supporting fixed-bottom construction, with limited infrastructure to support the deployment of floating wind capacity. Within the next 8 years Ireland intends to develop 7GW of offshore wind energy (approximately 7–10 offshore wind farms), and the study shows that this target cannot be accomplished using only the port facilities currently available in Ireland. It is imperative to ensure that adequate port infrastructure is in place to support the delivery of Ireland's offshore wind targets and ensure maximum benefit to the Irish supply chain.^[58] Up to 1GW of additional output from phase 2

offshore wind projects will be required to reach the 5GW 2030 target. In 2022, phase 2 policy changed from a developer-led approach to a plan-led approach within offshore renewable energy designated areas.^[59] There is an urgent need for designated maritime area plans to define these designated areas to ensure continued momentum in offshore wind development.

5.4.2. Accelerate flexibility

It is critical to phase out the use of coal in electricity generation in the near term and focus on the revision of the capacity market needed to ensure that 2GW of new flexible gas-fired generation (which is green hydrogen ready) is delivered on time.^[60, 61] The failure to deliver the necessary generation capacity in the context of a forecast increase in electricity demand has undermined previous commitments to close the Moneypoint coal-fired generation plant in 2025.

NCAP 2023 does not include a clear timeline for the phase-out of CO₂-intense coal in electricity generation. Measures to deliver a roadmap for a net zero power system should be brought forward and consider the timeframe for phasing out and ending the use of coal and oil in electricity generation. There is a measure to expand the gas network to accommodate 2GW of new gas-fired generation, but efficiencies should be explored where new generation can be connected to the existing network. NCAP 2023 includes no detail on how zero-emission gas-fired generation will be commenced or delivered by 2030. Policies are needed to ensure that zero-carbon gases, such as hydrogen, are used in the electricity sector to provide zero-carbon dispatchable electricity at sufficient scale. One of the potential further measures in the plan considers a policy to require future dispatchable generation to be zero-carbon gas ready; however, earlier introduction of this policy should be considered.

Deployment of renewable electricity is central to the decarbonisation of the electricity system, but it presents challenges, as the production of wind and solar power is variable, and electricity is not easily stored as energy in a liquid or gaseous form. Greater flexibility in the electricity system is required to facilitate increases in renewable energy, using proven flexibility providers such as batteries and interconnection. Eirgrid's recently published Shaping Our Electricity Future Roadmap version 1.1^[55] indicates that over 20% of available renewable generation could be surplus to the demand requirements in 2030 and recommends that further new interconnection, long-duration storage and demand-side flexibility are required to help mitigate and utilise renewable surpluses. Mehigan *et al.*^[62] investigated the impact of these flexibility providers on CO₂ emissions and renewable energy curtailment and found that a high CO₂ price is critical to interconnection and batteries achieving emission reductions and that, regardless of CO₂ price, interconnection and batteries alleviate renewable energy curtailment. In addition, their research suggests that solar energy benefits more from the deployment of batteries due to complementary timescales, while wind energy benefits more from interconnection. The technical challenges facing Ireland in moving to 80% renewable electricity on an island system with limited interconnection are unprecedented and the timely delivery of three new transmission grid connections or interconnectors to Northern Ireland, Great Britain and the EU are central to supporting this transition. The need for 5-hour battery storage has become increasingly crucial, particularly during the second carbon budget period (2026–2030), to provide the necessary flexibility and support to facilitate an 80% share of renewable energy sources on the grid.^[63]

However, the current treatment of grid-scale energy storage in the wholesale electricity market is a barrier to the entry and participation of battery storage in the market. In this context, the

Commission for Regulation of Utilities (CRU) review of the regulatory treatment of storage, due later this year and including licensing, charging and market incentives, is crucial to increasing the flexibility of Ireland's electricity system and must be delivered on time. Analysis indicates that battery storage can make money from arbitrage by buying power when cheap and selling when it is expensive in markets such as Ireland, with a large volume of renewables and strong price variability, and that profits increase with storage duration and efficiency.^[64] Ireland's only pumped hydroelectric storage plant, Turlough Hill, a 292 MW plant, generates electricity at times of peak demand and is instantly dispatchable. Silvermines Hydro's proposed 360 MW pumped hydroelectric storage plant is planned to allow a variable pumping load to match the variable output from renewables such as wind power; it is at a pre-development stage and requires planning permission. The potential for the development of further pumped hydroelectric storage as a means of storing renewable energy should be explored. ESB Networks has introduced local flexibility market arrangements,^[44] designed to incentivise investment in commercial storage facilities at scale, providing local network capacity for low-carbon technologies. Further policies are needed to incentivise short- and long-duration storage to balance and optimise electricity demand and variable renewable generation.

The Council welcomes the National Hydrogen Strategy^[65] and its recommendations, particularly regarding the limited suitability and prioritisation for potential end-use sectors.. The deployment of green hydrogen in Ireland will be reliant on the availability of additional wind power capacity, both offshore and onshore, and in the immediate term needs to be planned appropriately to interact with increases in electricity demand and the electricity system's needs. In the period to 2030 it is essential that proven technologies such as interconnectors and batteries are deployed to provide additional system flexibility and ensure that emissions reduce as quickly and efficiently as possible. There is significant potential for grid-connected electrolyzers to produce hydrogen during times of high availability and low-cost renewable electricity. The fuel can be stored for long periods of time and can be combusted in gas turbines to generate energy during periods of low renewable availability. Based on the research considered in the Council's 'Hydrogen in Ireland Discussion Paper',^[66] it will be important to examine options for storage and transport and what impacts these may have in terms of hydrogen leakage, emissions and environmental impacts. Hydrogen leakage may have the potential to considerably undermine near- and mid-term climate benefits, and further work is required to advance understanding of hydrogen's indirect climate effects and improve estimates of hydrogen leakage throughout the value chain. The use of hydrogen in the electricity sector needs to interact with pathways for the fuel mix post 2030, which have not yet been well developed, including consideration of the volume and location of offshore wind capacity. In terms of the demand for green hydrogen, a number of hard-to-abate sectors have been identified where hydrogen may play an important role, including the electricity, enterprise and transport sectors, but this will need to be balanced against alternative mitigation options in each sector and ensuring that hydrogen is focused where there is the greatest mitigation opportunity.

5.4.3. Demand management

A key recommendation in the 2022 Annual Review was that a strategy for managing the electricity demand side is urgently required to support the adoption of demand-side technologies and support reductions in the sector's emissions intensity, along with further measures to enable and incentivise flexibility in industrial, commercial and residential demand. However, the Electricity

Demand Side Strategy is still not available. Its delivery has been carried over from NCAP 2021 to NCAP 2023 and is now due in Q4 2023. The Council regrets the delay in publication of the Electricity Demand Side Strategy and urges that it is available not later than Q4 2023. The strategy is crucial for delivering Ireland's climate action targets in the context of the expected growth in the demand for electricity. Energy demand is forecast to increase 37% by 2031, compared with 2021 levels,^[45] and the primary demand growth drivers are data centres and the electrification of heating and transport.^[67] Data centres and other large energy users are expected to account for 28% of all electricity demand by 2031. The Council calls on the multiple Government departments and agencies involved in collaboration with industry to swiftly and efficiently implement the strategy.

The Electricity Demand Side Strategy will focus on delivering the demand flexibility targets in NCAP 2023, which include the aim of ensuring that 15–20% of electricity demand is flexible by 2025 and 20–30% of electricity demand is flexible by 2030.^[24] ESB Networks has developed a set of evidence-based scenarios exploring possible pathways to achieve this target of 15–20% flexible demand by 2025^[68] and the CRU has recently issued a call for evidence on the Energy Demand Side Strategy.^[69] The strategy must consider the impact on emissions of the response to demand and the method of achieving these flexibility targets, particularly for large energy users, where high on-site emission generation may be deployed to provide grid flexibility rather than shifting demand to times when the output of renewable energy from the system is high. The risk of this is evidenced by current data centre licence applications with the EPA for greater use of on-site diesel generation. The Council is of the view that targets for 20–30% demand-side flexibility, particularly for large energy users such as data centres, should be based primarily on shifting demand to times when the output of renewable energy from the system is high and avoid the use of on-site high-emission generation. The Electricity Demand Side Strategy, due in Q4 2023, will be fundamental to achieving Ireland's electricity sector decarbonisation targets and will require multiple Government departments and agencies in collaboration with industry to swiftly and efficiently implement the strategy.

The National Smart Metering Programme, along with the development of green electricity tariffs to incentivise the use of electricity at times of high wind and solar power generation, will be a key measure for delivering innovation in the demand side and will continue to play an increasingly important role in enabling consumers to participate in the transition to a decarbonised energy system. The National Smart Metering Programme will replace over 2.4 million electricity meters by end of 2024, and over 1.2 million smart meter customers are now able to avail themselves of new time-of-use tariffs and smart services being made available by electricity suppliers.^[44] However, the uptake of time-of-use tariffs to date has been relatively low, with just 7% of eligible customers availing themselves of smart services.^[70] While the introduction of a new measure in NCAP 2023 to implement dynamic green electricity tariffs to incentivise demand when low-carbon, variable renewable electricity is available is welcome, there is no consideration of the barriers to the uptake of time-of-use tariffs and the use of smart meter data. In a welcome development, ESB Network's new customer portal went live in November 2022, giving customers with smart meters access to their consumption data via the My Energy Consumption option on their ESB Network account. However, the limited access to smart metering data represents a significant barrier to the uptake of time-of-use tariffs and needs to be addressed. A clearer legislative basis to support the widest possible access to smart metering data needs to be progressed as a matter of urgency to address barriers to the uptake of time-of-use tariffs. The Council welcomes the CRU's recent consultation on proposals to incentivise the uptake of time-of-use tariffs,^[70]

which include amending the price comparison website accreditation framework to allow consumers to upload their smart meter data in order to receive a personalised price comparison, implementing an estimated annual bill for all time-of-use tariffs, and increasing the limit on the number of time-of-use tariffs that suppliers are allowed to offer to domestic customers.

EU Regulation 2022/1854 on an emergency intervention to address high energy prices included requirements for Member States to achieve reductions in electricity demand.^[71] Ireland was set a mandatory target to reduce electricity consumption by 5% during peak hours in the period December 2022 to March 2023, based on projected forecasts, and was successful in reducing peak electricity consumption by 7%.^[72] However, Ireland did not achieve a voluntary overall target of a 10% reduction in electricity consumption in the period between November 2022 and March 2023, based on historical consumption, and overall electricity consumption increased by 6% during the target period compared with the historical reference period. The reference period for the overall demand reduction target is one of comparatively lower demand, as Ireland's energy demand has increased in recent years, which further emphasises the challenges associated with the expected growth in electricity demand in the coming years. Measures identified to reduce demand towards achieving these targets include a conservation voltage reduction scheme, 'Beat-the-Peak' pilot schemes to increase domestic and commercial demand flexibility, various energy efficiency schemes in the public and private sectors, and a nationwide 'Reduce Your Use' information campaign. A review of the effectiveness of such initiatives should be conducted.

6 Transport

Key facts

Total emissions:

11.6 Mt CO₂ eq

% Change from previous year:

6.0%

% SEC consumed 2021–2025:

41.9%

Expected emissions

as % of SECs 2021–2030:

106.9%

Key messages

Observations

- ▶ Emissions in the transport sector were 11.63 MtCO₂eq in 2022, compared with 10.98 MtCO₂eq in 2021, an increase of 6%.
- ▶ 42% of the first sectoral emission ceiling was expended by the end of 2022.
- ▶ EPA projections indicate that under the 'with additional measures' scenario the transport sector will exceed its 2021–2025 sectoral ceiling by 1.1 MtCO₂eq and its 2026–2030 sectoral ceiling by 5.4 MtCO₂eq.
- ▶ Without intervention, modelling carried out for the National Climate Action Plan 2023 assumes 12% growth in Ireland's total car-kilometres and 26% growth in total goods vehicle-kilometres between 2019 and 2030.

Recommendations

The Council notes the importance of appropriate sequencing of measures under the Avoid–Shift–Improve framework as set out in the 2023 National Climate Action Plan.

Avoid

- 6.1. Ireland's transport system needs to make accessible, sustainable transport modes more attractive and shift away from car dependency through consideration of the proximity between people and places in land use and housing planning.
- 6.2. The compact growth target in the current National Planning Framework is insufficiently ambitious to achieve the low-carbon transition in the transport sector. The review of the National Planning Framework needs to reassess how Ireland approaches compact growth (housing density) and how it is measured from a spatial perspective.
- 6.3. Poor economic incentives for urban brownfield/infill development need to be addressed in order to limit further urban sprawl, along with the development of improved incentives for urban living and the revitalisation of vacant urban buildings.

Shift

- 6.4. Urgent investment is needed to improve the accessibility and reliability of public transport services in addition to road space reallocation, along with a fully interactive app with improved data on bus reliability and capacity. The ongoing programme of Public Service Obligation bus fleet replacement and depot charging upgrades should be expanded and accelerated with a focus on the electrification of public transport to support air quality goals.
- 6.5. The Council recommends that choices need to be made now on the design and implementation of demand management measures through the development of the National Demand Management Strategy. This should use proven approaches to drive behavioural change such as road pricing (e.g. congestion charging, low-emission zones), parking restraints and fuel pricing. The Taxsaver commuter ticket scheme and the cycle to work scheme should be updated, alongside the implementation of Part 18B of the Finance Act (No. 2) of 2008 (Parking Levy in Urban Areas) in the major urban centres of Cork, Dublin, Galway, Limerick and Waterford.
- 6.6. The current reduction in school transport scheme fees and in public transport fares should be continued in Budget 2024. Access to school buses under the scheme should be significantly expanded. The Council recommends an assessment of the impact to date of the reduction in public transport fares on emission reduction as an input to longer term fare strategy development.
- 6.7. Local Authority Climate Action Plan Guidelines should include specific actions and indicators in respect of accessibility, modal shift and active travel. The local authority of each city should introduce park and ride schemes along major arterial roads (by 1 January 2030), as well as produce (by 1 January 2025) and deliver (by 1 January 2030) a plan to reduce the number of public city centre parking spaces.

Improve

- 6.8. Motor Tax should be recalibrated to promote resource and energy efficient vehicles and should escalate year by year. Vehicle Registration Tax percentage rates for all category A vehicles (EU category M1) bands, except the least-polluting band, should also increase.
- 6.9. Electric vehicles present a means of achieving significant reductions in emissions, particularly in rural areas, and improvements in the charging infrastructure and incentives for uptake are important measures in the short term. A policy for the roll-out of vehicle-to-grid-enabled electric vehicles with bidirectional home charging should also be urgently prepared.
- 6.10. It is recommended that the target for commercial electric vehicles should be increased to 150,000 by 2030 from the current target of 95,000 to support decarbonisation of commercial vehicle activity, with consideration of additional incentives to support adoption by businesses.
- 6.11. The Council welcomes work carried out in the last year to assess the challenges associated with biofuel blending and recommends continued assessment and transparent reporting in this area.
- 6.12. A national certification/accreditation system for eco-driving programmes as identified in the Road Haulage Strategy (December 2022) should be established immediately along with a policy for the development of freight consolidation centres. A step up in ambition is also required on the future role of Ireland's rail network in order to significantly increase the proportion of inland freight tonnage moved by rail.

6.13. Ireland needs to develop a strategy for increasing the share of sustainably sourced aviation fuels.

6.1. Introduction

The transport sector^a represents the second largest source of greenhouse gas emissions in Ireland, with emissions of 11.63 Mt CO₂ eq in 2022. Under the sectoral emission ceilings, the transport sector is obliged to achieve a 50% reduction in emissions by 2030 (relative to a 2018 baseline) consistent with a sectoral emission ceiling of 54 Mt CO₂ eq over 2021–2025 and of 37 Mt CO₂ eq over 2026–2030, as shown in Table 6-1.^[24] This equates to a target emissions level of approximately 6 Mt CO₂ eq in 2030.

Table 6-1 Projected cumulative transport emissions over the carbon budget periods from 2021–2025, 2026–2030 and 2021–2030 (Mt CO₂ eq)^[29, 31, 32]

Carbon budget period	Sectoral emissions ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	54	22.6	32.3	54.9	0.9
2026–2030	37	–	42.4	42.4	5.4
2021–2030	91	22.6	74.7	97.3	6.3

6.2. Inventories and projections

Emissions were relatively stable for the period 2015–2019, at an average of 11.6 Mt CO₂ eq per year, despite increases in the number of vehicles as shown in Figure 6-1.^[72] This is a result of improved vehicle technology and increased biofuel penetration.^[73] The impact of electric vehicles (EVs) in reducing transport emissions is still limited because of the small number in the overall vehicle fleet, but they are projected to contribute substantially to emission reductions in the first and second carbon budget periods.^[31] Emissions increased by 6% in 2022 compared with 2021, to 11.63 Mt CO₂ eq.

Projections modelled by the National Transport Authority (NTA) for NCAP 2023 indicate that increased transport activity levels will lead to an increase in carbon emissions to approximately 13 Mt CO₂ eq and 14 Mt CO₂ eq by 2025 and 2030, respectively, under a 'business as usual' scenario.^[74] Fundamental changes in Ireland's transport system will be required to change current levels of energy demand across freight and private transport.

The latest EPA projections indicate that the share of total road transport CO₂ emissions from heavy-duty vehicles and light goods vehicles is projected to increase to 57% by 2030 and 74% by

^a The transport sector covers both freight and passenger transport and includes road transport, rail transport, and domestic aviation and navigation. International aviation and maritime emissions have not been covered by legislated national targets to date; however, a number of legislative changes under the EU Fit for 55 package will entail changes in this area. Section 6.4.3, below covers recent legislative developments in this area at EU level.

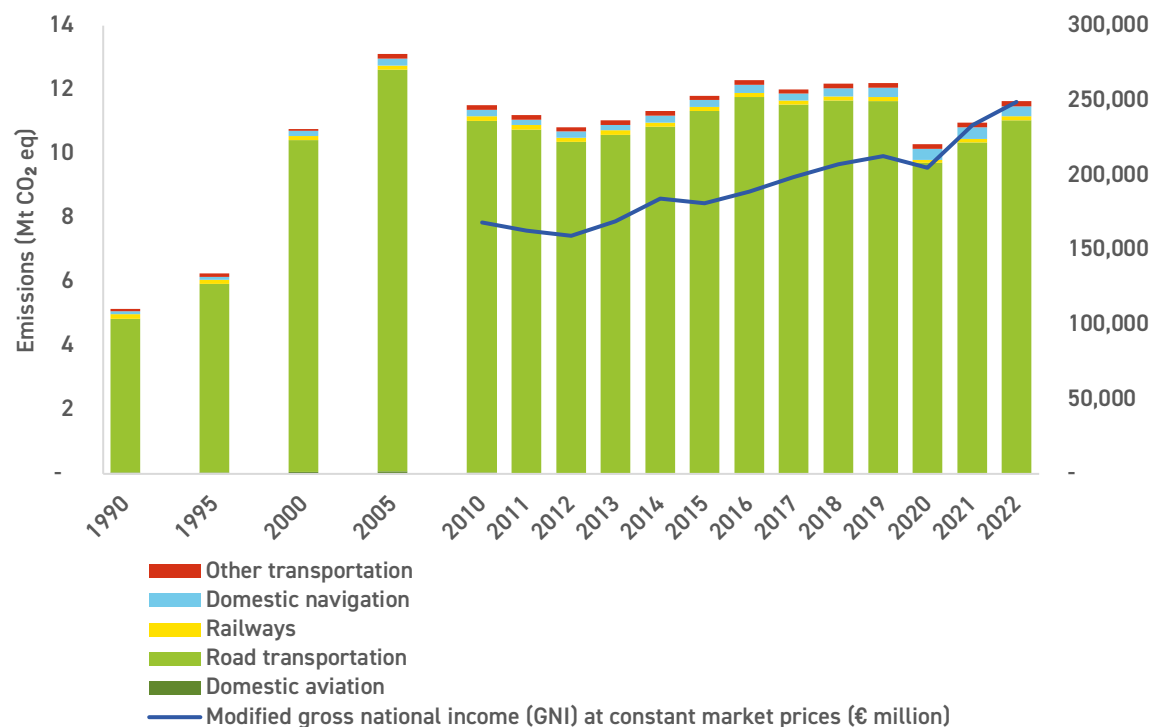


Figure 6-1 Transport sector emissions 1990–2022.^[32]

2040 (Figure 6-2). The assumptions for the WAM scenario for the transport sector in the 2021/22 EPA emission projections include:

- ▶ a 10% biofuel blend for petrol and 20% blend for diesel at pumps by 2030,
- ▶ 845,000 private EVs and 95,000 commercial EVs on the road by 2030,

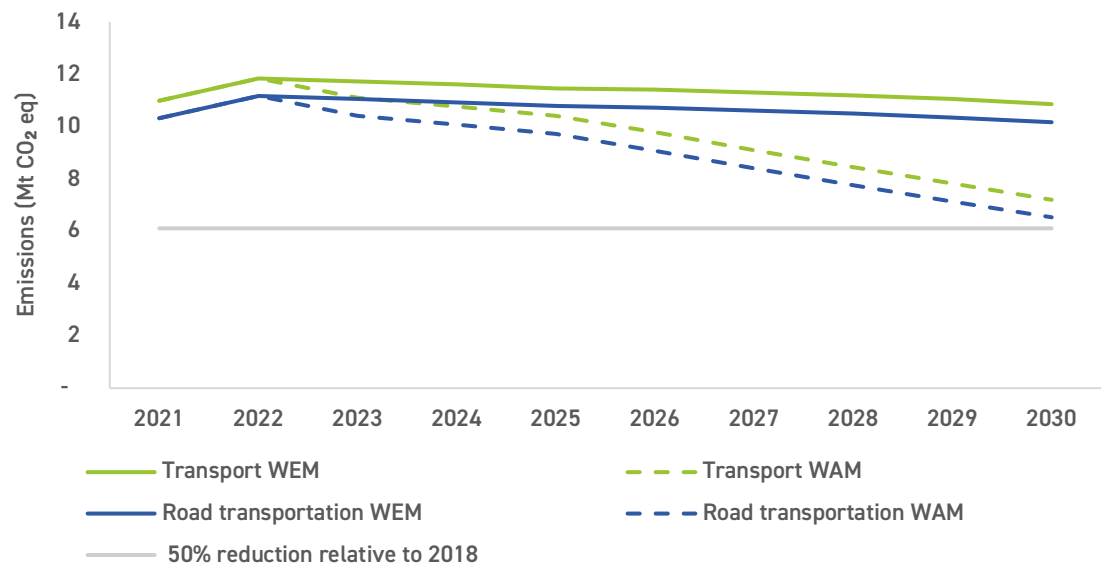


Figure 6-2 Transport sector emission projections 2022–2030.^[31]

- ▶ a 20% reduction in total vehicle-kilometres travelled to be achieved by behavioural and sustainable policies and measures outlined in NCAP 2023, such as a 50% increase in daily active travel journeys and a 130% increase in daily public transport journeys,
- ▶ the impact of transport infrastructure projects, such as the DART Expansion and BusConnects, also included in the WAM scenario.

6.3. Indicators

The EPA National Emissions Inventory represents the latest available official data on emissions. However, more recent indicators can be used to provide a more up-to-date picture on trends in the transport sector, as shown in Table 6-2.

Table 6-2 Transport sector indicators for 2015–2022^[36, 75–77]

Name	Unit	2015	2016	2017	2018	2019	2020	2021	2022
Sectoral emissions	Mt CO ₂ eq	11.81	12.29	12.01	12.19	12.2	10.30	10.98	11.63
Emissions relative to 2018	%	–	–	–	100	100	84	89	95
Renewable energy sources in transport (RES-T) weighted	%	5.9	5.2	7.5	7.2	8.9	10.1	4.3 ^a	–
Distance by private car	Million km	35,020	36,623	37,181	35,975	35,453	26,102	30,216	–
Distance by private car per capita	km	7,470	7,727	7,758	7,407	7,204	5,244	6,004	–
Distance by goods vehicle	Million km	7,021	7,410	7,785	7,891	8,023	7,283	8,812	–
Distance by public service vehicle	Million km	1,167	1,194	1,219	1,228	1,240	823	721	–
New battery electric vehicle share of all new private cars	%	0.39	0.28	0.49	1.01	3.04	4.67	8.40	15.26
New battery electric vehicle share of all new goods vehicles	%	0.05	0.04	0.13	0.26	1.19	2.06	3.15	1.74
Electrified rail energy use as % of total	%	–	–	–	–	–	11.56	10.97	–
Journeys by public transport	Million (weekly average)	–	–	–	–	4.4 (April)	0.55 (April)	1.87 (April)	4.17 (April)

^a The decrease between 2020 and 2021 is due to the change in calculation methodology between RED I and RED II.

6.4. Analysis

The increase in transport emissions in 2022 presents a clear challenge to the sector, as Ireland is now in year 3 of its first 5-year carbon budget where sustained reductions in emissions are required to meet the target for the sector under the second carbon budget. Approximately 42% of the transport sectoral ceiling was emitted in 2021 and 2022, with lower emissions in 2021, at least partially due to suppressed transport emissions due to COVID-19^[36] Under the EPA's WAM scenario, the sector is projected to overshoot its emissions ceiling under categories CB1 and CB2 by 6.5 Mt CO₂ eq.^[31]

Several measures to reduce transport emissions have the potential to support improved air quality,^[78] reduced noise, and improved wellbeing and health outcomes while also protecting households from volatile fuel prices. The Council welcomes the reframing of the transport chapter of NCAP 2023 and the focus on the Avoid–Shift–Improve (ASI) framework.^[24] Emission abatement policies in the transport sector should focus on demand reduction measures and transport-oriented development, investment in public transport infrastructure and road space reallocation, in addition to policy measures under the 'improve' aspect of the ASI framework that have impacted emissions to date. Policy measures will also need to account for a growing population and economy.^[79]

NCAP 2023 notes that biofuels are expected to reduce emissions by 1.08 Mt CO₂ eq by 2030; however, as noted in section 6.4.1, there may be challenges to achieving targeted biofuel blend rates.^[24] Electrification and vehicle technology is expected to contribute 4.74 Mt CO₂ eq in emission reductions by 2030 based on the sale of 845,000 private electric vehicles (EVs)^[24] along with technology improvements across the transport fleet. While the rate of uptake of EVs has increased, based on current growth rates in new EV sales and used imports, it will be challenging to meet the 2030 target.^[80] This will require a significant acceleration of EV sales and imports and phase-out of new internal combustion engine (ICE) vehicle sales within this decade^[80] along with a focus on vehicle energy efficiency.

