seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

National Energy Projections **2025**

National Energy Projections

2025

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Sustainable Energy Authority of Ireland

SEAI is Ireland's national energy authority investing in, and delivering, appropriate, effective and sustainable solutions to help Ireland's transition to a clean energy future. We work with the public, businesses, communities and the Government to achieve this, through expertise, funding, educational programmes, policy advice, research and the development of new technologies.

SEAI is funded by the Government of Ireland through the Department of Climate, Energy and the Environment.

Foreword – William Walsh, CEO, SEAI

Ireland's energy system produces more than half of our greenhouse gas emissions.

The National Energy Projections show that if we continue as we are, we will not meet our 2030 climate targets. That matters because reducing emissions is not only about protecting the environment - it also means more secure and affordable energy, a stronger economy, and healthier lives for our people.

A major challenge is rising energy demand. As our population and economy grow, energy use will increase. We need to be efficient in how we use our energy and make strategic decisions on demand growth and our economic priorities. Without action, this growth will lead to higher consumer bills, more expensive infrastructure, and greater reliance on imports.

The EU's Energy Efficiency Directive sets a clear cap on how much energy we can use by 2030. Current projections show Ireland is set to exceed this limit, so managing demand is critical. Keeping demand under control also helps ensure that energy costs do not hit the most vulnerable hardest, which is essential for a just transition.

Alongside managing demand, we must accelerate the shift to clean technologies. Progress is underway. In 2024, government supports reached record levels, illustrating long-term and growing commitment in this area. SEAI provided €544 million in government supports, which together with private investment drove over €1.2 billion of upgrades in homes and businesses. Over 1,000 Sustainable Energy Communities are now active nationwide, showing the power of local action. Across Government, planning processes are being streamlined, new incentives introduced, and awareness raised on the pathways to change.

However, financial supports alone will not deliver the scale and speed of change required. The International Energy Agency highlights the need for an integrated approach, combining incentives, information, and regulation. That means clear timelines for phasing out fossil fuels, requiring large energy users to adopt cleaner technologies, continuing to expand public transport and active travel, and an all of government response to align to Ireland's climate obligations. It also means finally addressing the planning and consenting delays that hold back renewable projects. These measures will give businesses and communities the certainty they need to plan for the future.

Ireland is at a decisive point. If we manage demand, deploy clean energy faster, and align policy with efficiency and sufficiency, we can meet our climate obligations. More importantly, we can create an energy system that is secure, affordable, and healthier for everyone.

Key Insights

This report presents the main findings of SEAI's latest National Energy Projections, developed as part of the 2025 national energy and climate modelling cycle. These projections underpinned the EPA Greenhouse Gas Emissions Projections published in May 2025.[1] The National Energy Projections further examine Ireland's future energy use under alternative scenarios, incorporating factors such as economic growth and the expected impact of government energy policies. The results provide a critical assessment of Ireland's anticipated future performance against national and EU climate and energy obligations.

Risk of delayed achievement is now built into reported scenarios.

In the reported projections scenarios, it is no longer realistic to assume full achievement of many key Climate Action Plan targets by 2030. A transformative approach to delivering infrastructure is needed to recover a feasible path and mitigate future risk.

In the final year of the first carbon budget, with just five years remaining to achieve 2030 Climate Action Plan (CAP) targets and meet EU obligations, it is crucial to refine assumptions on Ireland's progress to date and the anticipated pace of future delivery.
A risk-assessment approach was used to ensure the policy assumptions in the modelled With Existing Measures (WEM) and With Additional Measures (WAM) scenarios accurately reflect the current pace of progress and estimate the future pace. In collaboration with the EPA and government departments, current implemented and planned measures were assessed for their feasibility of delivering targeted levels of achievement by 2030.

This assessment resulted in the incorporation of delayed achievement risks into both the WEM and WAM scenarios across all sectors. Among others, these include delays in:

- Deployment of wind capacity for electricity generation,
- Creation and expansion of district heating networks,
- Uptake of retrofitting, renewable heating technology, EV adoption, and
- Delivery of transport measures to reduce private car demand.

[1] EPA, "Ireland's Greenhouse Gas Emissions Projections 2024-2055", May 2025. [Online]. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-greenhouse-gas-emissions-projections-2024-2055.php

Even with these risks accounted for, both WEM and WAM projections remain vulnerable to further delays. Detailed monitoring of key projects and actions to manage risks are vital to transparently examine gaps to targets, to determine compliance costs for target shortfall, and to accurately assess the scale of additional action required. The scenario assumptions are continuously refined to reflect the anticipated impact of policies and measures on energy consumption, renewable share and greenhouse gas emissions.

Changes in projections results year-on-year have shown a pattern in delays due to high complexity in project approval and planning, lack of clarity on fossil fuel phase out dates, and gaps in incentives that ensure long-term affordability of fuel and technology switching. Immediate transformative policy that addresses these issues can provide the best chance to catch up to meet Ireland's obligations and secure a sustainable future.

Achievement of all CAP targets is still projected to fall short of energy and climate obligations.

Even in a scenario where all delivery targets set out in the Climate Action Plan are fully achieved by 2030, Ireland is still projected to require more measures to meet its legally binding national and EU obligations. These must be combined with policy to meet a greater challenge by 2040.

Many of the risks modelled and discussed in the previous National Energy Projections (NEP) report have been transcribed into the main EU-reported scenarios (WEM and WAM). [2] SEAI ran an additional scenario, as a reference point, to evaluate the impact of fully achieving all CAP delivery targets on time. This scenario demonstrates that even in the unlikely case of full implementation by 2030, Ireland would still face a significant gap in meeting many legally binding energy and climate obligations, including national carbon budgets and sectoral emissions ceilings, and EU obligations on renewable energy, energy efficiency and greenhouse gas emissions.

Even with full delivery of the CAP it is likely that the energy sector will exceed its share of Ireland's national legally binding carbon budget for the first two budget periods. While reductions in electricity generation emissions have helped narrow the gap to achieving the first carbon budget, the second carbon budget will require a significantly greater effort to remain within limits. The cumulative nature of carbon budgets means any carryover will add to the challenge.

[2] SEAI, "National Energy Projections 2024", Nov. 2024. [Online]. Available at: https://www.seai.ie/sites/default/files/publications/National-Energy-Projections-Report-2024.pdf

Ireland is likely to substantially overshoot its Energy Efficiency Directive (EED) 2030 final energy consumption (FEC) target, by nearly 30% in the WEM scenario and over 24% in the more optimistic WAM scenario. This shortfall is primarily due to projected energy demand growth outpacing energy efficiency gains from implemented and planned measures. Under current projections, without additional interventions beyond what has been stated in CAP documents to date, Ireland is unlikely to meet its 2030 FEC obligation even by 2040, at which point a steeper reduction will be required.

Similarly, Ireland is projected to miss its 2030 overall renewable energy share (RES) target of 43% under the Renewable Energy Directive (RED) in all scenarios. Success for RES is dependent on the rapid scaling up of renewable capacity in electricity, heat and transport, while managing total energy use. The primary measure planned to achieve the RES target is the timely delivery of variable renewable energy (VRE) installed capacity for electricity generation. In the EU-reported policy scenarios accounting for likely delays in VRE deployment, especially in offshore wind, Ireland is projected to achieve just 28% overall RES in the WEM scenario and 34% in the WAM.

These projections show that the current package of sustainable energy policies is insufficient and progressing too slowly to keep pace with Ireland's increasing energy and climate obligations. Delays in meeting both national and EU obligations could result in significant, near-term, compliance costs, and missed societal benefits from a sustainable energy transition. The Irish Fiscal Advisory Council (IFAC) and the Climate Change Advisory Council (CCAC) estimate potential compliance costs of between €8 and €26 billion, depending on policy achievements and future market prices; costs that could increase further if the gaps to targets widen.[3]
With 2040 EU targets for energy and climate now in negotiation, a longer-term policy outlook is necessary to make up for delays in 2030 achievement while implementing transformative change for Ireland's future energy system. The scale of the challenge will continue to grow, so immediate action to clarify policy aimed at 2040 and beyond is essential.

Focus on long-term policy and energy system resilience is now required.

Ireland's energy transition targets require unprecedented technology shifts, combined with robust energy sufficiency measures across all sectors. Avoiding wasteful energy use is essential to get back on track toward obligations beyond 2030, to reduce compliance and consumer costs, and to increase long-term resilience of the energy system.

[3] IFAC and CCAC, "A colossal missed opportunity: Ireland's climate action and the potential costs of missing targets", Mar. 2025. [Online]. Available at: https://www.fiscalcouncil.ie/wp-content/uploads/2025/03/Irelands-climate-action-and-the-potential-costs-of-missing-targets.pdf

To bridge the gaps to targets, technology advancements must be complimented with comprehensive consumption management and decisive reductions of wasteful energy use across the economy.

The path to meet targets for energy consumption, renewable share and emissions is becoming increasingly steep. Historical trends in technology deployment, coupled with evident risks to the timely rollout of future solutions, indicate that technology change alone will not cover the gap. A strategic energy sufficiency approach, focused on net reductions to energy demand must be implemented in parallel to technology change to make a direct impact on total energy use.

An energy sufficiency approach focuses on meeting personal and societal energy needs, while significantly reducing material and energy consumption, including:

- Investing in infrastructure that supports efficient lifestyles in key energy-intensive areas, such as enabling shifts from private car use to public transport and active travel.
- Communicating clear dates for mandated reduction of energy use across sectors, and incentives for early action.
- Incentivising behaviours, goods and services aligned with the circular economy, including localised production and consumption networks and community-led projects.
- Avoiding significant additions of new energy demand that would widen gaps to targets, require accelerated renewables deployment, and increase the costs to the system and consumers.

Given historical rates of achievement and projected energy trends, the urgent development of more comprehensive policy packages is essential. Expanding the existing policy package and adding new policy measures, through a balanced mix of information, incentives and regulation, will help reduce compliance costs, enhance energy security and increase affordability for all Irish consumers. Legislation on the phase out timeline for fossil fuels and the plan for addressing cost barriers such as the per-kWh “spark gap” between electricity and gas are necessary catalysts for uptake and can be clearly signalled through documents such as the National Building Renovation Plan. To be most effective, these policies must be planned in detail not only for 2030 targets, but also with a clear long-term vision for sufficiency. This will improve Ireland’s prospects for a resilient, secure and sustainable energy system.

1 National Energy Projections overview

SEAI delivers the National Energy Projections (NEP) annually to assess expected policy progress against energy and climate obligations. Modelled energy scenario outputs support several national and EU reporting frameworks, including informing the Greenhouse Gas Emissions Projections produced by the Environmental Protection Agency (EPA). The projections are modelled using the National Energy Modelling Framework (NEMF), which is developed and maintained by SEAI.[4] The projections are used to plan and review policies and measures that are under discussion as mechanisms to achieve Ireland's national and EU energy and climate obligations.

The cycle of consultation with key stakeholders, refinement of input assumptions, and model development undertaken to produce these projections is a continuous process. The projections presented in this report are the result of the 2025 national energy and climate modelling cycle, which were finalised with the EPA Greenhouse Gas Emissions Projections published in May 2025.[1] The notable development this year from the stakeholder consultation is the adjustment to input assumptions resulting from a risk-assessed review of anticipated progress against delivery targets for climate actions.

Projections are produced for a 30-year time horizon and this year are available out to 2055. In this report, however, the focus is primarily on the period to 2040, as this is the period covering the main agreed 2030 EU and national targets and obligations and 2040 targets due to be negotiated. Most documented policies and measures have to date been focused on 2030 targets, but projected delays indicate delivery mostly between 2030 and 2040. Further measures are needed to ensure Ireland can gain ground lost on delivery to 2030 as well as secure successful delivery for 2040 targets.

Throughout this report, alongside data on energy use, data on greenhouse gas emissions are presented. In all cases, data on greenhouse gas emissions is taken from the latest EPA Greenhouse Gas Emissions Projections. The energy-related component of the EPA projections for greenhouse gas emissions is calculated directly from the National Energy Projections; therefore, the energy and greenhouse gas emissions data are consistent.

[4] For more information on the NEMF, see Appendix 1.

1.1 Policy inputs

The Climate Action and Low Carbon Development (Amendment) Act 2021 requires the government to produce a Climate Action Plan (CAP) setting out sector-specific actions that are required to comply with the carbon budget and sectoral emissions ceilings. The policies and measures in this and other government policy documents inform the assumptions for the modelled scenarios in the projections. The scenario modelling assumptions are not taken as given from the CAP, but rather assessed together with relevant policy owners to determine whether latest documented evidence of progress on committed policies and measures meets the standard required for inclusion according to scenario guidance from the EU Governance Regulation.[5] For more information on the scenario definitions and a detailed list of input assumptions, see Appendix 1.

1.2 Data inputs and freeze date

The National Energy Projections are built upon a large volume of input data, including historical data on Ireland's energy use, economic data and the current delivery and uptake of energy efficiency measures and renewable energy technologies.
The modelling for scenarios presented in this report was carried out in late 2024 and during the first quarter of 2025. **The freeze date for data inputs to the model was November 2024.**

The data presented in this report for energy use up to and including 2023 is historical data. The data presented in this report for 2024 and later years is modelled data. The most up-to-date historical energy data available at the time these projections scenarios were submitted was the 2023 National Energy Balance. Therefore, some differences are likely to exist between the 2024 data used in this report and the Full National Energy Balance for 2024 released in September 2025.[6] Where there are significant differences in the latest historical data, these are addressed in the text of this report.

1.3 Modelling scenarios

In line with EU Greenhouse Gas Emissions Projections reporting guidelines, SEAI model two main scenarios for the NEP with differing levels of policy achievement:

- a 'With Existing Measures' (WEM) scenario; and
- a 'With Additional Measures' (WAM) scenario.

[5] European Union, "Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018", Nov. 2023. [Online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02018R1999-20231120

[6] SEAI, "Full National Energy Balance 2024", Sept. 2024. [Online]. Available at: https://www.seai.ie/data-and-insights/seai-statistics/key-publications/national-energy-balance

The WEM scenario is a projection of future energy use based on the estimated impact of policies and measures currently implemented and committed to by government. To become part of the WEM scenario, a policy or measure must be in place by the end of 2023. [7] The stated ambition must be commensurate with the resources or legislation already in place or committed to by government departments or agencies. This scenario does not assume the implementation of any new policies or measures post-2023, but only the feasible continuation of existing policy impacts over the modelled time horizon.

This year's WEM scenario considers the 2024 Climate Action Plan (CAP24) which was published in 2024, but not the 2025 Climate Action Plan (CAP25), though there were not substantial changes to key targets between the two documents that would impact the modelling assumptions. The WEM accounts for the anticipated impacts of the subset of measures contained in CAP24 which have been implemented as at the end of 2023.

The WAM scenario is more optimistic. It is a projection of future energy use based on the estimated impact of measures outlined in the latest government plans at the time the projections are compiled. This includes all policies and measures in the WEM scenario, plus those included in the latest government plans but not yet fully implemented. The WAM scenario considers the latest CAP published at the time policy assumptions for scenarios are agreed (CAP24 in this case). In previous years, this scenario broadly assumed that most CAP targets would be fully achieved, but this is now no longer representative of a feasible delivery timeline with only five years remaining for achievement of 2030 targets.

Even where measures have been implemented, the targets set in CAP24 are not automatically assumed to be met. For example, it is not assumed that the CAP24 target for delivery of 5GW of offshore wind installed capacity by 2030 is fully achieved in either the WEM or the WAM scenarios as, together with stakeholders, it was agreed that there is significant risk that implemented and currently planned supports will not result in full delivery of the target.

This year, in addition to the WEM and WAM projections, SEAI has modelled a CAP scenario, to illustrate the additional impact that broad achievement of targets in CAP24 by 2030 would make on energy consumption, renewable share and emissions over the modelled time horizon. More details on the main policy assumptions for each scenario are provided in Appendix 1.

[7] 2023 was the cut off year as it was the last historical reporting year at the time that the projections were carried out. The cut off is carried forward annually.

1.4 Risk Assessment approach to delivery assumptions

The annual process of agreeing input assumptions must continually evolve as the 2030 target date for the delivery of many CAP actions draws nearer. It is unreasonable to assume targets stated in CAP documents will be achieved by 2030 unless this timeline can be justified based on a grounded assessment of the latest data and trends. To ensure modelled projections scenarios continue to be a credible representation of the current policy landscape, an annual assessment of current progress and anticipated achievability of a target by a certain date is undertaken.

The methodology applied for the set of projections described in this report, undertaken together with the EPA and policy owners across sectors, was an input assumptions review grounded in a risk assessment matrix to appropriately revise WEM and WAM assumptions where necessary based on the latest available information. Given the variability of key metrics across targets, measures and sectors, the following two dimensions were used as a framework for refining assumptions:

- Complexity and difficulty of achieving target
- Maturity and strength of measures in place

Table 1 (a) provides an overview of these dimensions, and Table 1 (b) illustrates how these dimensions combine to create the risk assessment matrix. A highly complex or difficult target may require many interlinked decisions or may have a long lead-in time for policy development or planning stages, such as reducing private car dependency nationwide or delivering 5GW of offshore wind capacity. A target with lower maturity or strength of current measures in place may still be in early design stage prior to identifying projects or putting funding in place, such as the delivery of hydrogen at scale.

Table 1: Risk assessment matrix for delivery assumptions in policy scenarios (a)

Complexity or Difficulty of Achieving Target	
Low	• Significant autonomous progress in the absence of measures. • Relatively simple measures required that, if delivered, have a high chance of achieving target, e.g. extension of existing supports mechanisms, update to legislation. • Solutions can be implemented well within the timeframe of the target.
Medium-Low	• More challenging than low, but there is recent experience of solving similar scale policy challenges. Expert consensus that we have the policy tools required. • Timeframes for ramping up to full target achievement are longer than low but should still be possible by target year.
Medium-High	• Solution to achieving target has many dimensions requiring intervention. We have some of the tools required but it is uncertain if they are sufficient to meet the challenge. • Timelines are challenging, there are long lead times for policy to be implemented or for impacts to be achieved in the real world.
High	• Solution to achieving target has many dimensions requiring intervention, each with challenges, and many interlinkages to other complex areas of policy, increasing the overall difficulty. • Target timelines extremely challenging. Long lead times for policy development and likely slow rate of implementation or diffusion in real world.
Maturity and Strength of Measures in Place	
Low	• Measures in design stage but not yet funded or implemented. • High uncertainty as to whether the proposed measures will achieve target.
Medium-Low	• Some measures currently in place or funded. • High risk that these will not be sufficient to achieve target without additional supports.
Medium-High	• Measures currently in place or funded. • Some risk that these will not be sufficient to achieve target without additional supports.
High	• Comprehensive suite of measures currently in place. • High degree of confidence that these will achieve target with no additional supports required.

