

Country Reports

IEA Bioenergy: 10 2021



This report was prepared from the 2021 IEA World Energy Balances and Renewables Information, combined with data and information provided by the IEA Bioenergy Executive Committee and Task members¹. Reference is also made to FAOstat and Eurostat data as well as data from national statistics. All individual country reports were reviewed by the national delegates to the IEA Bioenergy Executive Committee, who have approved the content. General background on the approach and definitions can be found in the central introductory report for all country reports.

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HIGHLIGHTS

- Renewables make up 11% of the total energy supply in Ireland. The renewable energy share in *final energy consumption* is 13%². Around one-third of renewable energy is from biomass.
- Ireland has a high land share of permanent meadows/pastures (connected to animal husbandry) and a low share of forests. In terms of biomass growth potentials, waste, industry residues, and agricultural residues are most in focus.
- Fossil gas still dominates the power system in Ireland. The share of wind power is steadily growing and is now producing one-third of Irish electricity. The role of biomass-based electricity is modest and declining.
- Heat generation is dominated by fossil fuels (90%), mainly fossil gas and oil, with a modest share of biomass.
- The transport system also relies on fossil fuels, with three quarters being fossil diesel fuel and 20% gasoline. Biofuels are at a level of almost 5% of total transport energy consumption. Most biofuels (particularly biodiesel) are based on waste/residues.

¹ While data for 2020 are starting to become available at national level, it was decided to consider trends up to 2019 for good comparability and benchmarking between the different IEA Bioenergy member countries. Care should also be taken when using 2020 data for analysing trends as these data are distorted by the COVID19 Pandemic.

² The difference between the share of renewables in supply and consumption relates to unused heat from power plants (which is counted in energy supply, but not in final consumption).

- The Climate Action and Low Carbon Development (Amendment) Bill 2021³, supports Ireland's transition to Net Zero and achieve a climate-neutral economy by no later than 2050.

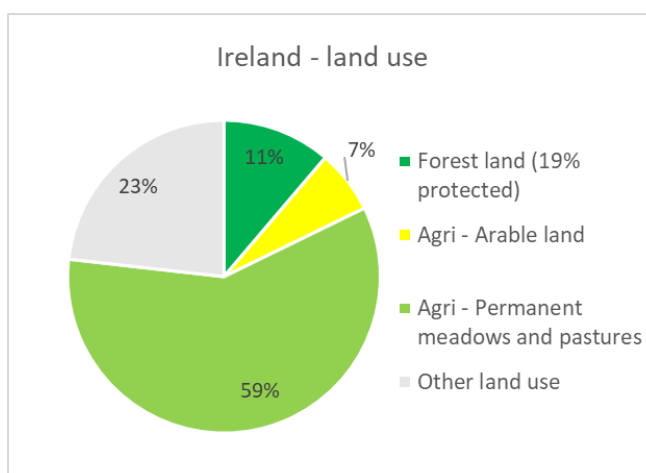
COUNTRY PROFILE

Population and land use

Ireland is an island in the northwest of Europe. The Republic of Ireland covers five-sixths of the island and is a member of the European Union. It has a total land area of 68.9 thousand km² and 5 million inhabitants, representing a relatively low population density of 73 persons per km².

The geography of Ireland comprises relatively low-lying mountains surrounding a central plain, and it has a temperate climate. 60% of the land area are permanent meadows/pastures. These are primarily used for animal grazing; only 7% is arable land and 11% forest land.

Figure 1: Land use in Ireland (2018 figures - Source: FAOstat)



Final energy consumption

Overall final energy consumption in Ireland (including non-energy use of oil, natural gas, and coal in the industry) is 2.3 tonnes of oil equivalent (toe) per capita. This number is around the average for IEA Bioenergy member countries. The profile of the industry in Ireland is the primary driver of the modest energy consumption. The sector does not consume as much energy as in other IEA Bioenergy member countries.

Table 1: Distribution of the final consumption of energy carriers by sector in Ireland (2019 figures - Source: IEA (2021) World Energy Balances and Renewables Information)

Final consumption energy carriers	Toe/capita (2019)	% of total energy consumption	Median* (toe/capita)
Industry (energy use)	0.47	20%	0.67
Industry (non-energy use)	0.05	2%	0.21
Transport	0.83	36%	0.69
Residential	0.58	25%	0.57
Commercial & public services	0.36	15%	0.34
other	0.05	2%	
Total	2.33		2.34

* Median of the 25 member countries of IEA Bioenergy⁴

³ <https://www.gov.ie/en/publication/984d2-climate-action-and-low-carbon-development-amendment-bill-2020/>

⁴ Comparative figures of the different IEA Bioenergy member countries are discussed in the central Countries' Report.

NATIONAL POLICY FRAMEWORK IN IRELAND

TARGETS AND STRATEGIES

The Climate Action and Low Carbon Development (Amendment) Bill 2021 is focused on reducing economy-wide GHG emissions by 51% by 2030 and reaching economy-wide carbon neutrality by 2050. The legislation sets out key objectives as outlined below:

- A 'national climate objective' is given a statutory basis. It commits Ireland to pursue and achieve, no later than 2050, the transition to a climate-resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.
- Embeds the process of carbon budgeting into law, Governments are required to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector, on a rolling 15-year basis, starting in 2021
- Actions for each sector will be detailed in the Climate Action Plan, updated annually - A National Long-Term Climate Action Strategy will be prepared every five years - Government Ministers will be responsible for achieving the legally binding targets for their sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year
- Strengthens the role of the Climate Change Advisory Council, tasking it with proposing carbon budgets to the Minister
- Provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% emissions over the period to 2030, in line with the Programme for Government commitment
- Expands the Climate Change Advisory Council from eleven to fourteen members and provides that future appointments to the Council include a greater range of relevant expertise and gender-balance.
- Introduces a requirement for each local authority to prepare a Climate Action Plan, which includes both mitigation and adaptation measures and be updated every five years. Local authority Development Plans will also align with their Climate Action Plan
- Public Bodies will be obliged to perform their functions in a manner consistent with national climate plans and strategies and furthering the achievement of the national climate objective.

