



Banc Ceannais na hÉireann
Central Bank of Ireland

Eurosystem

Central Bank of Ireland Climate Observatory

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Contents

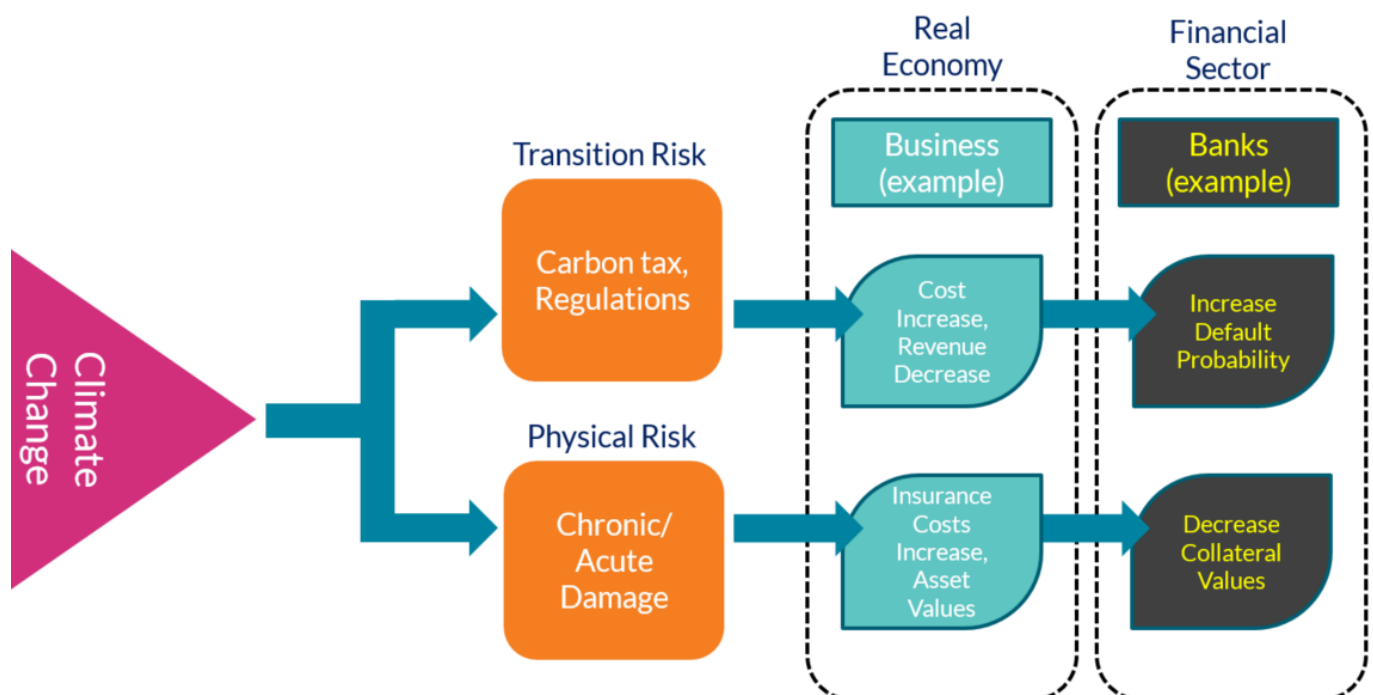
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Introduction

The social, economic and financial implications of climate change are becoming clearer. For the financial system, climate impacts are commonly summarised under “transition risks” (negative costs and impacts associated with the decarbonisation process) and “physical risks” (direct damages due to a changing climate).

The future health of the financial system depends on the health of the economy. Over the coming decades, deep decarbonisation policies, changing consumer and investor preferences, and increasing climate/weather-related damages could negatively affect business costs, revenues and asset values. Climate risks will also be unevenly distributed across sectors, depending on current emissions, the costs of decarbonisation, and the location of production, input and output markets.

Such changes could have implications for the financial system through future credit, insurance and investment decisions. For example, the profitability of past bank lending decisions could be affected by future changes in borrower ability to repay and collateral values (due to climate change). For the insurance sector, unexpected increases in household and business weather/climate-related claims could increase year-on-year profit volatility and future pricing/coverage decisions. In the funds sector, sudden changes in government policy or increases in environmental sentiment could lead to a carbon-aligned repricing of assets.



There is considerable uncertainty regarding the magnitude and timing of climate risks in the coming decades. While global damage-limiting emission and temperature targets are clear (see Box 1), the speed and depth of future technology investment (energy efficiency and low-emission fuels) is uncertain. There is, however, clarity on the global long-run intertemporal trade-offs associated with the transition to net zero: the reduction in climate/weather-related damages post-2050 will significantly outweigh the costs of reaching net zero pre-2050.¹

Many central banks, including the Central Bank of Ireland, have recently started viewing climate change through a financial lens by quantifying the breadth and depth of possible climate impacts on the main components of the financial system – banks, insurers and funds. It is clear that the financial sector will also play a major role in the transition to net zero – rapid decarbonisation and green technology investment will require unprecedented amounts of financing.

To this end, the Central Bank established a *Climate Change Unit* in 2021 to embed climate risk and sustainable finance considerations into its day-to-day activities.² Since 2022, we have also been increasing our climate-related engagement with regulated firms and representative bodies through the new “Climate Forum”.

This document – the *Climate Observatory* – provides an annual update of climate-related financial and non-financial metrics using a combination of internal and external data sources. The Observatory covers three areas:

- **Part A** summarises the available climate-aligned financial sector data to give insight into climate risks for banks, insurers and funds
- **Part B** uses publicly available national data to describe national decarbonisation challenges and progress
- **Part C** presents the Central Bank’s own emissions from operations and investment activities

The Observatory highlights considerable economic, technological and financial challenges in the coming decades. It also serves as an annual monitor of progress in relation to national decarbonisation and, ultimately, changes in financial sector climate risks. This first edition provides a baseline to anchor future trends. Annual updates will also include new data and insights as they become available.

¹ See analysis from the Network for Greening the Financial System [[here](#)] and results from the European Central Bank [[here](#)].

² See Central Bank climate webpage for more details [[here](#)].

Disclaimer:

Readers new to this topic should be aware that the climate data landscape has limitations and gaps, but is rapidly improving, as are the methods for quantification – current and historical charts and trends in this publication may change in future iterations as new methodological innovations and improved data become available.

A large number of charts employ data published by external organisations. The Central Bank does not take responsibility for any errors contained within externally sourced data.

Contact:

Comments and suggestions by email: climatechangeunit@centralbank.ie

Summary of Terms and Abbreviations used in this Document

BER	The Building Energy Rating (BER) is Ireland's Energy Performance Certificate (EPC) system. The BER audits properties from G to A1 based on the predicted energy (kilowatt hour) per metre squared (energy for heating, lighting, pumps and fans).
CAP	The <i>Climate Action Plan</i> (CAP) describes the key sectoral targets and policies to reach an overall reduction in national emissions of 51% by 2030.
CO ₂	Carbon Dioxide (CO ₂) is the main global warming driver. CO ₂ is commonly shortened to "carbon".
CO ₂ e	Non-CO ₂ greenhouse gas (GHG) components can be converted to a "CO ₂ equivalent" (CO ₂ e) for aggregation.
CSO	The Central Statistics Office (CSO) is the national statistical agency responsible for the gathering of information relating to economic, social and general activities and conditions.
EA	Euro Area (EA) countries are those that use the Euro.
ECB	The European Central Bank (ECB) is the central bank of the European Union countries which use the euro. Its main task is to maintain price stability. It also supervises the EA's significant credit institutions.
EEA	The European Environmental Agency (EEA) is European Union agency that delivers knowledge and data to support Europe's environment and climate goals. Core tasks include supporting policy development, providing analytical expertise and maintaining an efficient reporting infrastructure.
EIOPA	The European Insurance and Occupational Pensions Authority (EIOPA) carries out specific legal, technical or scientific tasks to shape policies and laws at EU and national levels. It is one of three European Supervisory Authorities, and focussed on insurance and occupational pensions sectors.
EPA	The role of the Irish Environmental Protection Agency (EPA) is to protect, improve and restore the environment through regulation, scientific knowledge and working with others.
GDP	Gross Domestic Product (GDP) is the most widely employed measure of economic activity within a country.
GHG	Greenhouse gas (GHG) components include the main atmospheric gases which lead to global warming – carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O) and fluorinated gases.
Green Bond	Instrument where proceeds are exclusively applied to finance or re-finance new and/or existing eligible green projects.
Green Mortgage	Green Mortgages offer borrowers lower interest rates for more energy efficient properties. Applicants in Ireland must have a minimum B3 BER rating to qualify. Green Mortgages have been available in Ireland since 2019.
Net Zero	Net Zero is a situation where emissions released equal emissions removed/captured (for example, due to an increase in forestry).

NGFS	The Central Bank is a member of the Network for Greening the Financial System (NGFS), which was launched at the Paris One Planet Summit in 2017. It is a group of Central Banks and Supervisors willing, on a voluntary basis, to share best practices and contribute to the development of environment and climate risk management in the financial sector and to mobilise mainstream finance to support the transition toward a sustainable economy.
Physical Risk	For the financial sector, physical risks relate to potential changes in asset values or economic metrics due to weather and climate events.
Real Economy	The term “real economy” describes an economy’s systems for the production of market goods and services (in contrast to the financial sector). Households (supply labour, receive income and buy products) are part of the real economy.
Scope 1 Emissions	Scope 1 GHG emissions refer to “direct” emissions released from the combustion of fossil fuels (for example, CO ₂ released from burning natural gas in a boiler).
Scope 2 Emissions	Scope 2 GHG emissions are primarily associated with “indirect” emissions from the consumption of electricity. Scope 2 emissions differ by country depending on the CO ₂ intensity of electricity generation. Where district heating is available, this is also included in Scope 2.
Scope 3 Emissions	Scope 3 GHG emissions include all other indirect GHG emissions – for example, Scope 3 emissions of a company include both the emissions embedded in their inputs (“upstream” emissions associated with supplier methods and distribution) and the future emissions associated with product use (“downstream” emissions associated with end-user product energy consumption).
SEAI	The Sustainable Energy Authority of Ireland (SEAI) has the goal of increasing the use and development of affordable sustainable energy in Ireland.
Transition Risk	For the financial sector, transition risks relate to the potentially negative financial impacts associated with an economy’s decarbonisation. For example, asset values and credit risk could be affected by government policy (e.g. emissions taxes and quotas), regulation (e.g. an increase in emissions disclosure requirements) and climate-aligned changes in investor/customer sentiment.
WACI	Weighted Average Carbon Intensity (WACI) calculates the weighted sum of tonnes of CO ₂ emissions per million euro of revenue. The weight is equal to the percentage share of the investment in a private company in the portfolio value.