(b)

	Low Complexity	Medium Complexity	High Complexity
Low Maturity			High risk / Low confidence in timely delivery
Medium Maturity			
High Maturity	Low risk / High confidence in timely delivery		

The review of key input assumptions for the projections found that most CAP targets fell in the higher risk quadrant, due to complexity of delivering projects amounting to the scale of the target, or to the lack of detailed measures in the implementation stage. This resulted in a scaling back of assumptions, particularly in the WAM scenario. The projected impact of measures by 2030 was revised downward due to lower confidence in timely delivery, pushing the full impact of the measures intended to deliver CAP targets out as far as 2040 in some cases. This delayed impact will have significant implications for the ability to deepen and add measures to meet the additional ambition required by 2040 EU targets and future carbon budgets.

2 Compliance with EU climate and energy targets

- Under all scenarios modelled, Ireland is projected to miss its agreed overall 2030 targets for energy efficiency, renewable energy share and greenhouse gas emissions reductions.
- Final energy consumption is projected to overshoot the Energy Efficiency Directive (EED) 2030 target by a significant margin of 24% to 30%.
- Overall renewable energy share is projected to fall short of the Renewable Energy Directive (RED) 2030 target by 9 to 15 percentage points.

2.1 Introduction

Ireland is obliged to contribute to EU level targets contained in the EU Climate and Energy Framework. The EU framework is separate from the national carbon budgets process and contains independent obligations to reduce greenhouse gas emissions, increase the share of renewable energy and reduce total final energy consumption significantly by 2030. The binding targets are set at an EU level and distributed across member states. If Ireland falls short of its commitments to its EU targets for 2030 (or select interim targets) then, as was the case for the 2020 EU targets, there may be a requirement to pay compliance costs or implement mandated additional measures to close the gap.

There are three main sets of targets under the 2030 framework:[8]

- Targets to improve energy efficiency and reduce total energy consumption.
- Targets to increase the share of renewable energy.
- Targets to reduce greenhouse gas emissions.

2.2 EU Energy Efficiency Directive target

The recast EU Energy Efficiency Directive (EED) entered into force in October 2023. Article 4 of the directive sets a binding target to limit final energy consumption at EU level in 2030 to 763 Mtoe.[9,10] In February 2024, the Irish government approved its contribution to the EED Article 4 target, notifying a Final Energy Consumption (FEC) target of 10.451 Mtoe in 2030. This target represents a 13% reduction from 2023 levels for Ireland.

[8] European Commission, "2030 climate targets". [Online]. Available at: https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-energy-framework_en

[9] The EU's target for the reduction of energy consumption by 2030 is 11.7%, compared to projected consumption in the 2020 Reference Scenario. The primary energy consumption target is indicative, while the final energy consumption target is binding. The result of this is that the EU's final energy consumption in 2030 must not amount to more than 763 Mtoe.

[10] Under the Directive, final energy consumption does not include the ambient energy used by heat pumps but does include international aviation.

The EED target for 2030 requires an absolute reduction in final energy use. This means that achieving energy savings from energy efficiency measures will not suffice if they are outweighed by growth in energy demand. Figure 1 and Table 2 show the target and projections for final energy consumption.

Figure 1: Projected progress towards EU Energy Efficiency Directive

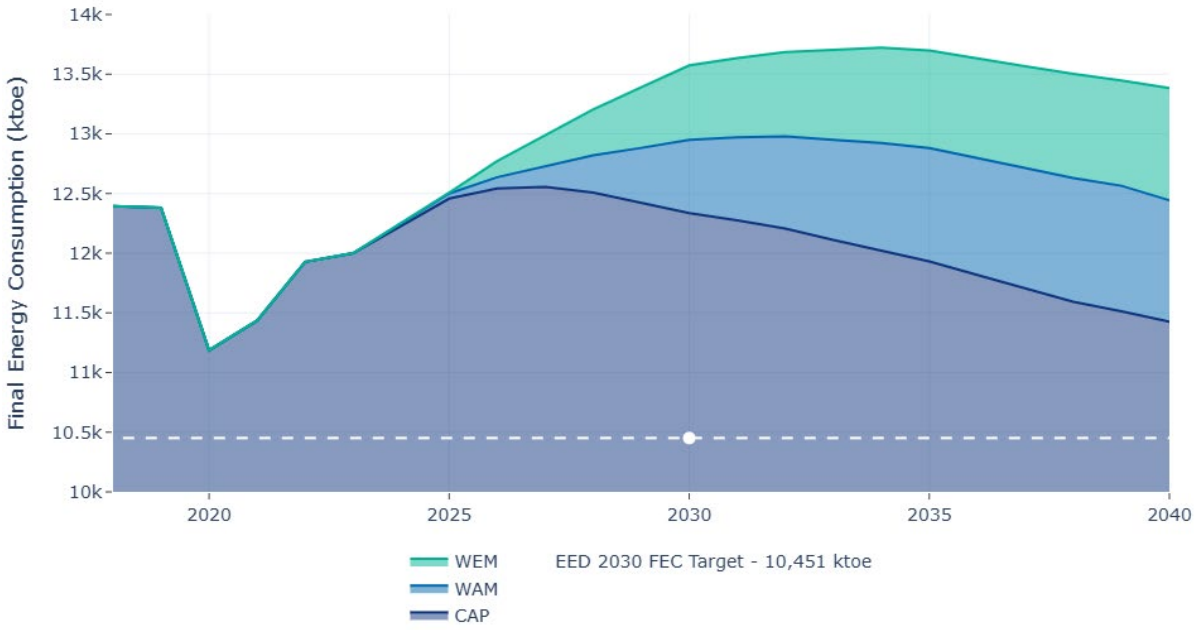


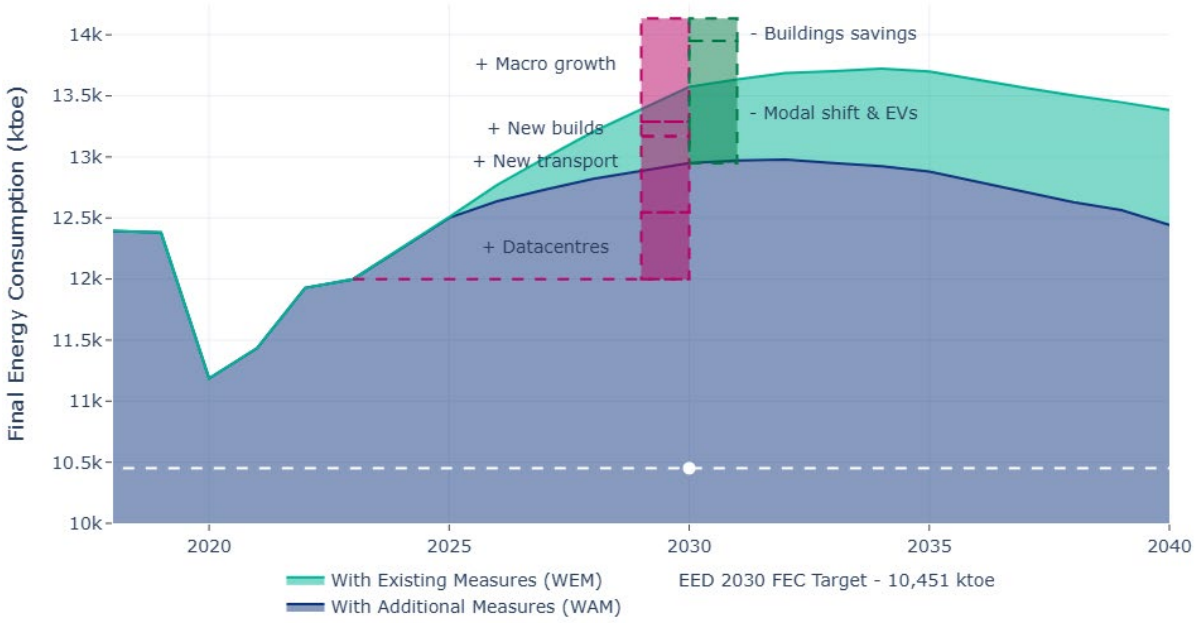
Table 2: Projected progress towards EU Energy Efficiency Directive

2030 Energy Efficiency Directive final energy target (ktoe)	2023 Historical (ktoe)	2030 Projected (ktoe)		
		WEM	WAM	CAP
EED Final energy*	11,999	13,574	12,948	12,337
Gap to Final energy target of 10,451 ktoe		3,123	2,497	1,886
*Under the EED definition, final energy consumption includes international aviation and excludes ambient energy.				

The EED 2030 final energy consumption target for Ireland is projected to be exceeded in all scenarios. In the WEM scenario, it is exceeded by 3,123 ktoe (30%) and in the WAM scenario, it is exceeded by 2,497 ktoe (24%). Both the WEM and WAM projections have increased since last year. These projections indicate that it is highly unlikely that Ireland would meet the 2030 final energy limit even by 2040 without significant additional measures to reduce consumption across the energy economy.

Figure 2 illustrates the challenge in overcoming growth in energy demand to achieve Ireland's target for reduction in total final energy consumption. FEC in 2023 is shown as the maroon dashed line, with the change in projected FEC under the WAM scenario by 2030 illustrated by the bars. The maroon bars represent projected additions to energy consumption, and the green bars projected reductions, largely due to energy efficiency measures in buildings, electric vehicles (EVs), and modal shift in transport. It is clear the projected measures to reduce FEC are not sufficient to outpace projected growth in energy consumption due to macroeconomic growth, new transport demand and significant demand growth from datacentres.

Figure 2: Drivers of changes in FEC 2023 to 2030 and gap to EED target



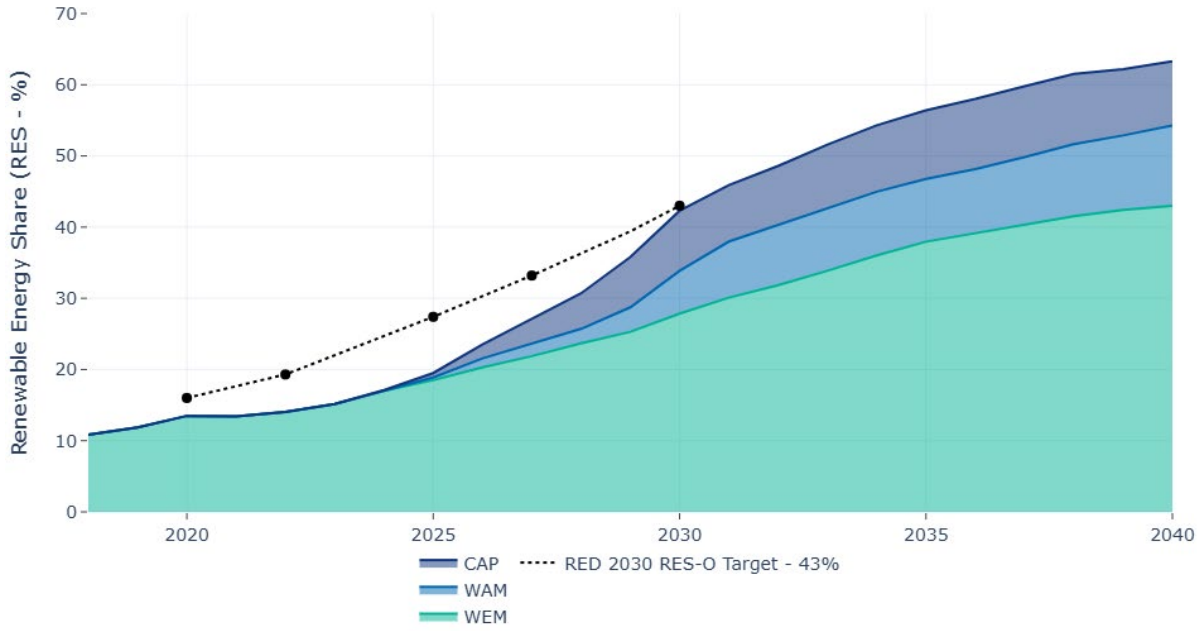
The risk that further delays in the implementation of measures will continue to widen this gap is significant, as only about 82% of the projected impact of planned building measures and 22% of the projected impact of transport measures are also currently included in the WEM scenario. The status of these measures is revisited annually, but the longer planned measures go without implementation, the larger this gap will become and the more challenging it will be to meet Ireland's energy efficiency obligations.

2.3 EU Renewable Energy Directive target

The EU Renewable Energy Directive (RED) sets a target for renewable energy share (RES) in gross final energy consumption.[11] The existing EU wide target set in REDIII is 42.5% RES by 2030.[12] Ireland's national contribution to this EU binding target for 2030 RES is 43.0%. There are also interim targets for 2022, 2025 and 2027, as shown in Figure 3 and Table 3.

The 2030 RES target for Ireland is not reached in any of the modelled scenarios. In the WEM scenario, there is a shortfall of over 15 percentage points and even in the WAM scenario, there is a projected shortfall of over 9 percentage points. Both the WEM and WAM projections have decreased (by 3 and 9 percentage points for 2030, respectively) since last year. This is due to revised assumptions on the projected delivery of renewable capacity, especially for offshore wind. Only in the case of the CAP scenario, in which 80% renewable share in electricity (RES-E) is achieved by 2030 does the overall RES projection reach within one percentage point of the REDIII obligation, but this level of installed capacity by 2030 is now looking highly unlikely given project delays and continued growth in electricity demand.

Figure 3: Projected progress towards EU target for Ireland for overall renewable energy share



[11] The revised EU Renewable Energy Directive sets additional targets for different sectors, but for this report we focus on the headline target for overall renewable energy share.

[12] The first Renewable Energy Directive (2009/28/EC) set targets for 2020. This Directive was revised in 2018 (EU/2018/2001) and recast to set targets for 2030. This recast Directive became known as REDII.
Given the need to speed up the EU's clean energy transition, the Renewable Energy Directive EU/2018/2001 was revised in 2023. This became known as REDIII. The amending Directive EU/2023/2413 entered into force on 20 November 2023. It sets an overall renewable energy target of at least 42.5% binding at EU level by 2030 - but aiming for 45%. For more information see: https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en

Table 3: Projected progress towards EU target for Ireland for overall renewable energy share

Current REDII target for overall renewable energy share (RES) for Ireland		WEM	WAM	CAP
2025	Projected overall RES	18.5%	18.9%	19.5%
	REDIII overall RES target for Ireland	27.4%		
	Gap to target	8.9%	8.5%	7.9%
2027	Projected RES	21.9%	23.6%	27.1%
	REDIII target	33.2%		
	Gap to target	11.3%	9.6%	6.1%
2030	Projected RES	27.9%	33.9%	42.3%
	REDIII target	43.0%		
	Gap to target	15.1%	9.1%	0.7%

The WEM scenario shows Ireland achieving 28% overall RES and the WAM scenario achieving 34%, both missing the 2030 target as well as interim year targets. This is due to downward revisions to assumptions on the level of renewable capacity feasibly deliverable by 2030 across electricity, heat and transport and upward revisions to the level of projected energy use. The shortfall illustrates the critical importance not only of the timing of renewable capacity to Ireland's progress on RES but also the strategic reduction of energy demand, to maintain a secure and resilient energy system in the face of capacity delays or supply shocks.

2.4 EU greenhouse gas emissions reduction targets

The European Green Deal set a target for the EU to reduce greenhouse gas emissions in 2030 by 55% compared to 1990 levels. This target is implemented by the EU Emissions Trading System, the EU Effort Sharing Regulation, and the Land Use, Land Use Change and Forestry Regulation. [13,14,15] For more information on Ireland's projected performance against EU greenhouse gas emissions reductions targets, see the latest EPA Greenhouse Gas Emissions Projections Report.[1]

[13] European Commission, "EU ETS". [Online]. Available at: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en

[14] European Commission, "Effort Sharing: Member States' emission targets". [Online]. Available at: https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets_en

[15] European Commission, "Land use sector". [Online]. Available at: https://climate.ec.europa.eu/eu-action/land-use-sector_en

3 Compliance with national climate obligations

- There are significant projected gaps to Ireland's legally binding national carbon budgets and sectoral emissions ceilings in all scenarios. By the end of 2030, total greenhouse gas emissions from energy and industrial processes are projected to be 14% and 17% over the carbon budgets in the WEM and WAM scenarios, respectively.

- The projected cumulative exceedance in energy-related sectors is down from last year's projections, primarily due to changes in electricity emissions driven by high levels of imports over interconnectors.

- With the third carbon budget proposed to be formalised in 2026, delays in climate action will increase the carryover from budgets 1 and 2 and the challenge for compliance.

- A transformation of the process for delivering large projects in Ireland is necessary to make up for delays and set out a feasible pathway for future carbon budgets.

3.1 Total greenhouse gas emissions

The Climate Action and Low Carbon Development (Amendment) Act established legally binding carbon budgets that limit total cumulative greenhouse gas emissions in Ireland between 2021 and 2030.[16] The total budget has been apportioned across the main greenhouse gas emitting sectors.

The focus of this report is on energy use and the emissions that result from the burning of fossil fuels for energy. However, because the carbon budgets relate to total greenhouse gas emissions (energy and non-energy related), this section presents data and analysis for total greenhouse gas emissions from all sectors. Data on greenhouse gas emissions from 2023 onwards are taken from the latest EPA Greenhouse Gas Emissions Projections, with 2021-2022 data taken from the 1990-2023 inventory.[1,17]

Emissions from energy still account for more than 30 megatonnes of carbon dioxide equivalent ($MtCO_2eq$), over 50% of Ireland's total greenhouse gas emissions.[18] The remaining non-energy sectors are agriculture, LULUCF and other emissions. Because these sectors do not relate to energy use, we do not cover them in detail in this report.

