

RENEWABLE ENERGY IN IRELAND

Companion Note to
2020 National Energy Balance
October 2021



Highlights of Renewable Energy in Ireland 2020

Benefits of Renewable Energy

Increases in Ireland's renewable energy generation act to reduce greenhouse gas emissions and some types of air pollution, by partially replacing fossil fuel based energy generation.

In 2020, 6.5 million tonnes of CO₂ were avoided by the use of renewables in Ireland

Adding renewable energy diversifies the national energy supply, and helps reduce Ireland's dependence on imported fuels. The manufacture, installation, and maintenance of renewable energy generation can stimulate and drive economic activity in Ireland.

Renewable Energy targets for 2020

Ireland had two binding European targets in 2020 - 16% renewable energy share (RES-Overall) in gross final consumption of energy* and a 10% renewable energy share in transport (RES-T).

To achieve the 16% binding European target, Ireland set two further national targets - 40% renewable energy share in electricity (RES-E) and 12% renewable energy share in heating and cooling (RES-H).

- Ireland reached an overall share of 13.6% renewable energy, below its 2020 RES-Overall target of 16%.
- Ireland succeeded against its 2020 EU RES-T target (10.2% vs. 10%).
- Ireland just missed its national RES-E target (39.1% vs. 40%).
- Ireland achieved just half its national RES-H target (6.3% vs. 12%).

*Gross Final Consumption of Energy is the energy used by end-consumers plus grid losses and self-consumption of power plants

Renewable Energy for Transport

- 99% of all renewable energy for transport was sourced from bioenergy* (with 88% from biodiesel and 11% from biogasoline).
- 77% of these liquid biofuels were imported.
- Only 1.4% of renewable energy for transport comes from renewable electricity. About a half of this is from electric vehicles and the other half from DART and Luas.

*Bioenergy is the conversion of biomass - such as agricultural and forest by-products and residues, organic municipal waste, energy crops, etc. into useful energy carriers including heat, electricity and transport fuels.

Renewable Electricity

- Increasing renewable electricity generation was a key element of Ireland's strategy for aiming to reach the European binding RES-Overall target of 16%.
- Despite falling just short of the 40% RES-E target, 42% of all electricity generated in Ireland during 2020 was from renewable sources. The RES-E result is lower due to statistical adjustments to account for annual variations in weather on wind and hydro energy.*
- 66% of all renewable energy in Ireland came from renewable electricity generation.
- 86% of all renewable electricity came from wind, with the remaining 14% evenly split across hydroelectricity and bioenergy sources.
- Ireland had a total installed wind capacity of 4.3 GW at the end of 2020. This was an increase of 180 MW on 2019. The highest annual increase in installed capacity in a single year was in 2017 when 518 MW of new capacity was added.

*RES-E is normalised in accordance with Annex II of the Renewable Energy Directive (2009/28/EC).

Renewable Energy for Heating

- Under performance against its RES-H target is the primary contributor to Ireland missing its RES-Overall target of 16%.
- Ireland's renewable energy share for heat has plateaued for the last number of years at just over 6%.
- 61% of renewable heat energy is used in industry, and 55% of this is wood waste used by the wood industry.
- The use of ambient energy from heat pumps* has doubled in just 5 years.

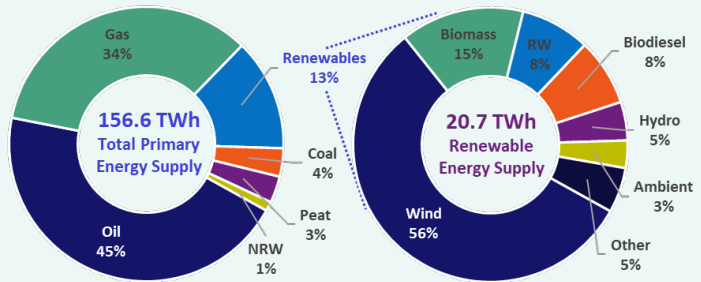
*Heat pumps work by transferring renewable ambient heat energy from (the air or ground) outside a building into useful heat inside a building

Sources & Benefits of Renewable Energy

Sources of Renewable Energy in Ireland

Renewable energy now makes up 13.2% of Ireland's energy supply. Wind accounts for over half of all renewable energy. Solar energy (both thermal and photovoltaic) makes up just over 1% of renewable energy and just 0.15% of Ireland's total energy supply.