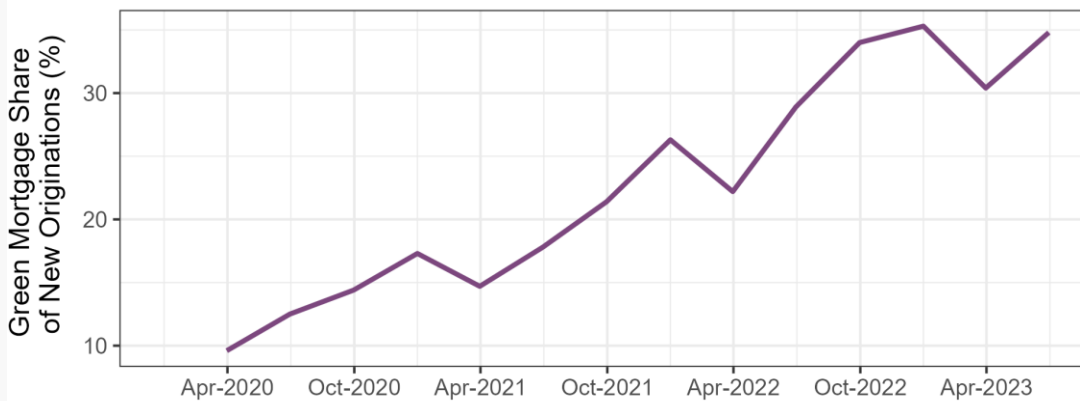
Part A: Financial Sector

Green Mortgages have Grown Rapidly since 2020



A.1 | Banks

Green Mortgages provide borrowers with lower interest rates on energy efficient properties (BER rating of “B3” or higher). For the group of lenders that offer this product, Chart A.1 shows that the green share of new originations has risen from 10% in Q1 2020 to 35% in Q2 2023. As a share of all outstanding mortgages, green mortgages represent a smaller share – 7.7% at end-2022. Central Bank analysis shows that first time buyers, those switching their mortgage, and borrowers in the Leinster region are the most likely to avail.



Source: Own calculations using Central Bank Monitoring Template Data

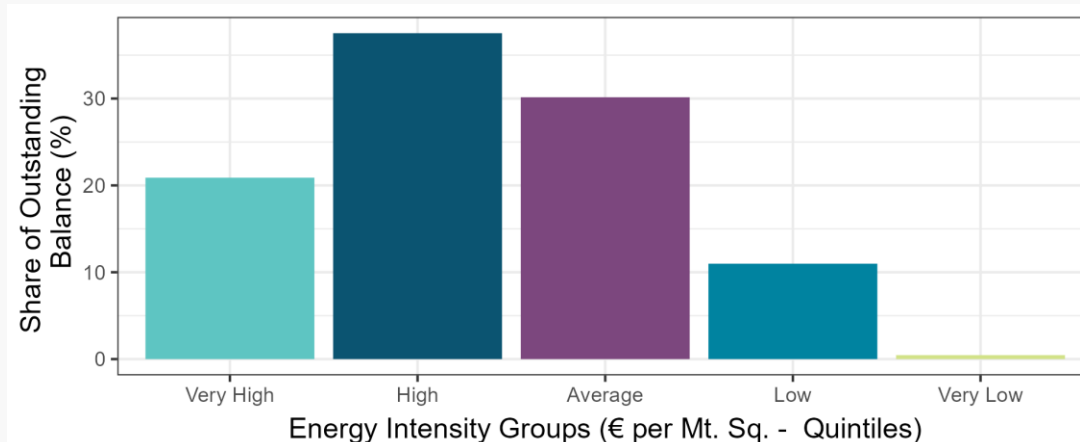
Notes: Methodology follows Lambert et al. (2023), *Financial Stability Notes* [[link](#)]

Mortgaged Properties more Energy Intensive than National Average



A.2 | Banks

Recent Central Bank research provides estimates of the energy intensity of mortgage borrowers. This sample covers mortgages originating between 2015 and 2021. Chart A.2 splits mortgages into different energy intensity groups (energy expenditure per metre squared). 58% of borrowers are in the “High” or “Very High” energy use categories (compared to national energy distribution).



Source: Own calculations using Central Bank Monitoring Template Data

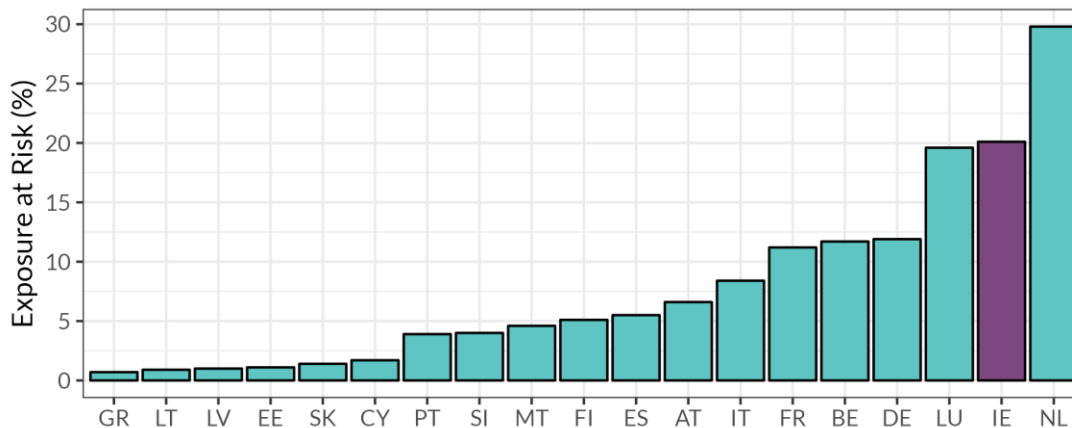
Notes: Methodology follows Adhikari et al. (2023), *Financial Stability Notes* [[link](#)]

Coastal Flooding Risk for Corporate Exposures 2nd Highest in Euro Area

A.3 | Physical Risk



Chart A.3 and A.4 presents the ECB's physical risk indicators for two hazards – coastal flooding and river flooding for EU exposures of euro area financial institutions and investment/pension funds at end-2020. Chart A.3 presents the share of corporate loans, debt securities and equities located in areas susceptible to coastal flooding. This indicator includes both domestic and non-domestic EU exposures. With 20% of exposure at risk, the Irish financial services sector is in a group of three highly exposed countries (with the Netherlands and Luxembourg). While not shown in Charts A.3 and A.4 due to limited cross-country data granularity, the majority of Ireland's flood exposure is classified as "low" risk (three flood risk bands – low, medium and high).



Source: ECB [\[link\]](#) "potential exposure at risk" (accessed 13/11/2023)

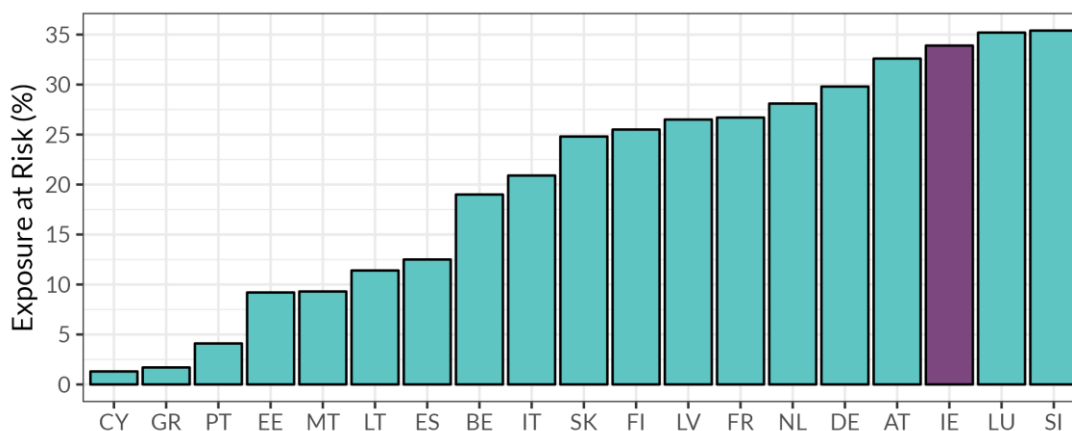
Notes: See ECB [\[link\]](#) for full description of methodology and caveats

River Flooding Risk for Corporate Exposures 3rd Highest in Euro Area

A.4 | Physical Risk



Similar to coastal flooding, the ECB analysis shows that the Irish financial services sector has a relatively high share of bonds, loans and equities holdings of EU corporate counterparties located in areas prone to river flooding. Compared to coastal flooding, river flooding is relatively more evenly spread in the euro area – the financial sectors of ten countries, including Ireland, have corporate exposure to river flooding of between 25% and 35%.