[16] Each carbon budget period covers five years. The first carbon budget period (CB1) is from 2021 to 2025, and the second carbon budget period (CB2) is from 2026 to 2030.
[17] EPA, "Ireland's Final Greenhouse Gas Emissions 1990-2023", Apr. 2025. [Online]. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-final-greenhouse-gas-emissions-1990-2023.php
[18] SEAI, "Energy in Ireland 2024", Dec. 2024. [Online]. Available at: https://www.seai.ie/sites/default/files/publications/energy-in-ireland-2024.pdf

For more information on these non-energy sectors, refer to EPA Greenhouse Gas Emissions Projections.[1]

The carbon budgets for total greenhouse gas emissions are shown in Table 4. If the indicative trajectory for the carbon budgets had been followed every year, emissions in 2030 would have needed to be 51% lower than in 2018. However, given the cumulative nature of carbon budgets, where this trajectory is exceeded, steeper reductions are required thereafter to compensate, leading to a larger reduction required by 2030.

Table 4: Overall national carbon budget obligation and related indicators

Overall carbon budget	
2018 baseline emissions (single year) ($MtCO_2eq$)	68
CB1 ceiling 2021-2025 (five-year cumulative) ($MtCO_2eq$)	295
CB2 ceiling 2026-2030 (five-year cumulative) ($MtCO_2eq$)	495
Indicative average annual % reduction required in CB1*	-4.6%
Indicative average annual % reduction required in CB2*	-9.6%
Initial indicative reduction required by 2030 (relative to 2018)*	-51%
**Assuming indicative target trajectory met in all years*	

Figure 4 shows the cumulative emissions trajectories for all greenhouse gas emissions out to 2040 under the WEM and WAM scenarios, including the first two agreed carbon budgets (CB1 and CB2) as well as the second programme of carbon budgets (CB3 and provisional CB4) proposed by the Climate Change Advisory Council (CCAC) currently under discussion in government.[19] The grey horizontal dashed lines show the budgets in each period, and the plot illustrates the years in which these budgets are projected to be reached in each scenario. The cumulative exceedance by the end of the second budget period is noted for each scenario in Table 5. For all cumulative emissions figures in this report, any exceedance at the end of each carbon budget is assumed to be carried over into subsequent budget periods.

In the WEM scenario, total greenhouse gas emissions are expected to exceed the carbon budgets for CB1, CB2 and provisional CB3 in 2025, 2029 and 2031, respectively, with a cumulative exceedance of 23% by the end of 2030. In the WAM scenario, cumulative exceedance of 16% is projected by the end of 2030. The projected overall carbon budgets exceedance has reduced from the 2024 projections, though there are still significant risks that this could increase again subject to market changes and the pace of implementation of stated policy. The changes in energy sector projections this year are discussed further in Section 3.2.

[19] CCAC, "Carbon Budget Proposal 2024", 2024. [Online]. Available at: https://www.climatecouncil.ie/media/CCAC%20Carbon-Budget%20Proposal%202024-final.pdf

Figure 4: Cumulative greenhouse gas emissions from all sectors

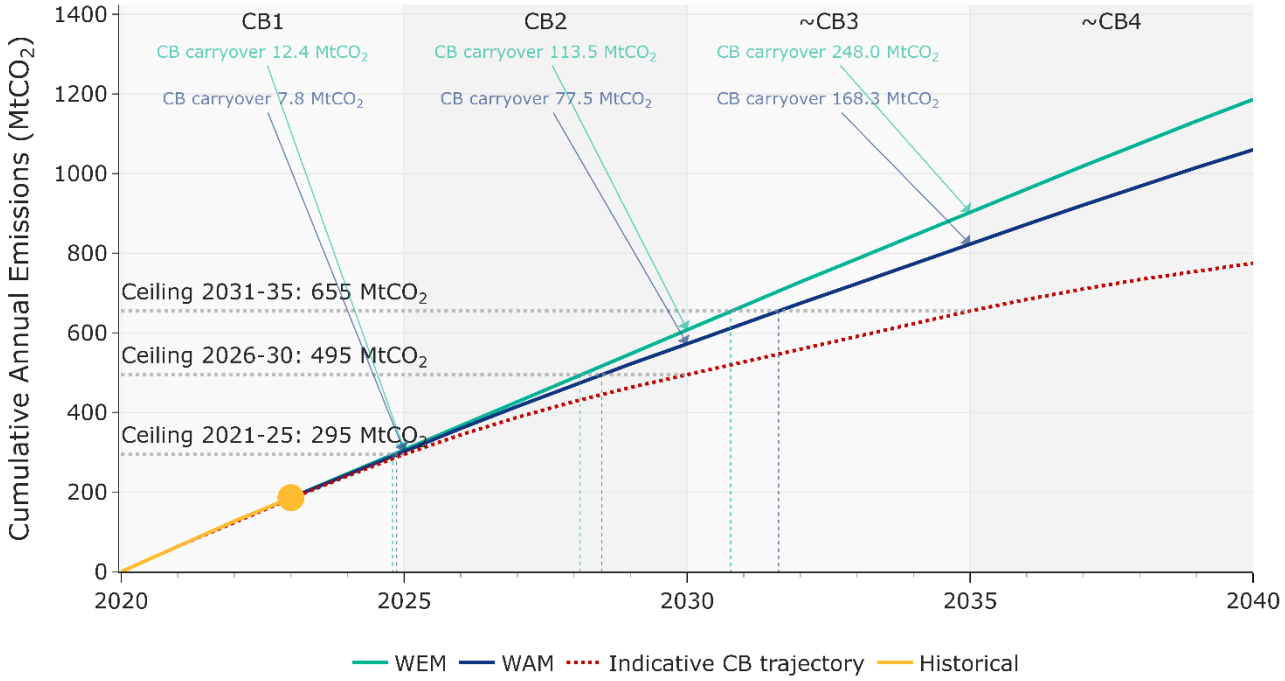
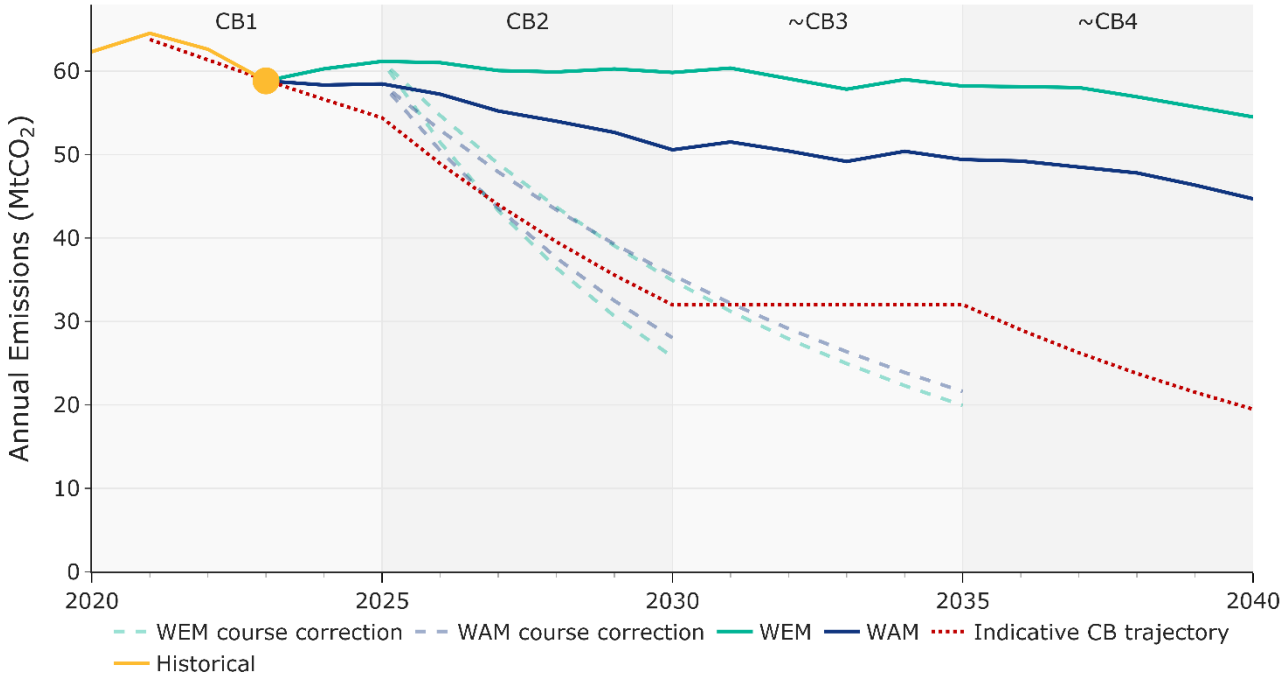


Table 5: Projected exceedance of overall national carbon budget obligation

Total greenhouse gas emissions from all sectors	WEM	WAM
Projected CB1 exceedance ($MtCO_2eq$)	12.4 (4%)	7.8 (3%)
Projected CB2 exceedance (including CB1 carryover) ($MtCO_2eq$)	113.5 (23%)	77.5 (16%)

Figure 5 shows the annual greenhouse gas emissions projected from all sectors for the first two agreed carbon budgets, and the proposed second programme of carbon budgets for the WEM and WAM scenarios. It also shows an indicative annual emissions trajectory required to stay within these budgets to 2040. Dashed lines are used to illustrate a revised trajectory that would meet the carbon budgets by the end of CB2 or CB3, starting from the WEM or WAM scenario in 2025.

Figure 5: Annual greenhouse gas emissions from all sectors



Delays in emissions reductions increase the pace of future reduction needed to be compliant with cumulative carbon budgets. This highlights the importance of clear ground-up project level monitoring of progress to ensure the most accurate representation of the challenge Ireland is facing.

3.2 Greenhouse gas emissions from energy use and industrial processes

This section examines greenhouse gas emissions from all energy use in the context of the sectoral ceilings. Because the sectoral ceiling for industry includes both energy use and process emissions, it is necessary to also include the process emissions from industry.[20] The agriculture sectoral ceiling includes energy and non-energy related emissions, but because the latter make up most agriculture emissions, the agriculture sector is not included in this section of the report.

Figure 6 shows the projected cumulative emissions trajectories for combined energy sectors and industrial process emissions out to 2040 for the WEM and WAM scenarios, with projected carryovers into subsequent budget periods due to overshoot indicated for the first two agreed sectoral emissions ceilings.

[20] Unlike greenhouse gas emissions from energy use, greenhouse gas emissions from industrial processes do not come from combusting fossil fuels. They are produced by chemical reactions used for industrial processes other than combustion. Most process greenhouse gas emissions are from cement production.

In the WEM and WAM scenarios, greenhouse gas emissions from the combined energy use and process emissions sectors are projected to exceed the CB1 ceiling by approximately 4% by 2025. This overshoot means that 7% of the CB2 budget is consumed before the period begins. The second sectoral ceiling is then projected to be exceeded in 2029, by 14% to 17% in the WAM and WEM scenarios, respectively, as shown in Table 6.

The projected exceedance in CB1 for energy sectors and industrial processes has decreased from the 2024 projections, while the projected exceedance in CB2 has increased. The main driver of this change from last year is the electricity sector, which has experienced higher levels of imports through interconnection in recent years. This net imports behaviour is projected to continue in the near term, but the electricity sector also subject to projected delays in the installation of variable renewable capacity by 2030. Downward revisions to the assumed level of progress against CAP targets by 2030 across all energy-related sectors drive up the projected overshoot of the aggregate energy emissions ceilings in CB2.

Figure 6: Cumulative greenhouse gas emissions from energy sectors and industrial processes

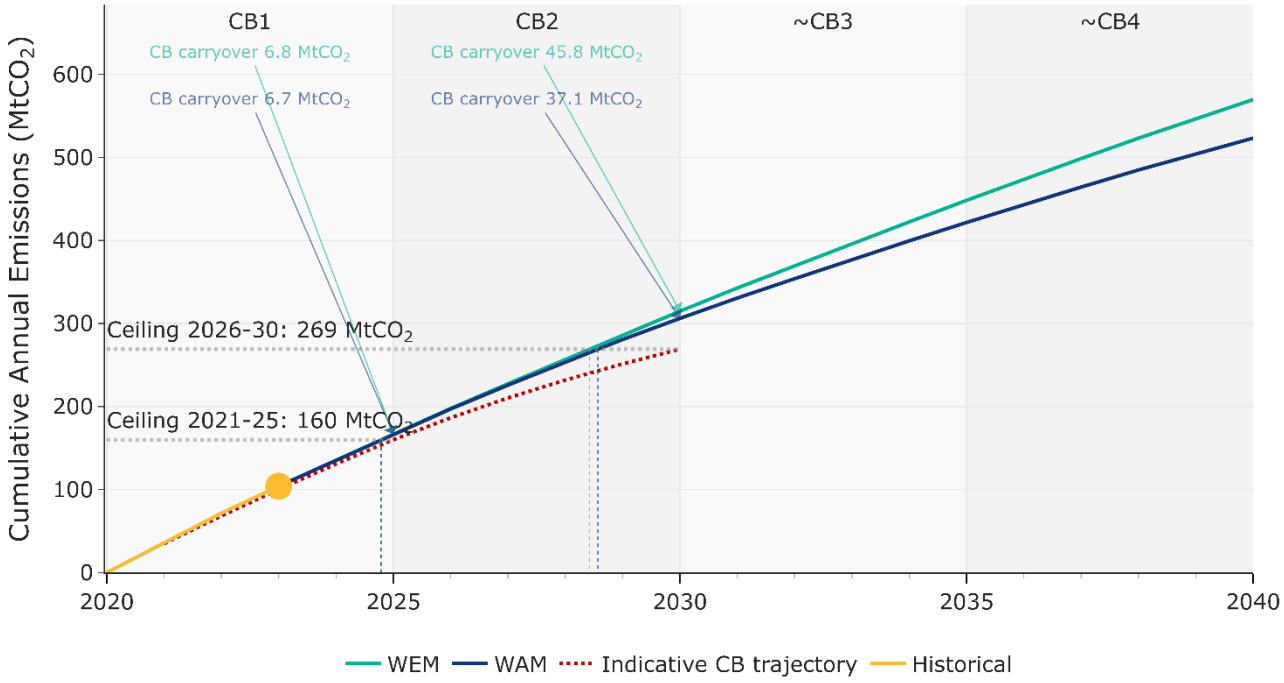
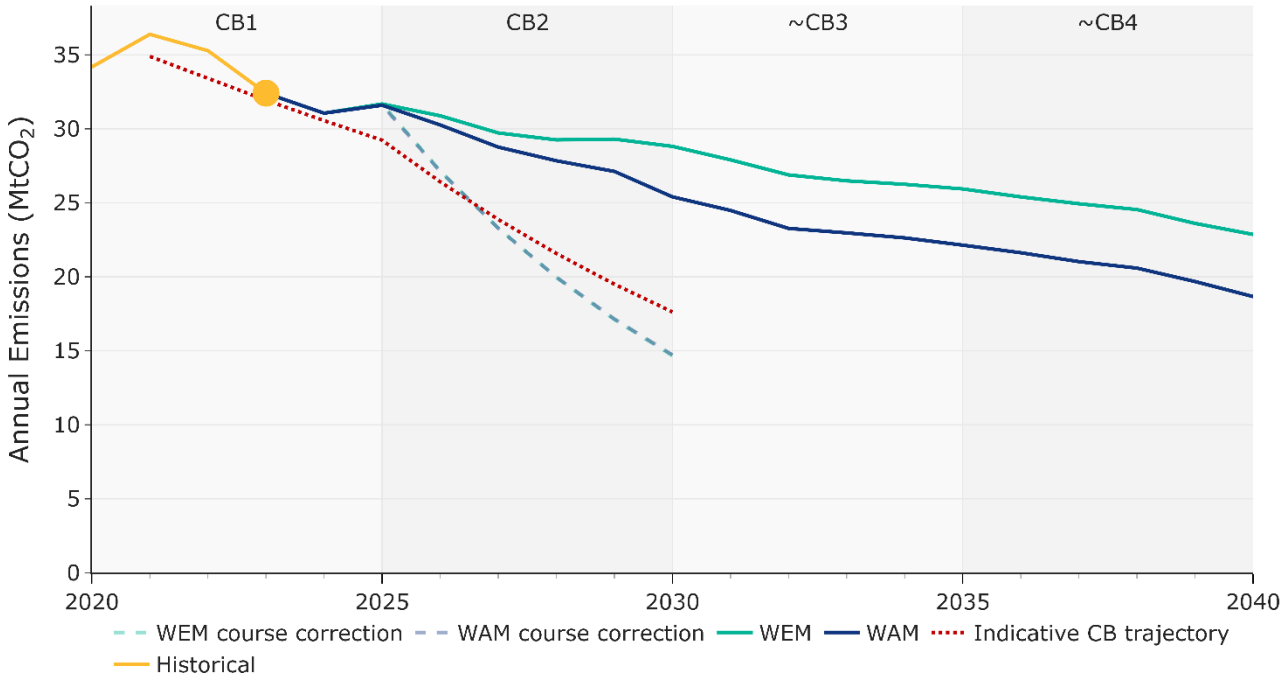


Table 6: Projected exceedance of sectoral ceilings for energy sectors and industrial processes

Total energy and industrial process emissions	WEM	WAM
Projected CB1 sectoral emissions ceiling exceedance ($MtCO_2eq$)	6.8 (4%)	6.7 (4%)
Projected CB2 sectoral emissions ceiling exceedance (including CB1 carryover) ($MtCO_2eq$)	45.8 (17%)	37.1 (14%)

Figure 7 shows the annual emissions projected from energy use and industrial processes out to 2040 for the WEM and WAM scenarios and the indicative annual emissions trajectories required to stay within the sectoral emissions ceilings from 2021 to 2030. The dashed blue line illustrates a revised annual reduction trajectory that would be required to get back to compliance for the subsequent carbon budget period. The WEM and WAM correction for CB2 are equivalent, as the projected impact of WEM and WAM policies does not begin to diverge until 2026.