Additional policy targets and supporting measures are being developed as part of the Climate Action Plan 2021 discussions. This Plan will set out the detail of sectoral level objectives and strategies to achieve these. In this context, the discussion on potential new strategies and policy measures is limited.

Bioeconomy Policy Statement:

The Government of Ireland has recently published a National Policy Statement on the Bioeconomy. Bioeconomy with the aim of capitalising on the potential to reduce Ireland's reliance on fossil fuel based resources by boosting the use of renewable biological sources. The policy statement was developed in consultation with interested parties working in the area in Ireland in the context of developments at an EU level and internationally. It aims to capitalise on the potential of the Bioeconomy by:

1. Ensuring policy coherence.
2. Establishing a Network of Stakeholders.
3. Translating Research to real Applications.
4. Identifying fundamental challenges to the commercial success and social development of the Bioeconomy.
5. Developing a framework for implementation.
6. Raising awareness of Bioeconomy and its products.

In October 2020, the National Bioeconomy Forum was launched to promote, support and advocate for the sustainable development of the bioeconomy in Ireland.

A description of renewable energy and climate policies and measures in Ireland is available at the IEA's Policies and Measures Database: <https://www.iea.org/policies?country=Ireland>

Specific policies related to renewable electricity, renewable heat and transport biofuels will be highlighted in the chapters about the role of bioenergy in different sectors⁵.

THE CONTRIBUTION OF BIOENERGY IN NATIONAL ENERGY SUPPLY

TOTAL ENERGY SUPPLY

Ireland's total energy supply (TES) in 2019 amounted to 571 PJ, a drop of 11% from the peak in 2008. The declining trend in TES arises from improved energy efficiency. The primary drivers of the trend are the increase in the proportion of power coming from wind, the retirement of inefficient peat power stations, and the reduced competitiveness of coal. Total energy supply is still 87% dominated by fossil fuels. Gas is the primary fuel in the power sector and has a large share of heat also. Most oil is used in the transport sector, but Ireland still has a large share of oil-based heating. Oil and gas represent 46% (263 PJ) and 33% (191 PJ) of the total energy supply, respectively. The use of peat for energy is also significant in Ireland at 5% of TES (28 PJ), but the closure of the peat power stations means this will drop significantly in 2020. Coal represents less than 3% of TES (15 PJ).

Renewable energy sources have a share of 11% or 63 PJ. Around 55% of renewable energy supply in 2019 came from wind energy (36 PJ) and 40% from biomass (26 PJ). Hydropower and solar energy only have a minor role (4 PJ together).

⁵ <https://www.gov.ie/en/publication/0015c-irelands-national-energy-climate-plan-2021-2030/>

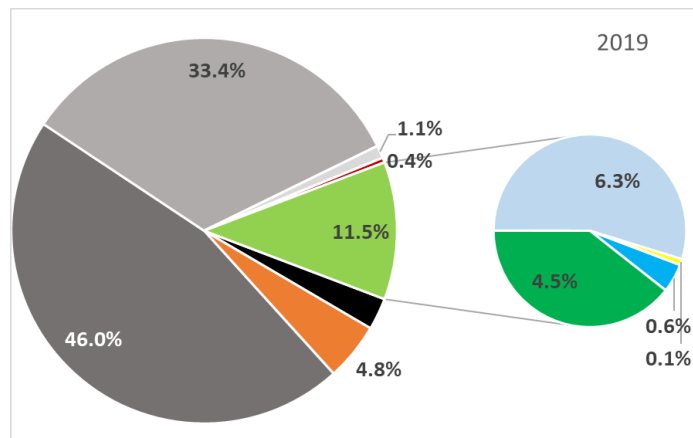
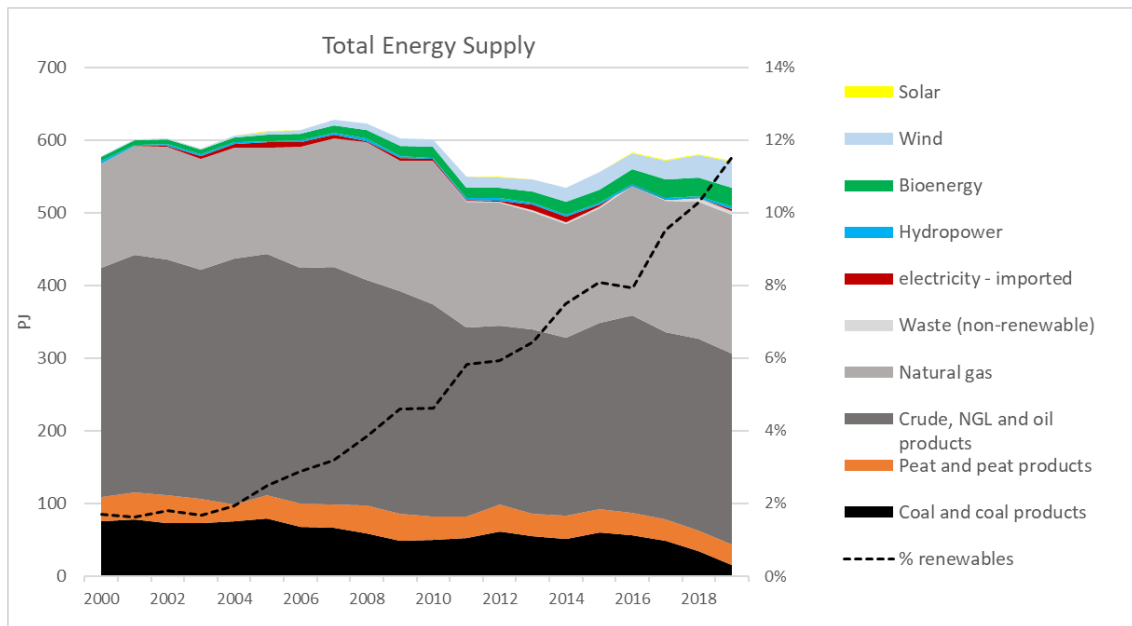