In 2021, the Council commissioned an analysis by the OECD with the aim of redesigning Ireland's transport system to achieve net zero emissions. The OECD's report, published in 2022, identified Ireland's car dependency and the need to significantly reduce car-kilometres.^[81] The OECD noted a number of key issues to be addressed in relation to the unsustainable dynamics of car dependency in Ireland, related to induced demand for private car transport, urban sprawl and under-investment in sustainable transport modes.^[82]

6.4.1. Avoid–Shift–Improve framework

Avoid

Long-term transport emission reduction and congestion alleviation are closely linked to spatial planning, and measures in this sector should include consideration of settlement patterns to shift travel behaviours.^[82] As set out in the Council's recent letter to the Government,^[82] sustainable residential development can reduce transport demand and can also reduce the cost of providing low-carbon services such as public transport. The 2022 Census found a number of interesting shifts in transport patterns: the number of people commuting to work increased by 4% between 2016 and 2022; however, with 4% fewer people commuting to work by train, LUAS or DART.^[83] It also showed an increase in journey times for private vehicles.

The upcoming National Planning Framework (NPF) review^a should take account of updated understanding of population and economic growth and their regional distribution when setting policies and targets.^[84] The OECD has noted that the compact growth target in the NPF is insufficiently ambitious to achieve the low-carbon transition in the transport sector, and that it 'still allows for 60% of urban development and 70% of rural development to take place in greenfield areas, thus enabling urban sprawl to continue'. The OECD also notes that urban sprawl brings with it 'higher infrastructure costs and emissions'.^[81]

The NPF review should also more strongly quantify the imperatives around compact and sustainable urban development from a climate and emissions perspective by harnessing NTA transport modelling and/or ESPON-derived research^[85] to quantify the influence of spatial planning policies on greenhouse gas emissions in a consistent manner. Incorporating compact growth targets within local authority climate action plans will be crucial, as many of the levers for implementation sit with local authorities.^b A number of specific recommendations for transport-oriented development (TOD) in the revised NPF have been highlighted in a recent study on opportunities for TOD in Dublin.^[86] It notes that the role of TOD in delivering compact growth and climate action and supporting housing need to be further emphasised in the NPF.

Shift

The 50% decarbonisation pathway modelling carried out for NCAP 2023 does not currently represent committed Government policy (e.g. the national Demand Management Strategy will require further consultation and design).^[24] Research has shown that incentives to use active and public transport modes alone are not sufficient to encourage a significant reduction in private car trips, which need to be coupled with measures to disincentivise car use.^[74, 79] This can be achieved by reducing the need for travel and reducing the relative attractiveness of using the private car versus other sustainable modes.^[34] The design of policies needs to consider preferences and behaviour and use existing evidence of policies such as road pricing (congestion charging, low-emission zones), parking restraints and fuel pricing, which have all been demonstrated to be effective in encouraging a reduction in the use of private cars across a number of cities in Europe.^[79] Choices now need to be made on the design and implementation of such measures in an Irish context.

Designing and implementing demand reduction measures requires careful consideration of the availability of alternatives, alignment with public service enhancements, active travel and shared mobility infrastructures, and local and political support. The OECD has noted that, although measures to discourage car use often have a low level of acceptability, evidence suggests that it can be improved if the purpose and benefits of policies are clearly understood, if public concerns are considered and if revenues are earmarked to support improvements in the transport sector.^[87] Revenue recycling schemes for lower income households and enhanced, subsidised public transport can ensure that low-income, car-dependent communities do not become disproportionately burdened by road pricing schemes.^[33]

^a A road map for the revision of the NPF was published in June 2023 (<https://www.gov.ie/en/publication/deef6-a-road-map-for-the-first-revision-of-the-national-planning-framework/>).

^b The Sustainable and Compact Settlements Guidelines for Planning Authorities will replace Sustainable Residential Development in Urban Areas Guidelines for Planning Authorities, published in 2009. When finalised, these will constitute ministerial guidelines under Section 28 of the Planning and Development Act 2000, as amended. The Minister for Housing, Local Government and Heritage published a pre-draft consultation paper, 'Proposed Policy Approach', on Thursday 30 March 2023.

A number of recent Irish studies have provided recommendations in this area. The Five Cities Demand Management Study identified priority measures including 15-minute neighbourhoods, enhanced delivery of the NPF, healthy street assessments, on-street parking controls and pricing, and mileage-based vehicle taxation.^[88] The key recommendations of the OECDs' report on redesigning Ireland's transport for net zero emissions also include measures to support demand reduction, including road space reallocation, on-demand shared services, and better communication of the changes required and their benefits.^[81] The Commission on Taxation and Welfare suggested distance-, location- and time-based charging, congestion charging and an additional duty on non-residential car parking.^[89] The Clean Air Strategy emphasises the need for local measures such as congestion management, safe routes to school, and consideration of air pollution in setting speed limits to improve air quality in urban areas, as well as low-emission zones in cities.^[78]

Specifically in relation to parking, the Commission on Taxation and Welfare recommended 'the introduction of an additional duty on non-residential car parking, both public and private, and not limited to employer provided car parking, in the same key urban areas identified as suitable for congestion charges'.^[89] The Council notes that Part 18B of the Finance Act (No. 2) of 2008 (Parking Levy in Urban Areas) makes provision for a levy on employees for the use of parking facilities provided by employers in the major urban centres of Cork, Dublin, Galway, Limerick and Waterford of up to €200 per annum.^[90] The recently published Public Sector Climate Action Mandate also aims to phase out the use of parking in buildings that have access to a range of public transport services and active/shared mobility options.^[91] Further incentives to use public transport and active travel modes could be provided by employers where private parking capacity is reduced. This could include updates to the Taxsaver commuter ticket scheme, as well as the cycle to work scheme, to help support access to active and public transport with further reviews of how they can be improved.^[92]

Efficient progress through the planning system is essential for the success of major sustainable mobility infrastructure projects, such as BusConnects, MetroLink and DART Expansion. Adequate resourcing of the planning service is crucial for timely project delivery.^[84] The extended lead time for public transport projects, necessitating considerable consultation and planning, can lead to declining public transport capacity to meet growing demand (e.g. due to population growth), with knock-on impacts on the quality of public transport.^[79] Delays can also impact the availability of skilled workers to deliver infrastructure projects, and time and investment are required to build capacity.^[79] The Council notes the inclusion of supporting measures within the recently published Road Traffic and Roads Act 2023 for core bus corridor planning applications for BusConnects.^[93] A full life cycle analysis of the emissions associated with transport infrastructure development is also important.

In 2019, journeys by car accounted for 73.7% of all journeys, while 56.9% of short journeys (of less than 2 kilometres) were made by car.^[94] A shift to active travel or public transport, where possible, is needed in urban areas as a priority, and space should be reallocated to support public transport, walking and cycling, in consultation with local communities. Local authorities will have an important role to play in this area and the Council recommends that local authority climate action plans should include specific actions and indicators in respect of accessibility, modal shift and active travel. Appropriately located and designed park and ride services can also enable greater uptake of public transport in regional areas.^[95]

Service improvements such as more frequent and reliable services are also critical to support greater uptake of public transport.^[96] NCAP 2023 places emphasis on enhancing the provision of public transport including in rural areas.^[24] More flexible on-demand services, such as Local Link or shared mobility schemes, along with an improved EV charging infrastructure in rural areas have the potential to increase transport accessibility in these areas.^[79, 81] The electrification of public transport and roll-out of associated charging infrastructure should be accelerated to support air quality goals and has been shown to be one of the major instruments for reducing emissions from urban public transport.^[97] In an Irish context, a review of alternative fuel buses concluded that a fully electric fleet would be most appropriate to reduce emissions, improve air quality and increase the share of renewable energy use in public transport.^[98]

The Council's 2022 Annual Review recommended that the 20% reduction in public transport fares should be retained and extended.^[99] Budget 2023 extended the 20% fare discount to the end of 2023.^[100] The Council recommends a continuation of this reduction along with an assessment of the impact to date of the reduction in public transport fares on emissions as an input to longer term fare development. Significant public transport subsidies are supported in a number of studies that indicate that an increase in public transport demand can increase overall efficiency and reduce car use.^[96, 101] The delivery of a consistent and transparent national fare structure will also be important in this regard.^[102] Reductions in school transport costs and expansion of access to the school transport scheme have potential benefits in terms of reduced congestion and improved air quality around schools and improved safety for schoolchildren.

Provision of convenient, safe and connected walking and cycling infrastructure is at the core of promoting active travel,^a and evidence from multiple countries suggests that building dedicated active travel infrastructure leads to increases in the frequency with which people choose to walk and cycle.^[67] The Council welcomes increased expenditure on active travel, which has increased from about €45 million in 2019 to an expected €290 million in 2023.^[102] A recent study by ESRI found that perceived safety is the strongest psychological predictor of active travel, which can be increased through appropriate intersection design, priority lights and traffic-calming measures, for example.^[67] There is a need to increase the quality and quantity of cycle parking as a critical component of the cycling infrastructure.^[103] Policies that improve public transport can also boost active travel as a way of accessing public transit, while policies that make car use less attractive will increase the competitiveness of active travel modes.

The Pathfinder projects for the transport sector outlined in NCAP 2023 could potentially provide policy and investment ideas for related local actions.^[104] International evidence supports communication of the benefits of active travel schemes, particularly using demonstration projects and trial periods, which can result in lasting change.^[67]

Improve

As of 2023, ICE vehicles remained the majority of new vehicle sales in Ireland and pathway modelling carried out for NCAP 2023 estimates an approximate 30% battery EV share of the fleet by 2030.^[74] While EU legislation requiring manufacturers to reduce average fleet emissions and changes to the taxation system for private cars was introduced from 2009^[73] the gradual phase-in

^a The National Planning Framework's Design Manual for Urban Roads and Streets aims to prioritise pedestrians, followed by cyclists, public transport, taxis and shared transport and finally private vehicles, aiming to divert short car trips to active transport modes.

of emission standards, under-estimation of manufacturer's emissions and flexibilities within each regulation has meant that reducing emissions from ICE vehicles has been slower than anticipated.^[105, 106]

In 2022, 22.74% of passenger car registrations in Ireland were medium-sized ICE sports utility vehicles (SUVs),^a (26.09% in 2023 so far), while large SUVs represented 12.12% in 2022 (8.62% in 2023 so far).^b This trend is also reflected globally, with an increase in SUV sales of 3% between 2021 and 2022 despite supply chain obstacles and inflation.^[107] The greater weight and height of SUVs means that they emit approximately 20% more CO₂ than medium-sized ICE cars and risk reversing emission reductions achieved through improvements in vehicle efficiency and the uptake of EVs.^[107, 108]

As set out in the Climate Change Advisory Council Annual Review 2022,^[99] there should be a greater focus on vehicle energy efficiency, while also increasing awareness of the embodied emissions in vehicles.^c A 2019 Tax Strategy Group paper recommended strengthening the incentive to purchase low-emitting vehicles via changes to Vehicle Registration Tax rates.^[109] Analysis carried out recently by Transport & Environment outlined the differentiation of acquisition tax burdens across countries in Europe based on different car models.^[110] It notes that an advantage of incentivising more efficient vehicles through ownership taxation (i.e. Motor Tax in Ireland) is that the difference between different models accumulates over the lifetime of the vehicle, potentially providing greater incentives to switch to lower emission vehicles.^[110] In Ireland, Motor Tax on private vehicles registered after 1 July 2008 is based on CO₂ emission levels and comprises a smaller tax burden for private cars than Vehicle Registration Tax. Schemes such as the French 'bonus-malus' system may help to reduce demand for more polluting vehicles by paying customers that purchase fuel-efficient vehicles and imposing a penalty on those purchasing less efficient vehicles.^[111]

Despite supply chain issues, the rate of uptake of EVs is increasing. In 2022, 15.3% of new cars licensed for the first time were electric compared with 8.4% in 2021.^d In the first 3 months of 2023, 16% of all new cars licensed for the first time were electric.^[112] According to the International Energy Agency, global sales of EVs increased by about 60% in 2022.^[107] Only a small proportion of imported used cars are electric with financial barriers to importing used EVs from the UK.

At present, the majority of EV charging (about 80%) is carried out via the home-charging infrastructure.^[113] While this can provide benefits to the electricity system and can be combined with renewable electricity technologies such as solar photovoltaics, there is a gap in the provision of publicly accessible charging infrastructure.^[113, 114] It will be important to urgently focus on the development of the national EV charging infrastructure network, and it is appropriate that funding is focused in this area in order to ensure greater reliability and support confidence in the

^a According to the International Energy Agency, the definition of SUV varies by country but goes beyond a passenger car and includes features of off-road vehicles (i.e. 4 × 4). Its analysis includes in the SUV category smaller SUVs, known as cross-overs, as well as the larger ones.

^b <https://stats.beepbeep.ie/>

^c Vehicle Registration Tax (VRT) is a one-off tax when vehicles are first registered in the Irish state. VRT is levied as a percentage of the open market selling price of the vehicle. There are five VRT categories (A, B, C, D and M), which determine the amount of tax payable. Since 1 July 2008, VRT has been based on CO₂ emissions, so that cars with higher emissions attract a higher tax liability and, since 1 January 2020, VRT is also based on the car's nitrogen oxide emissions.

^d Newly registered fully electric cars and plug-in hybrid electric cars accounted for approximately 19% of all new registrations in 2022.

uptake of EVs. The Government published the Electric Vehicle Charging Infrastructure Strategy 2022–2025 in January 2023 and an accompanying implementation plan.^[113] These are essential to ensure a robust national charging network to support further EV deployment, including provisions for interoperability and national targets for infrastructure provision to be set out in the Alternative Fuels Infrastructure Regulation and requirements under the EU Trans-European Transport Network policy. Supporting grid capacity and infrastructure for smart charging will be required to support energy demand management,^a with an assessment of the potential for vehicle-to-grid technology through bidirectional home charging and services in an Irish context required to inform policy in this area. National Grid ESO has included scenarios for vehicle-to-grid services in its Future Energy Scenarios, noting that it can support flexibility along with energy storage and demand response.^[115] Spatial analysis can be used to identify the most appropriate locations for different types of charging infrastructure based on different selection criteria.^[116]

Smaller and lighter EVs are more resource and energy efficient, which should be considered in the design of Government grants to incentivise the sale of smaller, more affordable EVs. A growing electric SUV market requires larger batteries and further increases demand on critical minerals. In terms of EV incentives, countries with the highest levels of EVs per capita, such as Norway and Sweden, have largely closed the price gap between ICE vehicles and EVs by applying significant taxes on the former to pay for grants for the latter.^[117]

The EU's Fit for 55 package includes a number of legislative changes in the transport sector, including progressive EU-wide emission reduction targets for cars and vans. In March 2023,^[118] the European Parliament and Council of the EU adopted a regulation^b that sets targets for reductions in CO₂ emissions of 55% for new cars and 50% for new vans from 2030–2034 compared with 2021 levels. This will rise to 100% for both new cars and new vans from 2035. Given the significant changes this will entail that the Council recommends that consideration is given to how existing ICE vehicles will be managed beyond 2035 along with the associated infrastructure.

The Council, along with the Commission on Taxation and Welfare, has previously recommended equalising the rates of excise duty on diesel and petrol in the short to medium term, which has the potential to reduce emissions from diesel by up to 7%.^[89] Research carried out by EnvEcon for the Council in 2023 found that substantial benefits can be realised with the phasing out of the lower rate of excise duty for diesel but recommended that revenue should be reallocated to upgrading pedestrian and cycle infrastructure in both urban and rural areas, along with subsidising public transport and investing in the public transport system.^[119] A recent paper supports these findings, noting that fossil fuel subsidy supports should be recycled by Government to alleviate any adverse impact of such a policy change.^[120]

To date, biofuel blending with Irish road diesel and petrol has been one of the primary mechanisms used to increase the share of renewable energy in the transport sector. Under NCAP 2023, it is expected to contribute an abatement of 1.08 Mt CO₂ eq of an overall reduction in emissions of 10 Mt CO₂ eq.^[24] A report prepared on biofuels in Ireland^[104] estimates that 72–78 million litres of bioethanol (compared with 51 million litres in 2019) and 570–730 million litres of biodiesel/hydro-treated vegetable oil (compared with 202 million litres in 2021) could be required to meet the

^a The recently published Shaping Our Electricity Future Roadmap version 1.1 assumes that a significant proportion of flexible demand comes from price-responsive EV charging.

^b <https://data.consilium.europa.eu/doc/document/PE-66-2022-INIT/en/pdf>

NCAP's transport targets of blend rates of E10/B12 equivalent by 2025 and E10/B20 equivalent by 2030.^a If UCO (used cooking oil) and tallow remain the most relied upon feedstocks, this could be challenging for Ireland where global supplies are limited.^b The report notes that reaching these targets, particularly for B20, while reducing the contribution of Annex IX B biofuel, which currently accounts for almost 100% of Ireland's biodiesel, will be challenging and recommends an increased share of renewable electricity in transport and incentivising the supply of advanced biofuels.^[104] The report finds that risks including limited global supplies, sustainability concerns and risks of fraud associated with certain feedstocks will need to be managed. The recently published Renewable Transport Fuel Policy 2023–2025 considers a number of these issues, for example in relation to potential increased bioethanol blend rates,^[121] and provides for the establishment of a working group to assess the current and projected supply of biofuels based on issues raised by the Council in its 2022 Annual Review. The Council welcomes work carried out in the last year to assess the challenges associated with biofuel blending and recommends continued assessment and transparent reporting in this area.

6.4.2. Freight

Next to private cars, freight is the second largest use of transport energy, highlighting the importance of decarbonising the sector.^[73] In 2022, a total of 164.3 million tonnes of goods was transported by road.^[122] The commodity group 'quarry products, metal ores and peat' represented nearly a third (28%) of all tonnes carried in 2022, demonstrating the link between road transport and the built environment.

Across Europe, increases in the demand for freight transport have outpaced efficiency gains,^[123] pointing to the importance of measures under the ASI framework to supplement other solutions in this area. There is potential for improving efficiency through consolidation of shipments, eco driving^[124]^c measures for heavy goods vehicles,^d efficient route planning, demand reduction and decarbonised last-mile delivery systems.^[119] Research is required to examine the feasibility of freight consolidation centres, funding support for operational and digital efficiencies, and alternative fuels. A number of studies and hydrogen strategies across the EU identify the potential application of green hydrogen in hard-to-abate parts of the transport system as a complement to electrification.^[66] The 2022–2031 Road Haulage Strategy outlines measures to achieve emission reductions in the interim, for example by improving urban logistics through consolidation hubs.^[62]

Trips of under 150 kilometres made up about 45% of tonne-kilometres in Ireland, demonstrating the early potential for battery EVs to play a role beyond just 'last mile' and light goods deliveries.^[125] High-powered (350 kW to 2 MW capacity) charging points for heavy goods vehicles are already being trialled.^[113] Times-Ireland model (TIM) analysis highlights the need to accelerate and increase the targets for freight electrification. In TIM scenarios compliant with the sectoral

^a Ireland has an ambitious biofuel target of using E10 (petrol with 10% bioethanol) and B20 (diesel with 20% biodiesel/hydrated vegetable oil) by 2030.

^b The report notes that the proposed ReFuelEU Aviation and FuelEU Maritime Regulations are also likely to rely on UCO and category 1,2 tallow as feedstocks.

^c The 2022–2031 Road Haulage Strategy includes an action to establish a national certification/accreditation system for eco-driving courses.

^d Heavy goods vehicles consist of articulated and multi-axle trucks.

emission ceilings, all new light goods vehicles^a are fully electric or plug-in hybrid by 2030, with 148,000 vehicles in the commercial vehicle stock in 2030 (relative to the NCAP 2023 target of 95,000).^[80] Steps taken to decarbonise fleets by An Post and ESB Networks, for example, may provide learnings for other organisations in this regard.^[126, 127]

Almost all (99.2%) inland freight transport in Ireland went by road in 2020, well above the EU-27 average of 77.4%.^[128] No freight was transported by inland waterways in Ireland and 0.8% was transported by railway, demonstrating the need to significantly increase the proportion of inland road tonnage moved by rail. The All-Island Strategic Rail Review aims to consider how the rail network on the island of Ireland can improve to promote sustainable travel and freight options.^[129] Irish Rail's Freight Strategy 2040 considers a number of measures to increase the proportion of rail freight in Ireland.^[130]

6.4.3. Aviation and shipping

To-date, measures to address emissions from aviation and shipping have been pursued primarily at European and international levels,^b but emissions continue to grow. In 2022, total international aviation contributed 3.05 Mt CO₂ from over 128,000 return flights from Irish airports,^[32] compared with 1.33 Mt CO₂ in 2021. Measures to address emissions from aviation and shipping should be complemented at a national level by developing the supply of alternative fuels to these sectors. Aviation fuels are also currently heavily subsidised and the industry benefits from exemptions from excise duty, carbon tax and the National Oil Reserves Agency (NORA) levy.

ReFuelEU Aviation^[132] aims to introduce obligations for minimum shares of sustainable aviation fuels and synthetic fuels as part of the decarbonisation of the aviation sector. Under recently agreed changes to the EU Emissions Trading System (ETS),^[133] free emissions allowances for the aviation sector will be gradually phased out with full auctioning in place from 2026. In line with these changes, it will be important for a strategy for increasing the share of sustainable aviation fuels used in Ireland to be established along with mechanisms to ensure that such fuels are sustainably sourced. ReFuelEU Maritime aims to ensure that the greenhouse gas intensity of fuels used by the shipping sector will gradually decrease over time, by 2% in 2025 rising to 75% by 2050. This complements the recent agreement to include shipping emissions in the EU ETS for the first time and proposed EU Alternative Fuel Infrastructure Regulation obligations concerning onshore power requirements.^[134] The challenges and enablers of increasing the supply of renewable transport fuels in the aviation and maritime sectors in Ireland will need to be assessed as noted in the latest Renewable Transport Fuel Policy.^[121]

The proposed revision of the Energy Tax Directive includes gradually phasing out the exemption from taxation for fuels used in the commercial aviation and maritime sectors, with a phased introduction of a minimum rate of excise duty on aviation fuel for intra-EU flights by 2033. The Commission on Taxation and Welfare has noted that greater ambition is required in this area, a position supported by the Council.^[89]

^a Light goods vehicles consist of vans and small trucks.

^b The International Maritime Organization recently adopted a revised strategy on the reduction of greenhouse gas emissions from ships, with a goal of net zero emissions from ships by or around 2050.^[131]

7 Built Environment

Key facts: Residential

Total emissions:

6.1 Mt CO₂ eq

% Change from previous year:

-12.7%

% SEC consumed 2021–2025:

45.2%

Expected emissions

as % of SECs 2021–2030:

101.2%

Key facts: Commercial

Total emissions:

1.4 Mt CO₂ eq

% Change from previous year:

-0.8%

% SEC consumed 2021–2025:

40.9%

Expected emissions

as % of SECs 2021–2030:

102.9%

Key messages

Observations

- ▶ Emissions decreased by 12.7% to 6.11 Mt CO₂ eq in the residential built environment sector in 2022, compared with 6.99 Mt CO₂ eq in 2021. This reduction was due to high fuel prices, a relatively mild winter and the introduction of new nationwide solid fuel regulations.
- ▶ Emissions were 1.43 Mt CO₂ eq in the commercial and public built environment sector in 2022, compared with 1.44 Mt CO₂ eq in 2021.
- ▶ 45% of the first sectoral ceiling had been consumed in the residential sector by the end of 2022, with 41% of the commercial and public sectoral ceiling consumed.
- ▶ Under the 'with additional measures' scenario, the residential built environment sector is projected to exceed its first sectoral ceiling by 0.8 Mt CO₂ eq, and the commercial and public built environment sector is projected to exceed the first sectoral ceiling by 0.1 Mt CO₂ eq. The residential built environment is the only sector projected to stay within its second sectoral ceiling. This reflects the clear development of energy efficiency programmes with financial support and resourcing, such as the National Retrofitting Scheme, and the impact of building regulations.

Recommendations

- 7.1. Clear policy choices need to be made about the long-term roll-out of low-carbon heat sources in Ireland's existing buildings and the interaction between support for district heating and deep retrofits to support heat pump installation. Introducing evidence-based zoning for district heating at the local authority level and comprehensive characterisation of heat sources is crucial to progression. It is essential that further research and consolidation of information on the age of dwellings, location and specific heating systems across dwelling types is undertaken to support urgent delivery of this ambition.
- 7.2. The Council recommends that best practice examples from other jurisdictions are followed in terms of the roll-out,

governance framework and management of district heating networks, with clear enabling legislation required urgently in this area.

- 7.3. Large energy users, and data centres in particular, should be obliged to build in a heat export ability at the time of construction to allow simple connection to future district heating networks. Existing data centres should progressively retrofit these.
- 7.4. Budget 2024 should set a target of 100% of social housing being raised to a building energy rating (BER) of B2 or connected to a district heating network by 2030, with retrofit measures prioritised in areas where it is unlikely that district heating networks can provide a solution. This should be supported by utilisation of local authority and Census 2022 data to assist local authorities in configuring their local authority climate action plans (LACAPs) for residential heat.
- 7.5. Significant acceleration is required to the rate of retrofit in Ireland. Properties that primarily use peat and/or coal as their heating fuels, particularly in open fireplaces, should be specifically targeted for grants for retrofitting and connection to low-carbon heating systems within the next 2 years.
- 7.6. The Council recommends developing a register of interested homeowners via local authorities to facilitate bulk discount retrofits among residents and collective purchase schemes. Consideration should be given to expanding the pilot under way in Fingal County to other local authorities to carry out aggregate retrofit projects in housing estates with a mix of social and private housing to achieve efficiencies of scale and attractive schemes for contractors.
- 7.7. Green financing solutions to assist homeowners and businesses to access longer term low-cost rates are essential to address some of the barriers to decarbonisation in this sector. While low-cost personal loans supported by national and EU risk sharing mechanisms are to be welcomed, mortgage providers should be encouraged to provide finance solutions for retrofits based on green mortgage structure and pricing to improve long-term affordability and encourage broader uptake of retrofitting initiatives.
- 7.8. It is recommended that climate maps and data which take account of current and projected climate factors are reflected in future building regulations to enhance resilience in support of adaptation to climate change.