Figure 7: Annual greenhouse gas emissions from energy sectors and industrial processes



As in the case of the overall annual emissions projections, the anticipated delays in achievement against CAP targets for delivery by 2030 have sharply increased the pace of reduction required for Ireland to catch up to its climate obligation.

4 Sectoral progress assessment and critical success factors

4.1 Electricity

- The fastest pathways for reducing energy-related greenhouse gas emissions across Ireland include significant electrification of heat and transport. Eliminating fossil fuels from electricity generation as quickly as possible is critical to this wider decarbonisation success.
- Electricity imports have increased in recent years and this trend is expected to continue into the near future, resulting in a lowering of the projected exceedance of the electricity sectoral emissions ceiling in the first and second carbon budget periods.
- In all modelled scenarios presented in this report, the sum of variable renewable energy (VRE), e.g. onshore wind, offshore wind and solar, is the largest input to electricity generation by 2028, overtaking natural gas. However, due to assumed delays in the delivery of VRE installed capacity, the projected 2030 RES-E has dropped from last year's projections.
- A delay in the roll-out of all types of renewables poses large risks to Ireland's renewable energy targets under RED, which increased imports do not mitigate.
- Natural gas is projected to be the major source of emissions in the electricity sector by 2030. Though this use is projected to mitigate the need for higher carbon intensity generators in the near-term and then fall as it is replaced by renewable generation sources, delays in renewable projects and increased demand for electricity in the meantime make continued fossil fuel use in electricity a significant risk factor to carbon budget compliance.
- In the modelled scenarios, the electricity sector exceeds its sectoral emissions ceilings for the second carbon budget period by 2 $MtCO_2eq$ and 4 $MtCO_2eq$ in the WAM and WEM scenarios respectively (inclusive of 0.4-0.5 $MtCO_2eq$ projected carryover from the first carbon budget period).
- In the context of legally binding national and EU climate and energy obligations, the consequences of allowing new large electricity users, such as datacentres, to establish in Ireland are critical. If the scale and pace of renewable energy growth cannot exceed that of electricity demand, as has been the case for the past two years, then renewables are just abating further increases in emissions rather than delivering emissions reductions. The resilience of Ireland's power system to supply shocks, the affordability of electrification across all sectors, and the progress against binding energy and climate obligations are all subject to the demand strategy adopted now.

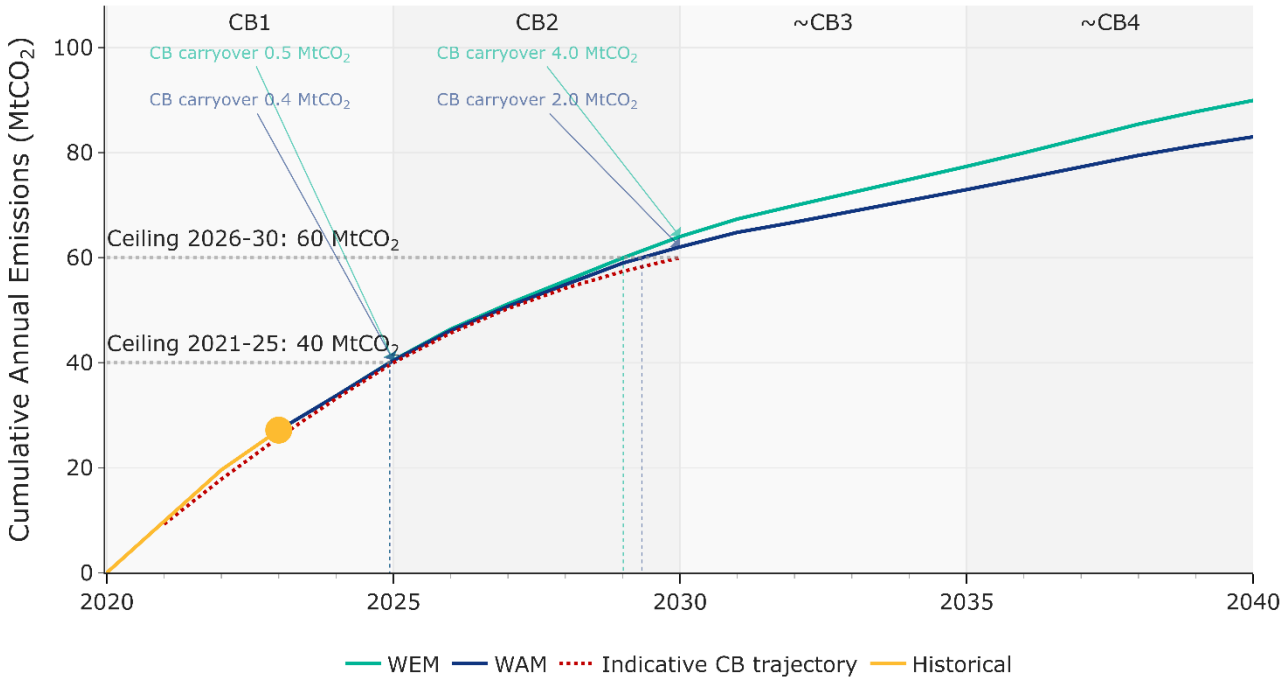
4.1.1 Electricity decarbonisation

The rate at which Ireland can decarbonise electricity generation is determined by four factors:

- The rate at which electricity demand grows.
- The rate at which renewable energy generation capacity is installed and integrated into the power system.
- The rate at which the carbon intensity of remaining non-renewable dispatchable generation is reduced (fuel switched).
- The scale and direction of cross-border interconnector trades.

The 2025 modelled scenarios project a narrower margin of exceedance of the electricity sectoral emissions ceiling for the first two carbon budgets, as shown in Figure 8. This is due in large part to recent changes in interconnector trades, as well as additional renewable capacity. Growing demand and delays in the delivery of further renewables and interconnection projects continue to increase the challenge faced in this sector, particularly as future obligations require steeper emissions reductions.

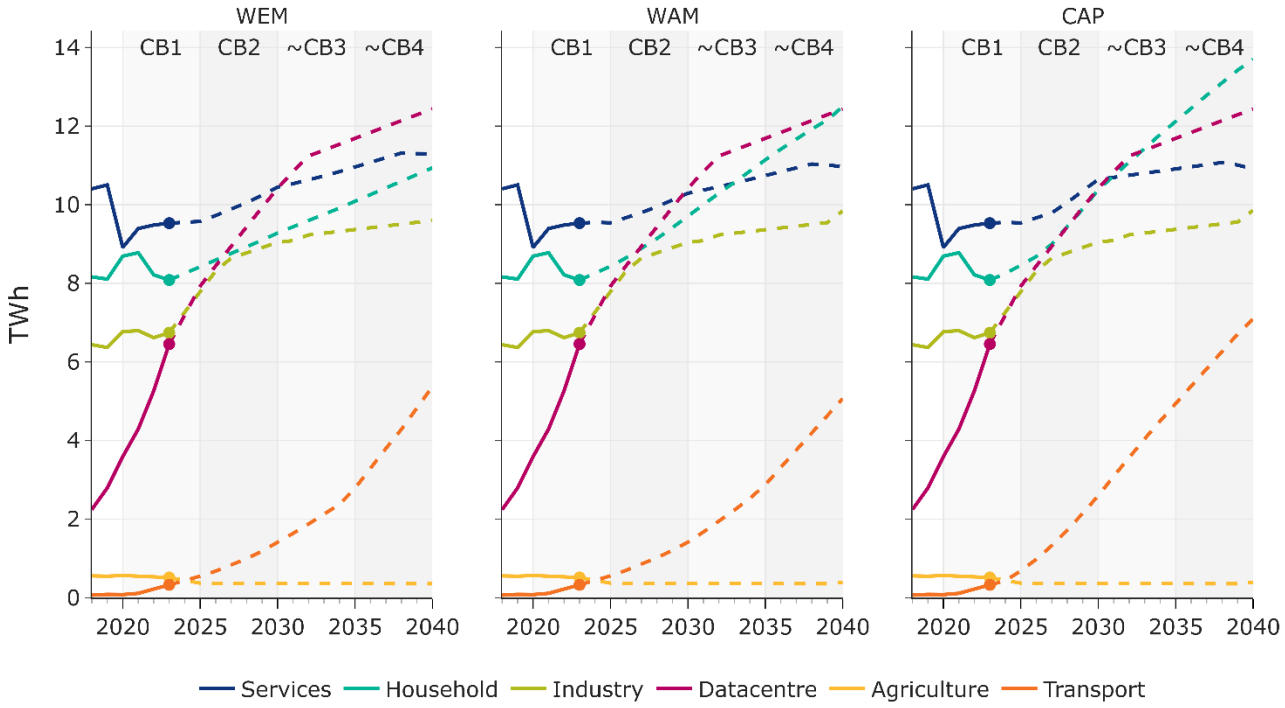
Figure 8: Cumulative greenhouse gas emissions from electricity generation



4.1.2 Electricity demand growth

Figure 9 shows projected final electricity consumption, which in the WEM scenario is approximately 41 TWh in 2030, an increase of 30% from 2023. Of this increase, 56% of final electricity consumption growth is anticipated to come from large energy users with the remainder mostly coming from transport and heat electrification. Further expansion of demand continues to pose a significant challenge to the electricity sector, as data centre growth exceeded VRE output in 2023 and 2024. Such expansion will strain progress to RES-E targets and steepen electricity costs, particularly when paired with delays to crucial grid infrastructure projects.

Figure 9: Final electricity consumption by scenario



For the WEM and WAM scenarios, the projected growth in datacentre electricity demand out to 2032 is taken from EirGrid's latest Median scenario at the time of input-data freeze.[21] EirGrid also produce Low and High demand scenarios. The High scenario assumes that a higher share of the currently contracted datacentre capacity is used (3.7 TWh of electricity consumption in addition to the growth already assumed in the Median scenario by 2030), though it still assumes that some attrition of contracted datacentre demand will occur. It is evident that the scale of energy consumption growth from datacentres is currently on a path to significantly eclipse the electricity consumption growth of any other sector over the second carbon budget period.

4.1.3 Delivery timeline of renewable electricity generation capacity

Table 7 shows the assumptions for VRE capacity for 2030 for each modelled scenario. One notable change in the projections assumptions this year is that the WAM scenario no longer includes installed capacities of solar and wind generation that meet the CAP Renewable Energy Share in Electricity (RES-E) target of 80% RES-E by 2030. Revisions to assumptions on delivery timelines have reduced the 2030 WAM RES-E to 68%, closer to the 2030 WEM value in last year's projections. The WEM scenario likewise assumes a slower rate of delivery of renewable electricity generation this year, leading to a RES-E of 60% by 2030.

[21] EirGrid and SONI, "Generation Capacity Statement 2023-2032", Jan. 2024. [Online]. Available at: https://cms.eirgrid.ie/sites/default/files/publications/19035-EirGrid-Generation-Capacity-Statement-Combined-2023-V5-Jan-2024.pdf

Table 7: Assumptions for year-end VRE capacity and resulting modelled RES-E

Parameter / Variable	Year	WEM	WAM	CAP
RES-E (%)	2030	60	68	80
Onshore Wind Capacity (GW)	2030	6.8	7.1	8.5
Offshore Wind Capacity (GW)	2030	1.4	2.7	3.8
Solar PV Capacity (GW)	2030	5.7	6.3	8.3

4.1.4 Risk of delays

In agreeing the assumptions for the modelled scenarios, risk of delays in the level of achievement by 2030 has been examined across the CAP targets. The VRE capacity assumptions are based on surveys of expert stakeholders conducted to determine forecasts of plausible rates of generation deployment out to 2040.[22]
Figure 10 shows the assumptions used for the roll-out of offshore wind, for which survey results indicate the risk of under-delivery of CAP targets is highest. As a high-level approximation of project build-out across a given year, the installed capacities are assumed to increase at the end of each quarter (March, June, September, and December).[23,24]

Delays in offshore wind have a significant impact on the achievability of RES-E 2030 targets due to its high capacity factor. Figure 11 illustrates the impact of the varying rates of deployment by scenario on the level of RES-E to 2040. The WEM and WAM scenarios show a delay in reaching 80% RES-E by two to four years, though the risk of further delay is still possible given the level of complexity involved in delivering projects of this scale.

[22] SEAI, "Forecasts of plausible rates of generation technology deployment 2024 – 2040", Jan. 2025. [Online]. Available at: https://www.seai.ie/sites/default/files/publications/dess-rates-of-generation-technology-deployment.pdf
[23] If a quarterly increase would be less than the typical size of a project, it is deferred to a biannual or annual increase as appropriate.
[24] Cumulative capacity limits are placed on each technology to reflect national spatial constraints; however, these limits are not hit prior to 2040 in the modelled scenarios.

Figure 10: Offshore wind generation capacity deployment

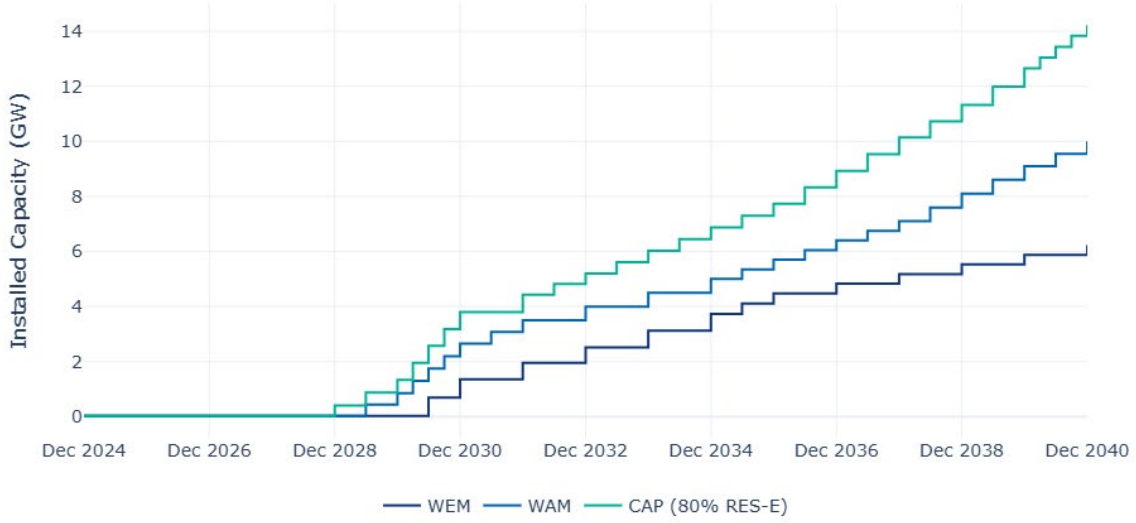
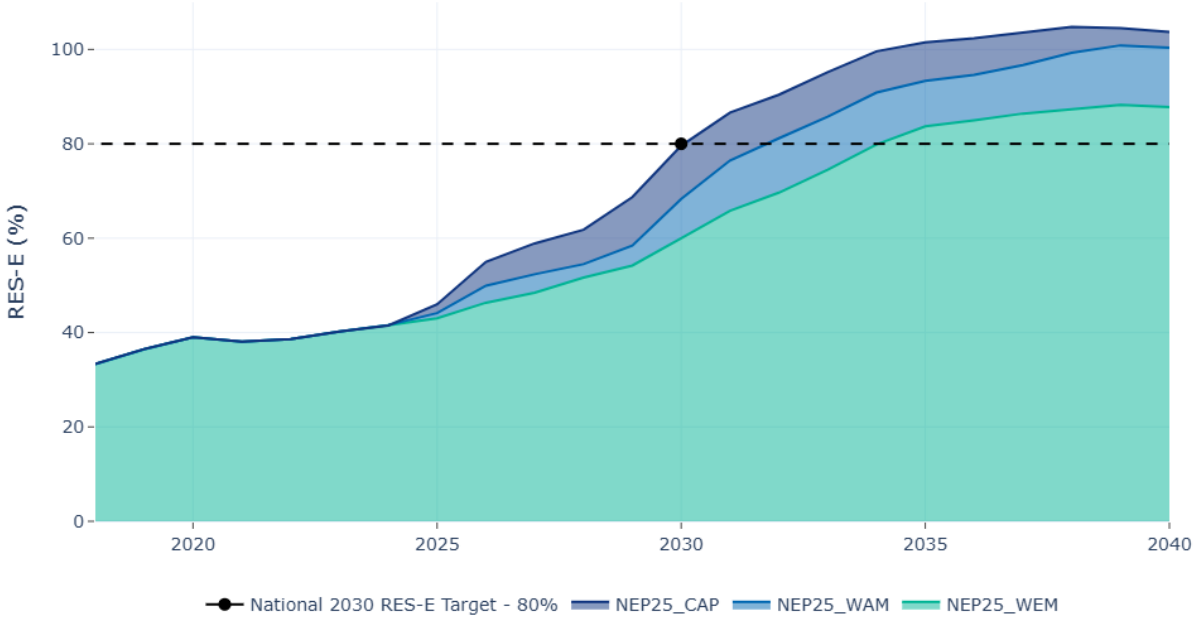


Figure 11: Projected progress to RES-E target by scenario



4.1.5 Cross-Border Interconnection

Since April 2023, imports to the Single Electricity Market (SEM) across interconnectors from Great Britain have increased significantly, corresponding to a period in which UK Emissions Trading Scheme (ETS) allowances have been lower than that of the EU ETS, offset to some degree by the UK Carbon Price Support. Ireland's interconnector capacity increased in April 2025 with the addition of the Greenlink interconnector. The high volume of imports to Ireland has contributed significantly to a reduction in emissions related to electricity generation in Ireland over the last number of years.