Source: ECB [\[link\]](#) "potential exposure at risk" (accessed 13/11/2023)

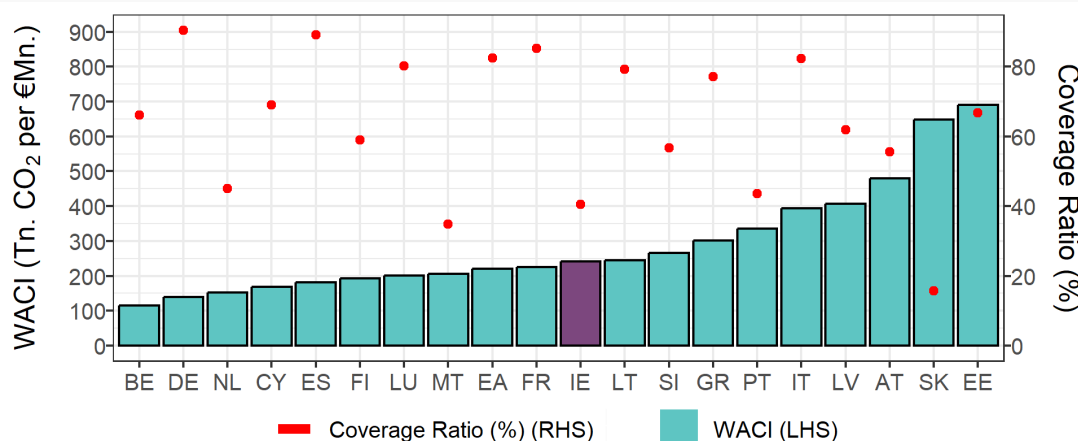
Notes: See ECB [\[link\]](#) for full description of methodology and caveats

CO₂ Intensity of Bank Investments similar to Euro Area Average

A.5 | Investments



Chart A.5 displays the CO₂ intensity of banks' direct holdings of debt securities and listed shares across the euro area at end-2020. Weighted Average Carbon Intensity (WACI) represents an institution's exposure to CO₂-intensive companies, expressed in tonnes of CO₂ per million euro of revenue. The coverage ratio (right axis) indicates the share of national exposures used in calculation (data availability). The CO₂ intensity of banks' resident in Ireland (242 tonnes) was slightly above the euro area average (220 tonnes).



Source: ECB [\[link\]](#) WACI indicator [\[link\]](#) (accessed 13/11/2023)

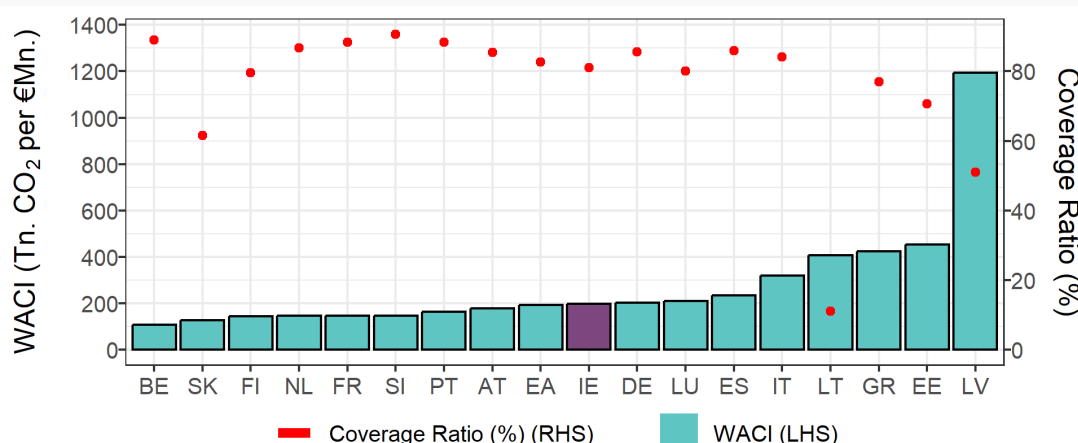
Notes: See ECB [\[link\]](#) for full description of methodology and caveats

CO₂ Intensity of Investment Funds similar to Euro Area Average

A.6 | Investments



Chart A.6 displays the CO₂ intensity of investment funds' direct holdings of debt securities and listed shares across the euro area at end-2020. Weighted Average Carbon Intensity (WACI) represents an institution's exposure to CO₂-intensive companies, expressed in tonnes of CO₂ emissions per million euro of revenue. The CO₂ intensity of investment funds resident in Ireland (198 tonnes) is similar to the euro area average (193 tonnes).



Source: ECB [\[link\]](#) and TCFD [\[link\]](#) (accessed 13/11/2023)

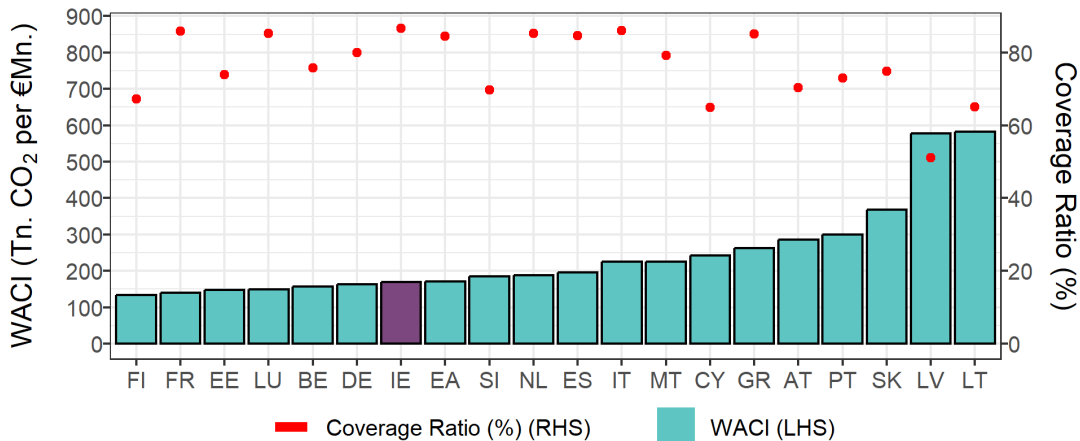
Notes: See ECB [\[link\]](#) for full description of methodology and caveats

CO₂ Intensity of Insurance/Pension Funds below Euro Area Average

A.7 | Investments



Chart A.7 displays the CO₂ intensity of insurance corporations' and pension funds' direct holdings of debt securities and listed shares across the euro area at end-2020. Weighted Average Carbon Intensity (WACI) represents an institution's exposure to CO₂-intensive companies, expressed in tonnes of CO₂ emissions per million euro of revenue. The CO₂ intensity of Irish resident insurance corporations' and pension funds' resident in Ireland (169 tonnes) was similar to the euro area average (170 tonnes).



Source: ECB [\[link\]](#) and TCFD [\[link\]](#) (accessed 13/11/2023)

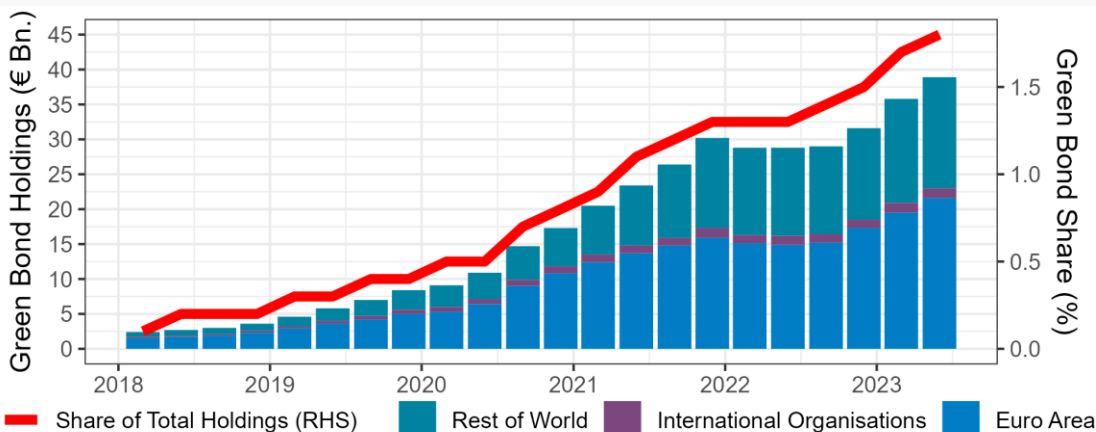
Notes: See ECB [\[link\]](#) for full description of methodology and caveats

Irish Resident Holdings of Green Bonds Small but Growing

A.8 | Investments



Irish residents held €38.9 billion of green bonds at end Q2 2023, most of which were issued in the euro area (55%). While strong growth is evident since 2018, green bonds represent a small share of total investments – 1.8% of debt holdings in Q2 2022.



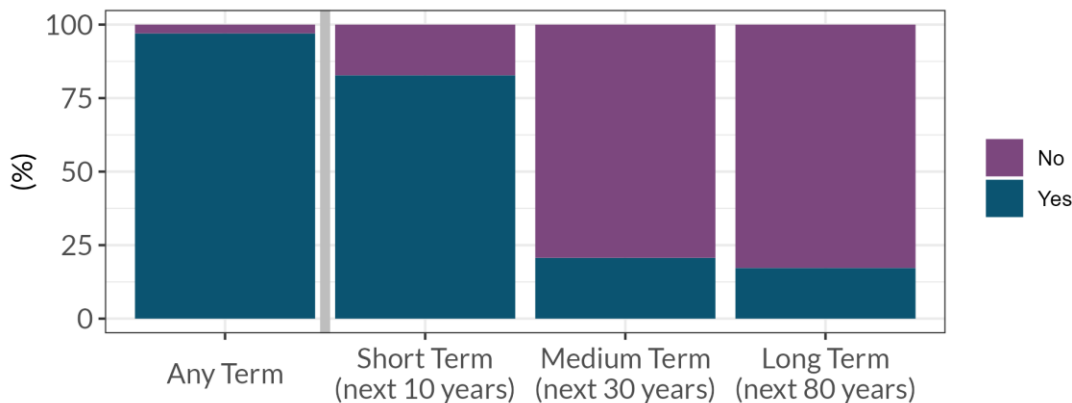
Source: Statistics Division [\[link\]](#) (accessed 13/11/2023)

Most Insurance Firms Reference Climate Change in Risk Assessments

A.9 | Insurance



Chart A.9 presents results from a review of 29 life and non-life (re)insurance firms' *Own Risk and Solvency Assessment* (ORSA) reports. Firms assess risk management and solvency positions in ORSA reports under normal and severe stress scenarios. 97% of firms have included at least a preliminary qualitative assessment of climate risk across at least one of the time periods in their ORSA reports. This is not equivalent to a materiality assessment as set out in the Central Bank's Guidance ([link](#)), which would require a more in-depth assessment. Fewer firms have carried out quantitative assessments, which mainly focused on the short term.