Figure 2: Total energy supply⁶ and the contribution of different energy sources in Ireland, with distribution in 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

After a drop between 2005 and 2010, **oil products** remained relatively stable, at around 260 PJ. Oil products account for about half of the Irish total energy supply. Since 2015 there was a significant decrease of **coal** from 60 PJ to 15 PJ in 2019, dropping its share from over 10% to less than 3% of TES. The displacement of less efficient coal-powered electricity generation with more efficient gas is the primary driver of this trend. **Natural (fossil) gas** increased from 157 PJ in 2015 to 191 PJ in 2019, around a third of the Irish total energy supply. The use of **peat** for energy slightly dropped in the past years from 32 to 25 PJ.

The share of renewable energy steadily increased from 2% in 2004 up to more than 11% in 2019. From 2015 wind energy overtook bioenergy as the dominant type of renewable energy; between 2013 and 2019, wind power more than doubled from 16 PJ to 36 PJ. Bioenergy is at 26 PJ (up from 16 PJ in 2013), representing 40% of renewable energy supply. Hydropower is relatively constant, around 2.5 PJ, and the share of solar energy is still marginal (less than 1 PJ).

⁶ Total energy supply refers to the use of resources. In terms of the role in the energy system this distribution overestimates the role of resources producing electricity with a high share of unused waste heat (like nuclear plants).

Figure 3 shows the evolution of the several types of bioenergy. In contrast to other countries, solid biomass represents less than half of bioenergy. This is consistent with Table 1 that shows the comparatively large share of transport fuel consumption and the lesser role of industry in Ireland relative to other IEA countries. As biofuel shares have increased in transport, so has the overall contribution of biomass fuels.

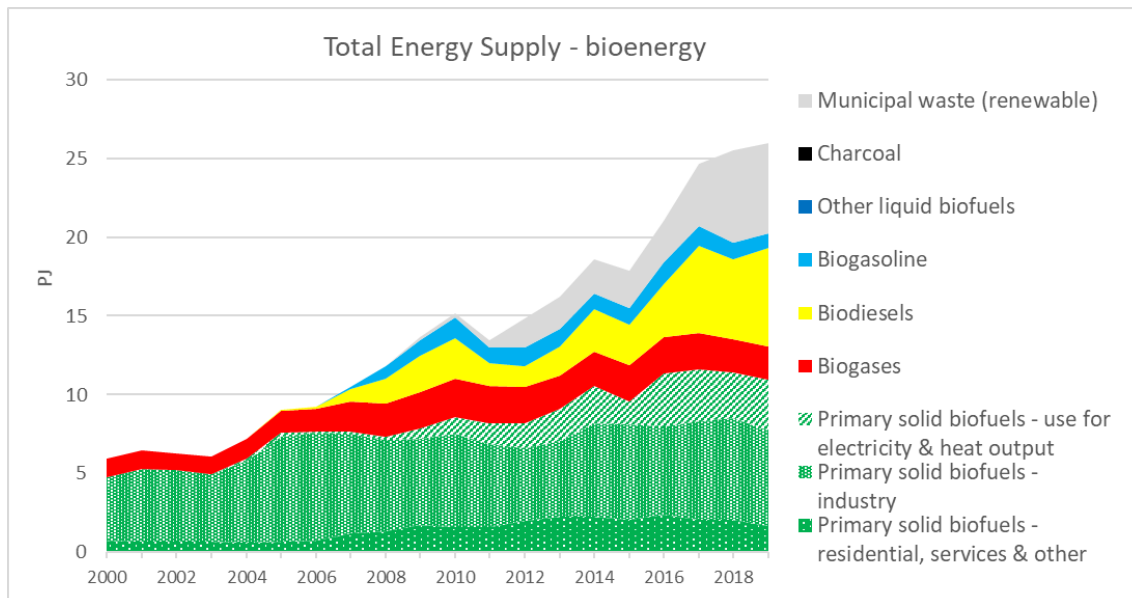


Figure 3: Development of total energy supply from bioenergy in Ireland 2000 - 2018 (Source: IEA (2021) World Energy Balances and Renewables Information)

Evolution of the bioenergy carriers:

- Solid biofuels are primarily consumed in the industry at a relatively stable amount, around 6 PJ. Solid biomass is widely used in the wood and wood products industry sector. The use of solid biofuels in residential applications is relatively low (2 PJ). Application for electricity production has grown to a level of 3 PJ.
- Liquid biofuels were introduced in 2007 and – with some fluctuations - have grown to a combined level of 7.1 PJ, most of them being biodiesel. This reflects the high percentage of road vehicles that are fuelled by diesel in Ireland.
- Biogas has been stable at around 2 PJ since 2007.
- The use of renewable MSW for energy production has consistently grown since 2010 to a level of 5.7 PJ.

Table 2 displays the 2019 total bioenergy supply values on a per capita basis. Compared to the other 24 member countries of IEA Bioenergy (expressed per capita), Ireland ranks at the higher end for renewable MSW, in the middle for liquid biofuels and at the lower end for biogas and solid biofuels.