One anticipated unknown in the near-term is the implementation and outcome of EU's Carbon Border Adjustment Mechanism (CBAM), due to come into effect in 2026. The National Energy Projections assume that the result of this will be the alignment of EU ETS and UK ETS, and in May 2025 the European Commission and the United Kingdom agreed to work towards establishing a link between their emission trading systems.[25]

The role of interconnection is expected to continue to grow across Europe. With respect to Ireland, the Celtic interconnector to France is under construction, while others are in the planning stage. The 2025 National Energy Projections reported here assumed that both Celtic and the second North-South interconnector would be operational from January 2027. However, in March 2025 it was released that North-South is expected to be delayed until October 2031, and in July 2025, it was announced that there would be a delay to the Celtic Interconnector until Spring 2028.[26],[27]

SEAI modelled sensitivities on the WEM and WAM scenarios to estimate the potential impact of these delays on CO_2 emissions, finding that with Celtic and North-South delayed as reported in 2025, the most significant increase in projected emissions is in 2027 and 2028. The sensitivity projects an increase in cumulative emissions during the second carbon budget of approximately 1.6 $MtCO_2$ in the WEM scenario, whereas in the WAM scenario the value is approximately 1.2 $MtCO_2$. The source of the emissions increase is the increased dispatch of natural gas-fired power generation in Ireland, which compensates for the reduction in imported electricity. Mitigating any further delays to the Celtic interconnector is a critical carbon abatement measure, as its strong import behaviour has a significant benefit for emissions in Ireland. This is particularly the case if the delivery of offshore wind were to be delayed beyond the dates modelled in this study.

4.1.6 Critical success factors and opportunities for electricity

Electrification is a key lever for decarbonisation of energy use across many sectors, and thus the timely decarbonisation of electricity generation is crucial to meeting Ireland's climate obligations. Unlike the electrification of heat and transport, growth in new electricity demand from large energy users like datacentres does not displace fossil fuel use elsewhere in the economy. This addition to demand is a risk to decarbonisation progress, especially given delays in the installation of renewable generation capacity.

This is not only the case for the electricity sector's national greenhouse gas emissions reduction obligations, but also its total final energy consumption and renewable energy share obligations under the EU targets for the EED and RED. The surge in usage of generative artificial intelligence (AI) will compound issues of unprecedented additional demand.

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[25] European Commission, "Questions and answers on the package agreed at EU-United Kingdom Summit", May 2025. [Online]. Available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_25_1268

[26] EirGrid and SONI, "All-Island Resource Adequacy Assessment 2025-2034", Mar. 2025. [Online]. Available at: https://cms.eirgrid.ie/sites/default/files/publications/AIRAA-2025-2034.pdf

[27] EirGrid, "Celtic Interconnector, Project Updates", July 2025. [Online]. Available at: https://www.eirgrid.ie/celticinterconnector#project-updates

- New demand should be carefully assessed and managed, especially in advance of scaled up renewable capacity.

The scalable deployment and integration of VRE into the electricity system is a complex challenge, and its value in delivery toward Ireland's energy and climate obligations is dependent on the concurrent success of many initiatives, including connections, network and policy developments, market design and regulation.[28,29,30]

- Planning permitting/consenting and grid-connection pathways should be optimised.
- Utilisation of existing grid infrastructure and resources should be maximised, and reductions of existing renewable capacity should be avoided.
- Social acceptance and community project support should be maintained and improved.

The long lifetime of power generation plants necessitates the urgent need for policy to incentivise companies to transition from conventional fossil-fuel generation to low-carbon alternatives.

- The most suitable technologies from a cost, risk and sustainability perspective should be identified and adequate market signals of opportunity provided.

Government has tasked SEAI with developing an evidence-based pathway to decarbonising the electricity system and SEAI proposed a Decarbonised Electricity System Study.[31] The study will identify and compare viable pathway options to support government policymaking for the electricity sector including decisions on which power generation technologies should be prioritised.

[28] EirGrid, "Shaping Our Electricity Future". [Online]. Available at: https://www.eirgrid.ie/shaping-our-electricity-future

[29] ESB Networks, "National Network, Local Connections Programme". [Online]. Available at: https://www.esbnetworks.ie/who-we-are/national-network-local-connections-programme

[30] ESIG, "Reports & Briefs". [Online]. Available at: https://www.esig.energy/reports-briefs/

[31] SEAI, "Decarbonised Electricity System Study". [Online]. Available at: https://www.seai.ie/renewable-energy/decarbonised-electricity-system-study

4.2 Transport

- Oil is still expected to dominate energy use in the transport sector by 2030, despite progress in switching to electric vehicles and avoiding vehicle journeys through modal shift and increased public transportation.
- The transport sector is projected to exceed its sectoral ceilings for both the first and second carbon budget periods, with 21-27% cumulative carryover into the next programme of budgets by 2030.
- There has been progress in the "Avoid-Shift-Improve" policy strategy to reduce the need for private vehicle travel and to shift journeys to more efficient and sustainable travel modes, though there is significant risk of delay in the delivery of large infrastructure projects which will be critical to mitigate to meet Ireland's energy and climate obligations.
- With transport comprising a significant share of energy consumption in Ireland, the feasibility of narrowing the gap to Ireland's final energy consumption obligations under the EED is critically dependent on the timely achievement of planned demand reduction measures in transport, as well as the introduction of similar targeted demand strategies across other sectors.

4.2.1 Transport decarbonisation

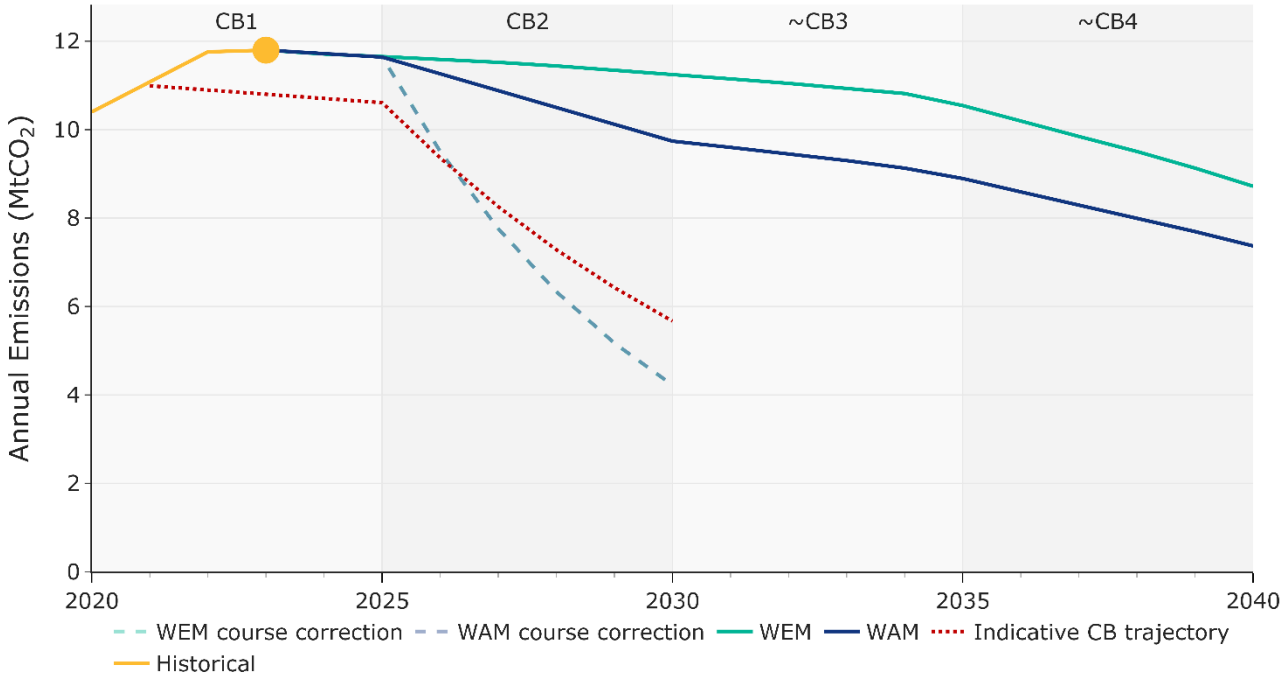
The government has adopted the "Avoid-Shift-Improve" strategy to decarbonise transport energy use. This framework is summarised as follows.[32]

- Avoid: Reduce the frequency and distance of trips.
- Shift: Move towards more environmentally friendly modes of transport, such as walking, cycling or using public transport.
- Improve: Decarbonising remaining vehicle energy use.

Figure 12 shows the annual pace of emissions reductions needed to comply with the sectoral emissions ceiling for transport relative to projections for the WEM and WAM scenarios. Transport emissions have consistently exceeded required levels, necessitating a very steep pace of reduction to get back on track in the second carbon budget period.

[32] Department of Transport, "National Sustainable Mobility Policy", Apr. 2022. [Online]. Available at: https://www.gov.ie/en/publication/848df-national-sustainable-mobility-policy/

Figure 12: Annual greenhouse gas emissions from the transport sector



The following sections discuss some of the main uncertainties relating to each of the factors targeted in the Avoid-Shift-Improve strategy that continue to contribute to emissions exceedance in this sector.

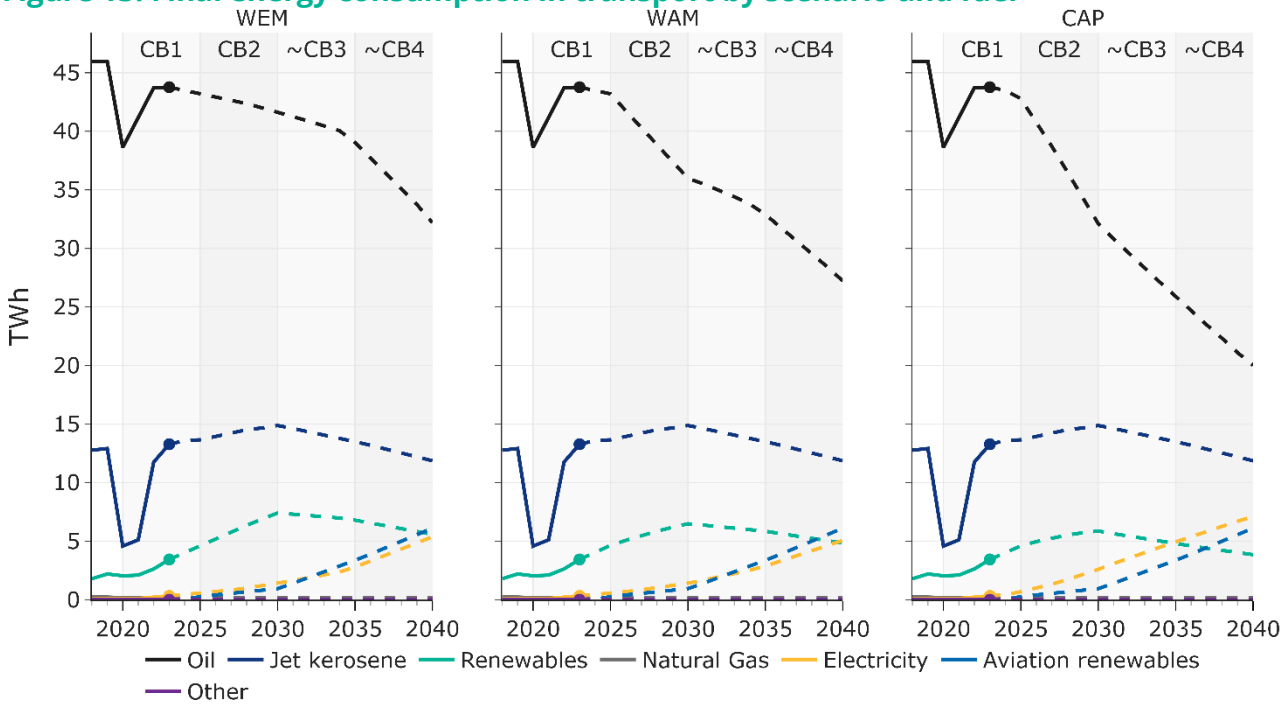
4.2.2 Transport energy demand

A key objective in this strategy is to reduce the activity of private cars and goods vehicles, and to increase public transport and active travel journeys, including a targeted 20% reduction of total vehicle kilometres relative to a 2019 base year.

Figure 13 shows the change in projected fuel use in transport to 2040 by scenario. Road transport activity levels are based on projections of private car and goods vehicle activity from the National Transport Authority (NTA).[33] The WEM scenario includes the impact of public transport measures that have been committed to, such as Dart+, Bus Connects and Cork commuter rail. The WAM scenario includes the measures in the WEM scenario, plus the impact of several measures planned to reduce demand in the sector, primarily through modal shift away from private car journeys. The rapid pace of targeted switching from oil can also be seen in the CAP scenario, and this projected rate reduces in the WAM and WEM scenarios as the level of modal shift and EV adoption assumed has been adjusted downward.

[33] The NTA projections were carried out on behalf of the Department of Transport to demonstrate a pathway to meeting the 2023 Climate Action Plan (CAP23) targets for the sector, but the NTA modelling was carried out separately from the development of the National Energy Projections and does not align exactly with the WEM and WAM scenario definitions. The WAM scenario included all the demand reduction measures included by the NTA in their CAP23 scenario, except for the additional demand reduction modelled by the NTA as an increase in fuel prices.

Figure 13: Final energy consumption in transport by scenario and fuel



There remains significant uncertainty as to the future growth potential in aviation energy use over the medium to long term. All modelled scenarios for these projections assume growth rates for aviation energy use aligned with modelling carried out by EUROCONTROL.[34]

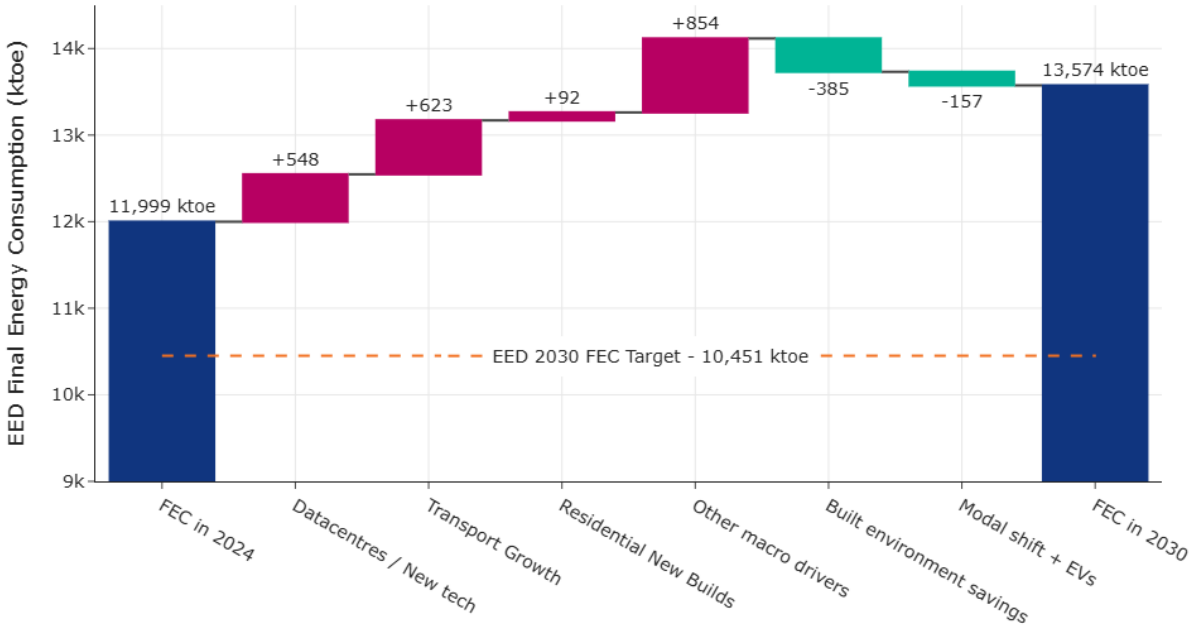
Though aviation energy use is not currently directly accounted for in carbon budgets, growth in aviation energy use will make it significantly more challenging for the transport sector and consequently Ireland to deliver its share of reduction in final energy consumption (FEC) by 2030 as required by the Energy Efficiency Directive, where it is counted.[35] It's clear from Figure 14 that measures in transport will be a critical component in meeting this target, especially when it comes to demand reduction through modal shift. The WAM scenario projects a higher level of delivery of demand reduction measures in transport (illustrated in 14 (b) by the larger green bar), which if successfully delivered would make a significant contribution towards narrowing the gap to the EED target.

[34] EUROCONTROL, "EUROCONTROL Forecast 2024-2030", Feb. 2024. [Online]. Available at: https://www.eurocontrol.int/publication/eurocontrol-forecast-2024-2030

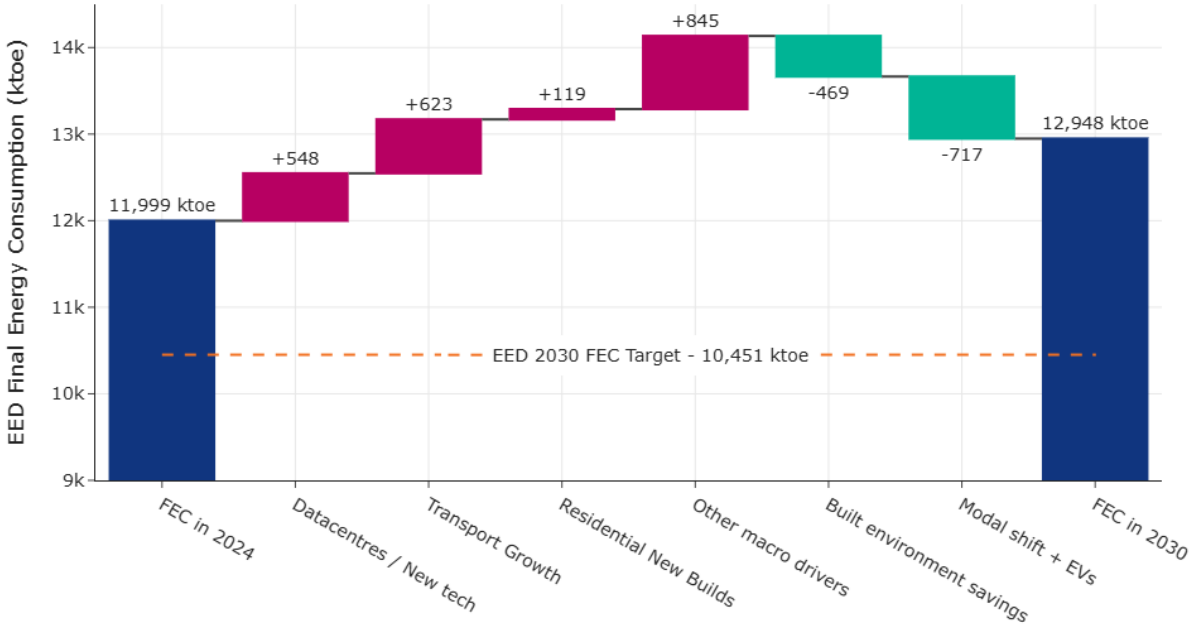
[35] The greenhouse gas emissions from international aviation are not counted towards Ireland's national or international greenhouse gas emissions reduction obligations, however the energy use of international aviation is counted for Ireland's EU Energy Efficiency Directive obligation to reduce final energy use.