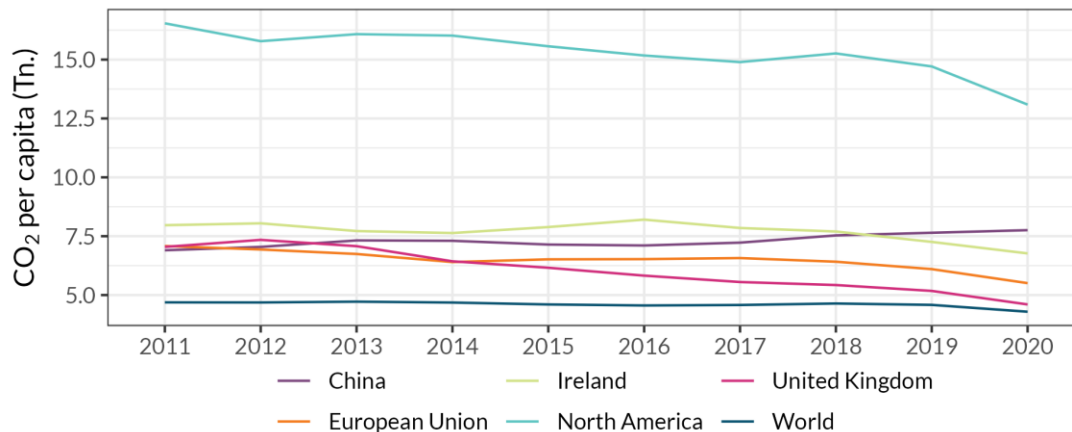
Source: Central Bank's Insurance Directorate Review of ORSA reports 2022 (using 2021 data) ([link](#))

Part B: Real Economy

Ireland's CO₂ Emissions per Capita are in the Top 10% Globally B.1 | National Emissions



By global standards, Ireland is an emission intensive economy. Chart B.1 compares Ireland's CO₂ per capita to a number of countries and regions. Ireland's CO₂ per capita in 2020 (6.8 tonnes) is 23% higher than the EU, 47% higher than the UK, but 48% lower than North America.

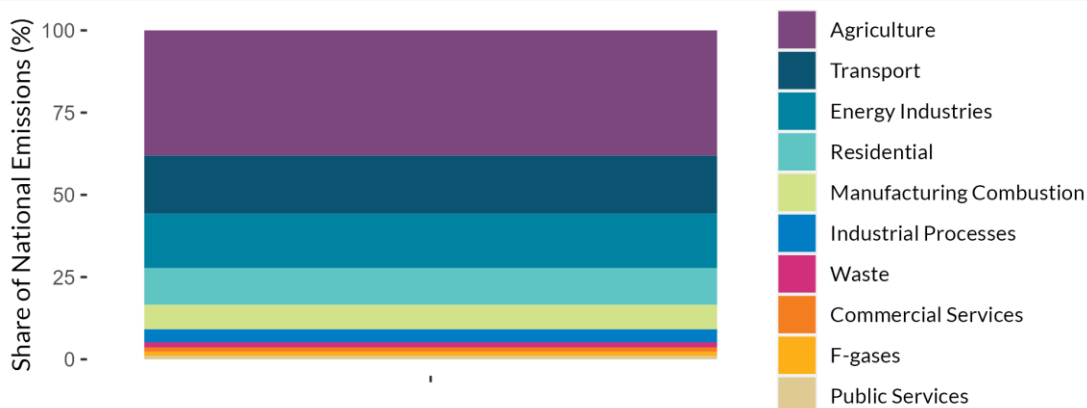


Source: World Bank [\[link\]](#) (accessed 13/11/2023)

The Agricultural Sector Dominates National Emissions B.2 | National Emissions



The Environmental Protection Agency (EPA) publishes Ireland's emission levels and policy targets across all sectors. Chart B.2 refers to direct ("Scope 1") emissions and therefore does not account for indirect emissions within sectors, such as a sector's electricity use ("Scope 2"), or emissions embedded in goods and services ("Scope 3"). This chart includes all greenhouse gas (GHG) sources (CO₂, methane, nitrous oxide and fluorinated gases). Four sectors account for 83% of Irish GHG emissions – Agriculture (38%), Transport (18%), Energy (17%) and Residential (11%).



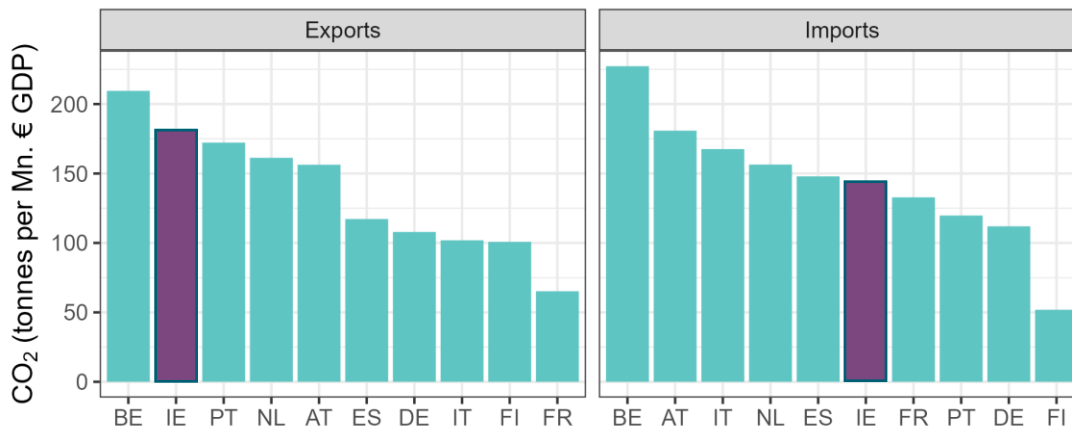
Source: EPA [\[link\]](#) (accessed 13/11/2023)

Export-Related Emissions Higher than EU

B.3 | Trade



The International Monetary Fund (IMF) provides trade-related emission estimates for all countries. These indicators capture emissions embodied in goods and services entering and leaving a country, for example, emissions associated with the manufacture of goods prior to importation. Such indicators highlight an additional source of transition risk for open economies through external policy-driven changes in import prices. When weighted by GDP (tonnes of CO₂ per million euro GDP), Ireland has the second highest export-related emission intensity in the EU (2021 – selected countries).



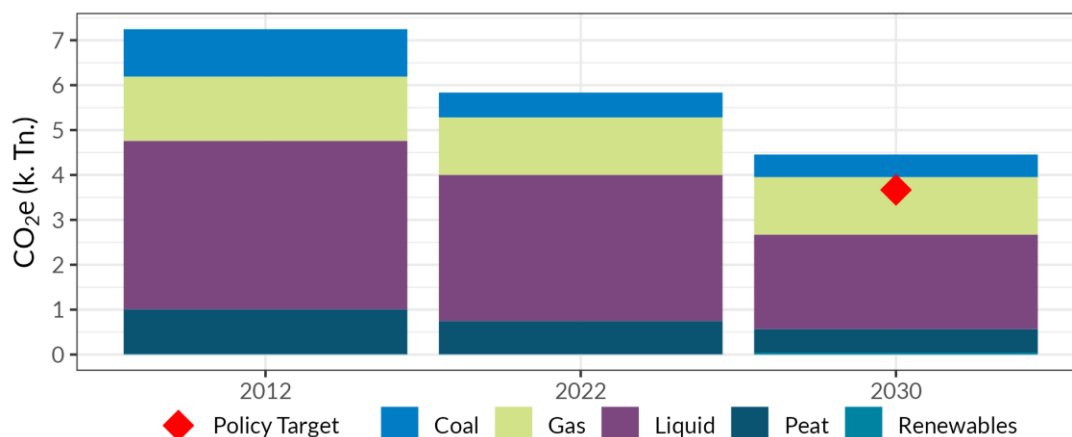
Source: IMF Climate Change Indicators Dashboard [\[link\]](#) and Eurostat [\[link\]](#) (accessed 13/11/2023)

Residential Sector Emissions to Reduce by 40% (target) by 2030

B.4 | Households



Chart B.4 presents trends in residential Scope 1 (direct) emissions and targets. In the latest year (2022), the main source of household emissions were from liquid fuels (household heating oil) and gas, which together account for 79%. Household emissions have declined considerably since 2012 (19%). Under the EPA's "existing measures" forecast for 2030, emissions will decline by a further 27%. However, if the *Climate Action Plan* (see Box A) is fully implemented, emissions will decline by 40%.



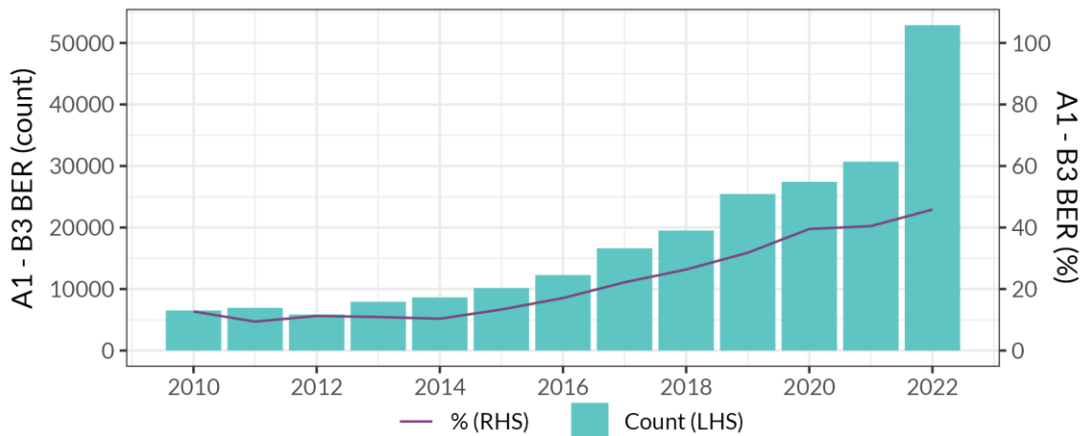
Source: EPA [\[link\]](#) (accessed 13/11/2023)

Household Energy Efficiency is Rising

B.5 | Households



All property sales and lettings transactions are required to have a Building Energy Rating (BER). The SEAI BER database contains approximately 1.1Mn BER audits, representing about half of the national building stock. Chart B.5 presents trends for the highly energy efficient “A1-B3” group. This category has shown considerable growth over the past decade, to represent 45% of BER assessments conducted during 2022.