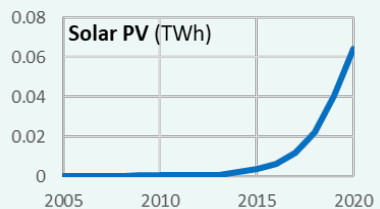
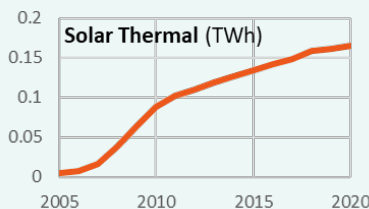
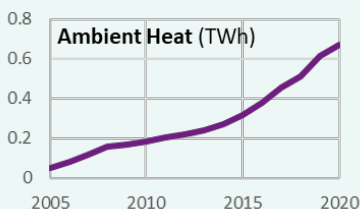
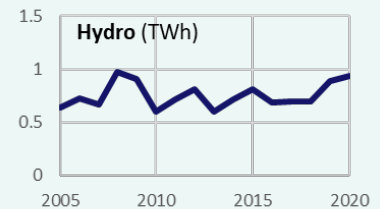
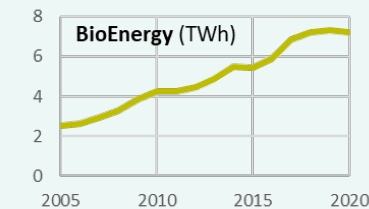
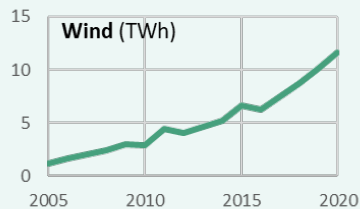
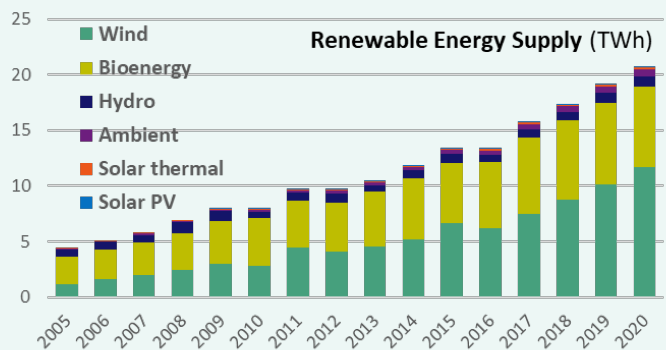
Despite the increase in renewable energy in recent years, this means that the majority of our energy supply (86.8%) still comes from fossil fuels.



*NRW = Non-Renewable Wastes; RW = Renewable Wastes

Growth of Renewable Energy

Energy from renewable sources grew by 8.2% in 2020. Wind and bioenergy (i.e. biomass, renewable wastes, landfill gas, biogas, biodiesel, and biogasoline) make up more than 90% of Ireland's renewable energy. Almost all renewable energy sources are up in 2020, with an approximate doubling of wind energy in just 5 years.

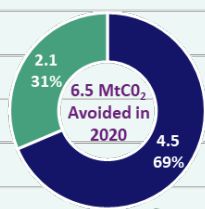
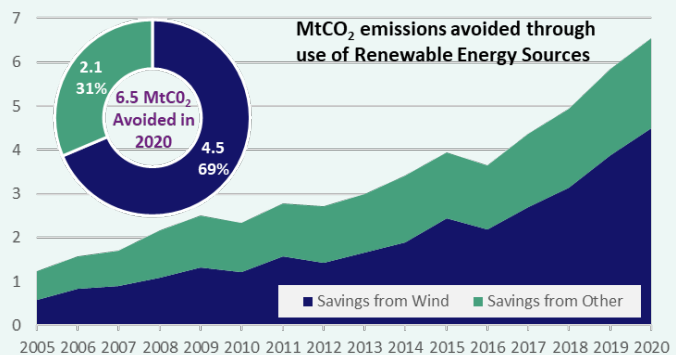


CO₂ Emissions Avoided through Renewable Energy Sources

Renewable energy displaces the use of fossil fuels. This avoids emissions of greenhouse gases and other air pollutants, reduces Ireland's fossil fuel imports, and improves our energy security.