7.1. Introduction

The built environment sector includes residential, commercial and public buildings with emissions primarily due to fossil fuels used for space and water heating. The sectoral emission ceilings for the built environment sector are set out in Tables 7-1 and 7-2, with a target to reduce emissions in the residential built environment sector by 40% from 2018 levels to 4 Mt CO₂eq by 2030. Commercial and public buildings were set a combined target under the sectoral emission ceiling to reduce emissions to 1 Mt CO₂eq by 2030, representing a reduction of 45% from 2018 levels.^[24]

DECC is responsible for residential buildings, and the Department of Enterprise, Trade and Employment (DETE) is responsible for commercial buildings. DECC and the Department of Public Expenditure and Reform have a joint coordinating role for the public sector across various departments.^a

^a The Department of Health for hospitals and the Department of Education for schools.

Table 7-1 Projected cumulative residential built environment emissions over the carbon budget periods from 2021–2025, 2026–2030 and 2021–2030 (Mt CO₂ eq)^[29, 31, 32]

Carbon budget period	Sectoral emission ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	29	13.10	16.7	29.8	0.8
2026–2030	23	–	22.9	22.9	0
2021–2030	52	13.10	39.6	52.7	0.8

Table 7-2 Projected cumulative public sector and commercial built environment emissions over the carbon budget periods from 2021–2025, 2026–2030 and 2021–2030 (Mt CO₂ eq)^[29, 31, 32]

Carbon budget period	Sectoral emission ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	7	2.86	4.2	7.1	0.1
2026–2030	5	–	5.3	5.3	0.3
2021–2030	12	2.86	9.5	12.4	0.4

7.2. Inventories and projections

Emissions from the built environment sector were 7.53 Mt CO₂ eq in 2022 (Figure 7-1). Emissions in the residential sector are affected by factors such as the temperature over the winter period,^a fuel prices and time spent at home. The decrease in 2022 was driven by a significant increase in fossil fuel prices, warmer weather and the introduction of solid fuel regulations.

The assumptions for the built environment (residential, commercial and public buildings) in the latest EPA emission projections assume full implementation of the relevant measures in NCAP 2023, including:

- ▶ the installation of 680,000 heat pumps by 2030 (400,000 in existing homes and 280,000 in new homes),
- ▶ residential energy efficiency programmes involving upgrades to homes and retrofits to achieve the cost-optimal equivalent of a BER 'B2' in 500,000 dwellings by 2030,
- ▶ a total of 5.7 TWh of biomethane used across the heat sector by 2030 (split between residential, commercial/public services and industry),
- ▶ district heating growth to 1.2 TWh in 2030 in the residential sector and to 1.5 TWh in the commercial and public services sector,

^a This is expressed in heating degree-days, which is a measure of the heating or cooling requirement on a given day with reference to a level where neither is required (typically 15.5°C). The number of degree-days in a year is a strong indicator of the annual residential energy demand. Heating degree-days data are available on the Eurostat website (https://ec.europa.eu/eurostat/data-browser/view/NRG_CHDD_A__custom_5757744/default/table?lang=en).

- ▶ an effective ban on fossil fuel boilers in existing residential buildings and new non-residential buildings after 2030 based on advancing the energy and carbon performance requirements of the building regulations as indicated in NCAP 2023,
- ▶ implementation of a range of energy efficiency programmes including the retrofitting of public building stock and commercial buildings with a focus on decarbonisation and the Energy Performance Contract scheme (to be introduced from 2024 to 2030).

Full implementation of policies and measures under NCAP 2023 is projected to bring emissions in both residential buildings and commercial and public buildings to the targeted emission levels set under the sectoral emission ceilings, with values of approximately 3.7MtCO₂eq and 0.8MtCO₂eq, respectively, in 2030 (Figure 7-2).



Figure 7-1 Built environment emissions 1990–2022.^[32]

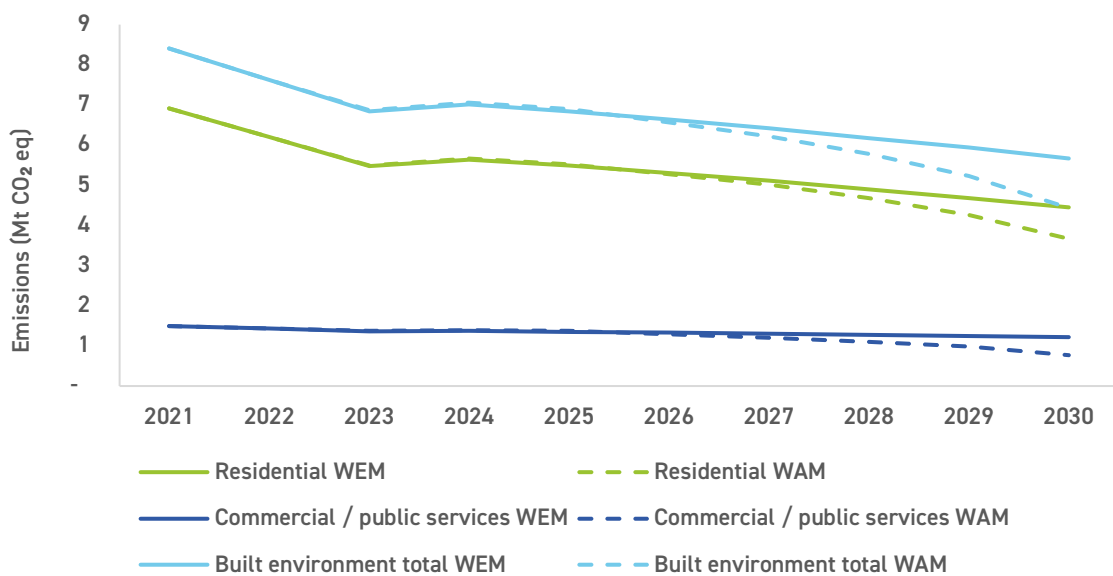


Figure 7-2 Built environment projected emissions 2021–2030.^[32]

7.3. Indicators

The EPA National Emissions Inventory represents the latest official data available on emissions. However, more recent indicators can be used to provide a more up-to-date picture on emission trends in the built environment sector (Table 7-3).

Table 7-3 Built environment sector indicators for 2015–2022^[32, 43, 75, 135, 136]

Name	Unit	2015	2016	2017	2018	2019	2020	2021	2022
Built environment emissions	MtCO ₂ eq	8.27	8.48	8.04	8.63	8.36	8.76	8.43	7.53
Renewable heat	%	6.5	6.5	7	6.7	6.6	6.6	5.6 ^b	–
Percentage residential energy from solid fuel (coal and peat)	%	17.58	17.44	15.18	15.82	14.38	14.48	14.00	–
Residences constructed with electricity as main source of space heating ^a	%	–	–	–	–	–	77.75	89.41	90.99
Percentage BER A and B rated domestic dwellings	%	12	13	14	15	16	23	24	26
Existing commercial buildings without fossil fuel heating as main space heating ^a	Number	–	–	–	32,392	35,096	36,913	39,188	41,735
Percentage BER A and B rated commercial buildings by year	%	13.17	13.42	14.79	16.96	17.28	17.18	20.89	24.72
Percentage energy efficiency gains in public bodies (includes heating and electricity)	%	21	20	24	27	29	34	32	–
Energy consumption of public bodies (includes heating and electricity)	GWh	9,343	9,375	10,248	10,178	9,898	9,160	9,787	–
District heating capacity/supply	%	–	–	–	–	–	–	<1 (all heat)	<1 (all heat)

- a** The Part L Building Regulation, which sets out the requirements for the conservation of fuel and energy in buildings, was updated in 2019 to include the Energy Performance in Buildings Directive requirement for nearly zero energy buildings. The impact of this change in regulation is increasingly being seen in the rapidly improving performance of new constructions.
- b** The decrease between 2020 and 2021 can be attributed to the transition from RED I to RED II and the introduction of new sustainability and verification criteria for biomass fuels.

7.4. Analysis

The residential built environment is the only sector in the latest EPA projections that meets its sectoral emission ceiling under the second carbon budget in the WAM scenario.^[31] This reflects how the targets for the sectors have been articulated and supported with financing through the National Retrofitting Scheme and the impact of the building regulations. There are, however, a number of challenges associated with the delivery of the National Retrofit Plan, given capacity constraints and skill shortages, which are discussed in this chapter.

The contribution from renewable energy to heat or thermal energy used as a share of overall heat use fell from 6.3% in 2020 to 5.2% in 2021 as a result of the transition from RED I to RED II^a and the introduction of new sustainability and verification criteria for biomass fuels.^[73] Under the recast directive, Ireland, along with all other EU Member States, must endeavour to increase the share of renewable energy in heating and cooling by a minimum of 0.8% per year for the period until 2026 and by 1.1% from 2026 to 2030.^[73]

Recent growth in the use of renewable energy for heat has been driven by the increased use of heat pumps in the residential and services sectors due to the revision of the building regulations for new dwellings and the provision of grant support, along with the increased use of renewable wastes and solid biomass in industry.^[73] Sustained action to decarbonise heating will help to insulate households and businesses from fossil fuel price volatility and increase the security of supply in addition to reducing emissions in the sector.^[24]

NCAP 2023 also includes measures for heating to be provided by renewable gases delivered through agriculture-based supply chains. It will be important to ensure that biogas fuels for heat are procured responsibly and the emissions and removals associated with transporting, growing, harvesting and refining biomass and biogas are accounted for along with the change in land use.^[137]

7.4.1. District heating

At present, less than 1% of heat demand in Ireland is supplied by district heating,^[138] however, studies have shown that 54–57% of total heat demand could be supplied through district heating networks.^[99, 139, 140] District heating could complement the installation of individual heat pumps in appropriate locations.

Potential heat sources and areas where they could be most cost-effectively adopted for district heating have been identified in Ireland.^[141, 142] In Dublin, 87% (538,983 homes and 41,394 businesses) of the city's heat demand could be supplied through these systems by 2050.^[143] Introducing evidence-based spatial analysis for district heating, coupled with specific requirements for buildings located in suitable areas in relation to connection, future-proofing on both demand and supply sides, and comprehensive characterisation of potential heat sources along with estimates of heat demand, is crucial to progression. With RED II, Ireland is required to incorporate the requirements for using renewable energy in district heating by transposing Articles 15 and 23 into building regulations.^b Ireland has a unique opportunity to learn from European counterparts that have built and subsequently upgraded their district heating network infrastructure, supplying

^a From 2021, the first EU Renewable Energy Directive (RED I) was replaced by the second Renewable Energy Directive (RED II).

^b <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02018L2001-20220607>

significant percentages of their urban population in this manner.^[137, 143, 144] Ireland's effective 'blank slate' for the roll-out of district heating allows the adoption of recent developments such as capacity for thermal storage as the energy system integrates more intermittent renewable electricity sources and to support the seasonal and daily variations in heat demand.^[145–147] The only cost–benefit analysis in terms of the deployment of district heating networks in Ireland was conducted in 2015; however, there have been a number of developments since then which must be considered in a more up-to-date analysis as outlined in the National Heat Study.^[148, 149] A study carried out in 2018 found that, while the initial investment costs for district heating may be higher than solutions based on individual heating, efficiency increases in the heating sector more than compensate for increased investment costs.^[150]

District heating represents an opportunity for decarbonisation along with the provision of secure and affordable heat sources for consumers.^[138, 146] District heating systems allow for reductions in emissions, circumventing the immediate need for significant retrofitting of buildings.^{[143]a} This may be particularly useful for certain building types: approximately 18% of dwellings in Ireland are 'traditionally built homes', which may require planning permission prior to retrofitting and can be particularly challenging to retrofit given their heritage features.^[151] Retrofitting of apartments also presents challenges, for example where apartment owners require specific approvals or where building-wide retrofitting is required, necessitating consent and financial contributions from individual owners.

The heat supply for district heating can come from a combination of sources such as waste heat (from data centres, power stations and other industrial sites), biomass boilers, biomass combined heat and power, air source heat pumps, and geothermal via ground source heat pumps.^[141] A policy statement, 'Geothermal Energy for a Circular Economy', was published in July 2023 setting out the approach to regulating geothermal systems and the scope for utilising Ireland's geothermal resources to decarbonise heating.^[152] This will be important for the development of geothermal energy for heating in Ireland. Waste heat from a data centre has been used successfully at the Tallaght District Heating Scheme.^[153] The number of data centres, particularly in the Dublin area, presents an untapped source of waste heat eligible for use in district heating systems.^[154] There is, however, limited reference to their potential to support local energy system decarbonisation in the Government's statement on the role of data centres in Ireland's Enterprise Strategy.^[155] Data centres can be designed to capture waste heat for distribution and reuse.^[156] The proposed recast of the Energy Efficiency Directive^b sets out minimum requirements to monitor and publish the energy performance of data centres, which would ensure that energy consumption and waste heat utilisation information is made publicly available.

There are significant challenges involved in implementing a district heating network, requiring substantial infrastructural development as well as financial investment. It is imperative to have the critical precursors in place as set out in the draft Planning and Development Bill,^c which defines district heating systems, refers to them under local authority development and allows planning authorities to carry out works, such as placing, constructing, laying or connecting the

^a While more efficient buildings allow higher return temperatures and greater overall system efficiency, this is not a strict requirement for district heating installation.

^b <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0558>

^c The draft Bill notes that a district heating system 'means a network by which thermal energy is distributed from one or more sources of production to more than one building'. Thermal energy means 'heating, cooling or hot water'. See the draft Planning and Development Bill 2022: <https://assets.gov.ie/245627/be71aebe-a594-4b3c-bffb-89ddf8e1ed95.pdf>.

required infrastructure, as well providing for licensing of use by third parties. The deployment of district heating at scale will be significantly challenging until enabling legislation is in place and it will be critical to ensure that this aspect of the Bill is fit for purpose.

The governance, regulation and management of district heating networks, setting out clear roles and responsibilities, requires careful attention. Proper governance ensures that the network operates efficiently, delivers a reliable heat supply, and meets the needs of customers and stakeholders. Countries such as Denmark operate their district heating schemes through cooperative ownership or through municipality ownership^[157] and assessment is required of the most appropriate model in an Irish context. The Government of Denmark provides financial support through grants and subsidies to promote the development and improvement of district heating schemes.^a A review carried out in the UK found that, in countries where district heating has been most successful, ownership of heat network companies is generally at the local authority level.^[158] In Ireland, a not-for-profit energy utility called Heat Works was set up and continues to be managed by South Dublin County Council for the Tallaght District Heating Scheme.^b

Government actions related to district heating have been delayed since 2020, when the ambition was first set out in NCAP 2019.^[159] Most recently, the District Heating Steering Group's report (Action BE/23/28(TF) in NCAP 2023) has not yet been published, missing its Q1 2023 deadline. The development of a policy framework on district heating is critical to its progression. Supporting the deployment of a heating network infrastructure should be prioritised by Government, and clarity is needed on how public capital expenditure can be mobilised and how district heating network deployment might interact with other major infrastructure projects.

7.4.2. Retrofitting

To date, significant effort has been put into the design, funding and execution of retrofit programmes that will be an essential part of the transformation of the energy system, providing significant benefits in terms of costs, comfort and health.^[24] While retrofitting combined with behaviour change has potential to reduce emissions, recent research has indicated the necessity for further investigation to improve our understanding of the interplay between energy efficiency standards, energy use and occupant behaviour, particularly when considering policy decisions based on energy performance certificates (BER) of buildings.^[160, 161] This enhanced understanding is crucial to optimise the allocation of public funds to achieve transformative and impactful reductions in emissions.

A recent study carried out by ESRI used high-frequency data from smart thermostats to demonstrate that the energy used for boiler operation is outweighed by factors other than variations in BERs, primarily the thermostat set point temperature.^[160] This suggests that behavioural change, along with upgrades to increase energy efficiency, is important. It also suggests that additional factors should be considered, such as building type and occupant behaviour, in addition to BERs and in regular reviews of retrofit grant schemes.^[160, 162]

NCAP 2023 relies to a significant extent on reaching the target of 500,000 home energy upgrades to achieve the cost-optimal equivalent of a BER of 'B2' by 2030, with current assessments

^a The Danish Energy Agency allocates more than Kr450 million for the roll-out of district heating to new district heating customers (in Danish) (<https://ens.dk/presse/energistyrelsen-tildeler-mere-end-450-mio-kr-til-udrulning-af-fjernvarme-til-nye>).

^b <http://heatworks.ie/our-network/>

indicating that 80% of homes and buildings in Ireland have a BER of C or lower.^[151]^a To reach the target for 2025, approximately 185,000 homes require retrofits (of which 83,000 will need to reach a B2 or cost-optimal level) followed by 75,000 B2-equivalent home retrofits per year from 2026 to 2030. In 2022, there were 27,199 retrofits carried out in total – 8,481 to B2 or better. Inflation, labour shortages and supply chain delays have led to unmet demand for home energy upgrades.^[163] Notably in Q1 2023, there were 9,946 upgrades completed, an increase of 172% over the same period in 2022.^[164]

An important pillar of EU policy is to improve energy efficiency among the worst performing dwellings. The Council welcomes revisions to the grants for fully funded energy upgrades to prioritise energy-inefficient dwellings and accepts applications from homeowners who previously received support under the scheme.^b A number of schemes deliver retrofitting support to lower income households, including local authority retrofits for social housing, fully funded energy upgrades managed by SEAI, and approved housing bodies are now eligible for the SEAI One Stop Shop Service. By Q4 2022, 2,823 local authority homes had been upgraded, set against the target to retrofit 36,500 local authority homes to B2/cost-optimal level by 2030.^[165] 4,438 fully funded energy upgrades through SEAI were carried out for low-income households in 2022, with a further 437 approved housing body homes supported under the One Stop Shop Service and an additional 95 low-income houses supported under the Communities Energy Grant scheme.^[163] A recent report from Friends of the Earth notes that waiting times for these schemes are in excess of 3 years, driven by delays in commencement due to COVID-19, expansion of eligibility, the deeper and more complex nature of retrofits being carried out and significant demand for the schemes.^[166] Age Action estimates that approximately 60% of all homes with BERs of E, F or G are occupied by older people who are at increased risk of fuel poverty and rely on fossil fuels for home heating.^[167] They may also face significant challenges in funding home retrofits and moving away from reliance on fossil fuels.^[167] This highlights the close link between retrofit support schemes and the Just Transition. Continued consideration of Just Transition principles and how they can be put into practice to protect the most vulnerable communities must be central to the allocation of public funds and in the phase-out of fossil fuel heating systems.^[24, 164] By prioritising these principles, we can ensure that the shift away from fossil fuel heating systems is not only environmentally responsible but also socially and economically inclusive.

The rationale for retrofitting in terms of energy poverty, participation in climate action and benefits in terms of health and wellbeing has never been clearer. This is a 'no regret' area for increasing funding for local authorities and SEAI so that they can increase their targets and deliver further retrofitting support to low-income households. In its 2022 Annual Review, the Council recommended that targets for the Local Authority Retrofit Programme should be significantly increased, which will have benefits in terms of participation in climate action, health, wellbeing and reduced rates of energy poverty.^[99]

Good progress is being made against retrofitting targets but not yet enough to be confident that targets will be met. SEAI has noted that the biggest risk to achieving the targets is having a sufficient pool of appropriately skilled workers to support contractors in scaling up the delivery of home energy upgrades.^[163] It has been estimated that, to deliver on targets for housing and retrofitting, in excess of 50,000 new entrants will be required in the building and retrofitting sectors.

^a It is estimated that 105,000 buildings are rated F, while 155,000 are rated G.

^b <https://www.seai.ie/grants/home-energy-grants/fully-funded-upgrades-for-eligible-homes/>

^[168] The current housing crisis may also be compounding challenges, increasing demand on the construction sector and the supply of skilled labour to carry out retrofitting works.^[151] SEAI estimates that 17,000 additional workers will be needed to achieve the target of retrofitting 500,000 homes to a BER of B2 by 2030.^[169] An analysis from Germany identified an increasing marginal cost of improving the energy efficiency of more efficient dwellings. This suggests that retrofitting the least efficient dwellings to a modest standard would better balance the marginal cost of CO₂ abatement at current carbon prices.^[164]

The potential for creating a register of interested homeowners via local authorities to facilitate bulk discount retrofits among residents and collective purchase schemes has recently been highlighted.^[151] This could reduce the hassle of identifying an appropriate contractor, harness local authority expertise in choosing suppliers and reduce the cost of retrofitting through economies of scale and offers the opportunity to carry out street-by-street bulk installations.^[151] Consideration should be given to expanding the pilot project under way in Fingal County^[170] to other local authorities to carry out aggregate retrofitting projects in housing estates with a mix of social and private housing.

A study carried out by SEAI to consider the behavioural aspects of retrofitting in Ireland noted that people are more likely to engage in behaviours that are in line with social norms, and this can be used to encourage a range of green behaviours.^[151] This may point to a need to make retrofitting activity more visible, for example through the inclusion of BERs and labels showing approximate energy costs on property listings and BER information clearly displayed on public buildings.^[171] Further retrofitting could be promoted by partnering with energy suppliers to identify high energy users or targeting those eligible for fully funded upgrades rather than waiting for homeowners to opt in.^[151] Optimal retrofit strategies need to be tailored for each building type so provision of better information to households could also support greater uptake.^[164]

Draft EU policy seeks to mandate a certain level of energy efficiency prior to the sale or lease of a property.^a Further research is required to understand the wider consequences of this proposed policy from a Just Transition perspective.^[164] Minimum energy efficiency standards have already been introduced in the UK for the sale or lease of commercial and residential properties with gradual increases in minimum standards over time.^[172, 173]

Analysis of BER public search data suggests that a substantial proportion of the population living in high-density areas is reaching the recommended end of life of their gas boiler. Approximately 25% of the current dwelling stock was constructed in 2001–2011 with heating systems with an average life expectancy of 15–20 years, highlighting the importance of policies influencing heating technology choice.^[137] Between 2017 and 2021, over 45,000 new consumers were connected to the gas network. New gas connections increase overall gas demand and may be locked in for at least 15 years.^[73] The connection of residential buildings to the gas network and the installation of new fossil fuel heating systems in new or refurbished buildings needs to be phased out urgently, with clear policy decisions required on the future role of the gas network. Policy choices need to be made about the long-term roll-out of low-carbon heat sources in existing buildings and the interaction between support for district heating and deep retrofits to support heat pump installation.

^a <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0802>

It will be critical to develop an understanding of the vulnerability of buildings to risk and how household characteristics intersect with place-based exposure to risk.^[174] This includes assessing the structural integrity, resilience and adaptive capacity of buildings in different regions, taking into account the specific climate change risks they may face. By examining factors such as construction materials, age, maintenance practices and retrofitting measures, areas where buildings may be particularly susceptible to climate impacts may be identified and interventions then prioritised.^[174] However, a building's vulnerability to climate change is not solely determined by physical attributes but also by household characteristics such as socio-economic status and access to resources which help a household's ability to adapt and recover from climate-related events.^[174] Climate maps and data may need to be reflected in future building regulations to enhance resilience in support of adaptation to climate change.^[175] Climate maps and data which take into account current and projected climatic factors like wind speeds, rainfall pattern and temperature changes can offer insight and guidance to better enable climate change considerations in decision-making in the planning, design and renovation of building and infrastructure projects.^[175]

7.4.3. Financing

Finance for retrofitting works for residential and commercial buildings will be required in addition to grant support, in the form of low-cost loans and green mortgage financing. A significant barrier to the uptake of retrofitting is the upfront financial cost and long payback period, which can be subject to high interest rates. This has been demonstrated in a recent case study analysis for Ireland.^[176] Low-interest loan programmes have been adopted in many countries to encourage the uptake of energy-efficient technologies and evidence recommends improved targeting of supports.^[164] A recent study in Germany has shown that long-term fixed-interest loans for energy efficiency renovations would give property owners more confidence to renovate their buildings^[177] although there are limited studies in an Irish context which focus on this area. NCAP 2023 included a measure to deliver low-cost loans for residential retrofitting, and the Council understands that work is ongoing between SEAI, DECC and the Strategic Banking Corporation of Ireland (SBCI)^a to develop low-cost loan schemes that are widely available.

A significant challenge in the residential rental sector is the misalignment of incentives to invest in energy efficiency upgrades between landlords and tenants. The Council welcomes the introduction of a new tax incentive in the Finance Act 2022 to encourage small-scale landlords to undertake retrofitting works while tenants remain in situ.^b Further fiscal incentives or regulatory measures are required to increase the rate of retrofitting of rented properties as signalled in NCAP 2023. One potential way to realign incentives between landlords and tenants would be to include an estimate of energy costs based on the commercial or residential properties' BER in rental advertisements. The Council welcomes ongoing work from the Irish Green Building Council's ENACT initiative which is working to enable commercial buildings to overcome financial, technical, knowledge and behavioural challenges in commercial retrofits.^[178]

A recent study by the Central Bank noted that there is a clear relationship between energy efficiency, energy costs and the overall financial health of households, particularly when energy prices are high, which may provide an incentive to provide favourable lending terms for

^a The SBCI currently provides an Energy Efficiency Loan Scheme, to support small businesses and farmers with access to finance for investment in energy efficiency measures (<https://sbc.gov.ie/products/energy-efficiency-loan-scheme-eels>).