Figure 14: Contributions to EED FEC target progress to 2030 by scenario

(a) WEM



(b) WAM



EV uptake

One of the high-profile targets contained in recent CAPs is for 100% of new cars to be EVs by 2030. The revision to this year's projections indicate that it is increasingly unlikely that 100% of all new cars and pre-owned imports will be EVs by 2030 in the absence of strong measures to discourage the purchase of new and pre-owned imported internal combustion engine (ICE) vehicles.[36]

For the WAM scenario 13% of private cars are projected to be BEVs by 2030 compared to the CAP24 target for 30%. The projected EV stock in all scenarios for 2030 is shown in Table 8.

Table 8: EV stock in 2030 by scenario

	2024	WEM 2030	WAM 2030	CAP 2030
BEV share of new car sales	14%	35%	50%	80%
PHEV share of new car sales	10%	30%	30%	20%
BEV share of pre-owned-imports	3%	5%	8%	33%
PHEV share of pre-owned-imports	13%	25%	25%	60%
BEV share of total car stock	3%	11%	13%	24%
PHEV share of total car stock	3%	11%	11%	11%
EV share of total car stock	6%	22%	25%	36%

4.2.3 Critical success factors and opportunities for transport

Transport still accounts for over 42% of Ireland's energy use, according to the 2024 Full Energy Balance, and much of this comes from international aviation. Aviation is a large factor in successfully meeting EU targets like the EED based on total final consumption.

- Growth in aviation must be assessed and managed for the challenge it presents to reaching EU energy obligations, even if it not directly counted toward national carbon budgets.

There are many systemic barriers to achieving significant levels of modal shift away from private car use in Ireland, including embedded travel patterns based on housing development and infrastructure prioritising car travel.

- Sustainable mobility options nationwide should be improved and expanded, prioritising the reduction of car dependency.

[36] Pre-owned imports refer to second-hand vehicles imported from the UK into Ireland. In some years up to 50% of all new vehicles added to the Irish car fleet have been second-hand vehicles from the UK. It is important that any measures to disincentivise new ICE vehicles also apply to this market.

The National Sustainable Mobility Policy and the accompanying action plan aim to address this and other opportunity areas. Progress on a range of critical public and active transport infrastructure continues to provide opportunities for modal shift, but full implementation and delivery of the policies and measures contained in this plan will be critical to achieving the targets for road transport demand reduction set in CAP.[37]

These projections illustrate that, at the current pace of progress, Ireland is unlikely to meet the goal of converting all new vehicle sales to EVs by 2030.

- Measures to strongly disincentives purchases of new and pre-owned imported ICE vehicles should be urgently implemented and sustainable alternatives should be supported.
- Remaining barriers to EV use should be removed to provide an affordable option to all Irish residents.

Public EV charging infrastructure, as referenced in the EV Charging Infrastructure Strategy 2022-2025 will be a key enabler to meeting this goal.[38] Other key enablers of the decarbonisation of private car transport should include incentives to phase out old ICE vehicles and to encourage the adoption of smaller, lighter and more efficient vehicles over larger vehicles like sports utility vehicles (SUVs).

[37] NTA, "Annual Report & Financial Statements 2023", Aug. 2024. [Online]. Available at: https://www.nationaltransport.ie/wp-content/uploads/2024/08/NTA-Annual-Report-Financial-Statements-2023-ENG.pdf

[38] Department of Transport and ZEVI, "EV Charging Infrastructure 2022-2025", Jan. 2023. [Online]. Available at: https://www.zevi.ie/publications/ev-infrastructure-strategy-2022-2025

4.3 Built environment

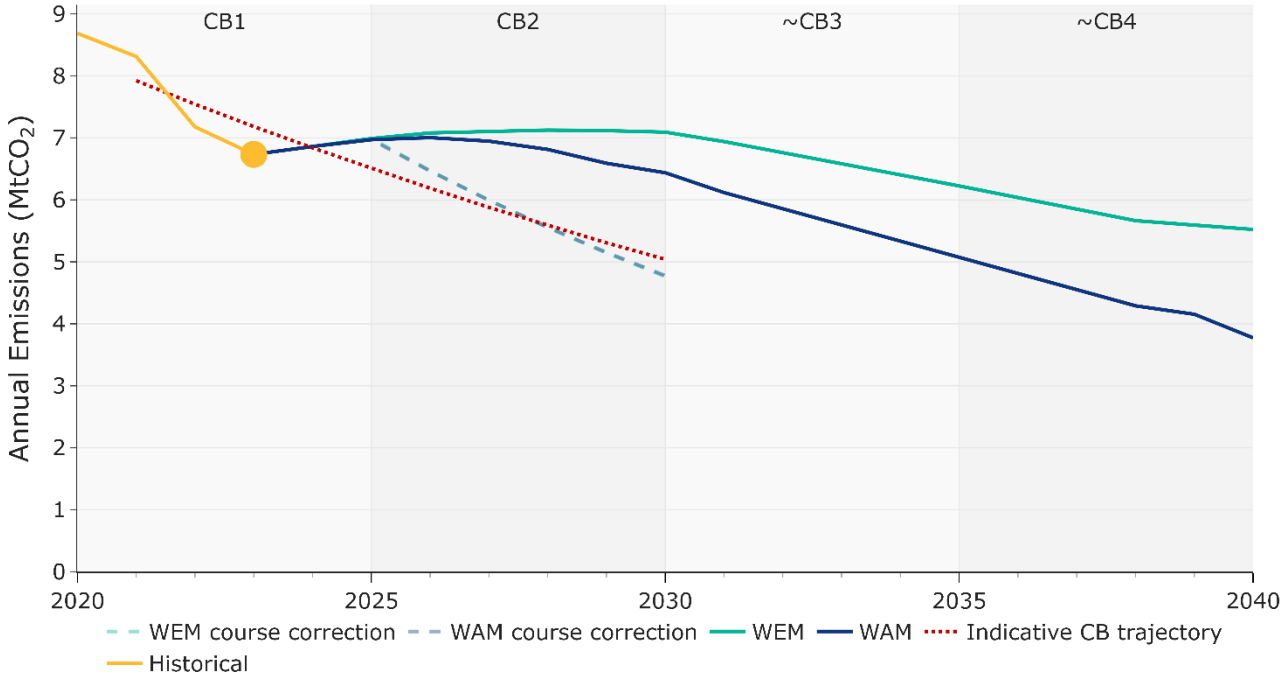
- In all reported scenarios, oil use in buildings declines more slowly out to 2040 in these projections, due to lower projected uptake of lower carbon heating alternatives in the absence of a clear fossil fuel boiler phase-out date
- In the WAM scenario, the assumed number of heat pumps expected to be installed in existing dwellings is not assumed to hit CAP targets, as ongoing barriers to uptake of energy upgrades continue to pose challenges despite significant progress.
- In the WEM and WAM scenarios, the residential sector is projected to stay within its first carbon budget ceiling, whilst the commercial sector is projected to exceed it by 0.2 $MtCO_2eq$. Both sectors are expected to exceed their second carbon budget ceilings, with the cumulative exceedance for the build environment reaching 5.8 $MtCO_2eq$ and 7.6 $MtCO_2eq$ by the end of the second budget period in WEM and WAM respectively.
- The level of projected delivery by 2030 of district heating networks has been revised significantly downward from last year, as the scale of the delivery challenge poses a significant risk to delayed progress on additional identified schemes.
- Affordability of alternatives continues to be a significant barrier to removal of fossil fuel heating systems in existing buildings.

4.3.1 Built environment decarbonisation

To succeed across all energy and climate obligations in reducing energy consumption, increasing renewable energy share in heating and decarbonising the built environment, thermal efficiency of buildings must be improved in parallel to reducing energy demand and replacing fossil fuel heating systems.

Figure 15 shows the annual pace of emissions reductions needed to comply with the sectoral emissions ceiling for the built environment relative to projections for the WEM and WAM scenarios.

Figure 15: Annual greenhouse gas emissions from the built environment



Affordability of energy upgrades and renewable heating technologies continues to be a significant obstacle to progress, with limited household budgets and uncertainty over the longer-term affordability of electricity over fossil fuels. Demand reduction also poses a challenge as continued growth and energy rebound remain risks to meeting demanding energy consumption obligations even with significant improvements in energy efficiency.[39]

4.3.2 Building efficiency upgrades and heat pump deployment

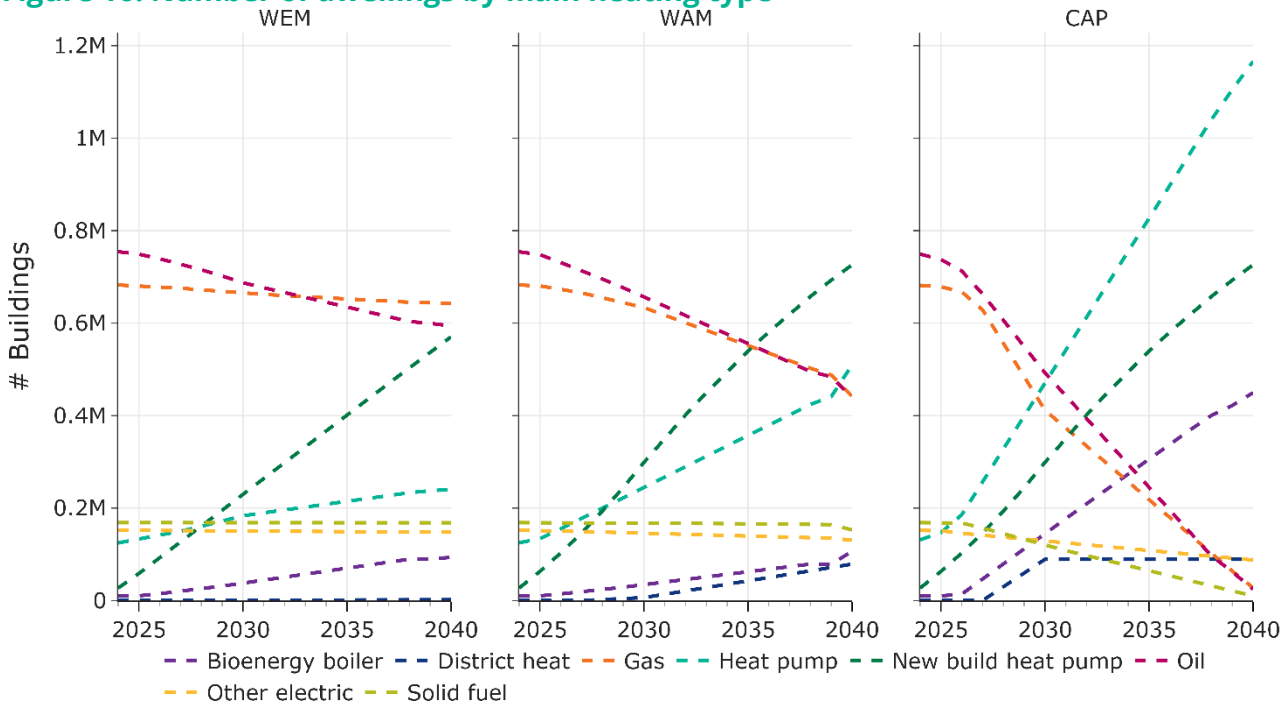
CAP24 sets out an approach for achieving 3.5 $MtCO_2eq$ reduction in greenhouse gas emissions from the residential sector by 2030, with 2 $MtCO_2eq$ reduction to be achieved through retrofitting and heat pump installation in existing houses. In 2024, SEAI reported nearly 54,000 property upgrades delivering 68 $ktCO_2eq$ of savings, of which 21,800 upgrades met at least a B2 standard.[40] Though more building upgrades are completed each year, the pace is not yet as quick as it needs to be to ensure timely achievement of the sector's decarbonisation target. Additionally, many B2s are achieved through the installation of solar PV which does not contribute to this target. To get the full impact of energy efficiency upgrades to dwellings, the switch to a lower carbon heating alternative such as heat pumps must be made.

[39] The rebound effect, in general terms, describes the observation that potential energy savings from efficiency improvements are offset by a resulting increase in energy service demand. In the case of home energy upgrades, direct rebound happens when households enjoy some or all of the benefits of improved efficiency in the form of a warmer, more comfortable home, instead of reducing their energy bills.
[40] SEAI, "National Retrofit Plan: Full Year Report 2024", Apr. 2025. [Online]. Available at: https://www.seai.ie/sites/default/files/publications/SEAI-Retrofit-Full-Year-Report-2024.pdf

The rate of installation of heat pumps annually, however, still lags significantly behind the pace that would be needed to meet the target of 400,000 heat pumps installed in existing dwellings over the 2019-2030 period. While schemes have been developed to increase uptake, including the addition of a low interest Home Energy Upgrade Loan Scheme, remaining challenges in the construction sector and potential changes in consumer priorities in the face of high costs make targets difficult to hit and reduce projected energy and savings potential in the residential sector over the near term.[41]

Figure 16 shows the projected dwellings in the modelled scenarios by main heating type. Here it is evident that, though the number of heat pumps is increasing through new build installations, heat pumps in existing dwellings are projected to be installed at a significantly slower rate in the WEM scenario and even the WAM scenario than under the CAP scenario.

Figure 16: Number of dwellings by main heating type



For the modelled scenarios, assumptions on the level of supports available to drive uptake of energy upgrades are inputs to the model and the outputs include a projected uptake rate based on payback periods and surveys of consumers' willingness to pay. For the WEM scenario, this includes the suite of current grants and supports and the continuation of current levels of retrofitting within the local authority housing stock.[42] This results in a projected uptake of 81,400 heat pumps installed in existing dwellings in the period from 2019 to 2030 in the WEM scenario.

[41] SBCI, "Home Energy Upgrade Loan Scheme". [Online]. Available at: https://sbci.gov.ie/products/home-energy-upgrade-loan-scheme

[42] SEAI, "Home Grants". [Online]. Available at: https://www.seai.ie/grants/home-energy-grants/

In the WAM scenario, these supports are increased in line with projected potential additional government spend, including full achievement of local authority retrofit targets. The resulting uptake is 143,000 heat pumps in existing dwellings by 2030, falling significantly short of the CAP target of 400,000 over the 2019-2030 period.

For the commercial and public services sector, CAP24 sets an overall greenhouse gas emissions reduction target from decarbonisation of heat in the sector, but without specific targets for numbers of building upgrades or heat pump installations, there remains some uncertainty on how target CO_2 savings will be achieved. The forthcoming National Building Renovation Plan due in 2026 should provide more clarity on the targets for upgrading the stock of existing buildings.

Several barriers to the efficient scaling of heating and cooling decarbonisation remain, including:

- The gap between electricity and fossil fuel prices results in a lack of clarity or comfort over upfront costs and ongoing operating costs of low carbon options over time.
- There are still some common misconceptions about heat pump suitability that may discourage building owners.
- The decision to replace a heating system is often brought about urgently when the existing system breaks down making occupants less likely to explore low carbon alternatives.
- There are still market and construction sector barriers that can often increase costs or extend the timeline for making the switch.

To overcome these barriers, it is crucial to address concerns about affordability, suitability and availability of minimally disruptive alternatives to fossil fuel systems. This must be done through a combination of measures, including:

- Improvements in incentive design to encourage earlier adoption
- Provision of short-term alternatives with a clear phase-out plan
- Pricing structure and market reform to allay longer-term cost concerns

SEAI continues to undertake research to support heat pump deployment in Ireland, including the Heat Pump and Heat Loss Indicator Research Pilot and the 2024 report: Encouraging heat pump adoption in heat pump ready oil-heated homes.[43,44] There is an ongoing need for evidence-based research to accelerate heat pump adoption that includes robust real-world energy use monitoring data to support policymakers and highlights the most appropriate solutions for current and potential heat pump users.

[43] SEAI, "Behavioural Energy and Travel Tracker: Results report 1 – heating season 2022/2023", Dec. 2023. [Online]. Available at: https://www.seai.ie/data-and-insights/behavioural-insights/publications/behavioural-energy-and-tr/

[44] SEAI, "Behavioural Energy and Travel Tracker: Results report 2 – Summer 2023", June 2024. [Online]. Available at: https://www.seai.ie/data-and-insights/behavioural-insights/publications/behavioural-energy-tr-2/

4.3.3 District heating

CAP24 sets a target of 2.7 TWh of heat supplied by district heating networks by 2030 in Ireland. This year's WEM and WAM scenarios project that there will likely be a significant gap to this target by 2030. This represents a change in the approach from last year's WAM scenario due to the risk assessment approach implemented for key projections assumptions this year. While Ireland is projected to fall short of the target, there is improved monitoring of potential schemes feeding into a bottom-up estimation to replace a high-level target, providing more transparency on ongoing progress and delivery risks. In 2024, the District Heating Centre of Excellence was established for the identification and support of district heating projects in Ireland. Their analysis will be used on an ongoing basis to inform the projections as new schemes are identified and move into development.

The WEM scenario projects the completion of just two sizeable schemes for operation by 2030: the Tallaght District Heating Network (TDHN) and the Dublin District Heating Scheme (DDHS). The first phase of the TDHN opened in 2023 and there are plans for further expansion before 2030. The DDHS is not yet operational but is at an advanced stage of development with much of its infrastructure in place. These two schemes are projected to deliver 75 GWh/annum, amounting to just 2.8% of the CAP target by 2030. Nearly 90 more schemes the size of TDHN would need to be identified, planned and delivered by 2030 to reach the 2.7 TWh target, suggesting a high risk of delayed achievement of this scale of capacity.