6.5 million tonnes of carbon dioxide were avoided in 2020 through renewable energy sources. Wind energy accounted for 69% of the avoided CO₂, with the liquid biofuels and hydroelectric energy avoiding a further 8% and 6%, respectively.

The strong increase in avoided CO₂ emissions since 2016 is mainly attributable to the increase in wind generation of electricity.



2020 Targets for Renewable Energy

Ireland's 2020 Renewable Energy Targets

Ireland had a 2020 binding European overall target of 16% renewable energy share (RES-Overall) in its gross final consumption of energy*.

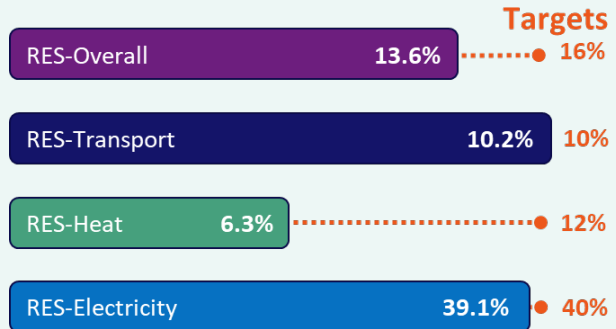
The overall target included two national sub-targets:

- 40% Renewable Energy Share in Electricity (RES-E)
- 12% Renewable Energy Share in Heating and Cooling (RES-H)

Ireland also has a binding European sub-target of 10% Renewable Energy Share in Transport (RES-H).

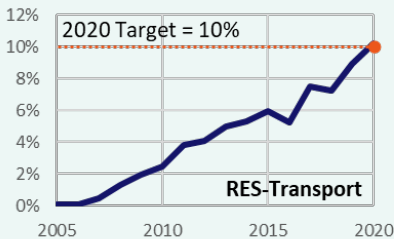
Ireland reached an overall share of 13.6% renewable energy, which is below its 2020 RES-Overall target of 16%. We succeeded against our 2020 EU RES-T target (10.2% vs. 10%) and just missed our national RES-E target (39.1% vs. 40%). We achieved just half of our national RES-H target (6.3% vs. 12%).

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Progress against Ireland's 2020 Targets

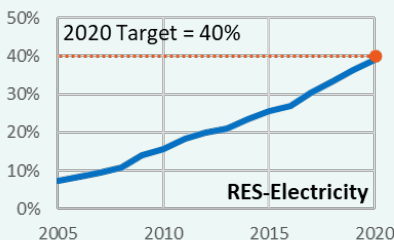
Ireland achieved its 10% target for renewable energy share for transport (RES-T) from a starting point of essentially 0% in 2005. Since then there has been a strong linear upward growth trend to the current value of 10.2%, despite some isolated drops in 2016 and 2018.



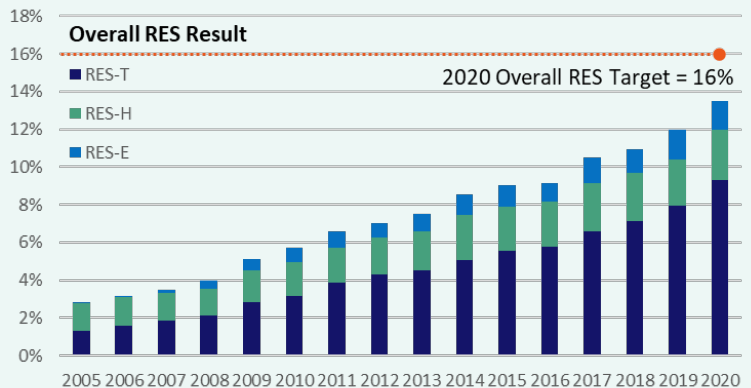
Although Ireland just missed its 40%* target in renewable energy share for electricity (RES-E), it has consistently improved on renewable energy in electricity every year for the last 15 years. In the last 8 years the renewable energy share in electricity has doubled from 19.8% in 2012 to 39.1% in 2020.