Table 2: Total energy supply per capita in 2019 for different bioenergy carriers

	Supply per capita	Median IEA Bioenergy members
Bioenergy	5.3 GJ/cap	10.6
Solid biofuels	2.2 GJ/cap	7.0
Renewable MSW	1.2 GJ/cap	0.8
Biogas	0.4 GJ/cap	0.7
Liquid biofuels	1.5 GJ/cap	1.5

Source: IEA (2021) World Energy Balances and Renewables Information

Table 3 indicates the amounts of the different bioenergy carriers compared to some relevant reference points, namely the amount of forest in the country (for solid biomass), the amount of generated MSW (for renewable MSW used for energy), the amount of natural gas consumed in the country (for biogas) and the amount of fossil oil products consumed (for liquid biofuels).

Table 3: Comparison of the supply of different bioenergy carriers in 2019 to specific reference points

	Compared to reference points		Median*
Bioenergy	4.5 %	of total energy supply	7.2 %
Solid biofuels	17.4 GJ/ha_forest	compared to the domestic hectares of forest land (excl. protected)	21.3 GJ/ha_forest
Renewable MSW	2.13 GJ/ton_MS_W	compared to the total generated MSW in the country	1.4 GJ/ton_MS_W
Biogas	0.011 GJ/GJ_NG	compared to natural gas supply	0.023 GJ/GJ_NG
Liquid biofuels	0.027 GJ/GJ_oil	compared to oil products supply	0.028 GJ/GJ_oil

Source: energy data from IEA (2021) World Energy Balances and Renewables Information; forest figures from FAOStat; waste figures from World Bank

* Median of the 25 member countries of IEA Bioenergy⁷

Note that the comparison of biogas to gas usage and oil to oil products does not capture the significant biomass resource constraints in Ireland nor the collection, scale and costs challenges associated with a low population density. Hence, the overall interpretation of the comparison below should be cognisant with the limitations for the benchmark as applied to Ireland.

Specific comments in relation to the reference points:

- The amount of solid biofuels compared to the domestic forest area is quite modest (~1 ton_{dry mass} of wood per hectare⁸).
- The use of renewable MSW for energy production is comparable to other European countries with well-developed waste management systems.

⁷ Comparative figures of the different IEA Bioenergy member countries are discussed in the central Countries' Report.

⁸ Counted with a typical calorific value of wood (dry mass) of 19 GJ/ton_{dry mass}

ROLE OF BIOENERGY IN DIFFERENT SECTORS

OVERVIEW

The overall 2019 share of renewables in **final energy consumption** among electricity, transportation and heat sectors is 13%, with bioenergy making up almost 5% of the energy share (Table 4). Note that these figures are slightly higher than the shares in total energy supply (where unused waste heat, e.g., in fossil power production, is also included).

Table 4: Role of bioenergy and renewable energy in electricity, transport energy and fuel/heat consumption in 2019

Sector	Share of bioenergy	Share of renewable energy	Overall consumption
Electricity ⁹	2.9%	40.0% (34.8% wind)	29.4 TWh (106 PJ)
Transport energy (final consumption)	4.6%	4.7%	170 PJ
Overall fuel and heat consumption ¹⁰	Direct biomass: 5.3%	5.6%	187 PJ
TOTAL FINAL ENERGY CONSUMPTION	4.5%	13.1%	462 PJ

Source: IEA (2021) *World Energy Balances and Renewables Information*

The following paragraphs will consider the evolutions in the different sectors.

⁹ Renewable electricity production compared to final consumption. Potential renewable shares of imported electricity are not included.

¹⁰ This includes final consumption of fuels and heat in industry, the residential sector, commercial and public services and agriculture/forestry. Transport fuels are excluded. Energy used for transformation and for own use of energy producing industries is also excluded. Electric heating (direct or through heat pumps) is not included in these figures as this is not separately reported.

ELECTRICITY

The Irish power production is dominated by natural gas (55%) and wind energy (35%). In 2019 coal was almost completely phased out for power production, coming down from 18% (5 PJ) in 2015. Note that a large part of this decrease is compensated by natural gas, which – after a declining trend between 2010 and 2014 - increased again from 48% (12 PJ) to 55% (16 PJ) of total power generation since 2015. Wind is still in a steady rise with an average growth of 12% per year in the past decade and now represents 38% of Irish electricity generation. Bioenergy as well as hydropower represent 3%.