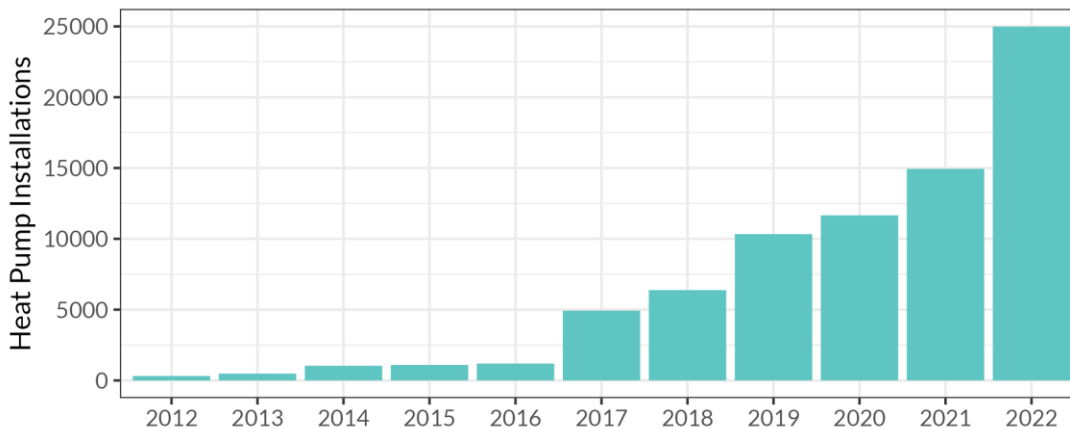
Source: CSO – Table EBA02 [\[link\]](#) (accessed 13/11/2023)

Heat Pumps Rising but Faster Growth Required for 2030 Targets

B.6 | Households



Residential heat pumps will play a key role in decarbonising residential heating. The *Climate Action Plan 2023* has a target of 680,000 heat pump installations by 2030. Chart B.6 presents the number of properties with heat pumps by BER assessment year. Installations have grown rapidly over the past decade, although ambitious targets will require even faster growth.



Source: Own estimates based on the SEAI BER database [\[link\]](#) (downloaded 25/10/2023)

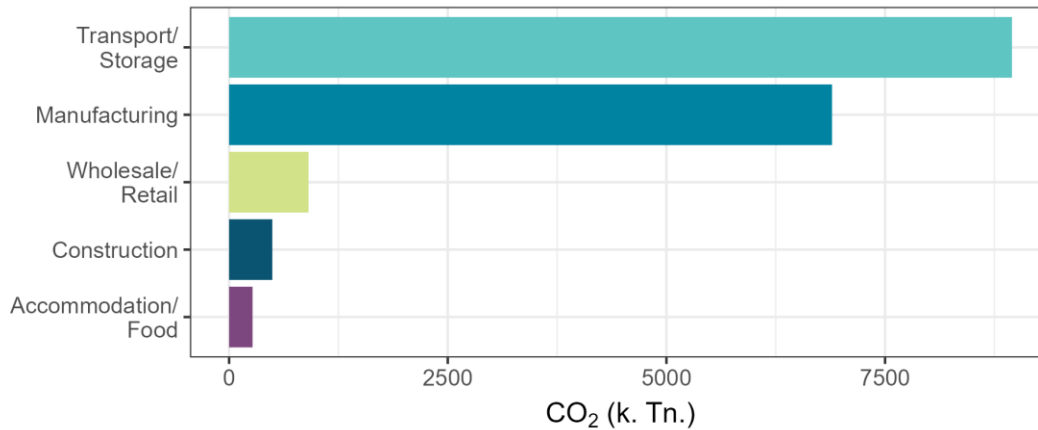
Notes: Heat pumps are identified based on the property’s space heating source (electric) and space heating efficiency (efficiency rates above 100%)

Business CO₂ Dominated by Transport, Storage and Manufacturing

B.7 | Business



Figure B.7 presents CO₂ emissions (Scope 1) for the five highest emitting business sectors in 2020, which together account for over 95% of business emissions. This chart excludes agriculture, energy and any sectors mainly provided by government. Two sectors dominate national business emissions: Transportation and Storage (49%) and Manufacturing (37%).



Source: Eurostat [[link](#)] (accessed 13/11/2023)

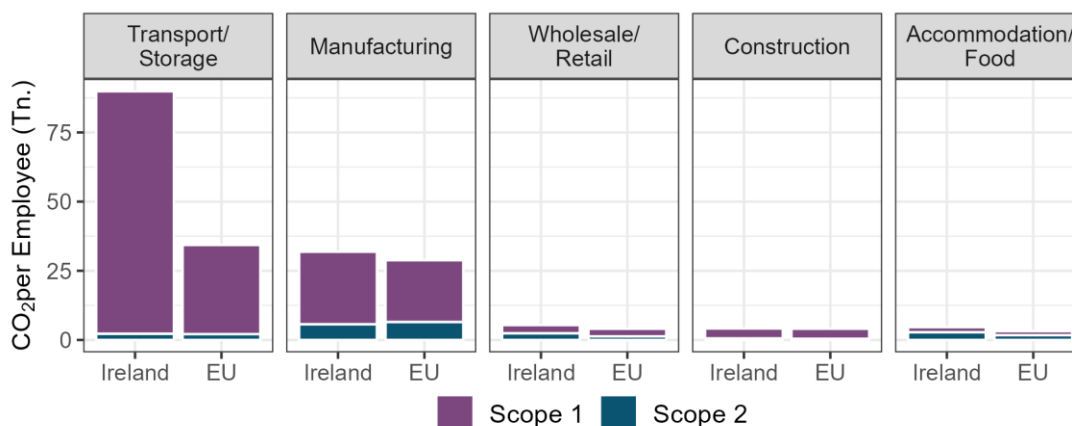
Notes: For this chart the “business sector” excludes agriculture and energy (analysed separately in later charts), and sectors mainly funded by the state (education, health, water and waste, for example)

Irish Business Sectors more CO₂ Intensive than EU

B.8 | Business



In Chart B.8, sectoral emission intensity is measured as the quantity of CO₂ (Scope 1 plus Scope 2) per employee. This is displayed for Ireland's top five emitting business sectors relative to the EU average. Transport/Storage and Manufacturing are substantially more CO₂ intensive than other sectors. Compared to the EU, CO₂ intensity for these five sectors is higher in Ireland, but only significantly so in Wholesale/Retail (33% higher), Accommodation/Food (46% higher) and Transport/Storage (162% higher). Scope 2 emission share of total (estimated from electricity use) ranges from 2.5% in Transport/Storage to 60% in Accommodation/Food (Ireland).



Source: own calculations using Eurostat emissions [[link](#)], electricity use [[link](#)] and employment [[link](#)] (accessed 12/11/2023)

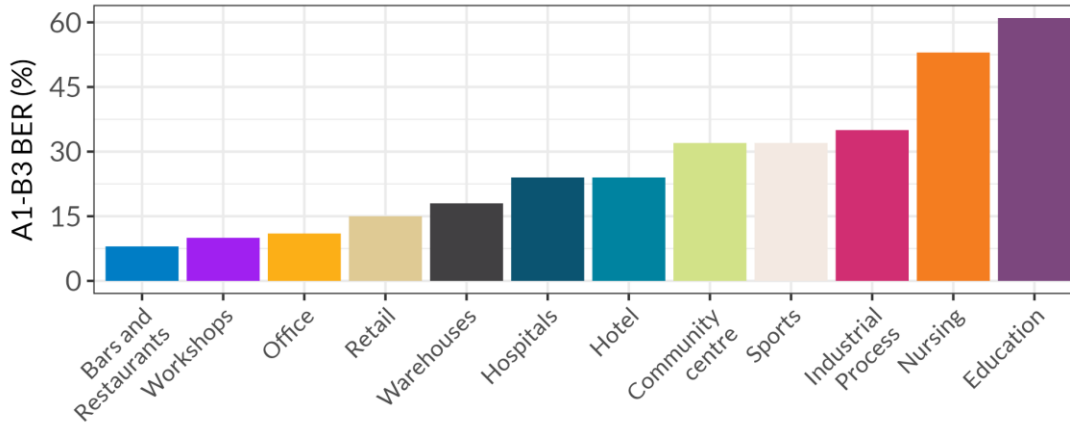
Notes: see Appendix for methodology

Significant Sectoral Variation in Commercial Building Efficiency

B.9 | Business



The Central Statistics Office monitors BER ratings in the non-domestic sector (business and public sector). Chart B.9 displays the share of buildings in each sector that have achieved a high A1-B3 BER rating (end-2022). There is clear heterogeneity across sectors, ranging from above 50% in education and health to below 15% in offices, workshops and bars/restaurants.



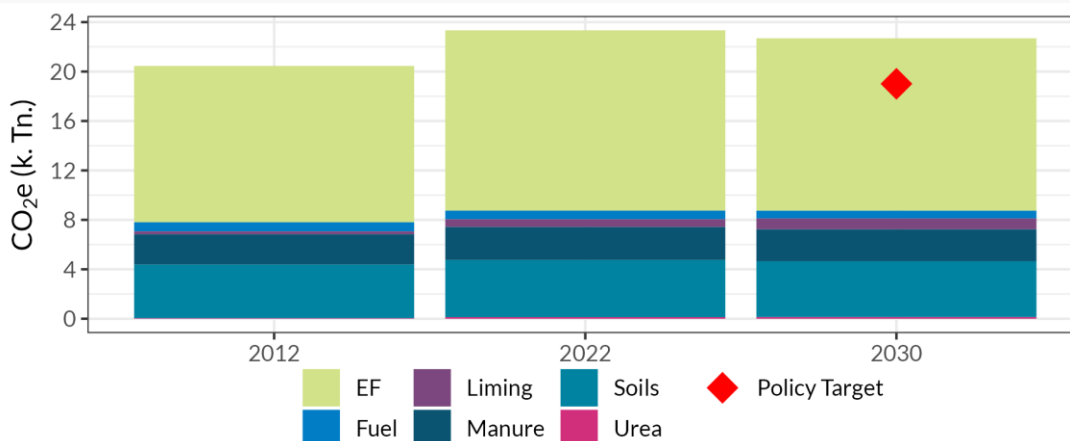
Source: CSO [\[link\]](#) (accessed 12/11/2023)

Agricultural Emissions have Risen by 10% Since 2012

B.10 | Agriculture



Ireland's relatively high national emissions in the EU is primarily due to high levels of agricultural activity. In 2022, 74% of agricultural emissions were connected to livestock – enteric fermentation (62%) and manure management (11%). In addition, agricultural emission increases since 2012 (up 14%) are due to livestock expansion. Under the EPA's "existing measures" forecast, emissions would decline by just 2.8% between 2022 and 2030. However, if the *Climate Action Plan* (see Box A) is fully implemented, emissions will decline by 19%, a mitigation target that is lower than other sectors.



