SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Ireland's Energy Projections

Progress to targets, challenges and impacts

2017

The Sustainable Energy Authority of Ireland

The Sustainable Energy Authority of Ireland's (SEAI) mission is to bring about a low carbon economy through measures and activities focused on the transition to a smarter and more sustainable energy future. To fulfil this mission SEAI aims to provide well-timed and informed advice to Government, and deliver a range of programmes efficiently and effectively, while engaging and motivating a wide range of stakeholders, and showing continuing flexibility and innovation in all activities. SEAI's actions will help advance Ireland to the vanguard of the global green technology movement, so that Ireland is recognised as a pioneer in the move to decarbonised energy systems.

National Energy Modelling Group

The National Energy Modelling Group (EMG), hosted by SEAI as part of our statutory mandate, provides high-quality analysis and policy advice on a range of energy and climate issues at national and European level.

SEAI supports evidence-based policy formation in the areas of energy efficiency, renewable energy and a mature transition away from fossil fuels. One example is the annual National Energy Projections, produced by SEAI. This involves modelling a range of short-term and medium-term scenarios for energy demand and supply growth and combining those results with an assessment of the impact of policy measures.

Projecting future energy demand is a challenging process. Projections for economic growth and fuel price changes, the key drivers behind Ireland's energy demand, are re-estimated as economic events unfold globally and within the EU. Interpretation of the results, therefore, is focused on medium and longer-term trends, rather than on any specific events that might occur in the short term.

Given the link between these energy projections and macro-economic trends, using the most up-to-date data sources remains a focus of this exercise. The data presented in this report are based on the most up-to-date assumptions available at the time of modelling. These include projections for a range of macro-economic indicators, from the Economic and Social Research Institute (ESRI)[1], that have an impact on Ireland's energy demand, together with recent fuel and carbon price assumptions from the European Commission. In addition to estimating these variables, much work goes into estimating the impacts of current energy policy on the projected trends.

A common goal of the ongoing work undertaken by SEAI is to improve the availability of disaggregated data to underpin its modelling capability and energy projections. This report can be read in conjunction with SEAI's Energy in Ireland 1990–2015 (2016 Report)[2], which provides the context of historical trends in energy supply and energy use. The data behind both reports are available to download in the SEAI Energy Data Portal.[3]

SEAI welcomes any comments on the contents of this report. Feedback can be sent directly to the group by emailing: emg@seai.ie

1 Ireland's Economic Outlook: Perspectives and Policy Challenges, ESRI (December 2016).

2 Available at http://www.seai.ie/resources/publications/Energy-in-Ireland-1990-2015.pdf

3 Available at http://www.seai.ie/resources/energy-data/

Executive summary

SEAI projections anticipate that Ireland could fall short of the 2020 16% renewable energy target in all three scenarios[4] modelled. In the *Current Trajectory* scenario the 2020 energy efficiency target will also be missed. This highlights the need for ongoing strong policy action to incentivise sustainable energy technologies and practices.

This report presents projections of Ireland's energy supply and use to 2035. These are based on the Economic and Social Research Institute's (ESRI) latest economic outlook. The projections anticipate strong growth in energy demand, in line with the return to economic growth in the Irish economy.

A continuing low oil price, reflecting low oil prices globally, and new sources of energy demand such as data centres also contribute to the expected increase in energy demand. In addition to increased energy demand, low energy prices provide a more challenging environment for the increase of energy efficiency and growth of renewable energy sources, as the monetary incentive to diversify away from fossil fuels is weaker than at times of high prices.

The EPA derive energy related emissions from the SEAI National Energy Projections for electricity, heat and transport. These are combined with agricultural and waste sector emissions to produce their annual greenhouse gas emissions projections. The 2017 emissions projections indicate that on the *Current Trajectory,* in the absence of additional emissions reduction measures, Ireland will not meet the 2020 emissions reduction target required under the EU's Effort Sharing Decision.[5]

Under the *Current Trajectory* scenario (which underpins the EPA's *With Additional Measures),* an overall renewable energy share of just over 13% by 2020 is projected meaning Ireland potentially missing its 2020 cumulative emissions reduction target by around 12 Mt CO_2eq. Failure to comply with energy and emissions targets in 2020 will result in EU fines and could lead to a more arduous trajectory in the context of post-2020 targets – both in terms of future deployment and potential compliance costs.