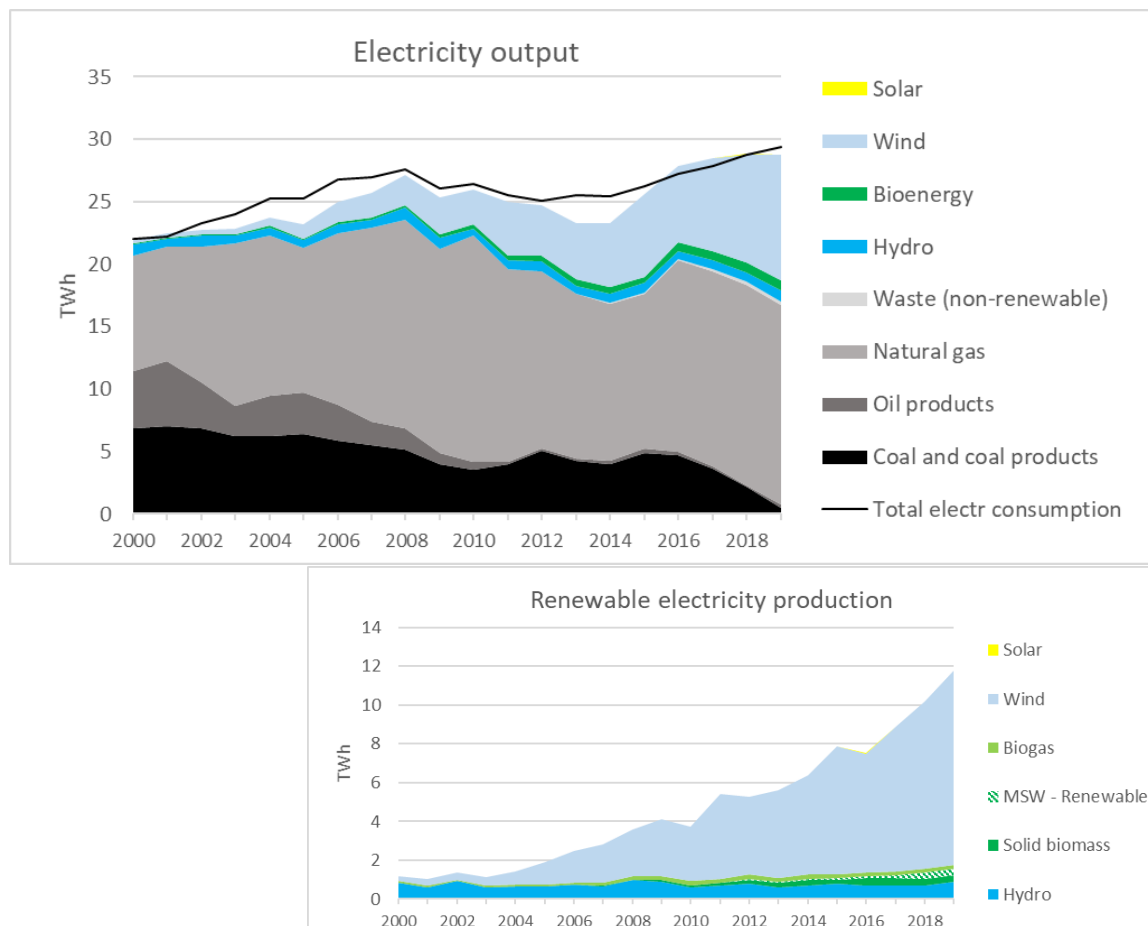


Figure 4: Evolution of the electricity mix in Ireland 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Policy framework

The main relevant policy instruments behind these evolutions:

Up to the end of 2015, a **Renewable Electricity Feed In Tariff (REFIT)** provided different support levels for several types of renewable electricity generation. Table 4 shows the list of technologies and the support offered. This scheme and its predecessors were successful in stimulating the deployment of renewable electricity generation, particularly wind. Ireland supplied over 25% of electricity demand from wind in 2016 placing the Irish system 3rd in the world for the penetration of wind generation. The deployment of bioenergy has also been helped by support for renewable electricity generation. In 2016 bioenergy technologies contributed 3.3% of total electricity demand

in Ireland. The scheme closed to new applications in 2015 and a proposal for a new scheme is under development called the Renewable Electricity Support Scheme (RESS). The proposed scheme was presented for public consultation in 2017. The proposal outlines a scheme that will set a support price based on an auction process where all renewable generators would compete for market share.

Table 5: REFIT 1, 2 & 3 Reference Prices for 2018 (in €/MWh)

Technology	2018
REFIT 1	
Large Scale Wind (> 5 MW)	69.999
Small Scale Wind (≤ 5 MW)	72.455
Hydro	88.42
Biomass - Land Fill Gas	85.964
Biomass - Others	88.42
REFIT 2	
Large Scale Wind (> 5 MW)	69.999
Small Scale Wind (≤ 5 MW)	72.455
Hydro	88.42
Biomass - Land Fill Gas	85.964
REFIT 3	
Biomass Combustion	89.671
Biomass - Energy Crops	100.221
Large Biomass CHP > 1500kW	126.595
Small Biomass CHP ≤ 1500kW	147.694
Large AD non-CHP > 500kW	105.496
Small AD non-CHP ≤ 500kW	116.045
Large AD CHP > 500kW	137.144
Small AD CHP ≤ 500kW	158.244

REFIT 1 Balancing Payment in 2018 = €10.50
(subject to CPI)

REFIT 2 & 3 Balancing Payment = €9.90
(not subject to CPI)

Source: Department of Environment, Climate and Communication (DECC)

The REFIT scheme was succeeded by the **Renewable Electricity Support Scheme (RESS)**¹¹ which provides support to renewable electricity projects in Ireland. With a primary focus on cost effectiveness, the RESS delivers a broader range of policy objectives, including:

- an Enabling Framework for Community Participation through the provision of pathways and supports for communities to participate in renewable energy projects;
- increasing technology diversity by broadening the renewable electricity technology mix;
- delivering an ambitious renewable electricity policy to 2030;
- increasing energy security, energy sustainability and ensuring the cost effectiveness of energy policy.

The proposed scheme seeks to set support levels through competitive bidding processes (renewable electricity auctions) and all new RES-E schemes would provide support in the form of a premium in addition to the market price. The scheme was launched in 2019.

HEAT/FUEL

Figure 5 shows the role of different fuels/energy carriers for providing heat in different sectors (industry, residential sector, commercial and public services and other). Fuel use by energy producing industries for transformation and for own use is excluded. Mind that electric heating (direct or through heat pumps) is not included in these figures as this is not separately reported.

The provision of heat is still largely dominated by fossil fuels, mainly natural gas and oil, both at around 82 PJ, together representing 85% of fuel consumption. Another 5% (10 PJ) is coal. The direct use of biomass for heat represents 5% (10 PJ) – its share has slightly grown in the past decade, mainly in industry.

There is no reporting of heat sales (e.g., through district heating) in Ireland.