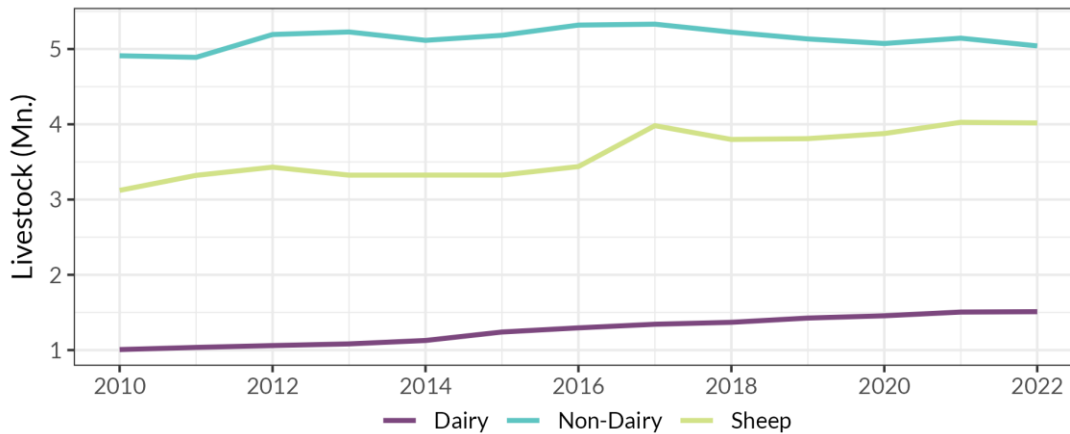
Source: EPA [\[link\]](#) (accessed 13/11/2023)

High Growth in Livestock Numbers, particularly Dairy

B.11 | Agriculture



The previous chart showed that livestock is the main source of agricultural emissions and growth. Chart B.11 presents trends in the main components of national livestock. In 2022, non-dairy cattle accounted for 48% of total, followed by sheep (38%) and dairy cows (14%). Since 2010, total livestock numbers have risen by 17%, with increases highest for dairy (increase of 50%), followed by sheep (increase of 29%) and non-dairy cattle (increase of 2.7%).



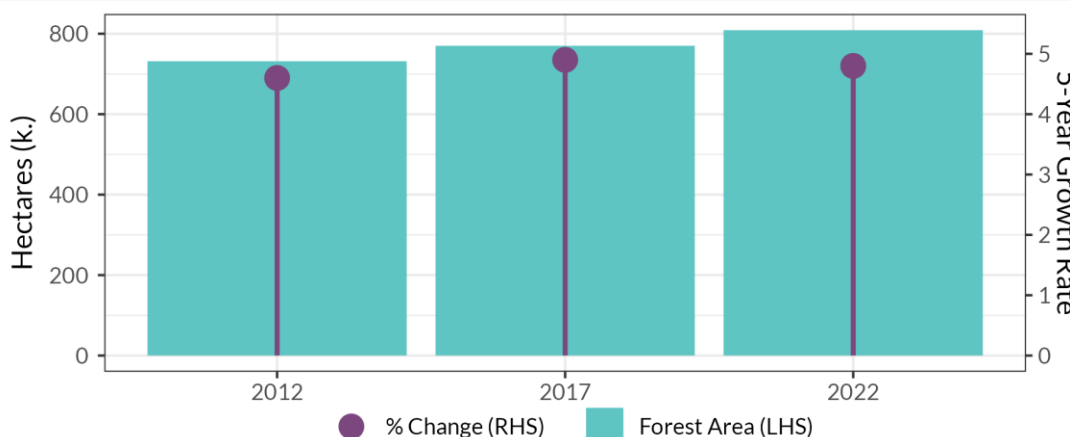
Source: CSO – Table AAA06 [\[link\]](#) (accessed 13/11/2023)

Forest Coverage Increasing but Higher Growth Required for 2030 Targets

B.12 | Agriculture



Forests remove CO₂ from the atmosphere and therefore play an important role in national emissions accounting. EPA data show that forest land and harvested wood products removed 37 million tonnes of CO₂e between 2012 and 2021, equivalent to about 5% of national net GHG emissions over this period. In 2022, 11.6% of Irish land was under forest, rising about 5% every five years (on average, 6.5k hectares per annum). The *Climate Action Plan* has targets to increase afforestation to 8k hectares per year from 2023.



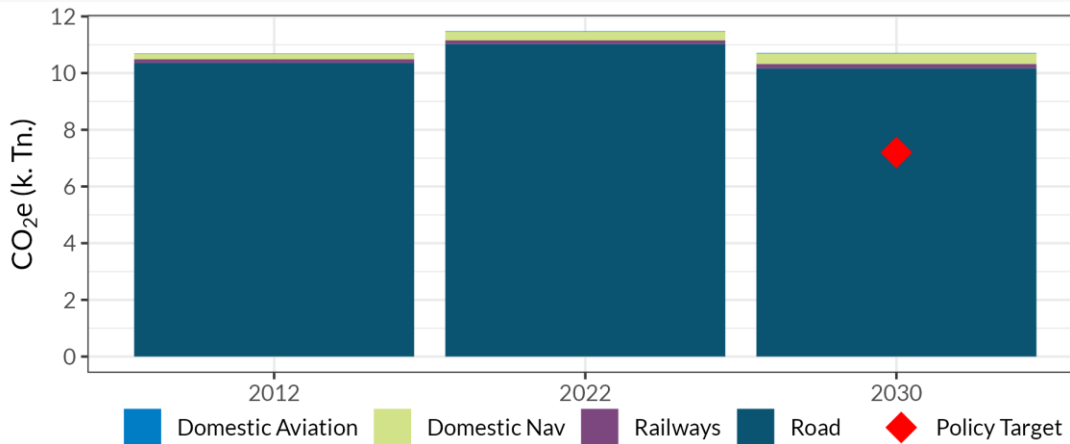
Source: Own calculations based on Government of Ireland [\[link\]](#), EPA [\[link\]](#) and EEA [\[link\]](#) (accessed 13/11/2023)

Transport Emissions Growing and Dominated by Road Transport

B.13 | Transport



96% of transport emissions relate to road transport (2022). Emissions in this sector have increased by 7.5% since 2012. This rise is considerably lower than the growth in vehicle numbers, which reflects fuel efficiency improvements over this time. Under the EPA's "existing measures" forecast, emissions will decline by 6.6% between 2022 and 2030. However, if the *Climate Action Plan* (see Box A) is fully implemented, emissions will decline by 38%.



Source: EPA [\[link\]](#) (accessed 12/11/2023)

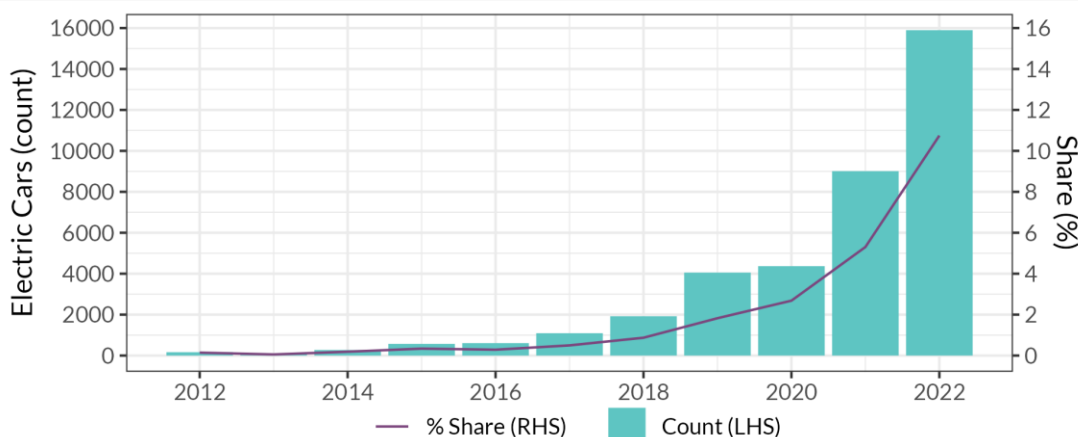
Notes: Figures exclude international aviation

Faster Electric Vehicle Growth Required to meet 2030 Targets

B.14 | Transport



The *Climate Action Plan* 2030 targets for transport include 943,500 additional electric vehicles (EVs), increasing the biofuel blend in petrol (to 10%) and diesel (to 20%) and a 20% reduction in vehicle kilometres. EV registrations (new and secondhand vehicles licencing statistics) have grown from 0.14% in 2012 to 10.7% in 2022. Cumulative EV registrations by end-2022 (38,101 vehicles) represent 4% of 2030 targets.