^b <https://www.revenue.ie/en/property/rental-income/irish-rental-income/tax-incentive-schemes-for-rental-income.aspx>

improving energy efficiency.^[179] This may be exacerbated by higher carbon taxes and energy prices, which may increase the 'energy efficiency premium' in property sales and rentals. The analysis points to a significant gap in green financing to support homeowners with the lowest BERs to retrofit.^[179] The lower green mortgage uptake among low-income borrowers is particularly noteworthy. Previous research suggests that lower income households are more vulnerable to climate-related energy price rises and are also less likely to be in a position to invest in technologies that help reduce energy use.^[180] While low-cost personal loans supported by national and EU risk sharing mechanisms are to be welcomed, mortgage providers should be encouraged to provide finance solutions for retrofits based on green mortgage structure and pricing to improve long-term affordability and encourage broader uptake of retrofitting initiatives.^[151]

7.4.4. Commercial and public buildings

Rapid decarbonisation of commercial and public buildings is required by increasing the uptake of solar photovoltaics, district heating, heat pumps and renewable gases. SEAI's National Heat Study found that heat pumps are technically suitable in 47% of existing commercial and public buildings, even without energy efficiency improvements.^[149] It will be important to provide supports and incentives for the uptake of carbon-neutral heating in this sector particularly for smaller businesses.

A key area of focus in NCAP 2023 is achieving energy efficiency through building automation and control optimisation and smart building technologies.^a^[24] The implementation of the Corporate Sustainability Reporting Directive, which entered into force in January 2023, is also expected to create incentives for larger corporations to prioritise energy efficiency upgrades, as it will require them to disclose their sustainability performance, including energy consumption and emissions, thereby increasing transparency and accountability.^b The recast of the EU Energy Performance of Buildings Directive is also expected to include minimum energy performance standards for commercial buildings.^c

^a NCAP 2023 notes that intelligent controls and monitoring will be a requirement for particular buildings by 2025 under the European Union (Energy Performance of Buildings) Regulations (SI 393 of 2021).

^b <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0189>. See also https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

^c https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en

8 Enterprise and Waste

Key facts: industry^a

Total emissions:

6.6 Mt CO₂ eq

% Change from previous year:

-7.2%

% SEC consumed 2021–2025:

45.6%

Expected emissions

as % of SECs 2021–2030:

125.1%

Key facts: other^b

Total emissions:

1.9 Mt CO₂ eq

% Change from previous year:

2.7%

% SEC consumed 2021–2025:

42.0%

Expected emissions

as % of SECs 2021–2030:

108.4%

^a Industry includes emissions from both manufacturing combustion and industrial processes.

^b Other includes emissions from F-gases, waste and petroleum refining.

Key messages

Observations

- ▶ Emissions from manufacturing combustion decreased by 7.1% in 2022, while emissions from industrial processes decreased by 7.5% in 2022.
- ▶ Emissions from the waste sector increased by 4.9% in 2022.
- ▶ Fluorinated gas emissions decreased by 0.5% in 2022.
- ▶ 45.6% of the sectoral emission ceiling for industry has already been expended during the first 2 years of the first 5-year carbon budget period (2021–2025), largely driven by economic growth and increased cement production. 42% of the sectoral emission ceiling for other (fluorinated gases, waste and petroleum refining) has already been expended during the first 2 years of the first 5-year carbon budget period (2021–2025).
- ▶ EPA projections indicate that under the 'with additional measures' scenario, the industry sector is projected to exceed its first sectoral ceiling by 4.4 MtCO₂eq and its 2026–2030 sectoral ceiling by 9.5 MtCO₂eq. The 'other' sector (comprising fluorinated gases, waste and petroleum refining) is projected to exceed the first sectoral ceiling by 0.7 MtCO₂eq and the 2026–2030 sectoral ceiling by 0.9 MtCO₂eq. This indicates that significant further measures will need to be developed and delivered to meet emission reduction targets, particularly for industrial processes and the waste sector.

Recommendations

Manufacturing combustion

- 8.1. The preparation of a decarbonisation roadmap for industrial heat based on the recommendations of the Sustainable Energy Authority of Ireland (SEAI) National Heat Study must be delivered by Q4 2023 and provide clear signals for industry to identify appropriate locations for an intensified roll-out of

industrial-scale heat pumps for medium-temperature heating, along with examining links to biomethane to achieve total decarbonisation.

- 8.2. Given the high costs of energy it is essential that there is a greater emphasis on energy efficiency for small and medium-sized enterprises in the National Climate Action Plan (NCAP) 2024, to be assisted by knowledge sharing, research and supports from Department of Enterprise, Trade and Employment, SEAI and local enterprise offices and other Government agencies with industrial policy and broader cross-cutting policy mandates.

Industrial processes

- 8.3. It is recommended that the action in NCAP 2023 to specify low-carbon construction methods and low-carbon cement material as far as practicable for publicly procured or supported construction projects be made mandatory.
- 8.4. The NCAP 2023 commitment to increase the use of timber in construction to replace cement is welcome. However, the building regulations will need to be updated to support the use of timber in construction, and detailed policies to implement this change along with clear timelines for its delivery are required, for example how the use of timber frames in construction will be realised and its linkage to commercial forestry in Ireland.
- 8.5. Greater efforts to reduce the emissions intensity of cement and concrete used in construction are required. The use of innovative lower carbon cements and concretes, for example, by replacing clinker with lower carbon cementitious materials, need to be facilitated in both national and European standards.

Waste

- 8.6. To achieve targets there is need for increased focus on food waste and food packaging waste segregation in businesses and households, including public education campaigns and economic incentives such as deposit return schemes.
- 8.7. The Council welcomes the EPA's development of national end-of-waste criteria for recycled aggregates due in September 2023 and is calling on the Department of the Environment, Climate and Communications to promote markets for the reuse of construction and demolition waste as secondary raw materials in construction engineering processes.

8.1. Introduction

This chapter includes four separate sectors (some of) which are covered by the EU ETS and reported on as part of the national greenhouse gas inventory. These are mainly associated with production processes and include manufacturing combustion, industrial processes, fluorinated gases (F-gases) and the waste sector. The biggest share of enterprise emissions comes from a small number of large companies in the manufacturing sector (comprising 64 installations), mostly in alumina, food processing, beverages and cement, which are included in the EU ETS. Emissions in the sectors outside the EU ETS arise mainly from small and medium sized enterprises.

Manufacturing combustion. This involves emissions from the burning of fossil fuels as part of production processes, usually for heat, water and industrial spaces. This includes combustion of fuels for heating, steam generation and powering machinery in industry.

Industrial processes. Emissions in this area are mainly associated with production processes (such as the chemical reactions that occur during the manufacturing process). Industrial process emissions represent a lower share of Ireland's total emissions than the EU average, as many industrial processes in the chemical sector and metal production common to many other developed countries have never been an important part of the Irish economy. Cement production is a key source of CO₂ emissions in this category.

Fluorinated gases. F-gases are synthetic greenhouse gases found in a diverse range of products and industrial processes. There is no production of F-gases in Ireland; however, these substances (hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆) and nitrogen trifluoride (NF₃) are used in a number of industries.

Waste. The waste sector includes emissions from solid waste disposal sites, which are a source of methane. Emissions from this source include both historical unmanaged and managed solid waste disposal sites. This sector also includes treatment of wastewater and sewage, composting of household organic waste, open burning of waste and anaerobic digestion at biogas facilities for recovery of biomass, and some waste incineration. All solid waste incineration in Ireland is for electricity production and therefore is accounted for in the energy industries inventory category.

The 'industry' sector as defined in the sectoral emissions ceilings covers emissions from both manufacturing and combustion along with industrial processes and has been set emission ceilings of 30 MtCO₂eq for the first carbon budget period (2021–2025) and 24 MtCO₂eq for the second carbon budget period (2026–2030) (Table 8-1). This equates to a headline target of a 35% reduction in emissions in the sector from 2018 levels by 2030, which will be achieved by a 75% share of carbon-neutral heating in industry, a 30% decrease in embodied carbon in construction materials and a 10% reduction in fossil fuel demand through energy efficient measures, supported by a range of actions set out in NCAP 2023.

The 'other' sector as defined in the sectoral emissions ceilings covers emissions from F-gases, waste and petroleum refining and has been set emission ceilings of 9 MtCO₂eq for the first carbon budget period (2021–2025) and 8 MtCO₂eq for the second carbon budget period (2026–2030) (Table 8-2). This equates to a headline target of a 25% reduction in emissions in the sector from

Table 8-1 Required level of decarbonisation for the 'industry' sector covering emissions from both manufacturing and combustion along with industrial processes for the period 2021–2030 (Mt CO₂ eq)^[29, 31, 32]

Carbon budget period	Sectoral emission ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	30	13.7	20.4	34.1	4.1
2026–2030	24	–	33.5	33.5	9.5
2021–2030	54	13.7	53.9	67.6	13.6

Table 8-2 Required level of decarbonisation for the 'other' sector covering emissions from F-gases, waste and petroleum refining for the period 2021–2030 (MtCO₂eq)^[29, 31, 32]

Carbon budget period	Sectoral emission ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	9	3.8	5.8	9.5	0.5
2026–2030	8	–	8.9	8.9	0.9
2021–2030	17	3.8	14.7	18.4	1.4

2018 levels by 2030, which will be achieved by waste prevention, increased recycling and reuse and a reduction in emissions from F-gases and from petroleum refinement, supported by a range of actions set out in NCAP 2023.

8.2. Inventories and projections

Emissions in the manufacturing combustion sector represented 6.58 MtCO₂eq in 2022, accounting for 10.8 % of total emissions, and decreased by 7.1 % (0.33 MtCO₂eq) in 2022 compared with 2021. Emissions from manufacturing combustion had been on an upwards trend since 2011 with minor reductions in 2019 and 2020. However, significant fuel reductions occurred in this sector in 2022 as shown in Figure 8-1.

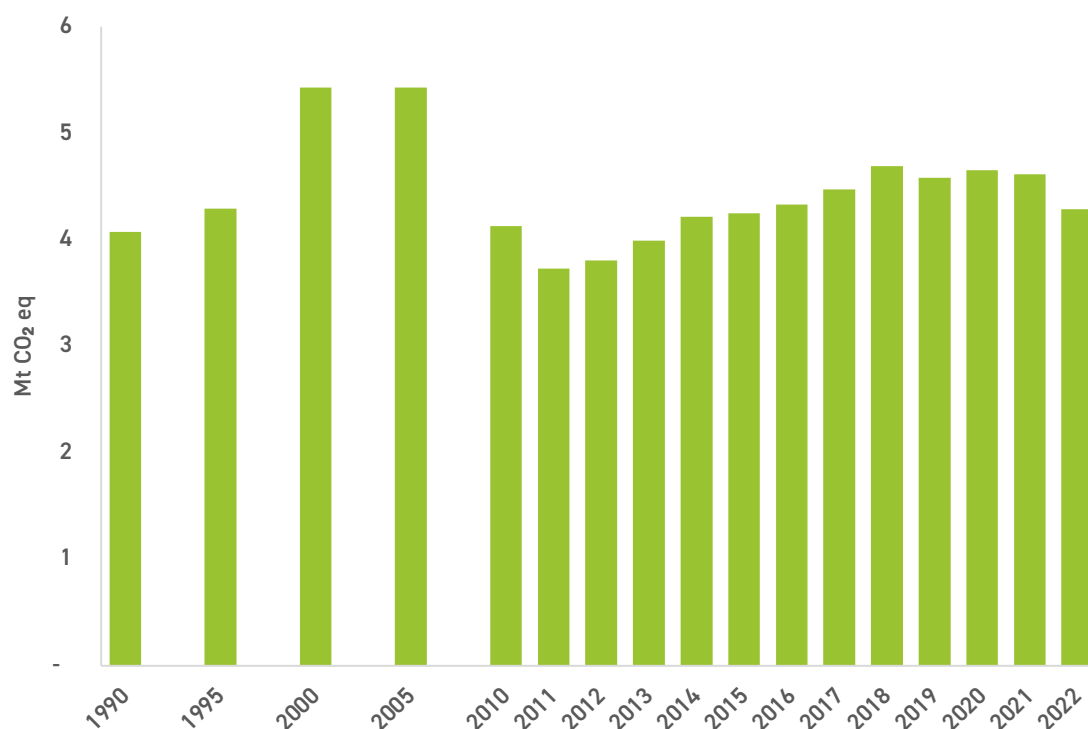


Figure 8-1 Manufacturing combustion greenhouse gas emissions for 1990–2022.^[32]

Under the WEM scenario, which assumes the implementation of existing energy efficiency programmes such as the SEAI Large Industry Programme, Accelerated Capital Allowances Programme and the Excellence in Energy Efficiency Design Programme, emissions from manufacturing combustion are projected to reduce by 6% between 2021 and 2030 from 4.6 to 4.4 MtCO₂eq. Under the WAM scenario, emissions are also projected to decrease by 22% from 4.6 to 3.6 MtCO₂eq, based on the assumed further roll-out of the energy efficiency programmes listed above along with an increase in the use of carbon-neutral sources for low- and high-temperature heating and the use of biomethane across the heat sector, as indicated in NCAP 2023 (Figure 8-2).

Industrial processes accounted for 3.8% of greenhouse gas emissions in 2022, representing 2.3MtCO₂eq. Emissions in the industrial processes sector decreased by 7.5 % in 2022 due to a reduction in cement production as shown in Figure 8-3.

Emissions from industrial processes are projected to increase by 5% between 2021 and 2030 under the WEM scenario from 2.5 to 2.6 MtCO₂eq, with no WAM scenario available for the sector. This is based on growth forecasts from the cement industry, with the majority of emissions in the sector coming from the cement and lime industries. It should be noted that the latest EPA projections do not include measures from the NCAP 2023 aimed at achieving emission savings by decreasing embodied carbon in construction materials and emission reductions associated with carbon capture and storage, as the plans currently lack the level of detail necessary to give confidence.

F-gas emissions in 2022 were at similar levels to 2021, representing 0.7MtCO₂eq, down only 0.5% following an increase of 5.5% in 2021.^[31] Combined emissions of HFCs, PFCs, SF₆ and NF₃ have generally increased year on year since 1990, reflecting increased use of HFCs across a range of applications (e.g. often as replacements in applications where the use of chlorofluorocarbons and hydrochlorofluorocarbons is no longer permitted under the Montreal Protocol). The

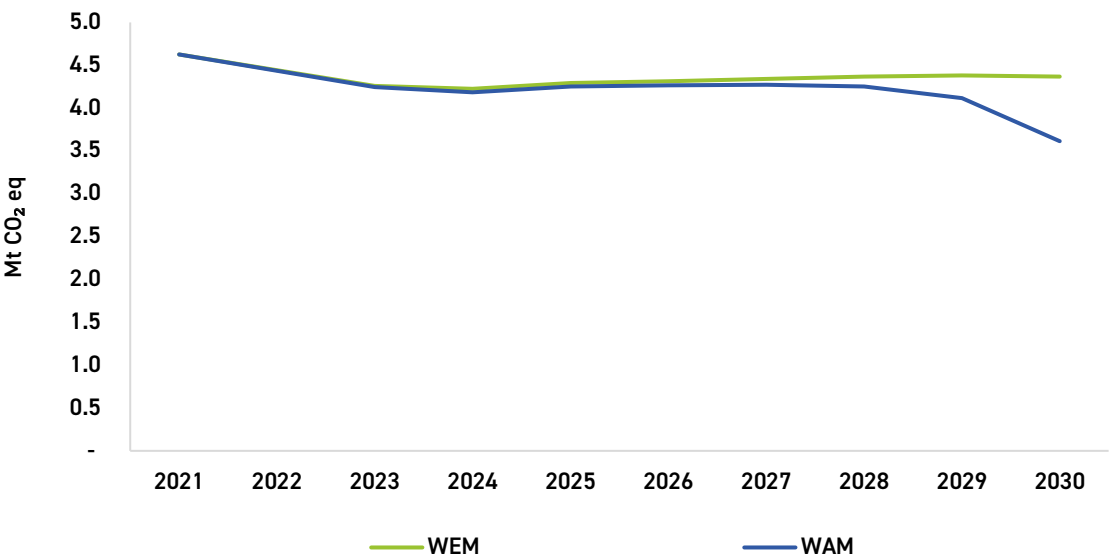


Figure 8-2 Greenhouse gas emission projections to 2030 for the manufacturing combustion sector under 'with existing measures' and 'with additional measures' scenarios.^[31]

Kigali Amendment to the Montreal Protocol adds HFCs to the list of controlled substances with a timeline for their gradual reduction. Recent decreases in F-gas emissions have been driven by a reduction in refrigeration and air-conditioning emissions through a phasing-out of gases with high global warming potential under the F-Gas Regulation ((EU) No. 517/2014). However, 2021 saw a 6.5% increase in F-gas emissions compared with 2020, the first increase since 2016 (Figure 8-4). Overall, F-gases are projected to decrease by 16% by 2030 in the WEM scenario

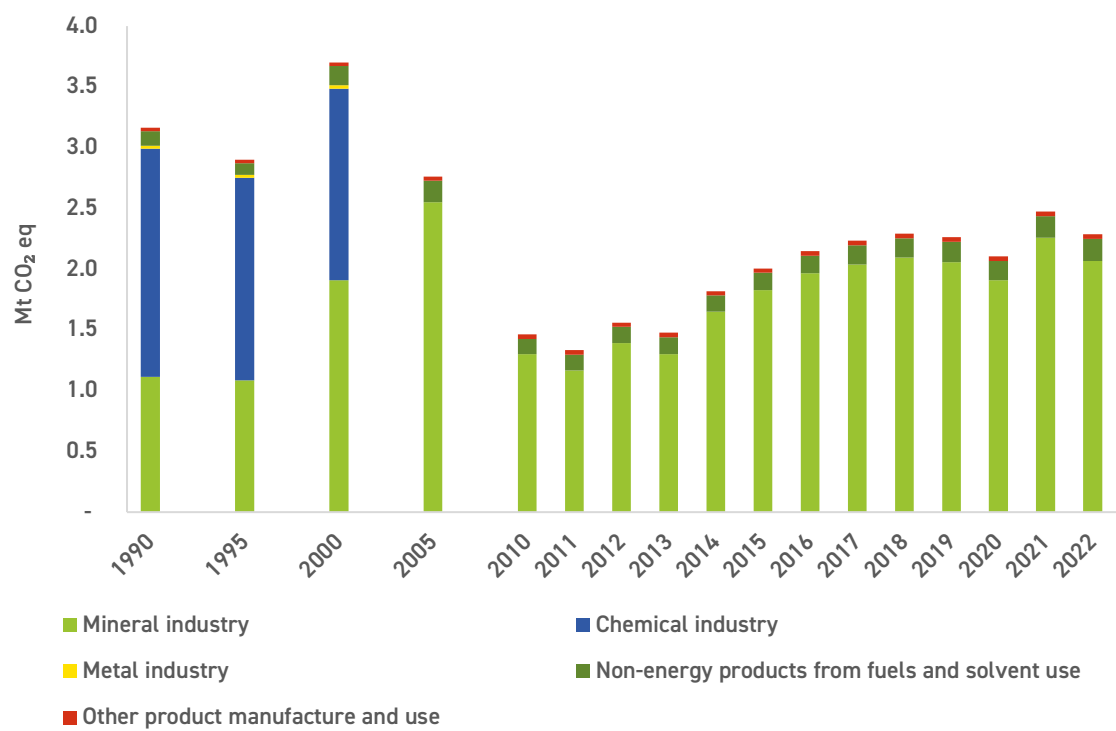


Figure 8-3 Industrial process greenhouse gas emissions for 1990–2022.^[32]



Figure 8-4 F-gas greenhouse gas emissions for 1990–2022.^[32]

(from 0.8 to 0.6 MtCO₂ eq) primarily due to the move away from mobile air-conditioning systems in vehicles that contain F-gases with a high global warming potential. In comparison, emissions are projected to reduce by only 14% by 2030 (from 0.8 to 0.7 MtCO₂ eq) in the WAM scenario, due to a greater uptake of heat pumps that contain F-gases in this scenario. This is coupled with a switch to a gas with a lower global warming potential (R-32 refrigerant, also known as difluoromethane) in air-conditioning units and heat pumps over the projected period (Figure 8-5). Clearly, work is still required to find viable alternatives to F-gases in some applications that will be required to achieve emission reductions in other sectors.

Emissions in the waste sector accounted for 14% of overall emissions in 2022, representing 0.9 MtCO₂ eq, and increased by 4.9% in 2022 (Figure 8-6). Emissions from the waste sector are

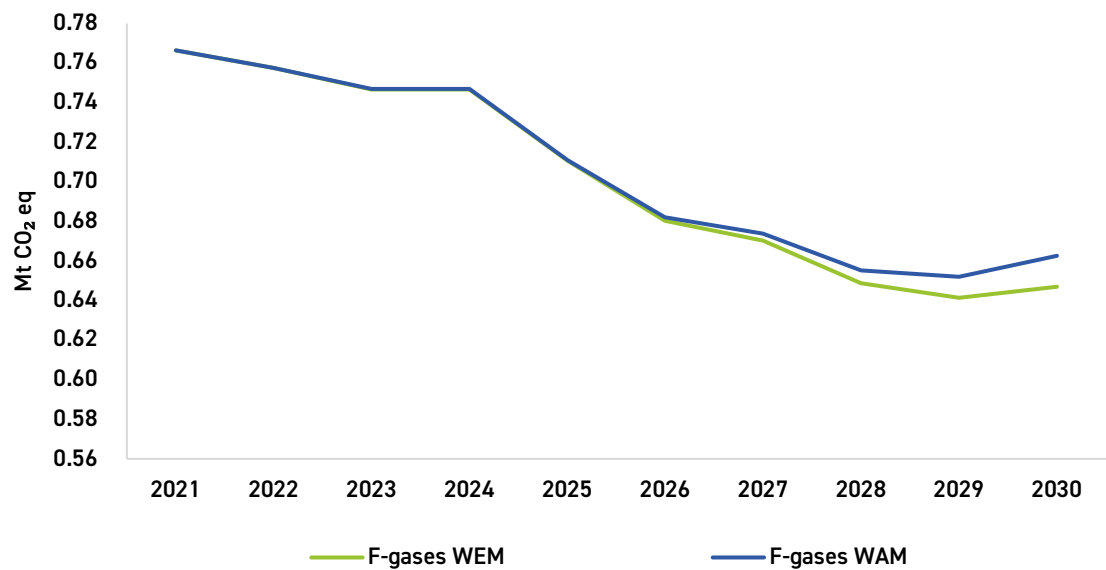


Figure 8-5 Greenhouse gas emission projections to 2030 for F-gases under 'with existing measures' and 'with additional measures' scenarios.^[31]

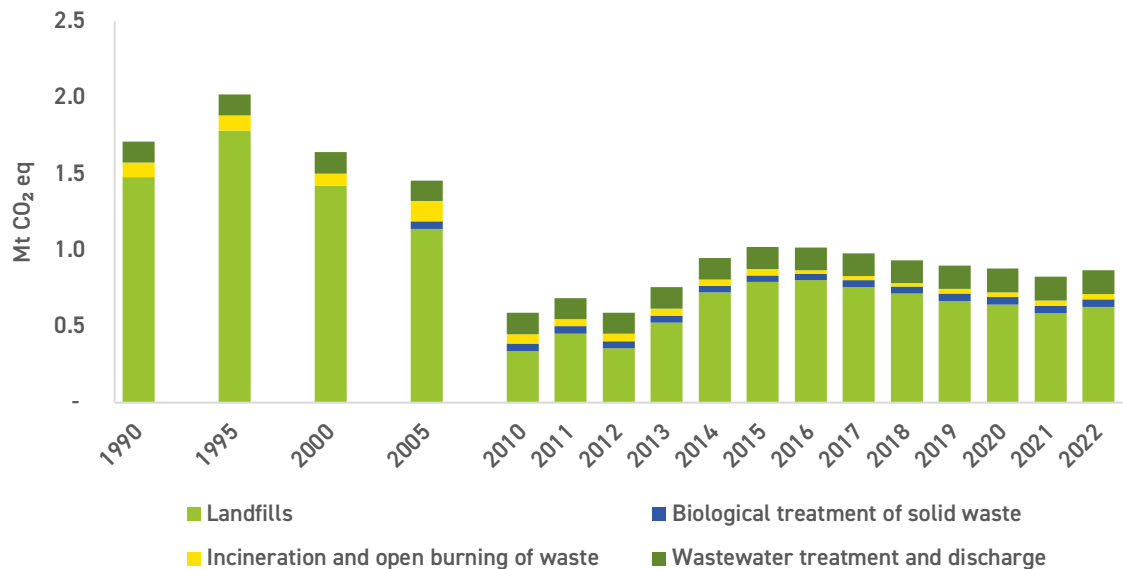


Figure 8-6 Waste greenhouse gas emissions for 1990-2022.^[32]

dominated by the methane that arises from organic waste deposited in landfills. Emission reductions in this area have been driven by decreased quantities of municipal solid waste disposed of at landfills, which are now are combusted in waste-to-energy plants, and a decrease in the proportion of organic materials (food and garden waste) in municipal waste, as well as a diversion of paper products from landfill. Improved management of landfill greenhouse gases has also helped to avoid fugitive emissions. Emission reductions are also likely a result of policy changes such as the Landfill Directive (Directive 1999/31/EC on the landfill of waste) and licence requirements for landfills, which have resulted in a gradual decline in the number of active landfills since the 1990s. Waste sector emissions are projected to decrease by 18% between 2021 and 2030 from 0.9 to 0.8 Mt CO₂eq. Emissions are primarily attributable to methane emissions from landfills, which are expected to reduce over the projected period, and the age of the waste already there. The amount of landfill gas flared and utilised for energy production is 58% in 2021 and is projected to decrease to 51% in 2030 and 40% by 2050 in line with more recent trends in the latest inventory.^[31] No additional measures are currently planned in this sector.

8.3. Indicators

The EPA National Emissions Inventory represents the latest official data available on emissions. However, a broader suite of indicators can be used to provide a more detailed picture on emission trends in the enterprise and waste sectors (Table 8-3).