Ireland achieved just half of its 12% target in renewable energy share for heating (RES-H), reaching 6.3% in 2020. Ireland's RES-H has somewhat plateaued for the last number of years at about 6%, but has improved over the longer term – increasing by 63% since 2005.



Under performance against its RES-H target is the primary contributor to Ireland missing its RES-Overall target of 16%.



*42% of all electricity generated in 2020 was from renewable sources. RES-E is lower than this because it is normalised in accordance with Annex II of the Renewable Energy Directive (2009/28/EC) which is designed to even out the effects of weather variation from year to year.

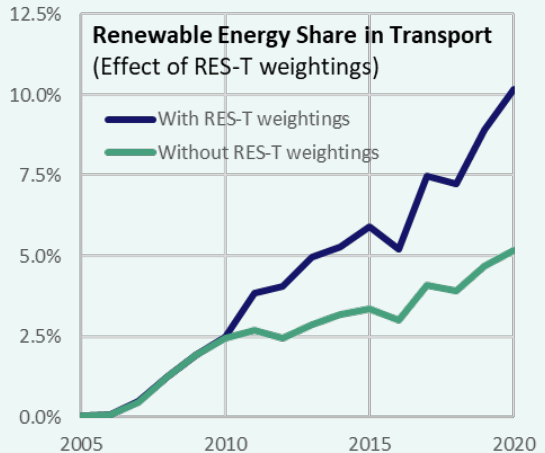
Transport and Renewable Energy

Renewable Energy in Transport Trends (RES-T Calculation)

Ireland achieved its 2020 RES-transport target of 10%.

The RES-T result is calculated with a methodology from the *European Renewable Energy Directive*. Numeric weightings are applied to certain energy sources to help incentivise the transition to sustainable and renewable transport.

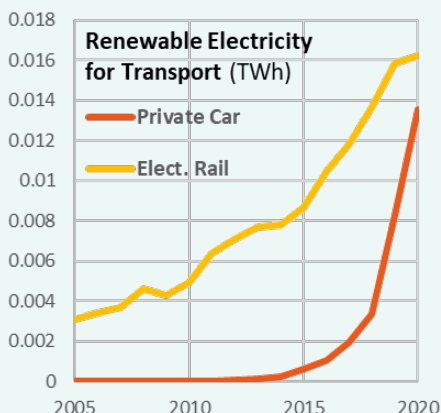
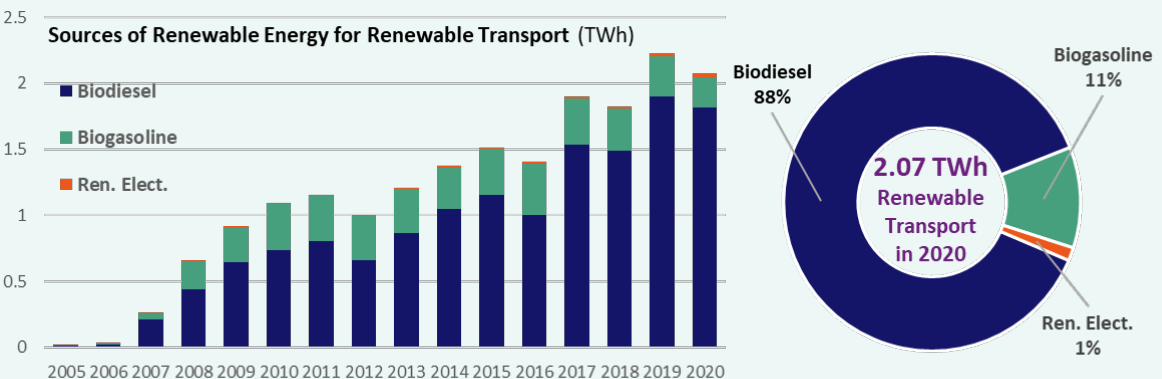
The figure to the right shows both the weighted and unweighted renewable energy share for transport in Ireland. Both calculations show long-term upward trends from an essentially zero starting point in 2005. The weightings in the RES-T calculation act to double the actual renewable share of transport (5.2%) to the 2020 RES-T result of 10.2%.