¹¹ <https://www.gov.ie/en/publication/36d8d2-renewable-electricity-support-scheme/>

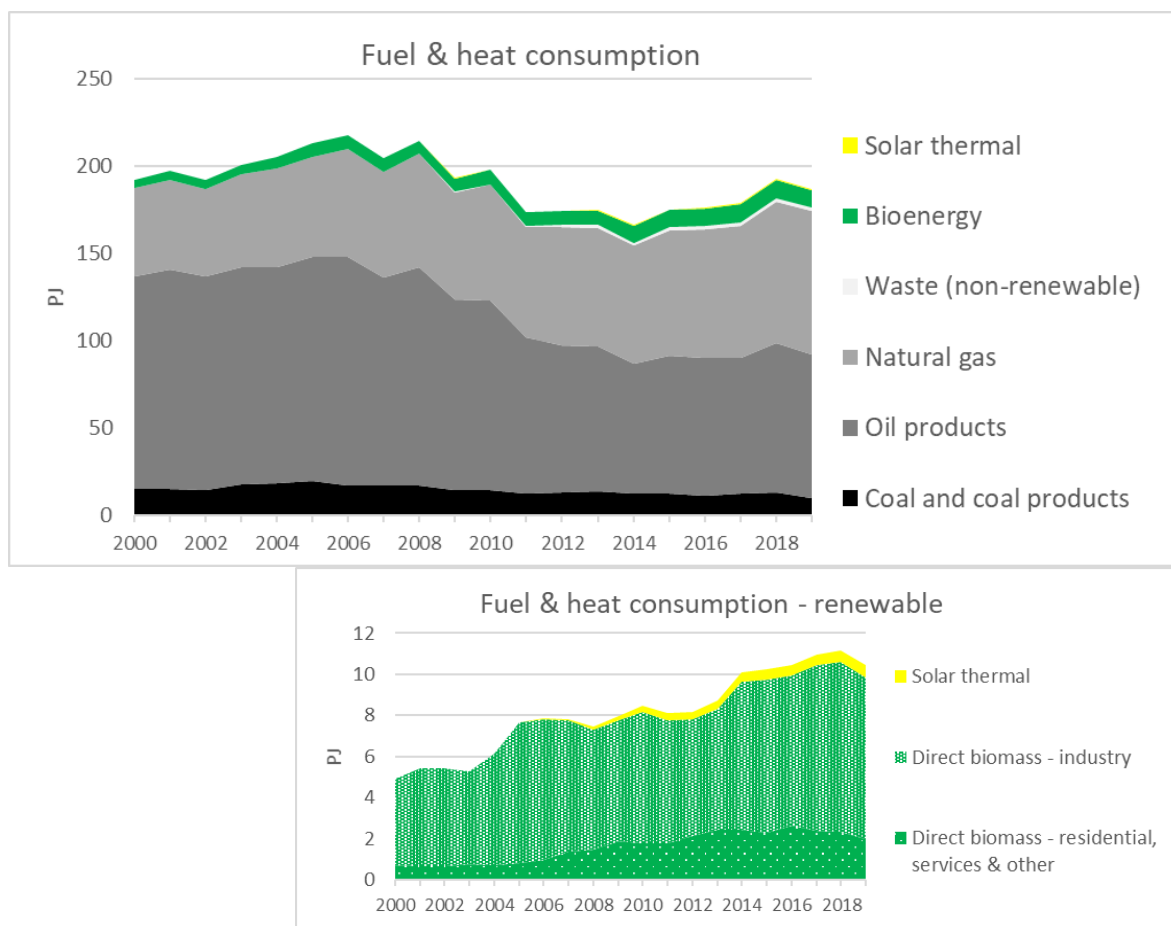


Figure 5: Evolution of fuel and heat consumption in Ireland 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Policy framework

The main relevant policy instruments behind these evolutions:

In December 2017, the Irish Government approved the introduction of a new scheme, the **Support Scheme for Renewable Heat (SSRH)**, to increase the energy generated from renewable sources in the heat sector. The Government funded scheme will support the adoption of renewable heating systems by commercial, industrial, agricultural, district heating, public sector and other non-domestic heat users not covered by the emissions trading system. The scheme will support projects through one of the following support mechanisms:

- An on-going operational support (paid for a period up to 15 years) based on useable heat output in renewable heating systems in new installations or installations that currently use a fossil fuel heating system and convert to using biomass heating systems or anaerobic digestion heating systems. This support consists of a multi-annual payment (for a period of up to 15 years) based on eligible heat use and prescribed tariffs. The tariffs paid will reduce with increasing output. Table 5 details the tariff structure for the eligible technologies.
- A grant (of up to 30%) to support investment in renewable heating systems that use eligible heat pumps technology.

Table 6: SSRH tariff details

Tier	Lower Limit (MWh/yr)	Upper Limit (MWh/yr)	Biomass Heating Systems Tariff (c/kWh)	Anaerobic Digestion Heating Systems (c/kWh)
1	0	300	5.66	2.95
2	300	1,000	3.02	2.95
3	1,000	2,400	0.5	0.5
4	2,400	10,000	0.5	0
5	10,000	50,000	0.37	0
6	50,000	N/A	0	0

(1) Source: Department of Communications, Climate Action and Environment

Other technologies and methods of support continue to be under consideration (including biomethane grid injection) for subsequent phases of the scheme.

In August 2020, the Department of Environment, Climate and Communication opened a consultation on a Renewable Heat Obligation. This obligation, if introduced, would require the suppliers of energy used in the heat sector in Ireland to ensure a certain proportion of the energy supplied is renewable. This consultation will inform the decision on whether, and how, such an obligation should be implemented in Ireland in the coming years.¹²

TRANSPORT

Figure 6 shows an overview of the energy used in transport in Ireland, split up by different fuels/energy carriers.

Diesel is the dominant transport fuel in Ireland, representing three quarters of transport fuel consumption, and its consumption is in fact still increasing, while the share of gasoline is going down (currently at 20%).

In 2007 biofuels were introduced; after a peak in 2010 there was a decline for a few years, but growth has meanwhile resumed up to a combined level of 8 PJ (4.6% of transport fuel). Most of these are qualified as 'advanced' biofuels according to the European Renewable Energy Directive. On average biodiesel represented 5% by energy of diesel consumption in 2019. Bio-ethanol represented 3.3% by energy of gasoline (which is consistent with a general use of E5).