Table 8-3 Indicators of the transition of the enterprise and waste sectors for 2015–2022^[32, 43, 76, 181–183]

Name	Unit	2015	2016	2017	2018	2019	2020	2021	2022
Sectoral emissions (from manufacturing combustion, industrial processes and F-gases)	Mt CO ₂ eq	7.50	7.78	7.92	7.89	7.76	7.40	7.79	7.32
Percentage electricity in industry energy consumption	%	27.4	27.5	27	26.4	26.6	25.7	24.2	30.4 ^a
Percentage renewables in industry energy consumption	%	8.9	8.3	8.9	8.7	8.3	8.6	9	13.9 ^a
Industrial Production Index (manufacturing industries)	Base year (2015) = 100%	100	104.8	102.2	97.9	104	117.2	139.4	186
Industrial Production Index (other non-metallic mineral products)	Base year (2015) = 100%	100	109.7	109.2	111.1	122.1	124.5	159.8	163

Table 8-3 Continued

Name	Unit	2015	2016	2017	2018	2019	2020	2021	2022
Sectoral emissions (from waste)	Mt CO ₂ eq	1.02	1.02	0.98	0.93	0.90	0.88	0.83	0.87
Circularity rate	%	1.9	1.7	1.7	1.6	1.6	1.8	2	–
Municipal waste	Mt	Data gap	2.76	2.77	2.91	3.09	3.21	–	–
Biodegradable municipal waste to landfill	Mt	278,000	390,000	307,000	190,000	145,000	104,000	109,000	129,500
Percentage municipal waste landfilled	%	Data gap	26	23	14	15	16	–	–
Percentage recycling of municipal waste	%	Data gap	41	40	38	37	41	–	–
Percentage recycling of packaging waste	%	68	67	66	64	62	62	58 ^b	–
Percentage recycling of plastic packaging waste	%	30	31	31	27	28	29	28 ^b	–

^a Based on SEAI projections.

^b Data provided by EPA.

8.4. Analysis

8.4.1. Manufacturing combustion

The electrification of new and current manufacturing processes displacing the use of fossil fuels where possible and as soon as possible has been identified as a key measure for the sector in NCAP 2023. The concerted effort to increase the share of carbon-neutral heating is supported by the prioritisation of financial support for green investments, including the roll-out of the Green Transition Fund incentives and the launch of the Growth and Sustainability Loan Scheme.^[184] NCAP 2023 includes targets for a 70–75% share of carbon-neutral heating in industry; however, a 60% share of carbon-neutral heating for industry has been modelled as part of the EPA WAM projections, highlighting the uncertainty around the achievability of the NCAP 2023 targets. Increasing the share of carbon-neutral heating for industry by 2030 needs planning to identify appropriate locations for low-, medium- and high-temperature heating. A decarbonisation roadmap for industrial heat based on the recommendations of the SEAI National Heat Study must be delivered by Q4 2023 and provide clear signals for industry to identify appropriate locations for an intensified roll-out of industrial-scale heat pumps for medium-temperature heating, along with examining links to biomethane in order to achieve total decarbonisation. Barriers to fuel switching, including both upfront capital expenditure and the ongoing operational costs of carbon-neutral heating systems, along with a potential lack of skills to advise businesses and install new systems, need to be assessed and managed by DETE and SEAI to drive greater uptake. In

addition, given the high costs of energy there is a need for a greater emphasis on energy efficiency for small and medium-sized enterprises in NCAP 2024, to be assisted by knowledge sharing, research and support from DETE, SEAI and local enterprise officers.

8.4.2. Industrial processes

NCAP 2023 includes the same target as NCAP 2021 in terms of a decrease of 10% in the embodied carbon in construction materials produced and used in Ireland. However, the inclusion of further detail on how this can be achieved through substitution of construction materials and a reduction in the clinker content of cement is welcome.

The NCAP 2023 action to specify low-carbon construction methods and low-carbon cement material as far as practicable for publicly procured or supported construction projects should be made mandatory. The NCAP 2023 commitment to increase the use of timber in construction to replace cement is welcome. However, the building regulations will need to be updated to support the use of timber in construction, and detailed policies to implement this change along with timelines for delivery need to be outlined in detail. The expansion of timber frame construction in Ireland could provide a strong domestic market for domestically produced timber. There is a need for more detail in terms of how the expansion of timber frames in construction will be realised and its linkage to commercial forestry in Ireland. In addition, greater efforts to reduce the emissions intensity of cement and concrete used in construction are required. Restrictions in both national and European standards that are limiting the use of innovative lower carbon cements and concretes, for example by replacing clinker with lower carbon cementitious materials, need to be addressed.

Progress has been made in terms of training and education in the construction sector to increase the use and installation of low-carbon technologies and materials in newly established centres of excellence. This includes the establishment of the University of Galway construction technology centre, which will house timber research, Mount Lucas, Co. Offaly, where the national construction demonstration park with timber buildings will be, as well as the Department of Housing, Local Government and Heritage (DHLGH) and local authorities committing to procuring local authority housing through modern methods of construction. However, a planned roadmap to promote greater use of lower carbon building material in construction has been delayed. Under Budget 2023, a new levy of 10% on certain concrete products at point of first supply aims to encourage a switch to alternatives such as timber construction.

The Council welcomes the introduction of mandatory new measures including energy audits, the adoption of measures with short payback periods, and reporting requirements on energy performance and emissions in NCAP 2023. Transparent monitoring of the impact of these measures and existing support schemes is required to see how they can be improved.

8.4.3. Waste

The waste sector continues to be significantly affected by rates of material consumption. Municipal waste production in Ireland is increasing, up 4% from 2019 to 3.2 million tonnes in 2020,^[185] increasing the challenge of reaching targets for reducing waste and increasing the circular economy. While significant progress has been made in managing waste streams over recent years, a move away from the linear pattern of 'take-make-use-dispose' is critical for reducing waste and incentivising the development of more circular products.

Many waste metrics have plateaued over the last 10 years. The recycling rate has remained level and was 41% in 2020. Achieving a recycling rate target of 55% by 2025 will be a challenge, and significant progress must be made to accomplish this over the next 2 years, especially as the most recent statistics available for 2021 indicate a declining recycling rate (Table 8-2). Ireland is currently heavily reliant on exporting waste for recycling, and increasing self-sufficiency in the processing and recycling of waste may lead to increased emissions in other sectors. Food waste contributes 8–10% of global greenhouse gas emissions.^[186] In Ireland there was 770,300 tonnes of food waste generated in 2020, the only year for which there is data, with 60% of this waste originating from the business sector, 31% from households, and 9% from primary production.^[185] The reduction of food waste is a key area for emission reduction and the development of a comprehensive roadmap for preventing food waste and food waste packaging is central to this.

The Circular Economy and Miscellaneous Provisions Act 2022 provided the legislative start for a transition to a circular economy and is welcomed by the Council. Construction waste is the largest waste stream in the state, with latest figures showing >8.2 million tonnes produced annually.^[185] National end-of-waste criteria for recycled aggregate and national by-product criteria for road planings and greenfield soil and stone are in development and will be central components of reducing construction waste in Ireland. When finalised, DECC must promote markets for these new products for the reuse of construction and demolition waste as secondary raw materials in construction engineering processes. The use of economic incentives to reduce waste and increase recycling rates, such as the incoming deposit return schemes for plastic bottles and drinks cans due in February 2024, along with education campaigns to assist the public with waste segregation will assist in the move towards a circular economy. Legislating for improving product durability, reusability, upgradability and repairability, reducing the presence of hazardous chemicals in products, and increasing energy and resource efficiency is necessary for the transition away from waste generation.^[187]

To progress in this area, the Irish Government must become a promoter, facilitator and enabler of the circular economy.^[188] In particular, the circular economy must be promoted beyond the waste sector, with strong coordination between key stakeholders. The current Whole of Government Circular Economy Strategy 2022–2023^[189] outlines objectives, including providing a national policy framework, reducing Ireland's circularity gap, raising awareness of and investment in the circular economy, and identifying and addressing barriers. There are, however, limited actions and targets to assist in reaching these objectives. Specific actions in relation to the circular economy are not addressed in NCAP 2023 but referenced in an action to publish a Whole of Government Circular Economy Strategy. The circular economy chapter of NCAP 2023 is overly focused on targets and the development of strategies, plans and roadmaps rather than specific actions.

8.4.4. Fluorinated gases

Due to EU and international commitments, driven by continued implementation of the F-gas Regulation, Ireland must reduce its F-gas emissions. Included in NCAP 2023 is a target to reduce emissions by 80% by 2030 (compared with 2014). In 2021, F-gas emissions increased on the previous year, against an overall trend of decreasing F-gas emissions: this was principally driven by increases in refrigeration and air-conditioning emissions. However, fluorinated gas emissions decreased by 0.5% in 2022. The latest projections from the EPA have F-gas emissions in 2030 in

excess of the target values. While the Council welcomes explicit support in NCAP 2023 for the proposed revision to the F-gas Regulation to raise the ambition regarding the phasing down of the use of F-gases, and promote the early implementation of the measures contained in any revised regulation,^[24] strong, clearly defined action is required in this area to reduce future F-gas emissions, particularly those with high global warming potential, and meet these ambitious targets.

9 Agriculture, Forestry and Other Land Use

Key facts: Agriculture

Total emissions:

23.3 Mt CO₂ eq

% Change from previous year:

-1.2%

% SEC consumed 2021–2025:

44.3%

Expected emissions

as % of SECs 2021–2030:

104.5%

Key facts: LULUCF

Total emissions:

7.3 Mt CO₂ eq

% Change from previous year:

-0.4%

% SEC consumed 2021–2025:

N/A

Expected emissions

as % of SECs 2021–2030:

N/A

Key messages

Observations

Agriculture

- ▶ Provisional estimates of emissions from agriculture in 2022 are 23.3 Mt CO₂ eq, 1.2% lower than in 2021.
- ▶ 44% of the sectoral emission ceiling for agriculture has already been expended in the first 2 years of the first carbon budget period.
- ▶ The outlook for the agricultural sector to 2030, based on the 'with additional measures' projection, indicates an overshoot of combined sectoral emissions ceilings.

Land Use, Land Use Change and Forestry

- ▶ Provisional estimates of emissions in 2022 from the Land Use, Land Use Change and Forestry (LULUCF) sector are largely unchanged relative to 2021. However, projections indicate increasing emissions to 2030, largely driven by activities on forest land.
- ▶ Sectoral emissions ceilings for the LULUCF sector have not been assigned. However, Ireland has agreed a target of a net emission reduction of 0.6 MtCO₂eq by 2030 under the EU LULUCF Regulation. Emissions are projected to increase in the period, and Ireland is not on track to achieve net emission reductions by 2030.
- ▶ National estimates of emissions and removals of greenhouse gases in the LULUCF sector are highly uncertain. The EPA is engaged in a continual programme of research and development to ensure that inventory methodology is informed by the best available peer-reviewed science and activity data from Ireland-specific research.
- ▶ The rate of afforestation nationally remains well below the 8,000 hectares target, with only 2,273 hectares planted in 2022, despite improvements in administrative processes and the announcement of improved incentives.
- ▶ There has been good progress on the rewetting and rehabilitation of Bord na Móna-owned degraded peatlands.

Significant progress in improving the management of other peatlands has not been demonstrated.

Recommendations

Agriculture

- 9.1. Farmers need to be supported to diversify on-farm activities to reduce emissions and enhance carbon removals. Co-benefits for mitigation, adaptation, water quality and biodiversity should be pursued and impacts monitored. These supports should be provided on the basis of payments for ecosystem services.
- 9.2. The recently published marginal abatement cost curve from Teagasc (July 2023) identifies pathways to meet the agricultural sectoral emission ceiling by 2030. Government should ensure a rapid uptake of the proven and effective mitigation measures across the agricultural sector. These include a reduction in the average finishing age of cattle of 3 months; replacing 90% of calcium ammonium nitrate fertiliser and 100% of straight urea with protected urea; the use of feed additives to reduce enteric methane in half of dairy cows and the uptake of diversification options to displace 140,000 livestock units. This will require providing appropriate incentives and support including advisory services, training and resources.
- 9.3. The National Biomethane Strategy, due in Q3 2023, combined with the Renewable Heat Obligation Scheme, due in Q4 2023, should clearly set out holistic policies for income diversification opportunities for farmers; the volumes of fossil fuel substitution and emission reductions expected, and the potential for employment in the rural economy.
- 9.4. Mitigation measures identified in the National Climate Action Plan (NCAP) 2023 for diversification could not be incorporated into the EPA's projections modelling because of a lack of detail in policy design and plans for implementation. Council recommends that the policies and measures are sufficiently detailed to ensure inclusion in subsequent EPA projections scenarios.
- 9.5. Agriculture is also responsive to market signals. Government should invest strongly in consumer information initiatives, with the support of retail outlets and consumer organisations, to better inform consumer choice in relation to sustainable diets. The initiatives should include cross-sectoral issues of food waste and food packaging. This will provide the necessary market signals to food processors and primary producers to enhance the environmental sustainability of the food system.

Land Use, Land Use Change and Forestry

- 9.6. The Council recommends that Government fully reflect the agreed EU LULUCF target when establishing the LULUCF sectoral emissions ceiling.
- 9.7. Afforestation rates remain very low. The Council strongly recommends that Government immediately put in place the necessary resources to streamline and accelerate processes to implement the new Forestry Programme 2023–2027 following State aid approval.
- 9.8. Improved understanding of the impact of afforestation on drained peatlands indicates that historical planting on these lands had adverse impacts on climate and biodiversity. The Council recommends that Government recognises landowners' need for resources and practical guidance to best manage these areas, including options for rewetting and rehabilitation, to enhance their carbon storage capacity and resilience to climate change. In addition, review

and revision of the primary legislation regarding afforestation and the management of existing forest should be considered.

- 9.9. The extraction of peat for horticulture is unsustainable and must cease. There remain a number of enterprises that continue to extract peat, in a number of instances without planning permission or an environmental licence. Government in collaboration with industry should enable the necessary research and development to identify alternative sustainable horticultural substrates.

9.1. Introduction

In this chapter, agriculture, forestry and other land use (AFOLU) are considered together. Combined, activities within these sectors account for the largest source of emissions in Ireland. Agriculture accounted for approximately 34% of total national emissions in 2021, while an additional 10.6% arose from land use.

National estimates of emissions and removals of greenhouse gases within the LULUCF sector are highly uncertain. Extensive research is ongoing to reduce this uncertainty and to gain better scientific understanding of the underlying processes. For example, a recent Teagasc study provides updated insight into the extent of drained organic soils under grassland. Further research is required to confirm these findings and enable their incorporation into the national inventory methodology, and to inform and guide policy development.

In July 2022, the Government agreed to a target of a 25% reduction in emissions by 2030, relative to 2018, for the agricultural sector. Furthermore, in September 2022, the Government agreed sectoral emission ceilings for agriculture for the periods 2021–2025 and 2026–2030, broadly consistent with the emission reduction target.

The Government has not agreed a target or sectoral emissions ceilings for the land use sector. However, the Government has undertaken in NCAP 2023 to agree the land use ceilings by the end of 2023 on the basis of interim findings from the Land Use Review. Progress on the development and implementation of the Land Use Strategy is necessary to complement the formal adoption of the sectoral emission ceilings for the LULUCF sector, which is expected later this year.

Ireland has agreed an emissions reduction target for the land use sector for 2030 under the EU LULUCF Regulation. The specific reporting and accounting rules associated with this obligation are complex, but in essence require Ireland to reduce net emissions from land use by 0.626 Mt CO₂eq by 2030 relative to 2018 levels.

The National Economic and Social Council (NESC) report, Just Transition in Agriculture and Land Use, published on 30 June 2023^[190] provides important insights into the need for farmer-inclusive processes working towards collective and shared actions to tackle the environmental and climate challenges, which must address the intersecting economic and social challenges. The report provides a robust, practical template for policy development and implementation, which can be translated to other sectors and vulnerable communities. The report advocates a realignment of existing processes for more effective engagement in four areas for action:

- ▶ **Socially and farmer-inclusive processes.** These include 'participatory processes of dialogue, which clearly communicate the scale of change needed, can help develop a shared national narrative and strengthen consensus and decision-making, and the active participation and engagement of farmers in innovating and changing practice across a diversity of contexts'.
- ▶ **Enabling people to benefit from opportunities of transition.** This 'emphasises that a just transition in agriculture and land use must be opportunities-led. A key issue is the ability to account for and value ecosystem services/natural capital. This is a critical systemic barrier to more sustainable agriculture and land use.'
- ▶ **Sharing and mitigating the costs of transition.** This recognises that 'a just transition approach is to ensure a fair and sustainable distribution of the effort to bring about transition. Throughout the process, stakeholders have emphasised the importance of recognising that transition will involve costs, and that it is critical to recognise these costs, to share them equitably and to address or mitigate them'.
- ▶ **Coordinating action.** This notes that 'the key to following through on actions and interventions is to co-ordinate and govern the transition so that it can deliver real change in a balanced, inclusive and just manner'.

9.2. Inventories and projections

9.2.1. Agriculture

Provisional estimates indicate that there was a 1.2% decrease in emissions from agriculture in 2022, largely due to reduced fertiliser use and an accelerated uptake of protected urea fertilisers.

[32]

In 2021, greenhouse gas emissions associated with agriculture reached an all-time high of 23.6 Mt CO₂eq, but fell back slightly to 23.3 Mt CO₂eq in 2022. This follows a steady upwards trend since the lowest emissions were reported in 2011 (see Figure 9-1).

The most recent EPA WAM scenario projections of emissions from agriculture are shown in Figure 9-2.

Table 9-1 provides an assessment of the agricultural sector's progress in remaining within its sectoral emission ceilings based on the EPA's reported provisional emissions for 2021 and the projected WEM and WAM scenarios. There is a high risk that the agricultural sector will overshoot its sectoral emission ceilings in 2025 and 2030.

Specific targets for the implementation of measures within NCAP 2023 are a welcome policy development. However, a large portion of the (~45%) mitigation actions expected to be implemented by 2025 are not adequately described in NCAP 2023, particularly those related to the impact of diversification of farming activities and the analysis supporting the measures has not been published. Therefore, EPA projections do not reflect the full level of ambition in NCAP 2023, and analysis cannot reveal whether implementation is progressing in line with expectations.

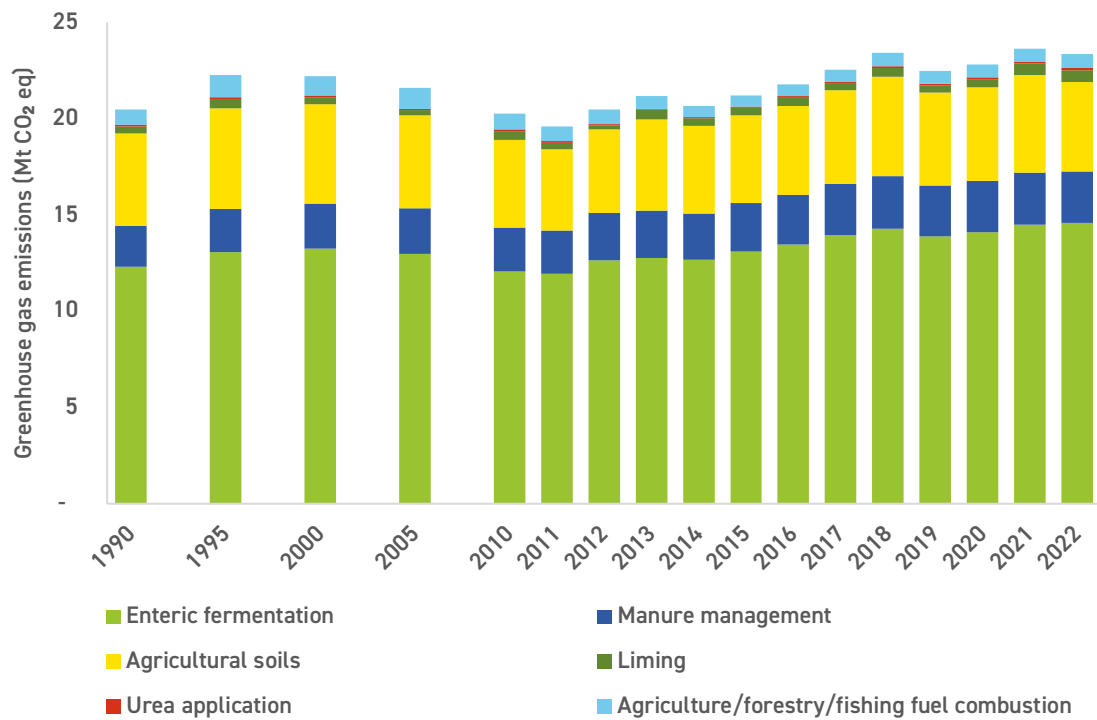


Figure 9-1 Emissions associated with agricultural activity for selected years in the period 1990–2022.^[32]

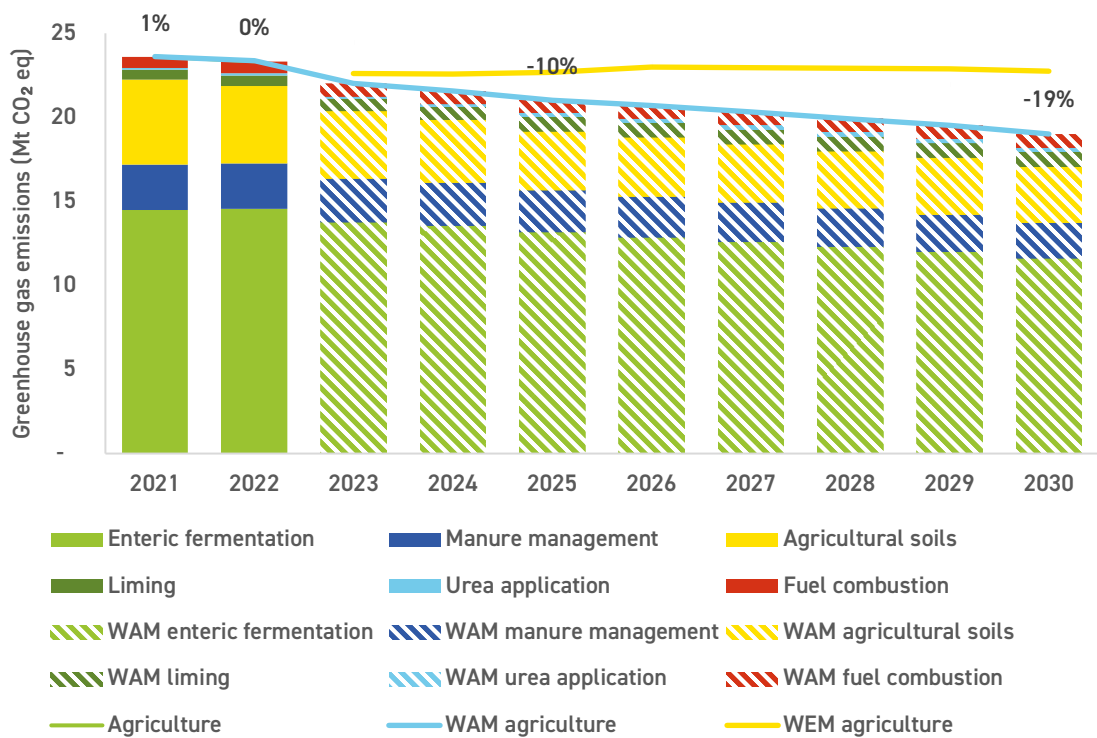


Figure 9-2 Most recent EPA ‘with existing measures’ and ‘with additional measures’ projections of emissions from agriculture.^[31, 32]

Table 9-1 Projected progress of the agricultural sector towards achieving sectoral emission ceilings for the periods 2021–2025 and 2026–2039. Based on the EPA ‘with additional measures’ scenario and EPA reported emissions in 2022 (Mt CO₂ eq).^[29, 31, 32]

Carbon budget period	Sectoral emission ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	106	47 (44%)	65	112	6
2026–2030	96	–	100	100	4
2021–2030	202	47	165	212	10

9.2.2. Land Use, Land Use Change and Forestry

Ireland’s LULUCF sector is a net source of greenhouse gas emissions largely due to an estimated 339,000 hectares of drained organic soils under grassland soils emitting approximately 6.9 Mt CO₂ eq annually and another 2.7 Mt CO₂ eq annually from 78,000 hectares drained for peat extraction.^[72] However, there is significant uncertainty in the current estimates of emissions and removals associated with land use. There is major ongoing research to improve understanding and to reduce uncertainty. Figure 9-3 shows the trends in emissions and removal in each land use category since 1990.

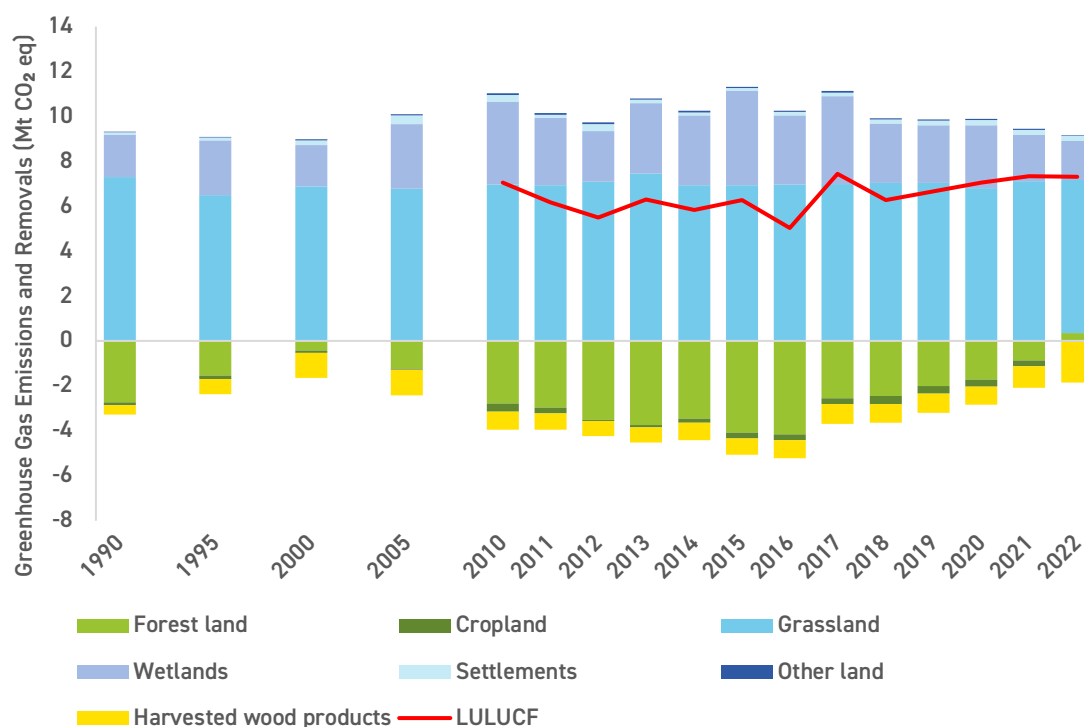


Figure 9-3 Emissions and removals from LULUCF categories for selected years in the period 1990–2022.^[32]

Although the expansion of forest land since the mid-1950s has resulted in a significant land use sink (-2.1 MtCO₂eq annually in 2020), the forest sink has declined in recent years^[191] and is expected, under a WAM scenario to flip to a net greenhouse gas emitter in the near future as seen in Figure 9-4.^[72] This is due to the combined influences of a decline in recent afforestation rates, continued emissions from organic soils, a seven-fold increase in the level of harvest since 1990, and a reduction in landscape level productivity due to age class structure shifts.^[191, 192]

Table 9-2 provides an assessment of progress in the land use sector based on the EPA's reported emissions for 2021 and the projected WEM and WAM scenarios. There is a high risk that the net emissions from the LULUCF sector will increase in this decade.