Sources of Renewable Energy in Transport

Virtually all of the renewable energy used for transport is in the form of biofuels that are blended with the regular fossil petrol and diesel. Biodiesel is by far the largest renewable fuel type in 2020, providing 88% of the total transport renewable energy. Biogasoline accounts for another 11.0% of supply, with other renewable energy sources for transport (i.e. renewable electricity) accounting for just 1.4%. As opportunities for further biofuel blending become exhausted, new leveraging of biofuel energy sources may emerge.

There were significant restrictions on mobility during 2020 as a result of the COVID-19 pandemic which led to a 16% reduction in road transport energy use. This reduction in transport activity meant that, even though the share of transport energy from renewable sources increased, the total amount of renewable energy for transport reduced by 7%.



Renewable Electricity in Transport

While renewable electricity for transport remains low in absolute terms, the last 5 years has seen it rise rapidly, especially through use in private cars.

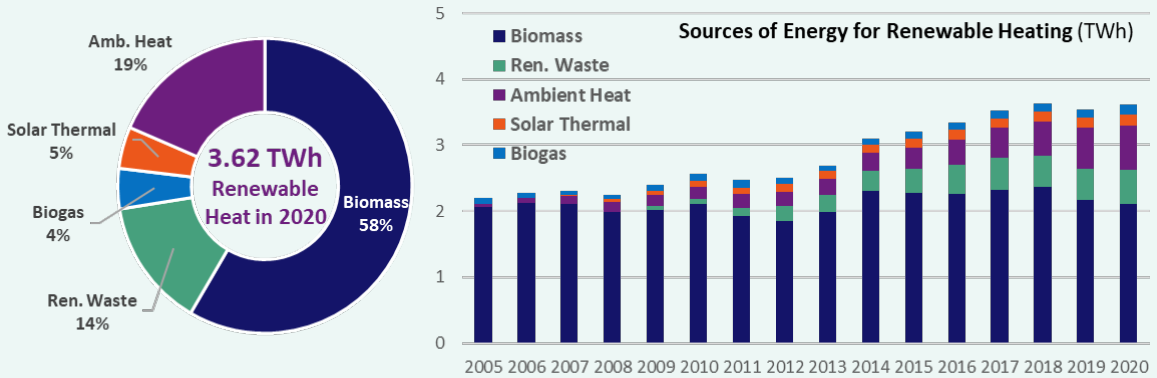
The increase is due to the combination of two factors – (1) increased numbers of electric vehicles (EVs) on the road, and (2) increased electricity generation from renewable sources to power both EVs and electric rail services.

Since the RES-T methodology applies a factor of 5x weighting to renewable electricity used in EVs, their contribution to Ireland's European binding RES-T target of 10% is significantly boosted.

Heating and Renewable Energy

Trends in Renewable Energy for Heating

Although Ireland has no 2020 European target for RES-H, it set a national target of 12% as part of its strategy in achieving the EU binding overall-target of 16%. The methodology for the RES-H calculation excludes renewable electricity used for heating and cooling, because these are already captured in the RES-E targets.