Electricity in transport is at very low level (0.2% of total transport energy). The use of electricity in road vehicles is still marginal in 2019 (0.06% of total transport energy use) but can be expected to grow in the coming years.

¹² <https://www.gov.ie/en/consultation/7bc5b-consultation-on-the-introduction-of-a-renewable-heat-obligation/>

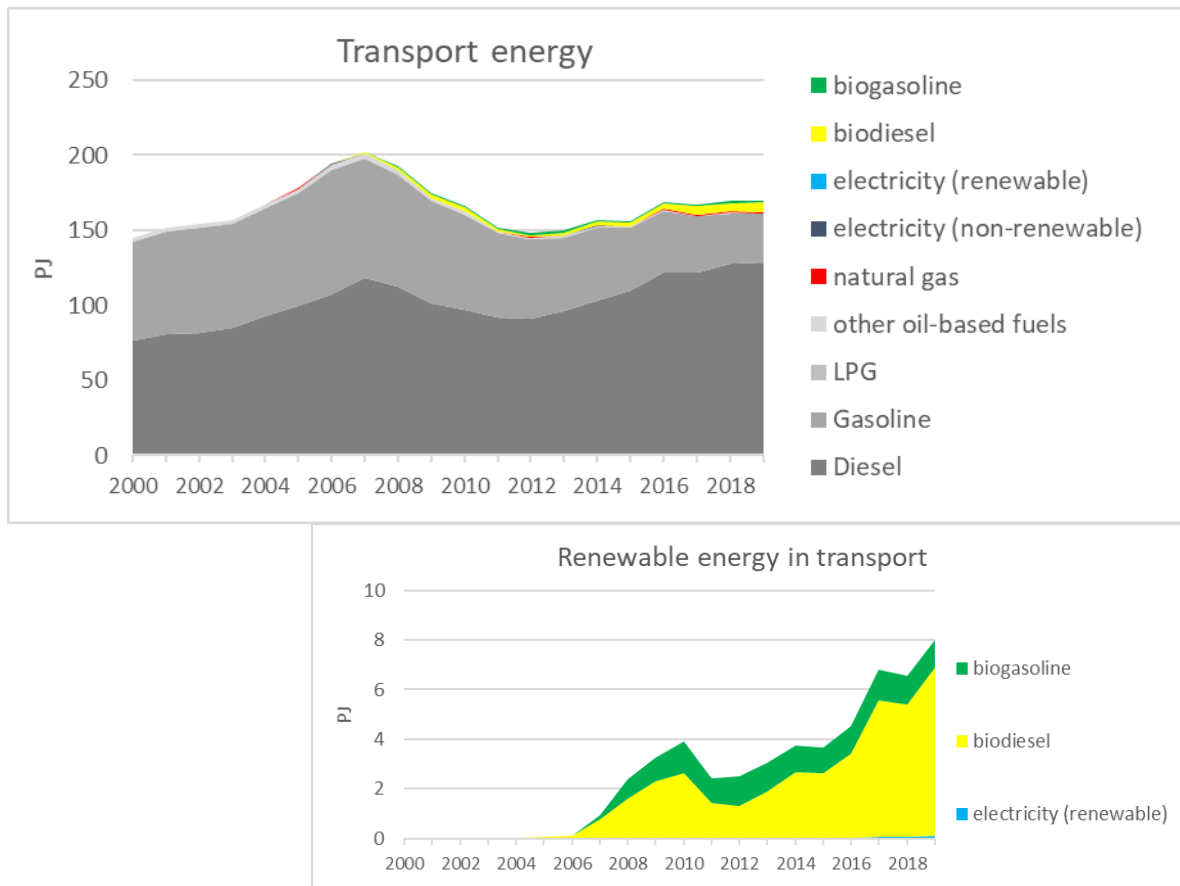


Figure 6: Evolution of transport fuels in Ireland 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Policy framework

The Irish Government introduced the **Biofuels Obligation Scheme** in 2010 to ensure that a proportion of the transport fuel used in the State consists of environmentally sustainable biofuels. Biofuels are typically blended with fossil fuels and made available to consumers at the pump. The existing scheme places an obligation on suppliers of mineral oil to ensure that 8.695% (by volume) of the motor fuels (generally gasoline and motor diesel) placed on the market are produced from renewable sources. This has increased from a share of 4.166% in 2010. In 2019, biofuels accounted for 1.4% of total energy demand and 4% of transport demand (under the EU's Renewable Energy Directive accounting rules).

Support schemes and taxation measures also support the uptake of low emissions vehicles. For instance, a purchase grant of up to €5,000 and relief from vehicle registration tax of up to €5,000 are available for electric vehicles. The excise rate for natural gas used as a transport fuel is set at the minimum rate allowable under the Energy Tax Directive up to 2023.

COMPARISON WITH RENEWABLE ENERGY TARGETS

According to Eurostat¹³, the following renewable energy shares in *gross final energy consumption* were reached.

Table 7: Share of renewables in different sectors in Ireland, according to Eurostat, and compared to the 2020 target

	2005	2010	2015	2019	2020 target
Overall share	2.9%	5.7%	9.2%	12.0%	16.0%
In heating & cooling	3.5%	4.5%	6.6%	6.3%	12%
In electricity	7.2%	14.6%	25.2%	36.5%	40%
In transport	0.1%	2.5%	5.7%	8.9%	10%

The penetration of renewable energy in the electricity and transport sectors has been significant. In 2017, Ireland had the 3rd in the world for the penetration of variable renewable electricity generation¹⁴. However, progress in heating and cooling has lagged. Because the heating and cooling sector makes up a substantial proportion of total energy demand in Ireland, this trend is having an influence on overall progress to the 2020 target.