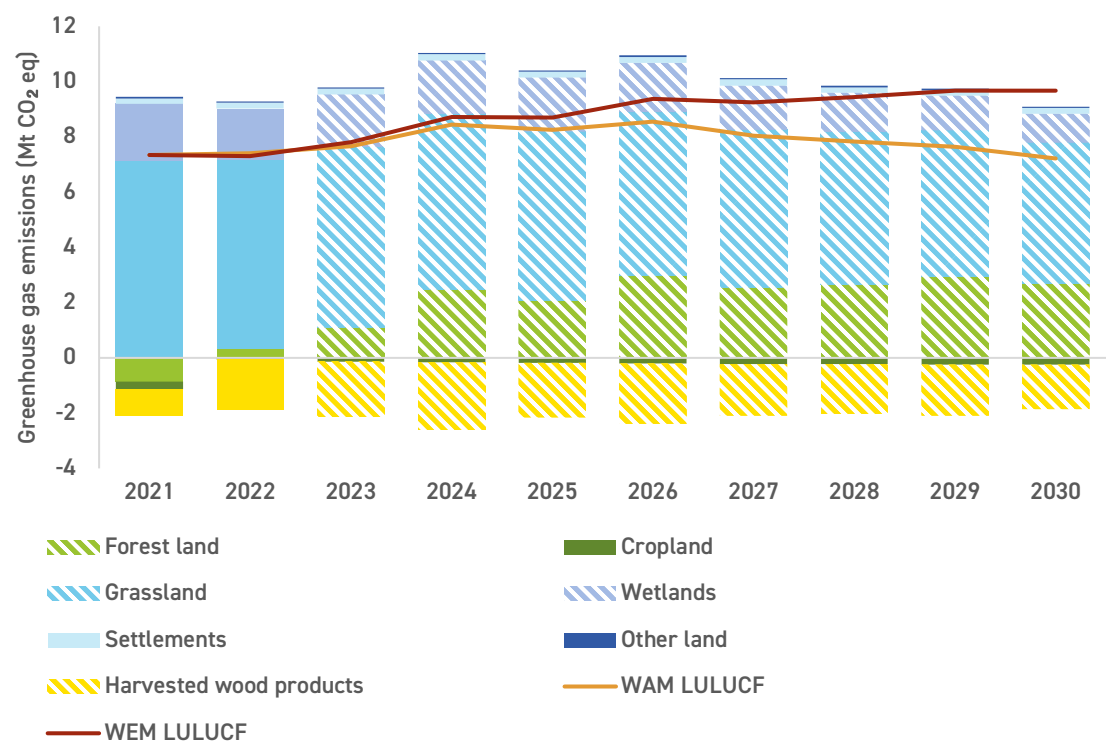


Figure 9-4 Projected emissions and removals from LULUCF categories for selected years in the period 2021–2030.
[32]

Table 9-2 Projected progress within the LULUCF sector for the periods 2021–2025 and 2026–2040. Based on the EPA ‘with additional measures’ scenario and EPA reported emissions in 2022 (Mt CO₂eq).^[31, 32]

Carbon budget period	Sectoral emission ceiling	Reported emissions 2021–2022	Projected emissions for remaining budget period	Cumulative emissions during budget period	Projected exceedance of sectoral emission ceiling
2021–2025	NA	15	24	39	NA
2026–2030	NA	–	39	39	NA
2021–2030	NA	15	64	78	NA

NA, not applicable.

9.3. Indicators

The EPA National Emissions Inventory represents the latest available official data on emissions. However, other recent indicators of activity can provide additional insights into trends in the agricultural (Table 9-3) and LULUCF (Table 9-4) sectors.

Table 9-5 shows the potential new indicators that may be needed to monitor the implementation of measures to reduce emissions in the sector.

Table 9-3 Agricultural indicators 2018–2022

Name	Unit	2018	2019	2020	2021	2022
Sectoral emissions	Mt CO ₂ eq	23.4	22.5	22.8	23.6	23.3
Emissions relative to 2018	%	100.0	96%	98 %	101%	100%
Dairy cows (June)	Thousands	1,481	1,505	1,568	1,605	1,628
Nitrogen fertiliser use	kt N	408	367	380	399	343
Protected urea fertiliser (% of total nitrogen fertiliser)	%	0.8	3.4	5.3	5.1	16
Dairy use of protected urea	% of farms	0	3	5	7	–
Beef use of protected urea	% of farms	0	1	2	2	–
Milk recording (%)	% of farms	38	46	43	48	–
Dairy profitability (gross margin)	€/hectare	1,730	1,802	1,920	2,396	4,808
GHG emissions per kg milk	kg CO ₂ eq	0.92	0.90	0.88	0.88	–
Dairy economic viability	% of farms	73	75	80	86	–
Beef profitability (gross margin)	€/hectare	486	495	511	653	951
GHG emissions per kg live weight	kg CO ₂ eq	12.6	11.7	11.7	12.0	–
Beef economic viability	% of farms	18	19	18	27	–
Tillage profitability (gross margin)	€/hectare	902	878	753	1,189	1,979
Tillage economic viability	% of farms	63	62%	66	76	–

Table 9-4 LULUCF indicators for 2014–2022

Name	Unit	2015	2018	2019	2020	2021	2022
Sectoral emissions	Mt CO ₂ eq	6.3	6.3	6.7	7.0	7.3	7.3
Forestry cover ^a	kha	758	773	777	779	781	809
Grasslands management (mineral)	kha	3,885	3,877	3,876	3,874	3,872	–
Grasslands management (organic)	kha	349	342	340	339	339	–
Peatlands management (extraction)	kha	90	76	75	74	74	–
Afforestation rates	ha	6,293	4,025	3,550	2,434	2,016	2,273

^a Note that the National Forestry Inventory 2022 has a higher estimate for national forest cover of 809kha under forestry. However, these two estimates are consistent when one considers the margin of error associated with the different methodological approaches used.

Table 9-5 Classification of actions in the National Climate Action Plans for 2021 and 2023 under LULUCF categories

Potential additional indicators required to monitor implementation of measures		NCAP 2021 2030 target	NCAP 2023 2030 target
Management of organic soils and peatlands	Rehabilitation of degraded peatland	65,000 ha	78,000 ha
	Improved management of forest on organic soils	No target specified	No target specified
Grasslands management	Rewetting, water table management of grassland	80,000 ha	80,000 ha
	Agroforestry	No target specified	No target specified
	Hedgerows (establishment and removal)	No target specified	No target specified
	Multi-species sward	No target specified	No target specified
Tillage	Cover crop	50,000 ha	50,000 ha
	Straw incorporation	10%	55,000 ha

9.4. Analysis

9.4.1. Agriculture

Much of Ireland's food production is exported, which limits the extent to which domestic action on consumption can influence emissions within the sector. Therefore, primary production in agriculture is largely driven by international market forces, including input costs and output prices.

In addition, farm enterprises also avail themselves of farm support and environmental schemes implemented under the EU Common Agricultural Policy (CAP).

Emissions from the agricultural sector are dominated by sources of methane and nitrous oxide, with livestock farming and the use of nitrogen fertiliser to grow fodder for animals the dominant activities driving emissions. The profile and size of the cattle herd is important, as dairy cows have a higher emissions profile than non-dairy animals.

The high price of fertiliser as a consequence of the war in Ukraine saw a significant decrease in fertiliser sales (–14%) in 2022 and yet did not induce a major decline in productivity or farm income. This indicates that a 25% reduction in chemical nitrogen use by 2030, consistent with EU policy and national climate objectives, is achievable with limited adverse impact on production or farm income. However, this is contingent on continued buoyant output prices, appropriate incentives, and implementation of effective statutory instruments, for example under the Nitrates Directive.

Agricultural emissions can be mitigated by changes in and diversification of production systems, production efficiency, and new technologies, as evident in the Teagasc marginal abatement cost curve (MACC).^[193] The recently published update to the MACC, July 2023, identifies pathways to meet the agriculture sectoral emissions ceiling by 2030. These are challenging and require systemic changes across the sector, with very high rates of adoption of key mitigation measures on farm and committed engagement with farmers. Government should ensure a rapid uptake of the proven and effective mitigation measures across the agricultural sector. These include a reduction in the average finishing age of cattle of 3 months; replacing 90% of calcium ammonium nitrate fertiliser and 100% of straight urea with protected urea; the use of feed additives to reduce enteric methane in half of dairy cows and the uptake of diversification options to displace 140,000 livestock units. This will require providing appropriate incentives and support including advisory services, training and resources.^[194]

Over several iterations, the CAP has moved towards increased conditionality and provision of additional support to encourage more sustainable practices. Nevertheless, food systems and markets have not provided sufficient reward for farmers to rapidly adopt sustainable practices.

There are strong market and policy drivers that maintain high levels of food production in Ireland. Farmers need to be encouraged to diversify and need appropriate incentives and market signals to change practices. Policies and measures are required that value the diverse services and products that the sector can deliver to society, the environment and the rural economy.^[34, 195] The NESC, as part of its sustainability and climate change programme, is currently engaged in research to consider using the framework for natural capital accounting to develop more inclusive approaches to policy and measures that recognise this diverse range of services and products while supporting long term sustainability and a resilient environment (<https://www.nesc.ie>).

The Council anticipates that the Bioeconomy Action Plan, due Q3 2023, will recognise that agriculture and land use has a key role in supplying raw materials to the bioeconomy, enabling diversification of income opportunities in the rural economy, but also complementing actions to address climate change, biodiversity and other environmental concerns in line with submissions made in response to the public consultation by the EPA, Teagasc and other stakeholder groups.^[196–198]

Higher market prices for agricultural outputs in 2022 have allowed continued production despite high input costs (see Figures 9-5 and 9-6). This is also evidenced in the National Farm Survey Sustainability Report, which recorded increased gross margins per hectare and improved

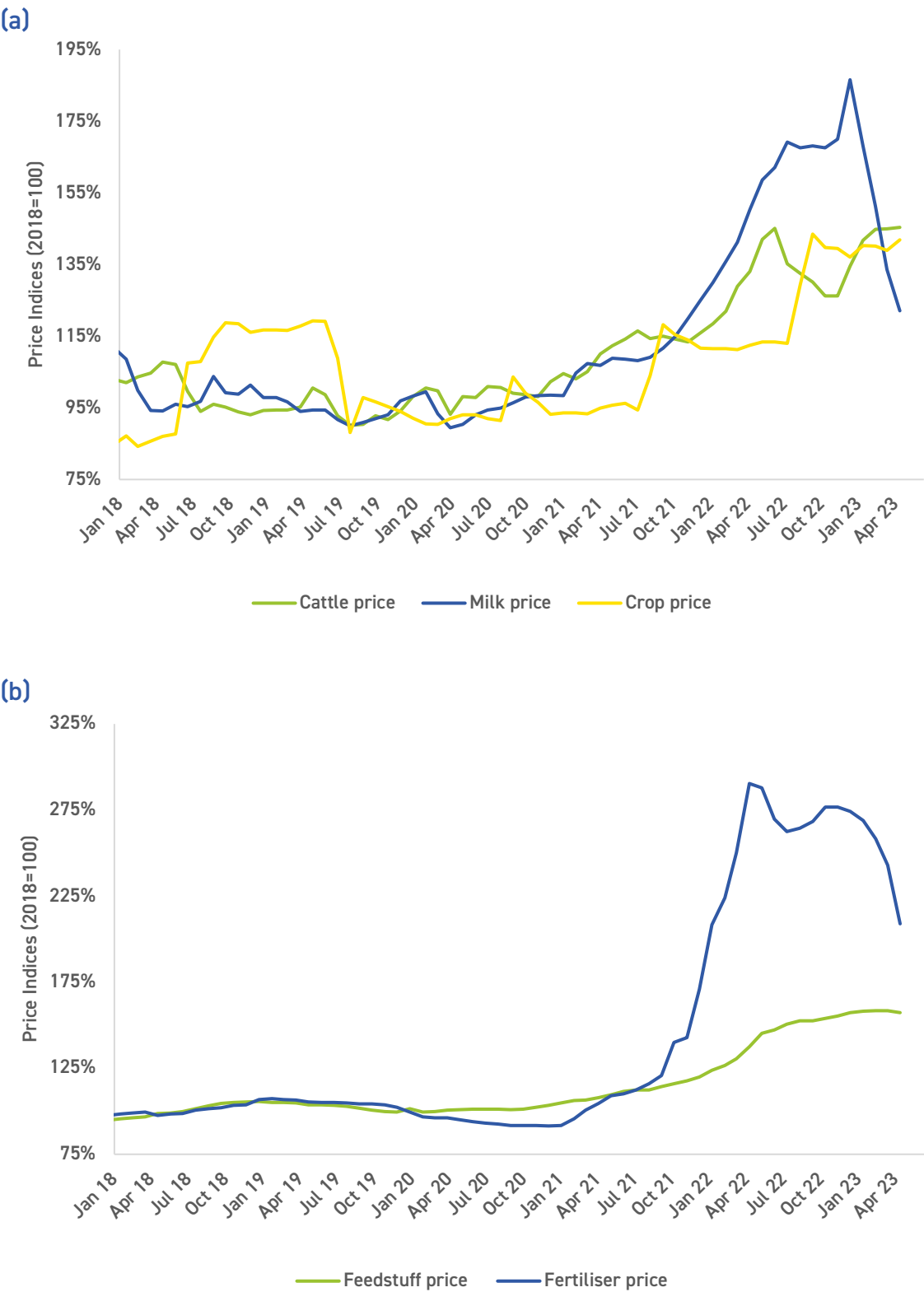


Figure 9-5 (a) Trends in agricultural output prices for cattle products, milk and crops, relative to 2018. (b) Trends in input prices for fertiliser and feedstuffs.^[199]

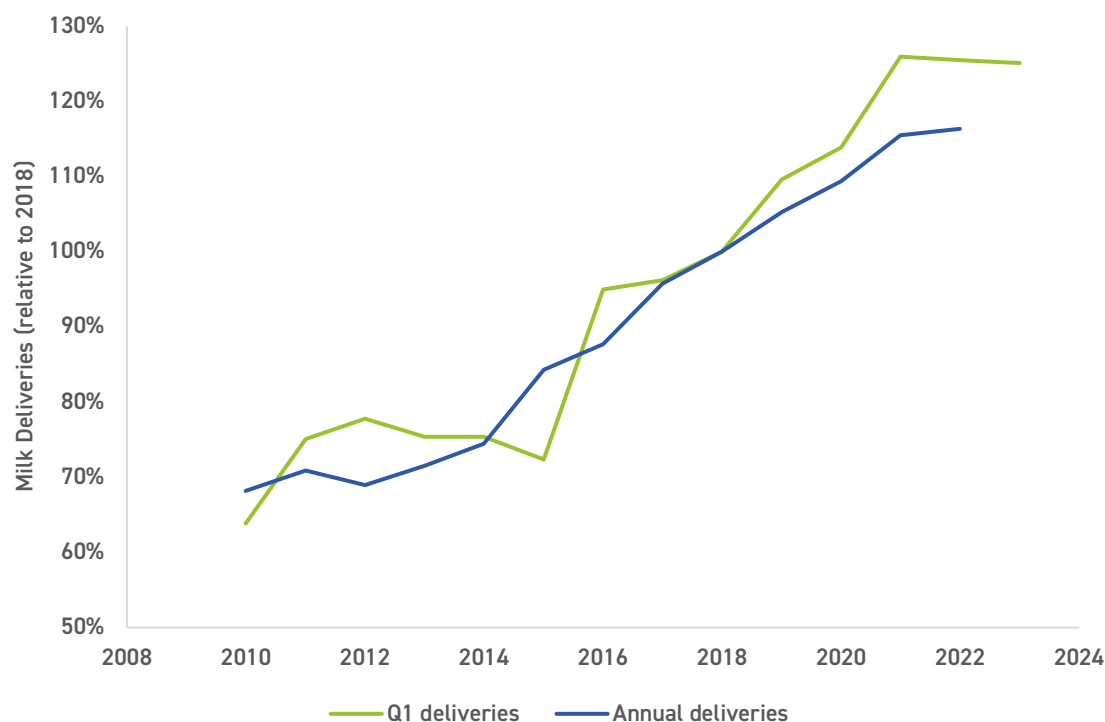


Figure 9-6 Trends in annual and first quarter domestic milk deliveries relative to 2018 baseline.^[200]

viability across all farm types in 2022 (see Table 9-3). Output prices softened significantly in the first half of 2023, which may reduce profitability. There is a need to develop further policy that counters these drivers, including improved coordination and alignment between the design and objectives of various incentive schemes.

The number of breeding animals within the national herd stabilised in 2022 (Table 9-3). However, there is uncertainty as to whether this reflects a limit to expansion in the sector, or a short-term response to a forecast of softening external markets and immediate constraints on processing capacity within the dairy sector. There is evidence of a softening of the market for inputs and milk, albeit with prices remaining well above long-term averages, whereas prices remain robust for crops. Cattle prices are notably volatile but 20–35% above long-term averages.

The reduction in nitrogen fertiliser use was due to many factors, with the significant increase in price being a key one. However, revised regulation of nitrates and advisory messages also contributed. In 2022, a 10% reduction in the maximum permitted application of chemical nitrogen per hectare was introduced for farms with a derogation.^a Improved technologies and land and manure management practices are being promoted by the Teagasc Advisory Service such as low-emissions slurry spreading, use of lime and use of clover/multi-species swards, which all work to reduce emissions by allowing similar levels of grass production with less chemical fertiliser use. The adoption of these technologies and practices continued to expand in 2022.

^a Ireland's nitrates derogation allows farmers to farm at higher stocking rates, above 170kg livestock manure nitrogen/ha up to 250kg nitrogen/ha, across the entire area of land declared on the Basic Payment Scheme). Access to derogation is subject to additional conditions designed to protect the environment (<https://www.teagasc.ie/environment/schemes--regulations/nitrates-derogation/>).

While the profitability of dairying in comparison with other enterprises is a driver of growth in the sector, this is increasingly constrained by regulations, land availability and price. A number of new measures to improve water quality in relation to nitrogen use and stocking rate on derogation farms, e.g. banding, have been introduced in 2022 and 2023 and are putting downward pressure on both nitrogen use and stocking rates on dairy farms.

Implementation of Ireland's CAP Strategic Plan has begun, with the new environmental scheme ACRES (Agri-Climate and Rural Environment Scheme) and eco-schemes opening and receiving 46,000 applications. Many of the measures promote more extensive farming and improved biodiversity. Another positive reform of the CAP is the provision that allows for basic farm payments to continue even in the event of land use change under the new Forest Programme. The new Organic Farming Scheme opened for applications in 2022 and attracted many new entrants, with the area under organic production doubling from 2% to 4% by 2027. This trend could continue in 2023 when the scheme opens again for new applications. The target in NCAP 2023 is 10% of land farmed organically by 2030. Planting of tillage crops increased in 2022 compared with 2021, with the Tillage Incentive Scheme introduced in 2022 under the CAP playing a role. The target in NCAP 2023 is to increase the area under tillage to 400,000 hectares by 2030.

9.4.2. Land Use, Land Use Change and Forestry

The climate and land use change policy landscape at EU and national levels, as well as at the State agency level, is complex and operates across multiple time horizons. Currently, the Irish LULUCF sector is a net source of greenhouse gas emissions, and the extra challenge for this sector is that EU policy is to achieve carbon neutrality within the broader AFOLU sector by 2035, and then continue to increase its sink capacity to counterbalance residual hard-to-abate greenhouse gas emissions of other sectors. Domestic policy must be consistent with the overarching EU objective.

Afforestation has been the major policy measure to increase the sink capacity in the LULUCF sector in the past. Ireland has a yearly planting target of 8,000 hectares but that has never been met in the last decade (Figure 9-7). The gap between the area planted and the target is increasing, which is a great concern. NCAP 2023 identifies afforestation as the single largest land-based climate change mitigation measure available to Ireland in the period to 2050, and meeting afforestation targets is critical for achieving Ireland's climate objectives. The greater the area afforested, the larger the number of livestock that can be maintained on the land while meeting the national carbon neutrality objective.

The Council welcomes the proposed new Forestry Programme 2023–2027, which offers attractive new premium rates across a broad spectrum of planting options. Furthermore, the period of tax-free premium payment has been extended for farmers across most categories and 20 years is now the standard. The proposed new Forestry Programme 2023–2027 was set to come into force in January 2023, or as soon as State aid approval by the European Commission had been received. While the new programme was announced in November 2022, at the time of publication the programme had not been approved or launched. The delay in approval for the Government's €1.3 billion Forestry Programme will have serious implications for the target set out in NCAP 2023. There is a need for Government to immediately put in place the necessary resources to streamline and accelerate processes to implement the new Forestry Programme 2023–2027, following State aid approval. This will avoid unnecessary delay in the implementation of the

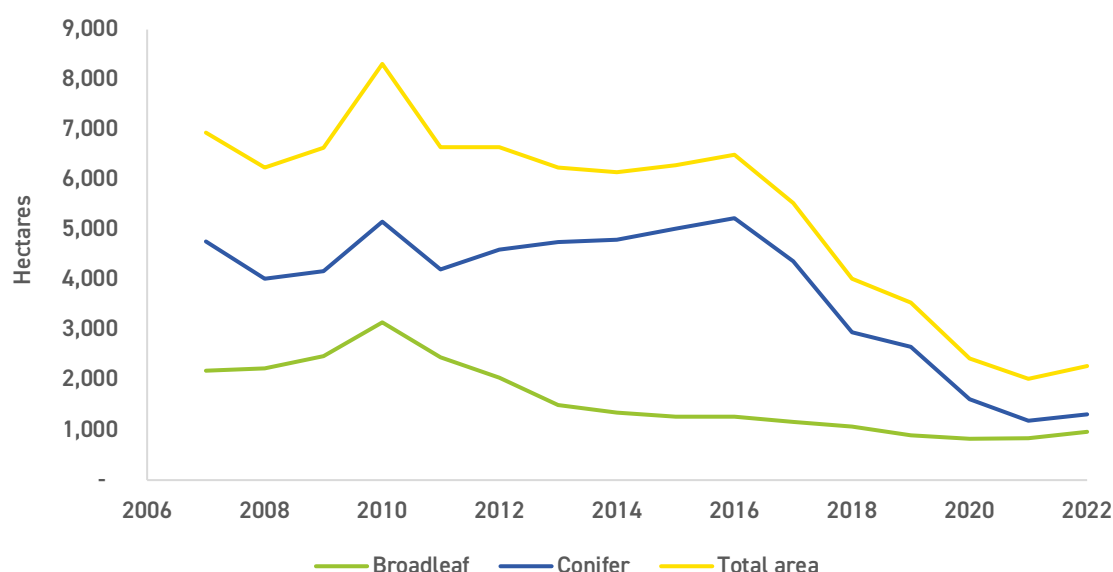


Figure 9-7 Afforestation area by species type, 2007–2022.

programme. Given the time lag between planting and sequestration, there is a need to deliver significantly higher rates of planting earlier, well beyond current targets. Evidence suggests that private forestry planting is unlikely to meet such ambitious targets, and the State should come forward with a plan for afforestation as a public good.

To date, socio-cultural barriers to afforestation have not been adequately addressed in the policy sphere. Farming is a cultural part of the rural community, and the perceived conflict of identity between ‘farmer’ or ‘forester’ needs to change. Ireland needs to have a strong communication plan to establish that forestry is part of the farm enterprise system, as is the norm in other European countries, and it is a reliable family investment for future generations. Policy instruments can play an important role by guiding the narrative and bridging the gap between farming and forestry. It has been proposed that initiatives for small wooded areas on farms is a viable way forward, focused on native species and enhancing biodiversity in the landscape, with carbon sequestration as a significant co-benefit. Most farmers have a portion of marginal land that they could easily dedicate to small afforestation projects. Government could incentivise all farmers to establish a small percentage (5–10%) of their farm as forest which would help overcome the identity barrier in our society and contribute to our national forest cover. This is similar to the ‘space for nature’ conditionality required for payments under CAP.

Recent analysis indicates there is cause for concern as to whether the current targets for afforestation (8,000 hectares) are sufficient to deliver carbon neutrality within the AFOLU sector.^[201] Realistic scenarios suggest that, in order to address the historical pattern of afforestation and forest management practices, target afforestation rates need to be approximately 18,000 hectares per year to reach carbon neutrality by 2050.^[202] Given the magnitude of this challenge, Ireland needs to adopt both measures discussed earlier – the use of public land for forestry and encouraging every farmer to plant a portion of their land – to achieve climate objectives.