As post-2020 energy policies are currently under development and not yet fully defined (at the time of writing), the post-2020 projections do not include any modelled impact of energy efficiency or renewable energy policies. Therefore the post-2020 trends represent a hypothetical base case to illustrate what future projections might look like without ongoing policy activity to 2035.

In the *Current Trajectory* scenario, the overall renewable energy contribution falls from 13% in 2020 to around 12% in 2030, due to energy demand growth over the period and an assumption of no policy impacts post-2020.

Key conclusions are:

- If the 2020 electricity target is missed by the amount anticipated in the *Current Trajectory,* a growth rate of 3% per annum would be required.
- Renewable electricity must grow by over 11% every year to meet the 2020 target. Once achieved, it must continue to grow by 2% a year to maintain that share to 2030.
- Renewable heat must double from the 2015 level to meet the 2020 target. To maintain this 12% contribution, it must continue growing by 1% annually to 2030. The required growth rate increases to 4% per year in the *Current Trajectory* scenario.
- Biofuels in transport must also double to 2020, a growth rate of 13% per year, and the total renewable transport contribution including electric vehicles and other alternative fuels must grow by 5% per year post-2020 to maintain the renewable transport share to 2030, or twice that in the *Current Trajectory* scenario.
- Energy efficiency can contribute to meeting emissions and renewable energy targets and must grow by 5% per year to meet the 2020 targets and by at least 1% per year to 2030.

Any shortfall to the 2020 targets would make Ireland's role in contributing to longer-term targets significantly more difficult and costly.

4 A *Baseline, Current Trajectory* and *NEEAP and NREAP* (Policies) scenario.

5 Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

Contents

1 Introduction to Ireland's energy projections

The projections are based on the relationships between energy use, economic growth, energy prices and energy policies – as embodied in past energy use trends. The results provide insights into the energy mix and technology deployment effort required to meet Ireland's national and EU targets on energy efficiency and renewable energy for 2020.

This report presents projections of Ireland's energy use to 2035. The results presented update previous energy projections published in April 2016[6]. Using macroeconomic modelling techniques, we have projected how future energy use may develop following changes in fossil fuel prices, economic growth and energy policy. The impact of energy policies and measures other than ongoing regulations are not incorporated post-2020.

These trends will be updated as the post-2020 policy package is defined at national level in the context of EU energy targets for 2030. The analysis is developed in collaboration with the Economic and Social Research Institute (ESRI). The projection data contained in this report are used by the Environmental Protection Agency (EPA) to prepare energy-related projections of greenhouse and transboundary gas emissions.

1.1 Model inputs and assumptions

There are significant changes to the energy price assumptions and other macroeconomic drivers underpinning the scenarios of the projections presented in this report compared with previous SEAI projections. A low oil price projection is modelled reflecting the recent protracted period of low oil prices globally. The input assumptions used are taken from the latest projections by two key sources: the Department of Energy and Climate Change (DECC) in the UK[7] and the European Commission, using data from their *Energy Reference* Scenario (2016)[8]. These were the most relevant and up to date sources available at the time of modelling and are similar to the assumptions underpinning the *International Energy Agency World Energy Outlook* (2015) low oil price scenario.

Despite the possibility of decoupling between oil and natural gas prices with the growth of shale oil earlier this decade, a significant split has not been realised, therefore projections for all fossil fuels remain lower than in previous projections.

The projected low energy prices contribute to an increase in the demand projections presented in this year's energy results. In addition to increased energy demand, low energy prices provide a more challenging environment for the growth of energy efficiency and renewable energy sources as the monetary incentive to diversify away from fossil fuels is weaker than at times of high prices.

In parallel with the projected low energy prices, Ireland's economic outlook has changed since the last SEAI National Energy Projections. According to the ESRI[9], strong growth in the economy is now anticipated to continue to 2020 and beyond. This increasing economic activity further raises the future energy demand. Given that the renewable energy targets are based on a percentage of total energy demand, this increases the level of deployment of renewable energy technologies required to reach targets. A third driver of additional demand in the scenarios modelled is anticipated growth from new demand sources such as data centres.[10]

> "The return of strong growth to the Irish economy, anticipated continuing low oil price and new energy demand sources such as data centres lead to increasing energy demand trends to 2020 and beyond.