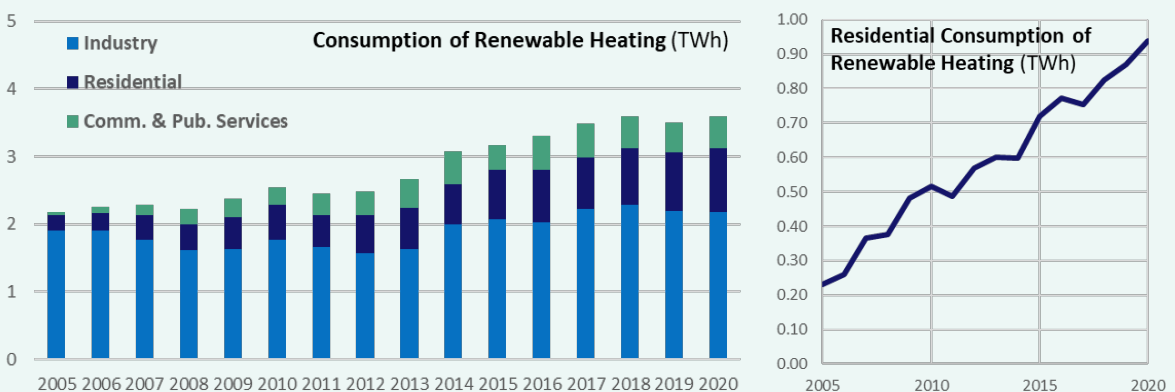
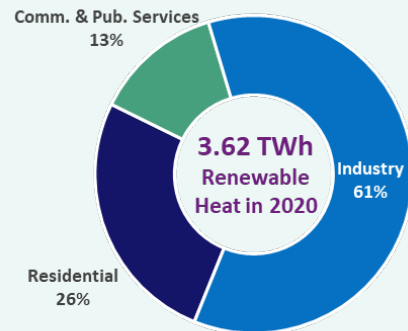


In 2020, Ireland's renewable energy sources for heating and cooling remain dominated by solid biomass (58%), with most generation and consumption of this energy occurring in the industry sector. The second largest contributor to renewable heating is the capture and use of ambient heat energy (19%) using ground- or air-source heat-pumps and related technology. Captured energy from ambient heat sources (0.67 TWh) has doubled in the last 5 years, as the roll-out of heat pump technology both in residential and commercial properties has increased.

Sector breakdown of Renewable Energy in Heating

Industry is by far the largest sectoral consumer of renewable energy for heating in Ireland. In total, industry accounts for 61% of renewable heat consumption. The wood and wood products sub-sector alone uses 34% of our renewable heat energy, where they use wood wastes produced as by-products to provide heat needed for the manufacturing process.

The residential sector accounts for over a quarter (26%) of renewable heating consumption. This share has doubled in less than 10 years, albeit from a very low initial level, with about half of this energy consumption fed by heat pumps.



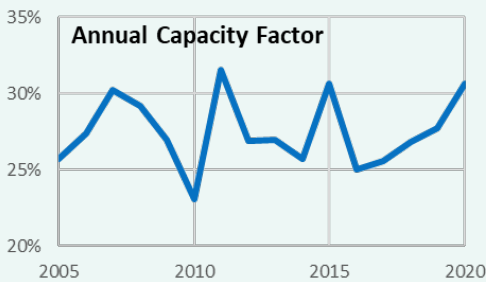
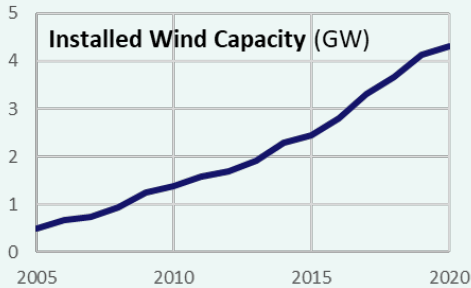
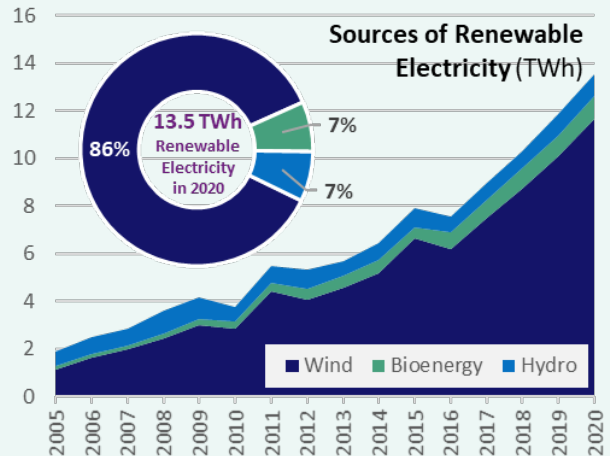
Electricity and Renewable Energy

Sources of Renewable Electricity in Ireland

Despite falling just short of the 40% RES-E target, 42% of all electricity generated in Ireland in 2020 was from renewable sources. The RES-E result is slightly lower (39.1%), due to statistical adjustments that account for annual variations in weather on wind and hydro energy.