Progress has been made by the Department of Agriculture, Food and the Marine (DAFM) in clearing the licensing backlog for forestry activities in 2022. For example, the number of licence

applications remaining with DAFM for over 120 days had fallen from over 6,000 licences in August 2021 to 1,123 by the end of June 2023. DAFM issued 702 afforestation licences and received 439 applications in 2022. In 2022, licences were issued to harvest approximately 9.7 million m³ of wood, an increase of 14% compared with 2021. In 2023 the year-to-date approval of felling licences is on a par with 2022.^[203] Currently there is no shortage of felling licences in the sector to fulfil the demand. However, with timber prices low compared with recent years in Ireland and Europe, many private owners appear to have postponed felling until prices improve. In its report *Forest Statistics Ireland 2022*, the Forest Service notes that there has been a gradual decline in the uptake of the afforestation scheme since 2013. There are currently over 7,000 hectares approved and potentially available for planting immediately; however, typically only 50% of these approved licences have progressed to actual plantation. In the year to date, dramatically fewer approvals for afforestation have been processed. This is likely to be due to the delay in implementing the new forestry scheme.

The forest estate is projected to switch from being a carbon sink to a carbon source, termed the 'carbon cliff'. This is a legacy of high afforestation rates in the 1990s and much lower rates of afforestation in more recent decades. A shared vision for the future of forestry in Ireland is required if the public, stakeholders and the Government are to achieve climate action targets, sustain the economic value of the industry and provide biodiverse and accessible spaces that Irish society can benefit from.

Peatlands drained and degraded for the purpose of peat extraction is a major source of emissions in Ireland.^[204–206] Historically, peat has been extracted as a fossil fuel and for use in horticulture (mostly exported). The rewetting and rehabilitation of degraded peatlands is an important mitigation measure available to Ireland and is required to achieve carbon neutrality by 2050. Rewetting of peatlands can also provide multiple ecosystem services, including biodiversity, water quality and regulation, erosion and fire prevention, and carbon storage in Ireland.^[207] Although mature peatlands are considered to be generally resilient ecosystems,^[208] models highlight the extreme vulnerability of degraded Irish peatlands to even modest changes in climate. As the temperature changes, rainfall patterns will also change, with prolonged periods of dry weather more likely to occur in the future. The south and east of the country are experiencing drier summers, while the north and west are experiencing wetter winters. As a result, changes are anticipated in the distribution of peatlands, with south-easterly sites most at risk initially. However, this may be counter-balanced by better conditions for peat accumulation further north, thanks to increased rainfall in winter.^[207]

NCAP 2023 sets a target for the restoration of 33,000 hectares of exploited peatland. Bord na Móna has a yearly target of rehabilitating 10,000 hectares of degraded peatlands under the Peatlands Climate Action Scheme. It commenced rehabilitation of peatlands in April 2021 and had rehabilitated over 13,000 hectares on 38 bogs by the end of 2022. The NPWS also expects to complete rewetting an additional 2,000 hectares of peatlands by the end of 2023. Overall, rewetting of these degraded peatlands is progressing well. In terms of Ireland's climate target, rewetting and rehabilitation of peatlands and organic soils has the potential to reduce carbon losses in a relatively short time following rewetting.^[205, 207] However, the effect of rewetting on greenhouse gas emissions depends on the restoration of peat-forming vegetation and microbial communities and the stabilisation of hydrological conditions.^[209, 210] Natural regeneration of seedlings from non-wetland species including commercial crops, wind-borne seeds of downy birch and other

conifer species and encroaching invasive species, e.g. rhododendron and pitcher plant, can occur on rewetted and rehabilitated sites. Once established, these can exclude the native peatland flora by competing for space, water and nutrients, causing drying out and increased shading, which transforms the bog surface into an unsuitable habitat for peatland flora. Therefore, following rewetting, regular inspection, monitoring and maintenance is necessary.

NCAP 2023 also has a target of rewetting 80,000 hectares of drained organic soils under grassland. Progress on this target has been limited mainly due to uncertainty over the extent and condition of these grasslands. A better understanding and activity data are needed. There are large areas of drained organic soils under agricultural grassland, where the organic soil layers are depleting rapidly. A recent study suggests that emissions and carbon losses from drained organic soil has been over-estimated based on historical records maintained in the Teagasc archive.^[211] Rewetting and partial rewetting can preserve the remaining carbon stocks in these areas while they are also maintained as a productive grassland. The 'Re-Peat' project, funded by DAFM and the EPA, should provide useful insights on the identification of these degraded peatlands. The nutrient status of peatlands is also important for emissions; currently, there are very limited data available to characterise peatlands based on their nutrient status.

The extraction and use of peat for horticulture is unsustainable. The dominant actor in the market in Ireland, Bord na Móna, has ceased extraction, and this is welcome. There remain a number of enterprises that continue to extract peat, in a number of instances without planning permission or an environmental licence. Almost 400,000 tonnes of peat were exported from Ireland in 2022. To ensure a Just Transition, existing users of horticultural peat in Ireland will require support to diversify activities and to identify alternative, sustainable horticultural inputs.

Recent, improved understanding of the impact of afforestation on drained peatlands on biodiversity and carbon stocks indicates that historical planting on these lands was misguided. There is robust scientific evidence that demonstrates the long-term negative emission profile and loss of peatland ecosystem biodiversity from afforestation on drained peatlands.^[205] Conversely, where plantation forests are removed from peat bogs and the bog ecosystem is restored, a long-term positive benefit with a net reduction in greenhouse gas emissions, together with wider ecosystem benefits in terms of water quality and biodiversity, can be achieved. Under forestry regulations, there is a general obligation that forest areas are to be replanted following harvesting and clear felling. The obligation to replant peatlands should be reviewed and clarified to avoid the risk of ongoing carbon loss due to drainage. Appropriate and transparent procedures for applying for a derogation from the existing replanting obligation are required to enable the adoption of improved management options. This action should be complemented by practical guidelines for landowners to best manage these areas, including options for rewetting and rehabilitation, to enhance their carbon storage capacity and resilience to climate change.

In order to ensure coherence with respect to peatland rewetting and restoration policy, it is also suggested that Government reviews existing legislation and regulations related to drainage works, including a review of the provisions of the Arterial Drainage Act (1945) and later amendments.^a Currently, once the Office for Public Works (OPW) has completed a drainage scheme under the Arterial Drainage Act, 1945 and 1995, it becomes a statutory requirement for the OPW to maintain the drainage works forming part of the scheme. The Act uses the terms 'proper repair

^a <https://www.oireachtas.ie/en/bills/bill/1995/22/>

and effective condition'. The performance criteria relate to the design standard of the original scheme works, its condition and the performance of the various watercourses, embankments, etc. Failure to comply with these obligations would be contrary to the requirements of the Arterial Drainage Acts and could lead to a 'writ of mandamus' being issued or an award of compensation arising from claims of damage to the benefiting lands. All of the completed arterial drainage and estuarine embankment schemes are now maintained under the statutory obligation. Therefore, there is a risk of conflict, at local and regional levels, between the need to rewet and otherwise manage water table levels and the obligation on the OPW to maintain drainage works according to their original design and objectives.

9.4.3. Research and innovation

There has been a significant increase in research, advisory and innovation support action in the public and private sector to help achieve climate targets. In addition, several dairy cooperatives now have sustainability bonus schemes that encourage farmers to adopt the mitigation measures in the Teagasc MACC. The Teagasc Climate Action Strategy, 2022, is a robust template for the roll-out of advances in science from research to on-farm implementation.

To date, success in developing technologies and changing management systems to reduce emissions has been greater for nitrous oxide than for methane. However, the updated MACC has identified a significant cost-effective opportunity for the deployment of 3-NOP to reduce methane emissions in the livestock sector.^a Research is active in this area, and supporting farmers to adopt mitigation measures on a widespread scale is also imperative. There is ongoing work on the potential for feed additives, including 3-NOP, to reduce methane emissions from ruminant livestock. The need to reduce methane emissions from cattle is urgent. The alternative is a significant reduction in the number of ruminant animals. This would have a major adverse financial and social impact on Ireland. Thus, there is a huge potential return on this research if the products are successful and deployable at scale in Ireland. The products have been demonstrated to be effective in housed livestock systems, but a mechanism for their use with grazing livestock has not been demonstrated. The pharmaceutical companies operating in Ireland should be incentivised to engage in addressing these challenges. As with protected urea, Government has a role in supporting the establishment of a supply chain for the rapid deployment of these emerging technologies. In this situation, waiting for the 'perfect' solution risks delaying the emission reductions that can be achieved. Consideration should be given to deploying proven feed additives during the period when livestock are housed.

Teagasc launched its new Climate Action Strategy in 2022 to support farmers and the industry to respond to the challenge of climate change. The strategy is built around three key pillars: (i) a new climate advisory service, (ii) a new virtual agri-climate research and innovation centre and (iii) a sophisticated benchmarking/decision support tool being developed in partnership with Bord Bia and ICBF, the Irish Cattle Breeding Federation.

Many very significant research projects are under way at Teagasc and universities to develop new technologies to reduce emissions, improve the national inventory and reduce the uncertainty in the land use sector: for example, improving the agricultural inventory through more accurate emission factors and better models, measuring soil emissions and sequestration with the

^a 3-NOP is the abbreviation commonly used for the proven methane inhibitor 3-nitrooxypropanol.

National Agricultural Soil Carbon Observatory and associated projects and using the data to develop models to enable 'carbon farming', and assessing drained agricultural peatland and how to reduce soil carbon emissions.

The Signpost Programme is now fully up and running and is demonstrating on over 120 farms the technologies, efficiencies and system changes that farmers can introduce to improve sustainability. This is a whole-of-industry programme led by Teagasc and involving 62 partners.

10 Biodiversity

Key messages

Observations

- ▶ The need for Ireland to be biodiversity rich by no later than 2050 is a key and interlinked element of the National Climate Objective. Potential synergies and conflicts between biodiversity and the other elements of the National Climate Objective have received limited attention and need to be further explored.
- ▶ Evidence from recently published reports shows the poor and declining status of a wide range of habitats, wetlands and species in Ireland, including those listed in the EU Birds and Habitats Directives. Climate change is expected to lead to further adverse effects on biodiversity and ecosystem functioning.
- ▶ Safeguarding biodiversity and ecosystems, including through conservation and restoration, is fundamental to developing climate resilience and requires cross-sectoral coordination.
- ▶ The implementation of nature-based solutions across sectors and land uses has the potential to offer positive gains for biodiversity, climate adaptation and mitigation as well as human health and well-being.

Recommendations

- 10.1. An ambitious and adequately resourced policy framework is needed for the conservation and restoration of biodiversity.^a This framework should be aligned with and support the achievement of the National Climate Objective.
- 10.2. A holistic and coordinated across Government approach to nature-based solutions is now needed, targeting different land uses and habitats, including the urban and built environment, coastal and marine habitats, agricultural land, forests, peatlands, and riverine and freshwater environments. All sectors and local authorities should identify and implement appropriate nature-based solutions and integrate them within climate action plans and sectoral adaptation plans.
- 10.3. The Council recommends that the restoration of degraded carbon stocks such as peatlands, salt marshes and seabed grasses within special areas of conservation, special protected areas and national heritage areas should be prioritised.

^a The policy framework should include the fourth National Biodiversity Action Plan, Biodiversity Sectoral Adaptation Plan and Nature Restoration Plan.

10.1. Introduction

The linkages between biodiversity and climate change adaptation and mitigation are increasingly recognised. The IPCC AR6^[12] describes climate change as a cause of biodiversity loss and change and underscores the need to safeguard biodiversity and ecosystems as a fundamental part of climate-resilient development.

The Citizen's Assembly on Biodiversity Loss^[212] and the Oireachtas Joint Committee on Environment and Climate Action report on biodiversity^[213] found that diversity in ecosystems and landscapes provides greater resilience to extreme climate events; better water, soil and air quality; and more adaptability to change. Well-managed grasslands, forests, peatlands, seabed grasses and salt marshes have a vital role to play as carbon stocks and to enhance the state of biodiversity in Ireland. Healthy and diverse ecosystems provide ecosystem services that are key to human and animal health, including food and food security, clean water, carbon sinks and protection against natural disasters caused by climate change.^[214] Biodiversity also provides opportunities for land use diversification through options linked to tourism, culture and recreation.

Biodiversity and climate change were declared as a national emergency in 2019, and for Ireland to be biodiversity rich by no later than 2050 is a key and interlinked element of the National Climate Objective. Limited attention has been given to tackling the interconnections and conflicts between climate change and biodiversity in an integrated way and ensuring that necessary climate action enhances biodiversity and vice versa. Efforts to reduce emissions in the energy, agriculture and forestry sectors could potentially put further pressure on biodiversity, while biodiversity considerations can also inhibit climate action.

10.2. Biodiversity decline and climate change in Ireland

The poor and declining state of Ireland's biodiversity is highlighted in several recent reports. This is a situation that mirrors global trends, which indicate that biodiversity is declining at an unprecedented rate and that the pressures driving this decline are intensifying.^[215] The findings from such reports show that Ireland fares poorly in terms of many of the headline indicators used by the Convention on Biological Diversity (CBD). These include:

- ▶ the area of land and sea covered by protected areas, which is far below targets set out in the Kunming–Montreal Global Biodiversity Framework;^[216] there are also considerable shortcomings in the management effectiveness of many of these areas in Ireland,
- ▶ the ecological status of a range of key species and habitats, particularly those listed and reported on under the EU Birds and Habitats Directives,^[217]
- ▶ the quality of water in rivers, lakes and estuaries and of groundwater as reported on under the EU Water Framework Directive.^[218]

The main threats and pressures on protected habitats and species in Ireland are from agriculture, forestry and fisheries, natural system modifications (including drainage), mining and quarrying (including peat extraction), climate change, pollution, and invasive and problematic species.^[217] Agricultural practices are commonly identified as the most significant prevalent pressures on water quality and native plants, with intensive grazing, overgrazing, loss of excess nutrients from point and diffuse sources, use of herbicides and soil drainage posing particular challenges.^[218, 219]

Climate change is expected to put additional stress on species and ecosystems and will lead to changes in species ranges, mass mortality events, declines in the population of some species and increases in others, which will lead to changing species interactions such as predation, competition and the spread of disease and invasive species. The impacts on biodiversity will become more profound with every degree of increased warming, and climate change is set to become one of the most significant drivers of biodiversity loss by the end of the century.^[220]

10.3. Taking action to minimise the negative and pursue the positive impacts of climate action on biodiversity

With Ireland urgently transitioning to a low-carbon economy, major changes are planned in the coming years to reduce emissions in the energy, transport, built environment, agriculture and forestry sectors. While many of these changes will have win-win outcomes for biodiversity, not least through reduced emissions, some have the potential to negatively impact biodiversity and can also be inhibited by biodiversity considerations. These include in particular:

- ▶ infrastructure developments to allow for the expansion of offshore and onshore wind and solar energy so that 80% of Ireland's electricity is generated from renewable sources, including targets to generate 9 GW of electricity from onshore wind, 8 GW from solar energy and at least 5 GW from offshore wind by 2030,
- ▶ measures linked to reducing emissions and sequestering carbon in the agriculture and forestry sector.

In work commissioned by the Climate Change Advisory Council, Gorman *et al.*^[221] provide a series of recommendations for climate change mitigation strategies to maximise positive benefits for both climate and biodiversity in Ireland. These are summarised in the following sub-sections and focus mainly on the importance of a 'right action, right place' approach to infrastructure development, integrating biodiversity-friendly design into infrastructure and realising the potential of nature-based solutions.

10.3.1. Renewable energy^a

In respect of renewable energy projects, Gorman *et al.*^[221] identify the main biodiversity impacts from renewable energy facilities (offshore wind, onshore wind and solar power, and bioenergy) and outline potential mitigation methods during the stages of construction, operation and decommissioning to ensure a win-win outcome for both climate and biodiversity. The main recommendations that cut across all renewable energy sources are:

- ▶ placing infrastructure in strategic locations to minimise negative impacts to sensitive areas and species,
- ▶ renewable energy infrastructure can increase biodiversity if it represents a more biodiversity-friendly use of land/sea than the existing use; therefore, the biodiversity benefits of the change in land/sea use can be maximised through appropriate design and management,

^a Further details on the development of renewable energy infrastructure in Ireland is provided in section 5.4 of this report.

- ▶ developing and following a decommissioning plan, where necessary, for biodiversity protection and rehabilitation/restoration.

In terms of offshore energy, there is a need to carefully manage the siting of offshore wind farms and the ongoing expansion of marine protected areas. Although there are potential negative impacts from construction and operations on habitats, seabirds and marine species, Gorman *et al.*^[221] highlight several opportunities for biodiversity protection and restoration, making this renewable energy source particularly viable as a potential win-win outcome for both climate and biodiversity. Wind farms can shelter areas from destructive activities such as bottom trawling and dredging, wind turbines and structures can provide habitat and protection for marine wildlife, and fish species abundance and diversity can increase near turbines. If wind farms are designed with biodiversity in mind, the potential negative impacts on biodiversity can be avoided, minimised and mitigated.^[221]

10.3.2. Agriculture and forestry^a

The key actions outlined in NCAP 2023 to deliver abatement of emissions in agriculture for the period 2023–2025 are likely to have varying impacts on biodiversity. Efforts to reduce chemical fertiliser use and the increased use of multispecies and clover swards should have a positive impact on biodiversity, as soil health and structure will be improved and nutrient loss and run-off will be reduced. The expansion of the organic sector should also have positive biodiversity impacts as soil and water quality will be improved and there will be less use of pesticides and harmful chemicals in the cultivation process. Providing options for diversification such as tillage and forestry should also improve soil health and create greater space for nature. These diversification options should also be broadened to enable farmers to better adapt to the changing climate such as drought events, the increasing incidence of heatwaves, changing growing seasons and severe rainfall events. The impacts on biodiversity from expanding the domestic biomethane industry are less clear and require further assessment.

The need to incentivise and expand more sustainable approaches to agriculture and forestry is key to ensuring co-benefits from adaptation, mitigation and improving biodiversity, including improvements in air, soil and water quality. The CAP Strategic Plan (2023–2027) and Forestry Programme (2023–2027) are promising results-based instruments for this and could be a basis for an expanded longer term system of payments for ecosystem services. This would incentivise farmers to conserve biodiversity and the ecosystem services it provides, which often do not have a direct market value. The uptake of measures in the CAP Strategic Plan schemes, such as hedgerow planting, tree planting, development of riparian buffer zones and low-input and extensive grassland management approaches, and their impact on emissions, soil and water health and biodiversity needs to be regularly monitored.

The area of afforestation has potential to be a win-win outcome but also has potential for conflict between climate action and biodiversity conservation. The need to rapidly increase the rate of afforestation to 8,000 hectares per annum runs the risk of further large monoculture plantations, which do not support high levels of biodiversity and are a significant cause of water quality degradation.^[218] The need for more diversified plantations is likely to delay achievement of this target and will make it less attractive to farmers and landowners. In this context, Gorman *et al.*^[221]

^a These matters are discussed in more detail in Chapter 9.

recommend increasing afforestation targets with an emphasis on appropriate implementation and use of native species. Avoiding afforestation of naturally open habitats and deep peat soils, restoring degraded natural and semi-natural woodlands, promoting agro-forestry initiatives and rehabilitating peatlands on failed plantation sites are among the key measures recommended by Gorman *et al.*^[221]

There were important policy signals in 2022, suggesting a shift in focus in the forestry sector towards a more multiple-benefit approach focusing on delivering benefits from forestry for climate in terms of carbon sequestration and storage, for wood in terms of providing sustainable building materials, for people in terms of providing places for recreation and for nature in terms of providing habitats for plants and animals and protecting water quality.

The new Forestry Programme 2023–2027 guides afforestation and diversification in the forestry sector and includes measures for sustainable forest management and to increase the adaptability and resilience of new and existing forests. It includes requirements that all sites have minimum areas of open space, at least 35% of broadleaved species, minimum setback distances from watercourses and increased species diversity. It also offers farmers and landowners benefits from grants, income tax-free earnings and support. Although it is concerning that afforestation rates are far off track and that the Forestry Programme is still delayed, the move towards more diversified plantations should lead to more positive biodiversity benefits.

10.3.3. Restoration of peatlands

The importance of peatlands as carbon stocks in Ireland is well recognised, and restoring peatlands will reduce emissions, enhance long-term carbon storage, increase carbon sequestration and enhance resilience to the impacts of climate change. The restoration of peatlands will also contribute to strengthening biodiversity and increase ecosystem services such as improved water quality and storage attenuation.^[24] There has been good progress against targets for the restoration of raised bogs on State land and considerable funding streams from a range of sources have been mobilised. Further information on progress and recommendations for peatland restoration are made in section 9.4.2.

10.3.4. Nature-based solutions

Nature-based solutions have assumed increasing importance at international and national levels as an area of synergy between climate action and biodiversity conservation and restoration. The United Nations Environment Assembly, in Decision 5/5/2022,^[222] defines nature-based solutions as 'actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human wellbeing, ecosystem services, resilience and biodiversity benefits'.

While many of the interventions outlined above in agriculture, peatlands and forestry are nature-based solutions, there is further scope for nature-based solutions to be applied across sectors and land uses as well as in the marine environment. It is notable that several sectors and departments are in the early stages of exploring nature-based solutions to address various challenges and opportunities, including:

- ▶ Urban drainage and run-off from urban roads and streets, which is being led by DHLGH and is to be further developed through the National Implementation Strategy for Nature-Based Solutions for the management of rainwater and surface water run-off in urban areas.
- ▶ Flood risk reduction approaches in urban and coastal areas, which is being led by the Office of Public Works through the Nature-based Solutions Catchment Management Strategy. There is a further opportunity to upscale nature-based solutions to reduce flood risk and enhance water quality through the development of 46 catchment management plans under the River Basin Management Plan (2022–2027).
- ▶ Use of pollinator-friendly management approaches and genetic species diversity along road and rail routes to provide benefits such as preventing landslides and soil erosion, which is being led by the Department of Transport. Pollinator-friendly management approaches should also be promoted on other public and private land and through programmes such as Tidy Towns.
- ▶ Expansion of marine protected areas and restoration of estuarine, coastal and marine habitats as per Ireland's programme of measures under the Marine Strategy Framework Directive and the implementation of the Convention for the Protection of the Marine Environment of the North-East Atlantic (Ospar Convention). The current focus in the marine environment is on improving the knowledge base and identifying suitable habitats for nature-based solutions, such as salt marshes, seabed grasses and oyster reefs, and is being led by DHLGH.
- ▶ Expansion of greenways as well as green spaces in the urban environment, which can offer benefits for buffering the urban heat island effect, biodiversity and human health.
- ▶ Development of the bioeconomy in Ireland to enable further diversification of income and added value opportunities from the rural economy and biological and genetic resources.

10.4. Opportunities for aligning the climate and biodiversity policy frameworks

Lack of funding and coordination were identified as key factors preventing the effective implementation of the Biodiversity Sectoral Adaptation Plan and other policies aiming at the conservation of biodiversity and ecosystems in general. Increased ambition and funding for biodiversity is required for the fourth National Biodiversity Action Plan, the next Biodiversity Sectoral Adaptation Plan and the Nature Restoration Plan. These policies should be aligned with the National Climate Objective and the holistic and ambitious framework provided by the Global Biodiversity Framework.

The Global Biodiversity Framework sets out a mission, vision, four overarching global goals and 23 voluntary targets to reverse biodiversity loss globally by 2030 and for people to be living in harmony with nature by 2050.^[216] It contains targets for the use of nature-based solutions, restoration of degraded ecosystems, expansion and improved management of conservation areas and measures for integrating biodiversity conservation into productive sectors such as agriculture, aquaculture, fisheries and forestry. The EU Nature Restoration Law is expected to set legally binding targets for the restoration of nature on both land and at sea, including for pollinators,

wetlands, rivers, forests, marine ecosystems, urban areas and peatlands. It will also require Ireland to develop a National Restoration Plan.

Better alignment of climate and biodiversity targets and actions is needed. The incorporation of explicit biodiversity actions and targets in NCAPs would be useful, and climate change-related targets and actions should also be reflected in the fourth National Biodiversity Action Plan and management plans for areas under conservation in Ireland. The establishment of a biodiversity and climate delivery task force could improve coordination, identify further targeted synergistic actions, mobilise resources and resolve potential biodiversity and climate conflicts.

The different departments and local authorities are encouraged to scale up the identification and implementation of nature-based solutions. However, there is still a need to identify best practices and to follow a holistic approach so that nature-based solutions are implemented across sectors and scales in a coordinated manner. Best practice nature-based solutions should be pursued in NCAPs, local authority climate action plans and relevant biodiversity frameworks. As part of information sharing and building an evidence base, it will be beneficial to demonstrate types of nature-based solutions in decarbonising zones and prioritise research into their wider benefits, impacts and cost-effectiveness.

11 Just Transition

Key messages

Observations

- ▶ Political will and leadership are required to push the Just Transition agenda in the political arena and to ensure community representation in the decision-making process.
- ▶ Public sector investment and supporting institutions will need to deliver targeted assistance to affected workers and their wider communities, taking into account local context and history.
- ▶ Although there is evidence of the Just Transition being considered across Irish policy, the need to accelerate the integration of the Just Transition principles across all mitigation and adaptation policy development and implementation is evident.

Recommendations

- 11.1. The Council recommends that evidence-informed Just Transition pathways to reduce national greenhouse gas emissions and to build adaptive capacity and resilience towards climate change are developed across all sectors.
- 11.2. The Council recommends that a set of national indicators is identified to measure the implementation of the Just Transition principles across policy actions.
- 11.3. The need for sustained dialogue with representatives from across all of Irish society is required to ensure equitable and fair outcomes. This should be grounded in evidence-based best practice that ensures an inclusive representation of Irish society. Therefore, it is recommended that a transparent methodological approach is identified that supports the implementation of social dialogues that are grounded in evidence-based best practice.
- 11.4. Understanding vulnerability in the context of a Just Transition is essential. Vulnerability assessments across society, the economy, the environment and health are required to ensure a Just Transition across all sectors. This will ensure the protection of workers and those who will be negatively affected by the transition but will also identify vulnerable groups more broadly such as vulnerable communities.
- 11.5. To ensure that Just Transition principles are being embedded across the development and implementation of climate policies, engaging strategic expert advice through the establishment of a Just Transition Commission is recommended.