6 https://www.seai.ie/resources/publications/Ireland___s-Energy-Targets-Progress-Ambition-and-Impacts.pdf

7 Note the UK Department of Energy and Climate Change (DECC) became part of the Department for Business, Energy and Industrial Strategy in July 2016.

8 European Commissions EU Reference Scenario 2016 https://ec.europa.eu/energy/en/news/reference-scenario-energy

9 *Ireland's Economic Outlook; Perspectives and Policy Challenges*, ESRI (December 2016)

10 Based on data and analysis sourced from EirGrid Generation Capacity Statement 2016.

A description of the modelling methodology is provided in Appendix A. The scenario philosophies and input assumptions are detailed in Appendix B.

1.2 Scenario summary

To illustrate a range of possible futures for energy efficiency and renewable energy deployment to 2020, a number of scenarios have been developed.

- The *Baseline* scenario includes all policy measures legislated for up to the end of the 2015 and represents a hypothetical worst case scenario in which no further policy actions or measures are taken post 2015. This provides a basis for comparison with other scenarios in which the expected additional effects of government policy are modelled.
- The *NEEAP and NREAP* scenario assumes meeting all obligations captured in the National Energy Efficiency Action Plan *(NEEAP)* and in the National Renewable Energy Action Plan *(NREAP)* by 2020[11].
- The *Current Trajectory* scenario reflects the most recent trends in energy efficiency and renewable energy deployment. It recognises that the current rates of energy efficiency improvements and deployment of renewable energy technologies are not sufficient to reach the 2020 targets.

Table 1 summarises the results of the analysis in terms of percentage reductions made towards the 20% energy efficiency target, the 40% target for renewable electricity (RES-E), the 12% target for renewable heat (RES-H), the 10% target for the renewable transport (RES-T) Directive and the overall renewable energy Directive[12] target of 16% for 2020.

> “These results highlight the need for ongoing policy action to incentivise sustainable energy technologies and practices.

Table 1: Summary table of scenario results for 2020

%	2015	*Baseline*	*NEEAP and NREAP*	*Current Trajectory*
Energy Efficiency	11.7	11.7	20.0	16.0
Renewable electricity	25.3	22.7	40.0	37.3
Renewable heat	6.5	5.8	12.0	9.0
Renewable transport (regulation)	3.3 (5.7)	3.23 (5.5)	5.4 (10.0)	4.6 (8.0)
Overall RES	9.1	8.3	15.4	13.2

As is evident from the projection scenario results, despite the significant progress made and given the increased demand projected, in the *Current Trajectory* it is anticipated that Ireland could fall short of all targets. Further, given the anticipated demand increases, the *NEEAP and NREAP* scenario results project that reaching the national renewable energy targets for electricity, heat and transport, together with the 2020 energy efficiency target, is not sufficient to reach the overall 16% renewable energy target. These results highlight the need for ongoing policy action to incentivise sustainable energy technologies and practices.

The return of strong growth to the Irish economy and the anticipated continuing low oil price leads to a projection of increased energy demand to 2020 and beyond in all scenarios. This makes the task of meeting energy efficiency and renewable energy targets more challenging. Ongoing action on energy efficiency can help to offset some energy demand growth – but it won't be enough to fully counter the strong energy demand driven by economic growth. In addition, renewable energy technology deployment must be accelerated. The low fossil fuel price environment provides a more limited incentive for consumers to shift to sustainable energy compared to high price trajectories, highlighting the importance of ongoing energy policy to stimulate deployment of energy efficiency and renewable energy technologies and services.

11 *The National Energy Efficiency Action Plan (NEEAP)* and *National Renewable Energy Action Plan (NREAP)* are available on the Department of Communication, Climate Action and Environment website. http://www.dccae.gov.ie

12 RES is the acronym for renewable energy source, and is the terminology used in the EU Renewable Energy Directive (Directive 2009/28/EU) to describe the level of renewable penetration required in each of the end-use sectors.