Based on early analysis of the pipeline of potential projects currently identified by the District Heating Centre of Excellence in SEAI, the WAM scenario assumes that 0.214 TWh could feasibly be delivered by 2030, with 50% serving public buildings, 30% commercial and 20% residential. SEAI analysis suggests that large public or commercial sector heat users will act as the anchor tenants for most schemes at least initially, with a potential for a larger residential share as development matures. This total estimated delivery would result in just under 8% of the target achieved by 2030, leaving a large gap remaining and still requiring significant efforts to mitigate risks of delays.

District heating may be new to Ireland, but it is a long-proven technology in many EU countries. Ireland's rapid scale-up to meet the CAP ambition carries significant challenges with it, including:

- Rapid development of legislative and regulatory frameworks.
- Clear national technical standards and guidance for district heating schemes.
- Large upfront capital investment and clear market signals for stability over long payback periods.
- Parallel development of policies and supports to ensure growing project pipeline.

4.3.4 Critical success factors and opportunities for the built environment

Success in energy savings and decarbonisation in the built environment relies on the timely upgrading of the building stock including both fabric upgrades and full replacement of fossil fuel heating systems. Strategic planning is essential to efficiently target district heating projects in parallel to incentivising heat pump installations to help guide consumers and businesses toward the most appropriate low carbon alternatives in their area. Even with grants and loans supporting fabric upgrades, heat pump installations and other energy efficiency measures, legislation for the phase out of fossil fuel use in buildings is still a missing piece.

- Clarity on a fossil fuel phase-out date should be provided to give appropriate market signals and further incentivise uptake.
- Measures to address the spark gap between gas and electricity pricing on an ongoing basis should be implemented to provide assurance to customers of longer-term affordability of heat pumps.

These actions are critical to reach the pace of progress necessary to reduce energy use and decarbonise heating and cooling in Ireland in line with our energy and climate obligations.

Some recent developments to further support the rollout of district heating across the country include:

- The establishment of the District Heating Centre of Excellence within SEAI to provide support and guidance in development of district heating projects.
- Government approval of the General Scheme of the Heat (Networks and Miscellaneous Provisions) Bill 2024 to set policy direction to deliver district heating networks across Ireland.[45]
- Pre-construction development cost support of €5 million allocated in July 2025 through the Climate Action Fund (CAF).

These developments are a promising start on Ireland's district heating pathway, but continued support and timely completion of these projects will be crucial to serving areas that are most viable for district heating and providing an affordable and stable future for all district heating suppliers and consumers.

[45] DCEE, "Heat (Networks and Miscellaneous Provisions) Bill 2024", Nov. 2024. [Online]. Available at: https://www.gov.ie/en/department-of-climate-energy-and-the-environment/publications/heat-networks-and-miscellaneous-provisions-bill-2024/

4.4 Industry

- The share of fossil fuel use in industry is projected to still be close to 50% by 2030, falling short of the CAP target to reduce the share to 23-40% by this date.
- In all scenarios, the industry sectoral emissions ceilings for the first and second budget period are projected to be exceeded, with a cumulative exceedance of 9.7 to 10 $MtCO_2eq$ by 2030 in the WAM and WEM scenarios, respectively.
- Heat pumps offer an alternative for low-medium temperature heat applications, though uncertainty remains as to the potential scale and pace of uptake given the gap between electricity and fossil fuel prices.
- Sustainably produced biomethane is seen as especially important for decarbonising industry but the scale of biomethane production to date is of the order of 1% of the 2030 target. Clarity is needed on the proposed support mechanism for biomethane; on feasible ramp-up rates for sustainable biomethane production in Ireland; and in which sectors biomethane is most likely to be used, as the assumption in these projections is that most would be taken up by datacentres in the absence of an obligation that secures a share for decarbonising industry.
- Demand growth in industry continues to pose a severe challenge to meeting national and international climate and energy obligations. Measures to reduce this demand and avoid fossil fuel lock-in are critical to mitigate this risk.
- Early action is crucial for limiting the growth in cumulative emissions to meet our climate obligations. Focusing industry decarbonisation on renewable and electrification technologies that are commercially available today will result in lower cumulative emissions than alternative pathways that wait for technologies that will not be commercially available at scale this decade.

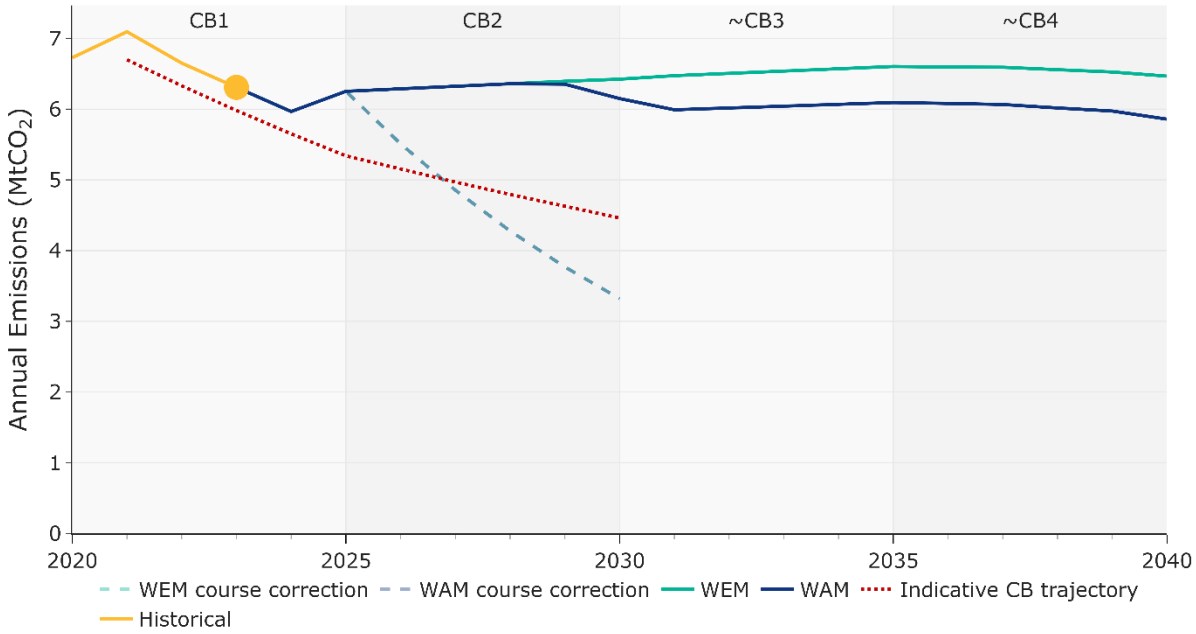
4.4.1 Industry decarbonisation

The government's 'Roadmap for the Decarbonisation of Industrial Heat' in 2024 outlines a high-level overview of the pathway to decarbonise industry in Ireland.[46] The roadmap identifies the following high-level approach:

- Implementation of energy monitoring and management systems for low-risk, low-cost reduction of emissions and costs, as well as improvements in energy performance.
- Electrification of heat initially targeted through switching to heat pumps and electric boilers for medium-low or low-grade heat applications.
- Application of technologies including biomass, biomethane and energy efficiency improvements for heat grades over 150°C, depending on site specifications.
- Support for businesses to ensure new growth and expansions are aligned with decarbonisation objectives.

Figure 17 shows the annual pace of emissions reductions needed to comply with the sectoral emissions ceilings for industry relative to projections for the WEM and WAM scenarios. Annual emissions have consistently exceeded the necessary trajectory to meet carbon budgets and so now require steeper reductions in the latter half of this decade to get back on track.

Figure 17: Annual greenhouse gas emissions from industry



[46] DETE, "Roadmap for the Decarbonisation of Industrial Heat", June 2024. [Online]. Available at: https://enterprise.gov.ie/en/publications/decarbonisation-of-industrial-heat-roadmap.html

4.4.2 Growth in industry energy demand

Industrial energy use in Ireland has been recently increasing again following a drop driven in large part by exceptionally high fossil fuel prices following the Russian invasion of Ukraine. According to the latest Energy Balance 2024, total final energy consumption in industry rose by 0.5 TWh (2%) relative to 2023, the third highest sectoral increase in energy use. Continued growth of energy use in this sector poses a significant challenge to meeting climate and energy obligations for the sector and contributes to the gap to national obligations.

4.4.3 Electrification of industry heat demand

The electrification of heating demand in industry is key to decarbonisation as many technologies are ready today, but early action is crucial to see the benefit of limiting cumulative emissions. Other technologies such as biomethane and hydrogen will also be important in decarbonising industry, but the scale of capacity needed to meet demand takes more time to develop.

Heat pumps offer an alternative for low and medium temperature heat applications (currently up to about 150 °C), especially in situations where there is a requirement for simultaneous heating and cooling, or where there are waste heat streams that can be utilised. The National Heat Study highlighted that approximately 10% of industry heat demand could be suitable for industrial heat pumps.[47] However, uncertainty remains as to the scale and pace of uptake that will be achieved.

4.4.4 Sustainable biomethane supply

CAP24 sets a target for the delivery of 5.7 TWh of biomethane capacity by 2030, 2.1 TWh of which is targeted for use in industry. Biomethane is an important low carbon alternative for this sector, particularly for high temperature applications. In 2024, government published the National Biomethane Strategy, outlining the intended policy approach for the development of an indigenous biomethane industry.[48] The Strategy states the need for Anaerobic Digestion (AD) plants primarily of a larger scale (around 40 GWh) supported by smaller farm scale plants (10-20 GWh) throughout the country. There is still uncertainty about the likely profile of AD plants in Ireland, but even if most AD plants were on the larger end of the scale Ireland would still require around 150 of these plants to meet the 5.7 TWh target through indigenous production.

There are a small number of AD plants currently in operation in Ireland, and a central grid injection point at Cush in County Kildare, but these only account for around 1% of the current 2030 target. A rapid scale up of biomethane production is needed to bridge the gap to the 2030 target. In the WEM scenario, 1TWh of biomethane is projected by 2030 due to commercial interest.

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[47] SEAI, "National Heat Study: Low Carbon Heating and Cooling Technologies", Feb. 2022. [Online]. Available at: https://www.seai.ie/data-and-insights/national-heat-study/low-carbon-heating-and-co

[48] DAFM and DCEE, "National Biomethane Strategy", May 2024. [Online]. Available at: https://www.gov.ie/en/publication/d115e-national-biomethane-strategy/

In July 2025, government approved the drafting of a Renewable Heat Obligation (RHO) Bill to obligate suppliers to demonstrate a portion of their energy is from renewable sources[49]. This RHO is planned to provide support for indigenously produced biomethane. The WAM scenario projects 4.3 TWh by 2030 to align with Gas Networks Ireland (GNI) best estimate production scenario from the Network Development Plan 2023. This is a downward revision in the WAM scenario compared to last year's projections, but there is still a significant risk to the timely delivery of biomethane production capacity, especially prior to the RHO being in place. It is also assumed in the WAM scenario that this delivery would be backloaded to the end of the decade. The split of the use of this biomethane is assumed to first meet road transport gas demand (quite small amount by 2030), followed by datacentre demand, followed by a split between other services and industry. Significant biomethane use by datacentres would be a risk to the pace of decarbonisation anticipated in other services and industry, and guidelines on use priorities could be addressed through the RHO.

AD technology is mature and well established within the EU; however, there will likely be significant lead-in times for ramping up indigenous production in Ireland allowing for financing, planning, development and construction of the large number of AD plants required. Therefore, the delivery timeline for biomethane is currently highly uncertain.

Some challenges include:

- The nascent nature of the industry in Ireland will necessitate additional technical expertise in the construction and operation of AD plants.
- Early stakeholder engagement and education is critical to gaining social acceptance for a significant infrastructure development.
- The scale of AD plant and infrastructure development will require significant resourcing within decision-making bodies to streamline planning, licensing, permitting and other essential processes to bring developments online.

4.4.5 Critical success factors and opportunities for industry

With electrification a key strategy for the decarbonisation of industry in Ireland, there are several critical enablers to ensure this can be achieved at a pace that aligns with our energy and climate obligations:

- It is crucial for new industrial energy demand to avoid fossil fuel lock-in in the coming decades and assess consequences of additional growth in areas such as manufacturing in advance of available renewable capacity at scale.
- The competitiveness of operating costs of electrification options with fossil fuel alternatives being used currently should be ensured. This could be achieved through measures to reform the electricity market to ensure the benefit of low-cost renewable generation can be passed on to consumers.

[49] DCEE, "Minister O'Brien secures government approval for the Renewable Heat Obligation Bill 2025", July 2025. [Online]. Available at: https://www.gov.ie/en/department-of-climate-energy-and-the-environment/press-releases/minister-obrien-secures-government-approval-for-the-renewable-heat-obligation-bill-2025/

- Other barriers to the electrification of industrial heat should be addressed, such as the availability and cost of electricity connection capacity for increased industrial electrical loads, including a flexible alternative to the standard firm electricity capacity connections currently in place.

The National Biomethane Strategy outlines that biomethane will be supported through a combination of the existing Renewable Transport Fuel Obligation (RTFO), the proposed Renewable Heat Obligation (RHO) and capital grants. The Strategy also highlights the importance of sustainability and has committed to the development of a Biomethane Sustainability Charter. This Charter will apply to all biomethane projects being developed in Ireland in receipt of any form of support or operating under the Renewable Heat Obligation and will cover AD plant developers and owners, those supplying feedstock into AD plants, plant operators, and those farmers acting as off-takers for the digestate. The Strategy leaves open the possibility that biomethane may be used for electricity generation. Where biomethane is used to generate electricity, only the energy content of the electricity generated counts towards our binding EU renewable energy targets.

- The priority uses of biomethane should be clarified through policy to ensure the highest impact on the use cases that are harder to decarbonise and the most beneficial to Ireland's overall RES.

Because of the high losses incurred in electricity generation from gas, potentially half of the renewable value would be wasted. In contrast, when biomethane is used for heat or transport, the full amount of biomethane consumed counts towards the RES target. Therefore, heat and transport uses will see the largest potential toward closing the gap to Ireland's renewable energy obligation.

Glossary

Term	Description
CAP / CAP21 / CAP24 / CAP25	Climate Action Plan / Climate Action Plan 2021 / Climate Action Plan 2024 / Climate Action Plan 2025
CB1 / CB2 / CB3	Carbon Budget period 1 (2021-2025) / period 2 (2026-2030) / period 3 (2031-2035)
CCAC	Climate Change Advisory Council
DSU	Demand Side Unit; an electricity demand site that EirGrid can instruct to reduce demand
EED	EU Energy Efficiency Directive
EPA	Environmental Protection Agency
ESRI	Economic and Social Research Institute
EV	Electric Vehicle
GW	Gigawatt; a unit of power
HGV	Heavy Goods Vehicle
ICE	Internal Combustion Engine
ktoe	Kilotonne of oil equivalent; a unit of energy
LGV	Light Goods Vehicle
$MtCO_2eq$	Megatonne of carbon dioxide equivalent
NEMF	National Energy Modelling Framework
NTA	National Transport Authority
OECD	Organization for Economic Cooperation and Development
RED / REDII	EU Renewable Energy Directive / Recast EU Renewable Energy Directive
RHO	Renewable Heat Obligation
RTFO	Renewable Transport Fuel Obligation
RES	Renewable Energy Share
RES-E	Renewable Energy Share of Electricity
RESS	Renewable Electricity Support Scheme
SEAI	Sustainable Energy Authority of Ireland
TWh	Terawatt-hour; a unit of energy
Vkm	Vehicle kilometre
WAM	With Additional Measures; a modelled scenario
WEM	With Existing Measures; a modelled scenario

Appendix 1
Projections scenario guidance

Reporting scenarios (EU Gov Reg)	
With Existing Measures (WEM)	**Implemented + Adopted policies and measures**: • **Implemented**: policies and measures for which one or more of the following applies at the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report: directly applicable Union or national law is in force, one or more voluntary agreements have been established, financial resources have been allocated, human resources have been mobilised • **Adopted**: policies and measures for which an official government decision has been made by the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report and there is a clear commitment to proceed with implementation
With Additional Measures (WAM)	**Implemented + Adopted + Planned policies and measures**: • **Planned**: options that are under discussion and that **have a realistic chance of being adopted** and implemented after the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report

Projections key input assumptions

Macroeconomic and baseline activity scenario input assumptions	
Wholesale Fossil Fuel Prices, ETS Prices, and carbon tax	• **WEM / WAM / CAP Prices**: Member states are required to consider the harmonised values for key parameters as outlined in Article 38 of Implementing Regulation 2020/1208. Recommended parameters are produced by the Commission 12 months before submission of the projections data on mandatory reporting years. The most recent dataset from EC was furnished in June 2024 for the 2025 mandatory reporting year.[50] • **Lower WEM Price sensitivity**: The International Energy Agency's (IEA) price projections as published each year in the World Energy Outlook (WEO) document – these projections are included because of the frequency with which they are updated. As of September 2024, the most recent WEO document is: World Energy Outlook 2023 – Analysis – IEA.[51] • **Carbon tax**: all scenarios include a varying carbon tax that increases by €7.50 per annum, reaching €100 per tonne by 2030, and is constant thereafter. This is as per the Finance Act 2020 which introduced a 10-year trajectory for carbon tax increases based on reaching €100 per tonne by 2030.
Energy Activity Growth	• **Industry and Services**: ESRI I3E model run in Q3 2024 with above price and carbon tax assumptions produces baseline activity projections for gas and oil use in industry and services. • **Residential**: Census 2022 stock starting point, new build assumptions aligned with Central Bank forecast for early years with increase to 2030 aligned with Housing for All target (WEM) and DHLGH press release 'Government agrees to progress amendments to Draft revision of National Planning Framework & new housing targets' (WAM), allowing for 0.25% per annum obsolescence. • **Datacentres**: **Electricity**: EirGrid 10-year median forecast (EirGrid's best estimate) taken for both WEM and WAM, with data extrapolated for remaining projections horizon. **Gas**: Projected increase in gas use by data centres aligned to the Low scenario of "Annual large new industrial &

[50] European Commission, "EC recommended parameters for GHG projections 2025", June 2024. [Online]. Available at: https://epanet.eea.europa.eu/Eionet/reportnet/docs/govreg/projections/govregart18_ec_parameters_projections_2021.zip/view

[51] IEA, "World Energy Outlook 2023", October 2023. [Online]. Available at: https://www.iea.org/reports/world-energy-outlook-2023

commercial loads demand forecasts" from GNI's latest Network Development Plan (NDP: Network-Development-Plan-2023.pdf.) This scenario "is limited to Data Centre customers with connection agreements already in place."