11.1. The concept 'Just Transition' discussed and defined

The Just Transition concept was first used by those in the labour movement.^[223] In more recent years the concept is being employed in the context of climate change. A Just Transition demands

that the State ensures that those livelihoods and lives most at risk from emission-reducing policies are protected and that when transitioning to climate neutrality no one is left behind.^[224, 225] Just Transition acknowledges that intersectional and structural inequities and injustices that are a central part of societal vulnerabilities can constrain the ability to adapt to climate change. Therefore, there is an urgent need to address these injustices and systemic social inequities when identifying and implementing adaptation and mitigation actions.^[225] While national and local policy and practice are beginning to recognise the importance of embedding social justice into climate actions, this is not being realised across the board. It is imperative that these challenges related to the translation and application of equity and justice as they intersect with climate adaptation and mitigation are addressed to ensure that no one is left behind. Integrating and embedding Just Transition principles into climate actions and ensuring that the principles translate into practice will play a key role in supporting equity and fairness.

A Just Transition is defined as: ‘one which seeks to ensure transition is fair, equitable, and inclusive in terms of processes and outcomes’.^[226] In other words, as society reduces emissions and responds to a changing climate, the pathway is fair and creates a better future for everyone, regardless of where they live, what they do and who they are.^[227] It refers both to the broader policy framework of climate action to support individuals and communities in the transition and to the process of ensuring that individuals and communities have a voice and a role in informing and shaping these supports.^[228]

The term is related to other justice-focused concepts and incorporates similar and sometimes overlapping principles, goals and values. Other such concepts include climate justice, environmental justice, vulnerability and social justice. Although all terms have a justice lens, they are distinct from each other in their meaning (Table 11-1)

Table 11-1 Concepts and descriptions

Concept	Description
Climate justice	Climate justice links human rights and development to achieve a human-centred approach, safeguarding the rights of the most vulnerable people and sharing the burdens and benefits of climate change and its impacts equitably and fairly. Climate justice is informed by science, responds to science and acknowledges the need for equitable stewardship of the world’s resources. ^[229]
Environmental justice	Environmental justice is the extent to which the physical and economic burdens of pollution and degradation, as well as the environmental benefits, are equitably distributed across society, both spatially and temporally, and the degree to which individuals and communities most vulnerable to environmental risks can access and participate in relevant decision-making processes. ^[230]
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity to harm and lack of capacity to cope and adapt. ^[231]
Social justice	Justice in terms of the distribution of wealth, opportunities and privileges within a society. A just society is one that is structured in such a way as to promote the right relationships so that human rights are respected, human dignity is protected, human development is facilitated and the environment is respected and protected. ^[232]
Just adaptation	Just adaptation requires, first, an understanding of which groups are most vulnerable to climate change impacts and the role that injustice and inequities play in their vulnerability and, second, adaptation processes and measures, including their implementation, to ensure that the needs of these groups are met and do not leave them behind. These injustices and inequities, and their intersections with adaptation, are both diverse and contextually specific.

11.2. International support for a Just Transition

EU Member States have endorsed the United Nations Sustainable Development Goals and ratified the Paris Agreement, which refer to the obligations of a Just Transition of the workforce and the creation of decent work and good-quality jobs.^[233] Guidelines from the International Labour Organization provide an internationally established policy framework that defines the concept of a Just Transition and calls upon policymakers and social partners to promote a just transition at a global level.^[234] Furthermore, 54 signatories (countries and social partners) endorsed the Silesia Declaration at COP24, including the European Commission, on behalf of the EU, and individual EU Member States including Ireland. The Declaration underlines that a Just Transition of the workforce and safeguarding and creating sustainable employment and decent work are crucial to ensure public support for long-term emission reductions, as well as to enable countries to reach the long-term goals of the Paris Agreement.^[235]

11.3. European support for a Just Transition

The European Green Deal includes various policy initiatives across industries such as agriculture to achieve energy efficiency, clean transport and the circular economy, in order to reach the EU's 2030 climate and environmental goals with a view to achieving climate neutrality by 2050. These policy initiatives will play a key role in ensuring that Europe's transition will be fair and equitable and in line with the Just Transition principles. As part of the European Green Deal and with the aim of achieving the objective of climate neutrality in an effective and fair way, the EU created the Just Transition Mechanism. This mechanism is a funding stream that supports the green transition of territories in the EU that currently host CO₂ emission-intensive industries and are thus most affected by the transition. The Just Transition Mechanism consists of three components: the Just Transition Fund, the Just Transition Scheme under InvestEU and the Public Sector Loan Facility implemented by the European Investment Bank.^[236] The Just Transition Fund support for Ireland will be discussed further in section 11.6.

The EU Fit for 55 package is a set of legislative proposals and amendments to existing EU legislation that will help the EU cut its net greenhouse gas emissions and reach climate neutrality.^[237] The package of proposals stretches across all sectors and aims to provide a coherent and balanced framework for reaching the EU's climate goals and objectives. For example, the Alternative Fuels Infrastructure Regulation sets out proposals through the Fit for 55 package to support a reduction in greenhouse gas emissions across Europe. The regulation sets out concrete targets for deploying infrastructure in the EU in future years to support the move away from fossil fuel dependency. This proposal is one example of how the Fit for 55 measures will support the reduction of greenhouse gas emissions across Europe. It is crucial that the implementation of such policies is being monitored and evaluated to ensure that the costs are fairly distributed and that people's livelihoods and lives are being protected. A set of Just Transition indicators will be imperative for this process.

Currently, there is no set of clearly defined and agreed upon Just Transition indicators to monitor the implementation of climate policy across Europe. The European Commission produced a study to examine how to measure a Just Transition and to assess existing indicators and gaps at the socio-environmental nexus in the context of transitioning to climate neutrality in Europe.^[238] In short, the study confirmed the diversity of the social effects of environmental policy and revealed a broad range of existing European indicators for monitoring certain aspects of them. Furthermore,

the study found a lack of any social dimension or disaggregation by socio-economic or demographic group across datasets that would enable the identification of usable Just Transition indicators. While the scope of the study was limited to social (distributional) impacts in Europe, it is also important to monitor international spill over effects from EU policies and laws to avoid burden shifting. For instance, a recent EU law states that companies must verify and issue a 'due diligence' statement for goods placed on the EU market to prove that they have not led to deforestation and forest degradation anywhere in the world. This law presents clear benefits for biodiversity; however, the unintended consequences could block small-scale farmers from entering the EU market because the cost of getting certified to prove due diligence is too high.^a This is a good example of the importance of ensuring that Just Transition principles are being considered across the entire policy cycle.

Overall, it is clear that there is a need to develop a set of Just Transition indicators to monitor the implementation of policies. This will be imperative for monitoring progress and identifying gaps to be filled and barriers to be overcome in a Just Transition across Europe. Furthermore, developing climate policy holistically to include social policy elements can ensure that the impact of policy is fair and equitable.

11.4. A Just Transition in other jurisdictions

Given that Just Transition is a relatively new concept in the context of climate change, drawing lessons from other jurisdictions can offer guidance for future implementation. This section will briefly discuss three examples of countries where a Just Transition is being implemented – New Zealand, Scotland and South Africa – and draw out lessons for future implementation in Ireland.

New Zealand has established a Just Transition Partnership Team that sits in the Ministry of Business, Innovation & Employment. Its role is to work across Government, portfolios and agency boundaries. Figure 11-1 illustrates how transition planning is supported in New Zealand and shows a pyramid with four layers, representing broad-based transition support at the bottom and intensive, targeted support at the top.

Currently, New Zealand is providing support to the two regions of Taranaki and Southland to undertake a Just Transition. Following the announcement that there would be no new offshore oil and gas exploration permits issued in New Zealand in 2018, the Government launched a Just Transition Partnership with Taranaki, where the oil and gas sector is a large part of the local economy. One of the key activities was the co-development of the Taranaki 2050 Roadmap.^[240] The people of Taranaki created the content of the roadmap through a co-design process run between February and April 2019. Upon completion of the roadmap, 12 transition pathway action plans were developed by community representatives, which defined tangible actions and outputs to be achieved in the short and long term. A metrics and evaluation transition pathway was developed to ensure that progress would be monitored. Implementation has commenced. Currently no evaluation has been undertaken and hence it is difficult to draw lessons from this example. However, the bottom-up approach employed throughout the planning phase of the transition is a good example of a community-led transition ensuring context-specific considerations are taken into account.

^a <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1115&qid=1687867231461>

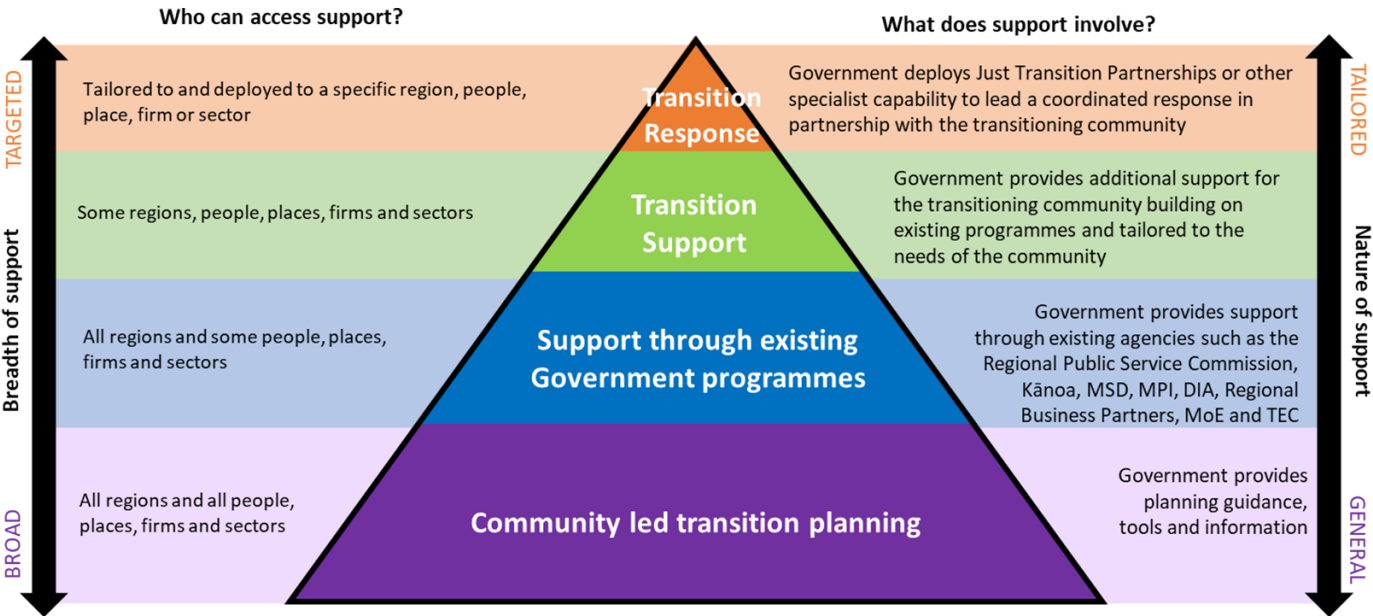


Figure 11-1 New Zealand's Just Transition Partnership transition planning. DIA, Department of Internal Affairs; MoE, Ministry of Education; MPI, Ministry for Primary Industries; MSD, Ministry of Social Development; TEC, Tertiary Education Commission. Source: New Zealand Ministry of Business, Innovation & Employment.^[239]

To ensure a fair and equitable transition to net zero in Scotland, a Just Transition Commission was established. The Commission published a report in 2022 that sets out strategic priorities to ensure that the decarbonisation of Scotland's economy is delivered fairly and provides key policy recommendations for the publication of the Energy Strategy and Just Transition Plan and sectoral Just Transition plans in 2023, which will feed into the next climate change plan.^[241] Recommendations put forward by the Commission push for the protection of decent work for those workers likely to be impacted by emission reduction policies and, importantly, the need for policies to tackle inequalities at every level. Furthermore, the importance of measuring progress by way of securing implementation is recommended.^[241] Scotland provides a good example of the importance of establishing a Just Transition Commission that pushes Just Transition recommendations in the political arena and leads on advising policymakers on how to ensure that Just Transition principles are being integrated across all sectors. Scotland's introduction of sectoral Just Transition plans is an important step in this process.

In 2022, South Africa reached a landmark milestone with the Cabinet's adoption of a Just Transition Framework.^[242] The framework lays out a shared vision for shifting to an equitable, zero-carbon economy and identifies key policy areas and principles to achieve this. Given the considerable inequalities that already exist in South Africa, a Just Transition Framework is essential so that inequalities are not exacerbated or widened. The at-risk value chains and sectors that operate in the formal economy were identified as coal, vehicle manufacturing, agriculture and tourism. These sectors were identified through an analysis using a national employment vulnerability assessment that identifies vulnerable groups broadly and by the development of sector jobs resilience plans.^[243] South Africa's framework is built on the principles of an environmentally sustainable economy and society, distributive justice, restorative justice and procedural justice.^[243]

Overall, some key reflections can be drawn from the examples discussed above. Specifically, New Zealand provides a good example of the importance of involving community across the development, decision-making and implementation phases. The Just Transition Commission in Scotland is a good example of how such an organisation can have a crucial role in pushing the Just Transition agenda in the political arena. Lastly, South Africa has a robust framework in place that considers Just Transition from a broader social justice perspective, considering vulnerable workers as well as vulnerable communities and groups more broadly. Their framework is informed by different analyses including a national employment vulnerability assessment which examines vulnerability across communities, workers and businesses. This type of analysis can support the principle of leaving no one behind.

11.5. Ireland's support for a Just Transition

The Climate Action and Low Carbon Development (Amendment) Act 2021 situates the Just Transition to a climate-neutral economy as a process, within the wider statutory framework of climate action, that endeavours, as far as is practicable, to maximise employment opportunities and support people and communities that may be negatively affected by the transition.^[228]

The first national Just Transition Framework was published in NCAP 2021 and consisted of four principles: (i) integrated structure and evidence base; (ii) the right skills; (iii) equitable impact; and (iv) social dialogue.^[244] The principles aim to provide guidance for Irish climate policy development across sectors. NCAP 2023 commits to establishing a Just Transition Commission in Q2 2023.^[24] The Commission will play a crucial role in integrating and embedding the principles into climate policy and actions and ensuring that the principles translate into practice; in doing so it will minimise the trade-offs and maximise the opportunities necessary to avoid creating and exacerbating inequalities when transitioning to a climate-neutral Ireland. Without the establishment of the Commission, climate actions aimed at building adaptive capacity could result in maladaptation negatively affecting the most vulnerable in society. Similarly, mitigation policies may exacerbate and/or cause inequalities. Therefore, there is an urgency to establish the Commission to ensure that a Just Transition is being considered alongside the implementation and development of climate policy measures.

There is evidence of progress in national policy supporting a Just Transition (Table 11-2). Specifically, national policy commits Ireland to take action to tackle energy poverty, to provide financial support for householders to retrofit their homes with specific focus on lower income households, and to redistribute carbon taxes through social welfare payments to those negatively affected by mitigation policies. There is some evidence of mainstreaming the Just Transition in policy, such as the requirement for local authorities to consider the Just Transition when developing their new local authority climate action plans. Separately, the NAF, soon to be revised, encourages the implementation of Just Transition principles in the development of the sectoral adaptation plans.

With increased pressure to implement mitigation policy to meet national and international obligations, now is the time to integrate the Just Transition across all mitigation and adaptation policy.

Table 11-2 National policy support for a Just Transition

Policy	Support for Just Transition
Department of Social Protection, Roadmap for Social Inclusion 2020–2025 ^[245]	The roadmap includes actions aimed at reducing energy poverty.
Carbon Tax ^[246, 247]	The redistribution of carbon taxes supports financing cross-sectoral policies and measures for climate action purposes, including actions aimed at supporting a Just Transition such as targeted social welfare payments, retrofit scheme and the Rural Environment Protection Scheme to encourage the uptake of sustainable farming practices.
Housing for All – A New Housing Plan for Ireland ^[248]	The plan includes energy efficiency, retrofitting initiatives for private and newly built homes, and social housing retrofitting initiatives.
Department of Social Protection, Pathways to Work Strategy 2021–2025 ^[249]	The strategy's priorities include engaging with and supporting those who are at risk of economic displacement as a result of decarbonisation.
Department of the Environment, Climate and Communications, Strategy to Combat Energy Poverty 2016–2019 ^[263]	The Strategy expands the reach of existing energy efficiency schemes and commits the Government to measures to find more effective ways to focus energy efficiency efforts on those most at risk of energy poverty.
Department of the Environment, Climate and Communications National Adaptation Framework (NAF) to inform the development of the sectoral adaptation plans ^[250]	The NAF will inform future adaptation policy across Ireland, including the development of the sectoral adaptation plans. The NAF recommends that all adaptation planning should prioritise ensuring a Just Transition. It is recommended that a stronger emphasis on a Just Transition in the context of adaptation is required throughout the NAF.
Department of the Environment, Climate and Communications, Local authority climate action plans ^[251]	The guidelines provided from DECC to the local authorities for the development of the climate action plans states 'plans for the identified Decarbonising Zones should also consider the economic and social benefits of decarbonising, including just transition and health.'
Department of the Environment, Climate and Communications, National Climate Action Plan 2023 ^[24]	NCAP 2023 has integrated Just Transition actions to be delivered across sectors such as agriculture and the built environment and commits to undertaking research in the area of Just Transition to ensure that the principles are being integrated. NCAP 2023 makes a commitment to deliver a number of actions to support a Just Transition, including the establishment of a Just Transition Commission in Q2 2023 which will be tasked with developing a set of Just Transition indicators, activation and training responses for at-risk employment through the implementation of social protection policies, and committing to ensuring that social welfare measures are put in place to prevent fuel poverty.
Department of the Environment, Climate and Communications, Just Transition Fund ^[21]	Supports 56 projects across the midlands. Expected outcome: 'Strengthened resilience of the regional economy of the Midlands in line with national climate objectives'.

Although national policy has made some progress, there are some concrete next steps whereby Irish policy can further support a Just Transition, aligned with earlier recommendations in this report, including:

- ▶ Putting more emphasis on a Just Transition in the context of adaptation in developing the new NAF and future NCAPs.

- ▶ A requirement that Just Transition principles and plans are integrated and developed in tandem across climate policies to ensure a fair and equitable transition to climate neutrality. This will require political leadership.
- ▶ A national vulnerability analysis to identify communities and households that will be the most affected by the transition so that policy development will support a Just Transition. Separately, the distributional effects of policy implementation need to be monitored throughout the policy cycle.
- ▶ Future increases in the price of energy may exacerbate energy poverty for households that face barriers in accessing retrofit. Therefore, as recommended in the Built Environment chapter of this report, providing incentives to encourage private landlords to retrofit and clear and accessible pathways to accessing retrofit for low- and medium-income households is necessary.
- ▶ Policy support aimed at alternative forms of income for small and medium-sized enterprises, farmers and other affected households should be considered urgently.
- ▶ Integrating environmental policies, including climate policies, with social policy. Despite the strong links between the two, they are not currently integrated. Much policy that supports a Just Transition is social policy, hence the need for integration.
- ▶ Providing grants for purchasing second-hand EVs can address the barrier of the cost to households of purchasing EVs and support a Just Transition.

11.5.1. Towards a Just Transition in Ireland

As discussed previously, there is evidence that national policy in Ireland is supporting a Just Transition. However, with increased pressure to reduce emissions alongside the need to implement adaptation actions, it is now time to put Just Transition principles into practice. Mainstreaming principles across all climate policy development should support their application on the ground. Furthermore, identifying a set of national Just Transition indicators to measure progress, or lack thereof, will be important for monitoring and evaluation purposes. This section explores and discusses what is being progressed to achieve a Just Transition and draws out recommendations for future implementation.

The EU Just Transition Fund was created to provide financial support to the regions and communities in Europe that are most negatively affected by the transition to climate neutrality, ensuring that no one is left behind.^[20] To date, the territory supported by the fund focuses on the regions directly impacted by the move away from peat production and electricity generation from peat.

Most recently, Ireland has prepared a Territorial Just Transition Plan and accompanying programme setting out the activities the fund supports.^[21] This was recently adopted by the European Commission and will be rolled out over the coming years.^[21] Notably the plan was informed by a territorial Just Transition analysis,^[252] the goal of which was to identify those territories most negatively affected, defined as 'territories shall be those most negatively affected, based on the economic and social impacts resulting from the transition, in particular with regard to the expected adaptation of workers or job losses in fossil fuel production and use and the transformation needs of the production processes of industrial facilities with the highest greenhouse gas

intensity'.^[252] This type of analysis is welcome, but a more disaggregated analysis at household level is recommended to get a more robust picture of vulnerability and identify all those impacted, both directly and indirectly, by the transition. The monitoring and evaluation of the transition away from generating electricity from peat will provide lessons for future national implementation.

A recommendation put forward following the Territorial Just Transition analysis was the need to involve communities before making any major decisions about the future of their livelihoods. Communities are best placed to identify the unique and varying challenges (both monetary and non-monetary) their communities face, hence it is recommended that increased community participation in the decision-making process is necessary.^[253] For example, rural communities face different constraints when compared with urban communities due to differences in education, income, housing, health and commuting patterns. These differences need to be considered when developing and implementing transition pathways. Involving communities in the development of the pathways can ensure that these challenges unique to communities are included.^[253] Likewise, the agricultural sector will face complexities unique to the sector's history and cultural context, making farmers and other key stakeholders best placed to identify the challenges they face and to inform solutions. As discussed in the Agriculture chapter, the National and Economic Social Council (NESC) recently published a report that argues that tackling the environmental challenge must be addressed together with the intersecting economic and social challenges.^[190] It provides policy recommendations informed by key stakeholders. The value of an inclusive dialogue with key stakeholders by way of fostering and growing a sense of shared purpose for the sector's transition was highlighted in the report.^[190] Dialogue is a key principle of a Just Transition and can enable the empowerment of individuals and communities.

The NDCA is a good example of national public participation, giving people the opportunity to make recommendations on climate policy development.^[254] Such open dialogue supports Just Transition principles and if the dialogue is implemented correctly can support inclusive climate policymaking. An assessment of the NDCA provided recommendations to support the development of methodological approaches to public participation in environmental and climate contexts.^[255] One recommendation resulting from the assessment was that methodological approaches should be culturally sensitive by ensuring that alternative questions, neglected issues and marginalised perspectives are considered. To support inclusivity in public participation, it is recommended that Government adopts a scientifically informed transparent methodological approach. Evaluations of such a process are equally important to identify voices that are not represented.

To ensure the costs of transitioning are fairly distributed, and to support equitable impacts, it is imperative that, as the carbon tax increases, the redistribution policy will support households that are least able to afford higher costs of carbon-intensive goods, such as household energy. Recent evidence suggests that energy poverty is prevalent in Ireland and has been exacerbated by the devastating conflict in Ukraine increasing the cost of living. The retrofitting programme brings co-benefits both for reaching climate targets and, if implemented correctly, for alleviating energy poverty. However, currently barriers exist to accessing the retrofitting grants. Specifically, many households cannot afford the upfront costs of retrofitting, those living in rented accommodation rely on landlords who lack willingness to retrofit their properties, and not all households have the time to cope with the administrative burden. Furthermore, people with disabilities or with English as a second language may face challenges in accessing and completing the

necessary grant forms.^[256] Organisations such as Money Advice and Budgeting Services (MABS) and St Vincent de Paul Society (SVP) are working on the ground to tackle these barriers. For instance, MABS works to reduce poverty, discrimination and the financial exclusion of Irish Travellers, and SVP financially supports people experiencing energy poverty. During Climate Conversation 2021, SVP recommended introducing community energy advisers to reduce these social barriers.^[257] Organisations such as these can provide the necessary recommendations on energy poverty to support fairness and equity in policy implementation.

Various policy incentives to move away from dependency on fossil fuel in the transport sector are being developed across Ireland. These include incentives to promote behavioural change in terms of using sustainable modes of travel and reducing travel, grants for EVs, road pricing, efforts to improve public and active transport, road space reallocation and street redesign. However, some evidence that the transport sector is not considering the Just Transition principles is apparent. A recent analysis of the affordability of public transport across EU cities positions Dublin city in last place.^[258] Affordability for all is key to supporting a Just Transition and will encourage the necessary behavioural changes.

A shift to EVs is seen as one of the main methods for decarbonising the transport sector. The European Parliament has approved a law banning the sale of fossil fuel-powered cars from 2035, while the Irish Government has committed to having 936,000 EVs on the roads by 2030.^[24] Hence, the pressure to transition away from using fossil fuels is increasing. Policy that supports this must consider fairness and equity, as the distributional impacts will be far reaching. A recent study measuring the equity impacts of Government subsidies for EVs provides evidence that level of income is a barrier to purchasing EVs. This is unsurprising, given the high cost of new EVs.^[259] Policy development must consider income as a barrier to accessing the EV market to ensure that no one is left behind; this could include grants for purchasing used EVs. Identifying evidence-informed policies that support a Just Transition is recommended. As discussed in the Transport chapter, a good example is a recent report, *Redesigning Ireland's Transport for Net Zero*, which identified policies with the highest potential to reverse car dependency and reduce emissions via a Just Transition. These include space reallocation, the mainstreaming of on-demand services and communication efforts to address car-centric mindsets.^[81] This type of evidence-informed policymaking is recommended to ensure a Just Transition.

To ensure that the right skills are being transferred to those whose livelihoods will be affected is at the heart of a Just Transition. Those employed in the transport, energy and agricultural sectors are likely to be the most severely impacted in Ireland.^[260, 261] Access to training opportunities and knowledge transfer will be critical. The training and upskilling of workers will require Government funding to support workers financially during their transition. To deliver a transition that is just in terms of jobs for different people and places, targeted policy action is required. There have been advances in addressing the future demand for specific skills. For instance, NCAP 2023 commits to 'Promote timely and tailored activation and training responses for workers whose jobs are at risk by the decarbonisation process' and to 'Build on existing education and training measures in place to address identified skills'.^[24] Separately, a needs analysis undertaken by the Expert Group on Future Skills sets out the demand for skills needed for the transition to net zero emissions up to 2030.^[24, 262] However, to ensure inclusivity in accessing training and reskilling opportunities socio-economic variables need to be considered such as people with disabilities, literacy levels, gender and age. Minority groups will also face barriers unique to their needs and challenges.

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