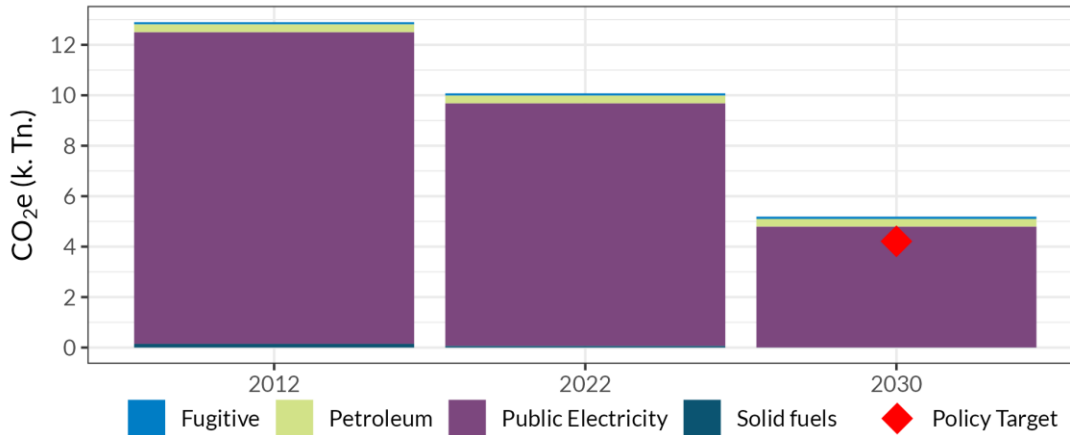
Source: CSO - Table TEA27 [\[link\]](#) (accessed 12/11/2023)

Decarbonisation of National Electricity Underway

B.15 | Energy



“Energy Industry” emissions are dominated by electricity generation (95% in 2022). The sector has shown considerable decarbonisation over the past decade – emissions have reduced 22% between 2012 and 2022 (and 39% between 2002 and 2022). 2030 energy targets are more ambitious than for other sectors – assuming full implementation of the *Climate Action Plan*, the EPA project that emissions will decline a further 58% between 2022 and 2030. This target will require an increase in the pace of decarbonisation.



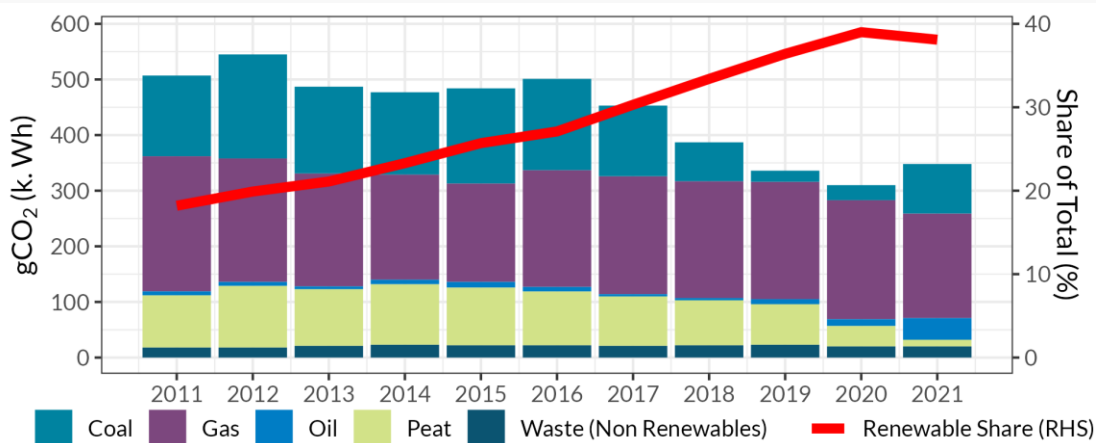
Source: EPA [\[link\]](#) (accessed 13/11/2023)

Significant Shift to Renewable Generation

B.16 | Energy



The CO₂ intensity of Irish electricity – measured in grams of CO₂ per kilowatt hour (the standard unit of electricity) – has declined considerably with growing renewable generation and declining use of coal and peat. The CO₂ associated with using electricity (electricity consumers’ Scope 2 emissions) has declined 45% since 2005, from 635g/kWh to 348g/kWh. Despite considerable improvements, Ireland is above the EU average (238g/kWh in 2022).



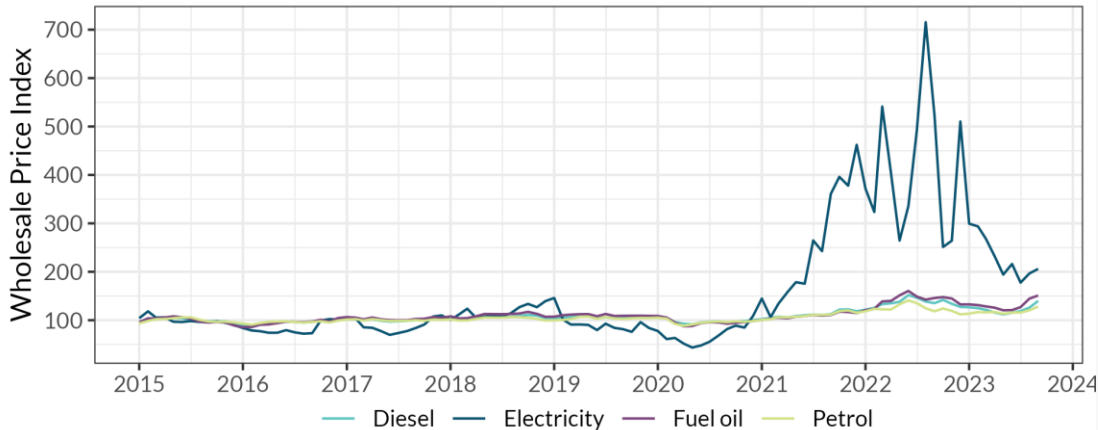
Source: SEAI [\[link\]](#) and EEA [\[link\]](#) (accessed 13/11/2023)

Wholesale Energy Prices Returned to pre-Ukraine War Levels

B.17 | Prices



The Central Statistics Office (CSO) publishes wholesale energy prices on a monthly basis. Chart B.17 presents the CSO's wholesale price index (Base 2015, excluding VAT) for four fuels. While prices peaked in 2022 (Ukraine war), they have since declined (although rising again since mid-2023). The rise in wholesale electricity prices was significantly above that of other fuels. Wholesale electricity prices are now back to pre-war levels but remain elevated relative to pre-2021.



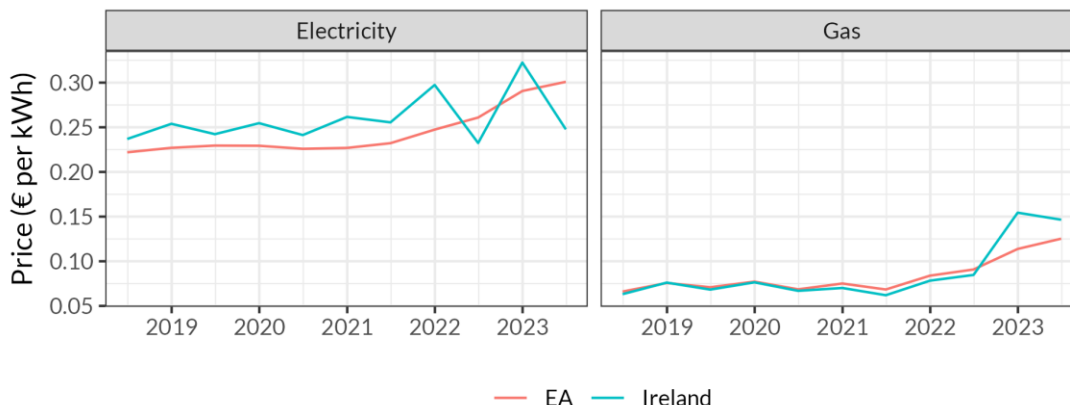
Source: CSO – Table WPM26 [\[link\]](#) (Accessed 10/11/2023)

Rise in Residential Energy Prices Higher than EU

B.18 | Prices



Eurostat publish cross-country residential energy price data on a half-yearly basis. While Irish household gas prices (right panel) were similar to the EU average up until mid-2022, they increased at a faster pace after. In the latest data (H1 2023), residential gas prices in Ireland were 17% higher than the EU average. For electricity (left panel), prices in Ireland have historically been higher than the EU. However, household energy supports in Ireland in H1 2022 and H1 2023 reduced household costs significantly. In the period prior to supports (H2 2021), electricity prices were 20% higher than EU.



Source: Eurostat electricity [\(link\)](#) and gas [\(link\)](#)

Notes: Prices include taxes and levies. Band DC used for electricity and band D2 used for gas.

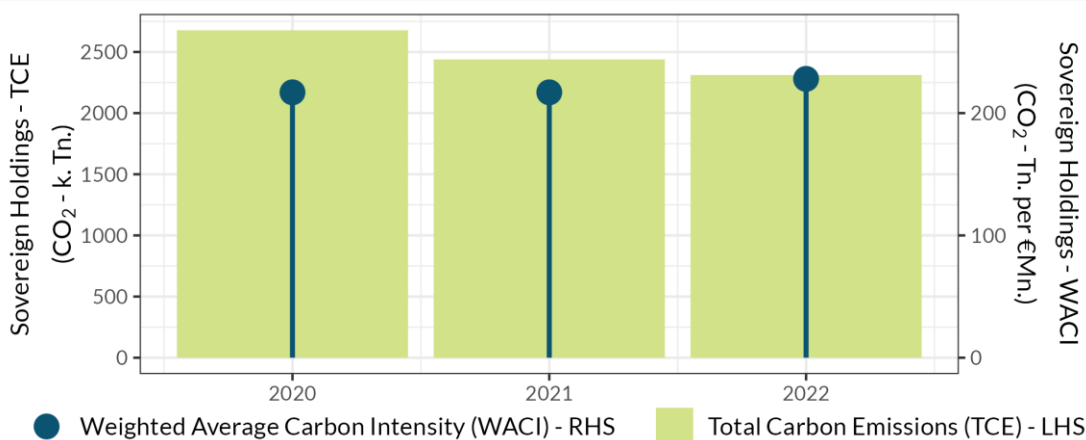
Part C: Own Emissions

Inaugural Climate-Related Financial Disclosures Published in 2023

C.1 | Own Investments



In line with a common framework developed by the Eurosystem, the Central Bank published its inaugural climate-related financial disclosures in 2023. Chart C.1 presents emissions (Scope 1) associated with the Central Bank's sovereign asset holdings for two metrics: total CO₂ emissions (TCE) and weighted average CO₂ intensity (WACI). Sovereign/sub-sovereign bond holdings accounted for 76 per cent of the investment assets in-scope for emissions calculations. Holdings of these assets in 2022 were associated with 2.3 Mn. tonnes of CO₂. Since 2020, total emissions have decreased, driven by the reduction in the absolute size of the investment assets, while the WACI has remained relatively stable.