- **Transport**:
  Road: aligned with NTA ref case (CAP23) baseline activity growth assumptions.
  Aviation: aligned with Eurocontrol baseline activity growth assumptions.

Electricity scenario input assumptions				
Conventional Generation	• **Coal**: Moneypoint shut down by March 2029 with primary fuel switching from coal to Heavy Fuel Oil (HFO) by June 2025, as per 'last resort' Services Agreement, see Commission for Regulation of Utilities (CRU) Security of Electricity Supply – Retention of Moneypoint Units information paper.[52] • **Peat**: Edenderry ED1 100% biomass 2024-2030 and close thereafter. • **Heavy Fuel Oil**: Tarbert all 592 MW capacity shut down by 2023. (Source: EirGrid and SONI, Generation Capacity Statement (GCS) 2023-2032). • **Distillate Oil**: All 324 MW capacity assumed to shut down by 2035 due to reaching end of life. • **HVO**: Edenderry peaking units switching from distillate oil to HVO 2025-2028 inclusive, as an interim measure before switching to natural gas. • **Gas**: 1.4 GW of new gas capacity assumed by 2030, as per 'risk adjusted capacity' in GCS2023.			
Variable Renewable Energy (VRE) and other Installed Capacities	**Onshore Wind**:	**WEM**: 2025: 5.2 GW 2030: 6.8 GW	**WAM**: 2025: 5.4 GW 2030: 7.1 GW	**CAP**: 2025: 5.9 GW 2030: 8.5 GW
	Offshore Wind:	2025: 0.03 GW 2030: 1.4 GW	2025: 0.03 GW 2030: 2.7 GW	2025: 0.03 GW 2030: 3.8 GW
	Solar PV:	2025: 2.2 GW 2030: 5.7 GW	2025: 2.5 GW 2030: 6.3 GW	2025: 3.1 GW 2030: 8.3 GW
	Other Generation:	No growth in CHP, hydro, waste to energy; No ocean energy	No growth in CHP, hydro, waste to energy; No ocean energy before 2030	Same as WAM
Zero-carbon gas as primary fuel source for power	• **Hydrogen**: 0 TWh • **Biomethane**: 0 TWh (see separate assumptions for biomethane outside electricity generation)			

[52] CRU, "Security of Electricity Supply – Retention of Moneypoint Units (MP1, MP2 & MP3)", Oct. 2023. [Online]. Available at: https://cruie-live-96ca64acab2247eca8a850a7e54b-5b34f62.divio-media.com/documents/Security_of_Electricity_Supply_Retention_of_Moneypoint_Units_Information_Paper.pdf

generation allocated to electricity sector				
Interconnection	• **Greenlink (IE-GB)**: 500 MW, Jan 2025 • **North-South (IE-NI)**: increase from 400 MW to 1350 MW, Jan 2027 • **Celtic (IE-France)**: 700 MW, Jan 2027 (note sensitivity analysis performed to estimate impact of announced delay)			
Flexibility and Storage	**DSU**: 745 MW by 2030, as per GCS2023			
	Battery energy and other storage	**WEM**: 1 GW of battery energy storage, with fleet weighted-average duration of 1.7 hours by 2030, as per GCS2023	**WAM**: 1.8 GW by 2030 with 3.3-hour fleet average. 400 MW 8-h included by 2030 as proxy for successful transmission system operator long-duration energy storage (LDES) scheme	**CAP**: Same as WAM
Large energy users	**Datacentre electricity use**: EirGrid median scenario from 10-year forecast (see macro assumptions on baseline datacentre growth)			

Transport scenario input assumptions				
Biofuels	• **Blend rates for road transport fuels**: Based on 2023 Renewable Transport Fuel Policy statement, CAP, and consultation with Dept. of Transport, assume following blend rates: 2025: E10, B12 2030: E10, B20			
Electric Vehicles	**Private Car**:	**WEM**: 2030 BEV: 270,142 (11% of car stock) 2030 PHEV: 279,410	**WAM**: 2030 BEV: 330,740 (13% of car stock; 90% new 10% imports) 2030 PHEV: 279,410	**CAP**: 2030 BEV: 696,949 (28% of car stock) 2030 PHEV: 186, 814 (8% of stock)
	LGV:	2030 BEVs: 10,500 2030 PHEVs: 4,500	2030 BEVs: 24,000 2030 PHEVs: 6,000	2030 BEVs: 76,000 2030 PHEVs: 19,000
	HGV:	2030 BEVs: 150	2030 BEVs: 600	2030 BEVs: 1,937
	Phase-out of ICE car sales:	No new ICE car sales post-2035 Import of used ICE vehicles continues post-2035	Same as WEM	No new ICE car imports or sales post-2030
'Avoid' (Reduction in ICE Vkm) & 'Shift' (behavioural and sustainable transport)	**Changes in road transport activity**:	**WEM**: Activity of private cars and goods vehicles based on NTA's Ref case scenario (CAP 23) WEM does not assume proxy for impact of basket of demand reduction measures NTA modelled to illustrate pathway to achieving 20% reduction in road transport activity targeted in CAP23	**WAM**: WEM plus the impacts of the following demand reduction measures: •% change due to change in speed limits •basket of measures modelled in RMS •escort to education •improved rural connectivity •inter-regional travel response WAM does not include the "High fuel price" NTA measure	**CAP**: Same as WAM, except "High fuel price" NTA measure included and applied to private cars, LGVs and HGVs.

Alternative fuel vehicles	• **CNG**: 329 GWh of CNG use in HGV's based on GNI's 2023 NDP. 100% of CNG assumed to be from Biomethane i.e. direct use of anaerobic digestion (AD) biomethane assumed. • **Sustainable Aviation Fuel (SAF)**: EU targets as per ReFuelEU Aviation Regulation: 2025: 2%, 2030: 6%, 2050: 70%
Energy efficiency in transport	• Real world data has shown improvements in technical energy efficiency of ICE vehicles have largely been cancelled out by shift to larger and heavier vehicles over past 10 years; Assumed no improvement in ICE efficiency apart from effects of switching to more efficient BEV and PHEV vehicles

Enterprise, built environment and public sector scenario input assumptions				
Baseline demand and new dwellings	• See macroeconomic assumptions			
Support Scheme for Renewable Heat (SSRH)	**SSRH tariffs**:	**WEM**: Current SSRH tariffs simulated to 2045 (modelling supports to newcomers until 2030).	**WAM**: Current SSRH tariffs simulated to 2054 (modelling supports to newcomers until 2039. Assume an effective ban on the installation of fossil fuel boilers from 2040 based on changes to building regulations.	**CAP**: Same as WAM
Domestic heat pumps	**Heat pump installations in existing dwellings**:	**WEM**: Assume SEAI grants continue at current level until 2030, equating to: •2025: 30,800 additional heat pumps in existing dwellings (31,200 in lower price sensitivity) compared to 2018. •2030: 81,400 additional heat pumps in existing dwellings (85,600 in lower price sensitivity) compared to 2018.	**WAM**: 9% VAT rate on heat pumps from 2025. Assume that grants will increase to support the installation of 143,000 additional heat pumps in existing dwellings by 2030 compared to 2018 (includes SEAI scheme retrofits and Local Authority housing retrofits) and that grants remain at this level until 2039. Assume an effective ban on the installation of fossil fuel boilers from 2040 based on changes to building regulations.	**CAP**: 9% VAT rate on heat pumps from 2025. Assume that grants will increase from 2024 to 2026 and assume an effective ban on the installation of fossil fuel boilers from 2027 based on changes to building regulations. Collectively these measures will support the installation of 366,000 additional heat pumps in existing dwellings by 2030 compared to 2018 (includes SEAI scheme retrofits and Local Authority housing retrofits).

	Heat pump installations in new dwellings:	Assume heat pumps installed in all new dwellings from 2025, in line with building regulations (with a small number of gas boilers being installed in 2024).	Assume that heat pumps will be installed in all new dwellings from 2025, in line with building regulations (with a small number of gas boilers being installed in 2024).	Same as WAM
District heating	**DH capacity delivered**:	Only Tallaght District Heating Network (TDHN) and the Dublin District Heating Scheme (DDHS) in place by 2030 in the absence of any supports not already in place by the end of 2023. Updated estimates of heat delivered from these schemes come from data from the SEAI District Heating Centre of Excellence project pipeline estimates. 74 GWh (0.074 TWh))	Assume projects currently on the SEAI District Heating Centre of Excellence project pipeline list that have been assessed to be highly likely to be completed will be in place by 2030. During the meeting higher levels of achievement for the WAM scenario were proposed but the feedback was that only these projects had a reasonable chance of being completed by 2030. 0.214 TWh Sector splits: Public: Commercial: Residential = 50:30:20	2.7 TWh by 2030 Sector splits: Same as WAM
Biomethane	**Biomethane capacity delivered**:	1 TWh delivered by 2030 based on consultation with Dept. Agriculture, and statements by international developers of their plans for AD development in Ireland under existing market conditions	4.3 TWh (was 5.7 TWh last year as per CAP) delivered by 2030 to align with GNI's best estimate biomethane production scenario from the 2023 NDP. Splits:	5.7 TWh by 2030 Sector splits: Same as WAM

		Assumed in absence of an RHO the market for biomethane will be created by large gas users entering directly into Gas Purchase Agreements with AD developers. On this basis assumed that the full 1 TWh produced will almost all be purchased directly by datacentres	Assume that all gas used in road transport is biomethane. (This is a very small amount by 2030) Assume that after transport demand is met, datacentre demand is met next. Once transport and datacentre demand is met, assume that remaining biomethane use is split pro-rata between services and industry	
Residential energy efficiency programmes	**Energy efficiency grants:**	Assume that SEAI energy efficiency grants continue at their current level until 2030.	Assume that energy efficiency grants increase and the Home Energy Upgrade Loan Scheme is extended to support the installation of 143,000 additional heat pumps in existing dwellings by 2030 compared to 2018 (includes SEAI scheme retrofits and Local Authority housing retrofits). Assume that SEAI energy efficiency grants remain at the higher level until 2039.	Assume that energy efficiency grants increase and the Home Energy Upgrade Loan Scheme is extended to support the installation of 366,000 additional heat pumps in existing dwellings by 2030 compared to 2018 (includes SEAI scheme retrofits and Local Authority housing retrofits).
Public sector and commercial energy efficiency programmes	**Grants and requirements:**	Current levels of Community Energy and EXEED grants assumed to continue until 2030. Mandatory energy audits for large organisations	Current levels of Community Energy and EXEED grants assumed to continue until 2039. Assume an effective ban on the installation of fossil fuel boilers from 2040 based on changes to building regulations.	Same as WAM

			Mandatory energy audits for large organisations.	
Energy Efficiency Obligation Scheme (EEOS)	**EEOS savings:**	Assume 2023 level of savings (that are uniquely attributable to EEOS) continues annually until 2030.	Assume 60% of EED Article 7 target will be met through EEOS. (See CAP21 Section 14.2.8 EEOS.)	Same as WAM
Carbon neutral heating in industry	**Renewable heating uptake:**	Modelled implicitly - growth in RES-H is an outcome of the model depending on demand growth and the assumptions on individual renewable heat sources. In WEM scenario, share of low carbon energy (electricity + renewables, incl. biomethane) in industry in 2030 is 46%	Uptake of renewable heating technologies based on SEAI's uptake modelling rather than hard-coding the targets until there is a direct measure to apply in input assumptions. Assume an effective ban on the installation of fossil fuel boilers from 2040 based on changes to building regulations. In WAM scenario, share of low carbon energy (electricity + renewables, incl. biomethane) in industry in 2030 is 51%	In CAP scenario, share of low carbon energy (electricity + renewables, incl. biomethane) in industry in 2030 is 54%
Embodied carbon in construction	**Modelled reductions:**	N/A	Not modelled currently as no agreed method for measuring yet, ultimately any reduction in cement production will be reflected in the fuel numbers and this is how the saving will be represented in the projections.	Same as WAM

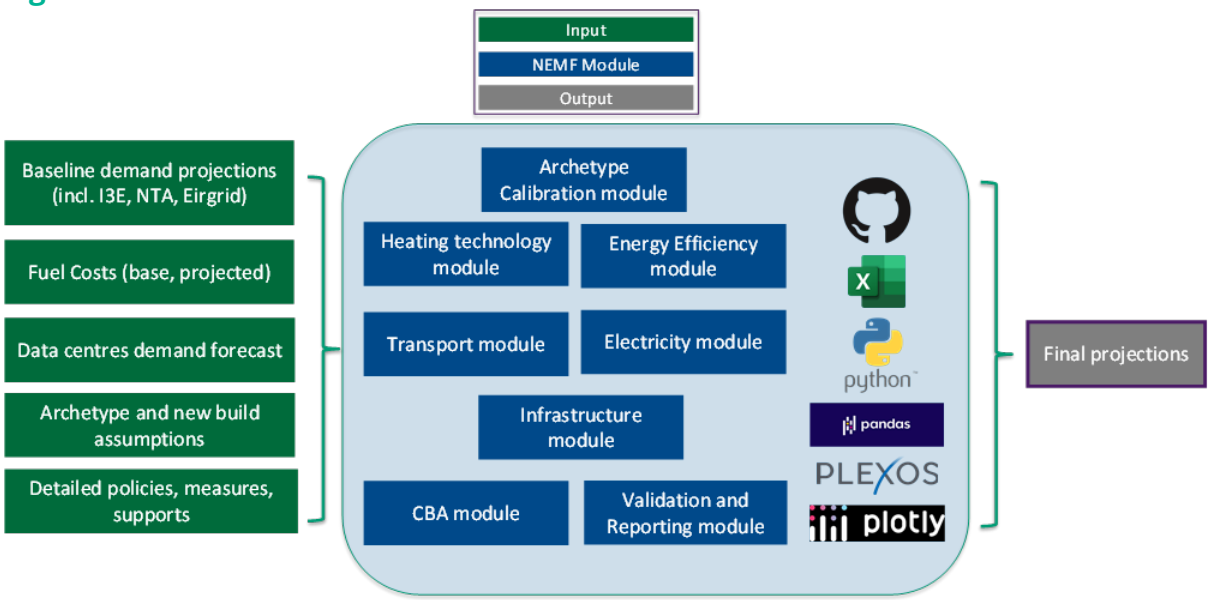
Construction materials and CCS	**Modelled changes and CCS in industry:**	N/A	Not modelled explicitly – Projections benchmarked to underlying growth trajectories informed by available macro trend data	Same as WAM
Building Regulations	All new dwellings are Nearly Zero Energy Buildings (NZEB).			

Appendix 2

National Energy Modelling Framework (NEMF)

The National Energy Modelling Framework (NEMF), developed and maintained by SEAI, is a national energy system model that assesses the impacts of packages of energy policies and measures on future energy supply and demand. It combines several SEAI sectoral models to produce policy-rich outlooks for the whole energy system.
The NEMF couples modules focussed on modelling of the heat, transport and electricity sectors. It examines aspects such as the variation in technology readiness, technical suitability, cost data and performance data, to assess various scenarios (including potential decarbonisation paths) in Ireland. A high-level outline of NEMF inputs and modules is shown in Figure 18.

Figure 18: NEMF outline



A key feature of the NEMF is its focus on the end consumer, providing insight into the challenges faced by consumers considering actions and where policy can help. The heat sector module contains a detailed set of archetypes representing all buildings and industries in Ireland. The NEMF contains 650 individual heat demand archetypes, representing a combination of physical and consumer attributes, which in turn provide a detailed description of demand in residential, services and industry sectors, as well as agricultural energy use. Technology suitability and performance are mapped to each archetype, along with costs consumers face when deciding on switching to a lower carbon heating alternative.

The model uses techno-economic data to generate payback and lifetime cost estimates for the various technology options available, accounting for policy incentives, taxes and regulations. This payback and lifetime cost information is used with other data on consumer decision-making behaviour to simulate how much uptake may result in various scenarios and in response to policy measures.

The model also contains representations of bioenergy and hydrogen resources and fuel supply chains as well as an infrastructure module that calculates the costs of

infrastructure deployment linked to technology uptake. Where technology deployment is based on centralised decisions, these are accounted for outside of the consumer decision-making framework; district heating and industrial Carbon Capture, Utilisation and Storage (CCUS) are dealt with in this way.

A detailed description of the methodology, data-sources and assumptions used to generate the archetypes within the NEMF is provided in the National Heat Study report "Heating and Cooling in Ireland Today".[53]

Examples of some of the key questions the NEMF is regularly used to answer are:

- Given a potential set of energy-related policies and measures that could be implemented over a given time horizon, what is the projected future energy supply and demand by sector for each year?
- Is the current set of planned policies and measures likely to meet domestic and European targets for primary / final energy, energy-related emissions and renewable energy shares (RES)?
- What is the size of the possible gap to targets if there is a delay in implementation?
- Which combinations of measures are likely to have the most impact on uptake of schemes and technologies to accelerate decarbonisation and improve energy efficiency across sectors?

More information on the model strengths and links to recent outputs can be found in the National Modelling Assets for Energy and Climate Change Mitigation.[54]

[53] SEAI, "National Heat Study: Heating and Cooling in Ireland Today", Feb. 2022. [Online]. Available at: https://www.seai.ie/data-and-insights/national-heat-study/heating-and-cooling-in-ir/

[54] Department of the Taoiseach, "National Modelling Assets for Energy and Climate Change Mitigation", June 2025. [Online]. Available at: https://www.gov.ie/en/department-of-the-taoiseach/publications/research-and-modelling-group/

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