It is important to note that some of these figures can differ from the IEA derived data because of different accounting rules. Particularly in transport the Eurostat shares are higher, which is due to the multiple counting of advanced biofuels and renewable electricity towards the transport target. The heating & cooling figure in Eurostat also includes heat pumps.

RESEARCH FOCUS RELATED TO BIOENERGY

Bioenergy research in Ireland is funded by a number of State Agencies and undertaken in research centres and universities. Some state agencies also compete for funding and conduct research.

The Sustainable Energy Authority of Ireland (SEAI) provides energy research funding to Ireland-based projects which contribute to Ireland's transition to a clean and secure energy future through its Research, Development & Demonstration (RD&D) Funding Programme. SEAI RD&D Funding is available to Companies, Research Performing Organisations (e.g., Universities, Institutes of Technology and Research Institutions), public sector bodies and semi-state bodies which are based in the Republic of Ireland. In 2021 SEAI expects to commit €10 million to energy research (€11m in 2019 and €10M in 2018 were committed). Bioenergy projects are funded through the Programme as are many different types of sustainable energy projects. SEAI supports the development and demonstration of new technologies, practises and/or supply chain innovations across the bioenergy sector. The 2018 call includes 4 themes related to bioenergy as well as an open call. Key themes

¹³ http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_335a&lang=en

¹⁴ https://iea.blob.core.windows.net/assets/07adb8b6-0ed5-45bd-b9a0-3e397575fefd/Energy_Policies_of_IEA_Countries_Ireland_2019_Review.pdf

included citizen participation in energy projects, the small-scale aggregation of biogas for grid injection and an investigation to quantify the impact of applying circular economy principles to the Irish biomass sector, to name but a few other can be found in the [National Energy Research Database](#).

Science Foundation Ireland (SFI) is Ireland's national foundation for investing in scientific and engineering research in academic institutions. SFI focuses most of its research investment on projects at technologies readiness levels (TRL) 1 (basic principles observed) and 2 (technology concept formulated), but aspects of some projects can also involve higher technology readiness levels (e.g., in the ICT space where moving between TRLs can be rapid). SFI funds individual researchers in academic institutions at all career levels from Postdoctoral Research upwards as individuals as well as part of groups. Several academics engaged in the bioenergy and bioeconomy areas are funded through investigator led research. Two research centres are also funded:

- BiOrbic (formerly BEACON: Bioeconomy Research Centre): is Ireland's national bioeconomy research centre, established to promote and develop Ireland's bioeconomy through excellent research and innovation. BiOrbic is a national collaboration of over 100+ researchers, focused on the development of a sustainable circular bioeconomy. Their work on selectively separating and extracting valued compounds from renewable materials, converting those resources into novel bio-based products and processes, delivering market and industry- scalable sustainable resources.
- Marine and Renewable Energy Research (MaREI) is the marine and renewable energy research and development centre supported by Science Foundation Ireland. It combines the expertise of a wide range of research groups and industry partners, with the shared mission of solving the main scientific, technical, and socio-economic challenges across the marine and renewable energy sectors. MaREI has 220 researchers across six academic partner institutions, working with 82 industry partners. It is coordinated by the Environmental Research Institute (ERI) at University College Cork. MaREI has built upon the excellent track record of well-established marine and energy-based research groups across each of our academic partners, covering a range of cross-cutting topics across seven main research areas. The academic partners are University College Cork, University of Limerick, NUI Galway, Maynooth University, University College Dublin, and Cork Institute of Technology.

Public funding also contributes to the test bed for bio-based innovation - tcb RESOURCE. The centre collaborates with industry and academia to support the scale up, demonstration and piloting of biobased technologies. The Irish Government also fund the International Energy Research Centre (IERC) as an industry-led collaborative research centre in the field of integrated sustainable energy systems. The IERC recently completed a project to develop the blueprint for a renewable gas certification scheme in Ireland in partnership with MaREI, DBFZ in Germany and industry partners from the gas industry in Ireland.

The Environmental Protection Agency also runs a research programme for projects which focus on research in the environmental sector. With up to €10.5 million available (2021) for new research projects, the funding will be provided under the four EPA Research 2030 interconnected research hubs:

- Addressing climate change evidence needs
- Facilitating a green and circular economy
- Delivering a healthy environment
- Protecting and restoring our natural environment

Several bioenergy and bioeconomy projects have been funded and topics such as air quality are addressed.

LINKS TO SOURCES OF INFORMATION

Climate Action and Low Carbon Development (Amendment) Bill 2021:

<https://www.gov.ie/en/publication/984d2-climate-action-and-low-carbon-development-amendment-bill-2020/>

Ireland's National Energy and Climate Plan 2021-2030: <https://www.gov.ie/en/publication/0015c-irelands-national-energy-climate-plan-2021-2030/>

National Mitigation Plan (2017): <https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/7/National%20Mitigation%20Plan%202017.pdf>

Draft Bioenergy Action Plan (2014): <https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/bio-energy/Pages/Bio-Energy.aspx>

Support Scheme for Renewable Heat:

<https://www.dccae.gov.ie/documents/Scheme%20for%20Renewable%20Heat%20Scheme%20Overview.pdf>

Green Gas Certification scheme: <http://www.greengascert.ie/>

Renewable Electricity supports: <https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/electricity/renewable-electricity-supports/Pages/REFIT-Schemes-and-Supports.aspx>

Biofuels Obligation scheme: <https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/transport/Pages/Biofuels.aspx>

Afforestation scheme:

<https://www.agriculture.gov.ie/media/migration/forestry/grantandpremiumschemes/2012/AfforestationSchemeFeb12.pdf>

Energy-related RD&D in Ireland: <https://www.seai.ie/grants/research-funding/research-development-and-demonstration-fund/>

National Energy Research Database - <https://www.seai.ie/data-and-insights/seai-research/research-projects/?query=&page=1>

Official Energy Statistics for Ireland: <https://www.seai.ie/resources/energy-data/>