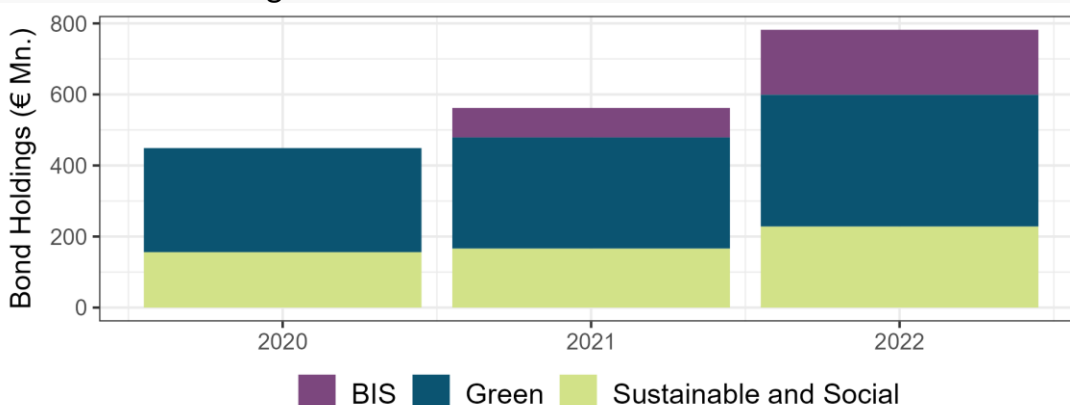
Source: Central Bank Financial Markets Division [\[Link\]](#)

Increase in Central Bank's Holdings of Thematic Bonds

C.2 | Own Investments



Thematic Bonds comprising Green, Social and Sustainability (GSS) bonds are issued by multilateral development banks, supranational organisations, governments and sovereign-linked agencies. The Central Bank has increased its GSS bond holdings from €448 million in 2020 to €781 million in 2022.



Source: Central Bank Financial Markets Division [\[Link\]](#)

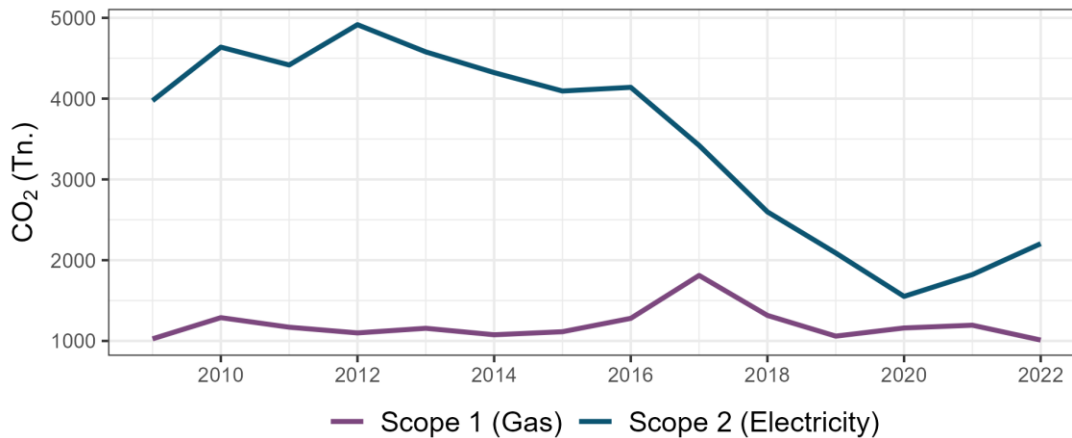
Notes: Bank for International Settlements (BIS) green bond funds support, for example, clean transportation, renewable energy and green buildings.

Central Bank Operations' CO₂ Primarily from Electricity Use

C.3 | Operations



Chart C.3 presents emission trends from Central Bank operations. In the latest year (2022), the majority of emissions were associated with electricity use (Scope 2 – 2,204 tonnes: 69%), followed by gas (Scope 1 – 1,011 tonnes: 31%). Overall declines since 2012 are due to lower Scope 2 emissions as a result of building energy efficiency improvements combined with lower-CO₂ electricity from the national grid.



Source: Central Bank Operations [\[Link\]](#).

Notes: For Scope 2 (electricity), the average CO₂ intensity from the national grid is employed [\[Link\]](#)

Box 1: Climate Policy Context

Ireland's Climate Action Plan 2023 (CAP23)

CAP23 is the second annual update to Ireland's Climate Action Plan 2019 and is the first that was prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021. This strategy implements carbon budgets, sectoral emissions ceilings and sets out a roadmap which aims to halve Ireland's emissions by 2030 and reach net zero by 2050. CAP23 consists of actions and targets relevant to fifteen different sectors, some of which being renewables, carbon pricing, international climate action, transition and adaption.

The Paris Agreement

The Paris Agreement entered into force in 2016. This legally binding international treaty has three main aims: (i) limit global average temperature increase to 1.5°C (above preindustrial levels) and/or well below 2°C, (ii) increase adaptation to climate change, (iii) provide financing to developing countries to mitigate, strengthen resilience and adapt to impacts. The Paris Agreement works on a 5-year cycle where countries submit updated and increasingly ambitious climate plans known as Nationally Determined Contributions (NDCs). The EU submits a joint NDC on behalf of all member countries.

European Green Deal

In December 2019, the European Commission launched the European Green Deal. This package of policy initiatives aims to facilitate the transition to a low-carbon economy, with an overall goal of reaching carbon neutrality by 2050. The initiatives cover climate, environment, energy, transport, industry, agriculture and sustainable finance – all of which are intended to be interlinked.

The Green Deal consists of many components but two are of particular note:

- The “Fit for 55” package includes proposals to revise outdated legislation and input new legislative initiatives to align EU laws with 2030 climate goals (reduce emissions by 55%).
- European climate law sets a legally binding target of “net zero” GHG by 2050. EU Institutions and Member States are bound to take the necessary measures at EU and national level to meet the target. For Ireland, this is the EU basis for our Climate Action Plan.

The Green Deal includes a number of sustainable finance initiatives. In 2018, the EU launched its first action plan on financing sustainable growth which led has three building blocks:

- **Taxonomy:** A classification system, or ‘taxonomy’, of sustainable activities. The Taxonomy aims to provide a robust, science-based classification system, allowing non-financial and financial companies to share a common definition of sustainability and thereby providing protection against

greenwashing. Greenwashing is when misleading claims are made that an activity or product is green or supports a more sustainable economy.

- **Disclosures:** A disclosure framework for non-financial and financial companies. This mandatory disclosure regime provides investors with information to make informed sustainable investment decisions. Disclosure requirements include the impact of a company's activities on the environment and society, as well as the business and financial risks faced by a company due to its sustainability exposures (*this is known as the 'double materiality' concept*). A key part of this building block is the Sustainable Finance Disclosures Regulation (SFDR), which is a Regulation that ensures transparency on the sustainability characteristics of investment products and the entities producing or selling/advising on those products- this includes insurance companies, fund managers and investment firms.
- **Tools:** Investment tools, including benchmarks, standards and labels. These make it easier for financial market participants to align their investment strategies with the EU's climate and environmental goals. They provide greater transparency to market participants.

European Union Emission Trading System (EU ETS)

The ETS is a cornerstone of EU climate policy. Its aim is to reduce emissions by pricing greenhouse gas (GHG) pollution from the power, industry and aviation sectors. By increasing the cost of emissions, the ETS incentivises the switch to lower CO₂ technologies. The ETS is a 'cap and trade' system. This means that the EU sets an overall limit (cap) on the total volume of GHG emissions and that companies can buy and sell (trade) allowances on the open market.

Carbon Border Adjustment Mechanism (CBAM)

The CBAM is an EU import tariff which is designed to prevent non-EU imports from price undercutting EU producers due to lower emission taxes outside the EU. The planned penalties will range between €10 and €50 a tonne, which will be based on the bloc's CO₂ price. CBAM came into effect for an 18-month trial period from October 1st 2023 and will be fully operational from 2026.

Appendix: Technical Methodology

Chart	Description
A.1	Methodology follows Lambert et al. (2023), <i>Financial Stability Notes</i> [link], where green mortgages are classified in new mortgage origination data based on observed interest rate differences (discounts) applied to energy efficient properties.
A.2	Methodology follows Adhikari et al. (2023), <i>Financial Stability Notes</i> [link], where statistical models using household energy expenditure data are employed to populate mortgage data with estimates on energy expenditure and emissions.
A.3/A.4	<p>See ECB [link] for full description of methodology and caveats. Charts A.3 and A.4 present the ECB's "potential exposure at risk" (PEAR) indicator. The PEAR indicator gives information on the total amount exposed to some type of natural hazard. It does not differentiate whether the probability or the intensity of the hazard event is high or low.</p> $PEAR = \frac{\sum_{i=1}^{N_c} (EXPOSURE_i RS > 0)}{\sum_{i=1}^{N_c} (EXPOSURE_i)} \cdot 100$
A.5/A.6/A.7	<p>See ECB [link] for full description of methodology and caveats. Charts A.5, A.6 and A.7 use the Weighted Average Carbon Intensity (WACI) indicator which calculates the weighted sum of tonnes of CO₂ emissions per million euro of revenue. The weight is equal to the percentage share of the investment in a private company in the portfolio value.</p> $WACI_{b,s} = \sum \left(\frac{investment_{b,i}}{portfolio\ value_{b,s}} \times \frac{company\ GHG\ Scope\ 1_i}{revenue_i} \right)$
B.7/ B.8	<p>In Charts B.7 and B.8, Scope 2 emissions are calculated using sectoral electricity use (terajoule) data from Eurostat [link]</p> <ul style="list-style-type: none"> • Terajoule to kWh conversion: 27,777 [link] • kWh to CO₂ conversion: based on national electricity CO₂ kWh per kilowatt from EEA [link] <p>These charts exclude the energy sector, the agricultural sector and any sectors which are expected to be mainly funded by government (education, health, and water).</p>



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