By far the largest source of renewable electricity in Ireland is wind power. 86% of all renewable electricity comes from wind, with the remaining 14% evenly split across hydroelectricity and bioenergy sources.

Wind generation has almost doubled in the last 4 years, increasing from 6.2 TWh in 2016 to 11.6 TWh in 2020.



Wind – Capacity and Operation

Ireland has an installed wind capacity of 4.3 GW (gigawatt-hours), which has more than doubled in the last 6 years. Ireland added 180MW of wind capacity in 2020.

Not all of that capacity can be realised at any given time – it depends on the strength and direction of the wind on any given day, winter vs. summer variations, and even longer-term annual fluctuations in the useful wind.

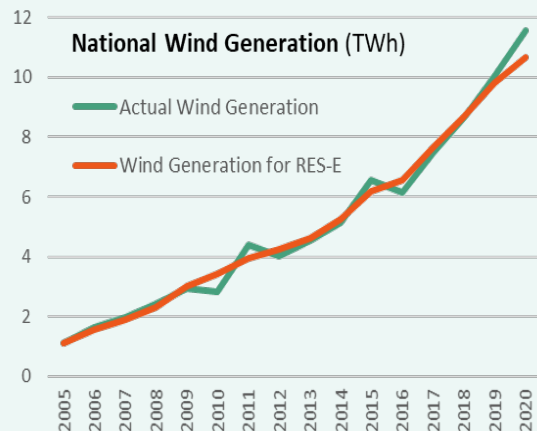
The combined effect of the above variations are summed into an Annual Capacity Factor - the ratio between actual wind generation and the installed wind capacity. In Ireland, this typically varies between 25% and 30%. 2020 was a particularly “windy” year, and this boosted production of renewable electricity.

Wind and the RES-E Results

Ireland generated 11.6 TWh of wind energy in 2020.

To help minimise the effect of annual variations in assessing progress towards its 2020 renewable energy share targets, the RES-E calculation applies a 5-year average of the annual capacity factor. This averaging acts to smooth out years with particularly high and low amounts of useful wind. As a result, the contribution of wind energy to the RES-E result can be slightly higher or lower than the actual wind generation in a given year.

This is why the 2020 RES-E result for Ireland was 39.1%, while 42% of all electricity generated in 2020 came from renewable sources.



Ireland's National Energy Balance

The National Energy Balance is the official record of how energy is used in Ireland each year. It shows how over thirty different fuels are used in seven different sectors of society, including residential, transport, industry and services. It shows the flow of energy from imports and production to transformation and on to final consumption. The National Energy Balance is our primary statistical release and is the basis of much of the further analysis we do. The data is shown in the form of a table.

To download the 2020 National Energy Balance and for more information visit:

www.seai.ie/NationalEnergyBalance.

Developing the National Energy Balance is a continuous and ongoing process, and revisions are made whenever improved data becomes available. We welcome feedback sent to epsu@seai.ie.

About SEAI

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 Government, homeowners, businesses and communities 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 the Environment, Climate and Communications.

SEAI is the official source of energy data for Ireland. We develop and maintain comprehensive national and sectoral statistics for energy production, transformation and end-use. These data are a vital input in meeting international reporting obligations, for advising policymakers and informing investment decisions. SEAI's core statistics functions are to:

- Collect, process and publish energy statistics to support policy analysis and development in line with national needs and international obligations
- Conduct statistical and economic analyses of energy services sectors and sustainable energy options
- Contribute to the development and promulgation of appropriate sustainability indicators

An electronic version of this and other statistical reports, are available on SEAI's website at:

<https://www.seai.ie/data-and-insights/seai-statistics>

Acknowledgements

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