1.3 Progress to targets, challenges and impacts

While substantial progress has been made towards achieving Ireland's energy efficiency and renewable energy targets, a continuous broader effort is needed.

Energy efficiency

Achievements to date: Ireland achieved energy efficiency savings which equated to about 60% of the country's 2020 energy efficiency target by the end of 2015. Over 350,000 homes, 3,500 businesses and public sector bodies have implemented energy efficiency measures with government support, saving approximately €1 billion annually to the end of 2015.[13]

***Current Trajectory* scenario:** In 2016, grant schemes supported energy efficiency upgrades in 22,000 homes. A further 2,000 homes and 383 community buildings were upgraded via community-based projects, and 667 businesses and 80 public sector entities interacted with SEAI programmes. Programmes for energy efficiency were expanded in 2017, however in the absence of further expansion and development of new policy measures, a shortfall of 6–7 TWh in 2020 is projected resulting in an efficiency improvement that equates to 16% rather than the 20% target.[14]

***NEEAP and NREAP* (target achievement) scenario:** A significantly increased number of both homes and businesses (80,000–100,000 annually) will need to be upgraded for improved energy efficiency every year between 2017 and 2020, if Ireland is to achieve the 2020 energy efficiency target. Further savings will be required from transport and cross-sectoral measures.[15]

Renewable energy (transport, heat and electricity)

At the end of 2015 Ireland was, on average, over half way towards meeting its 2020 EU renewable energy target, with 9.1% of gross final consumption derived from renewables. A shortfall of 3 percentage points is anticipated in the *Current Trajectory* scenario, giving a renewable energy share of approximately 13%, rather than the target of 16% in 2020. Further, meeting the individual *NEEAP and NREAP* energy sector targets does not guarantee overall renewable energy target achievement.

Renewable transport

Achievements to date: At the end of 2015, 5.7%, against a 2020 10% renewable energy in transport target[16], had been achieved. In 2015 the total biofuels supply was 173 million litres and passenger cars traveled an average of 590 kilometres using biofuel that has been blended with regular petrol and diesel. Battery electric vehicles and plug-in hybrid electric vehicles together accounted for 0.5% of new car sales in 2015, comprising a total of 562 vehicles sold that year with over 1,370 electric vehicles in total in circulation.[17]

***Current Trajectory* scenario:** A modest increase in the annual growth rate of the biofuels blending share from its historical rate of 0.2% to 0.3% per year to 2020 was modelled in the *Current Trajectory* scenario, to give a total biofuels supply of 272 million litres by 2020. The expected 2020 electric vehicle[18] (EV) stock has been revised downward for this modelling exercise to approximately 10,000 EVs, reflecting slower than anticipated take up of the technology. The combination of these measures is anticipated to bring the share of renewables in transport to 8% (compared to the 10% target when calculated as per Directive guidelines).

***NEEAP and NREAP* (target achievement) scenario:** In order to meet the 10% RES-T target by 2020, supply of approximately 320 million litres of biofuels (double the 2015 supply) must be secured for blending with fossil fuels for transport. In addition, 50,000 EVs would need to be present[19] in the private car stock. To assist in meeting the target, the Department of Communications, Climate Action and Environment (DCCAE) have signalled their intention to increase the mandated Biofuels Obligation[20] blending rate beyond the existing share of 8.7% by volume at least once before the end of 2020.

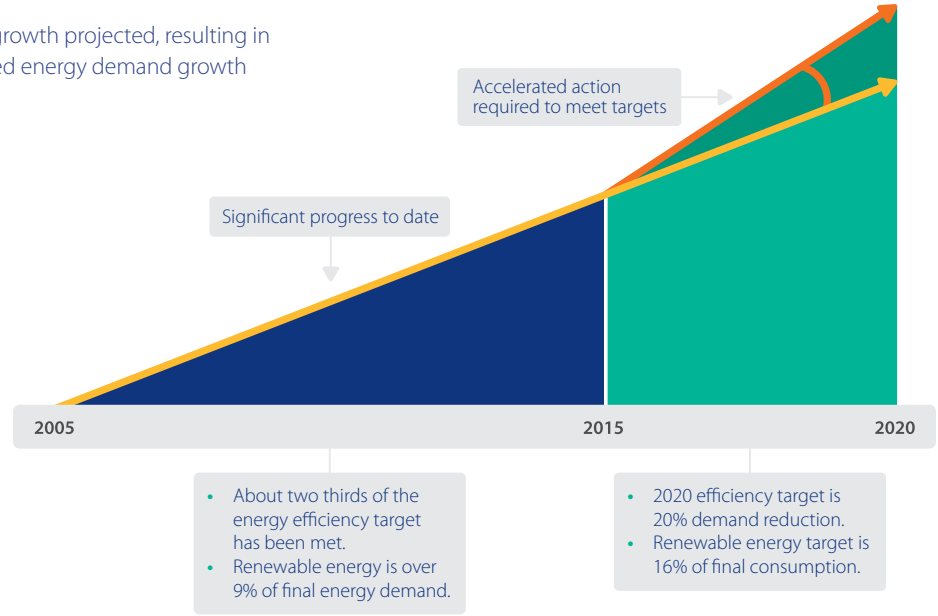
Renewable heat

Achievements to date: Just over half (6.5%) of the national 12% heat target had been achieved by the end of 2015. Most of this renewable heat is in the form of traditional solid biomass, especially residues in the wood and wood products and food sub-sectors of industry. Recent growth of modern renewable heat[21] in the residential and services sectors is attributed to the support of SEAI grant schemes and revisions to building regulations that require a share of energy demand in new buildings to come

13 Based on latest SEAI programme and fuel-cost comparison data.
14 As detailed in Ireland's 4th *National Energy Efficiency Action Plan*.
15 Efforts are underway to increase uptake rates across all sectors. See details in *Ireland's Transition to a Low Carbon Energy Future 2015-2030* (DCENR, 2015). However only measures included in the *NEEAP* were included in the *NEEAP and NREAP* scenario.
16 When calculated as per the 2009 Renewable Energy Directive (Directive 2009/28/EU) guidelines, where a multiplier of two is applied to sustainable biofuels and a multiplier of five is applied to the renewable portion of electricity used in transport (road and rail). The renewable electricity share is taken from two years prior to the year for which the target is being calculated.
17 Data for 31 December 2015 available in the International Energy Agency (IEA) IA-HEV Annual Report (2016). Total vehicles at the end of 2016 over 2,050 (source: IEA upcoming annual report update). Include both battery and plug-in hybrid electric vehicles.
18 Future projections include battery electric vehicles only as data are currently not available to model plug-in hybrid vehicle consumption. Given that EVs in Ireland are dominated by battery EVs the hybrid EV contribution is considered negligible for the volumes included in the projections.
19 As per the *3rd National Energy Efficiency Action Plan*.
20 Statutory Instrument no. 225 of 2016, National Oil Reserves Agency Act 2007 (Biofuel Obligation Rate) 2016.
21 Modern renewable heat technologies include efficient bioenergy technologies, solar thermal and geothermal/heat pumps.

Figure 1: Accelerated effort required to 2020

Strong economic growth projected, resulting in associated increased energy demand growth



from renewable sources.

***Current Trajectory* scenario:** While there is an anticipated policy measure in the form of a Renewable Heat Incentive (RHI)[22], given the level of progress to date on renewable heat there is still a risk of falling short of the renewable heat target. The extent of this shortfall will depend on the timing of implementation of the RHI and the number of projects delivered by 2020. Policy impact in this scenario is anticipated to bring RES-H to 9% (compared to the 12% target), or 1.5 times the amount of renewable heat in 2015.

***NEEAP and NREAP* (target achievement) scenario:** To achieve the RES-H target of 12%, the amount of renewable heat must double by 2020. This would require a combination of strong growth in renewables, especially in the services sector, in conjunction with deep energy efficiency measures.

Renewable electricity

Achievements to date: Wind energy, generated from 2.44 GW of installed capacity[23] at the end of 2015, accounted for 21% of total electricity generated in that year. Hydro and other renewable electricity sources had a combined share of 4% of total electricity generation. This resulted in an overall renewable electricity share of 25% at the end of 2015, building towards the 40% renewable electricity target by 2020. In 2015, approximately 270 MW of wind capacity was installed, an increase on the average installed capacity over the five-year period 2011–2015 of 200 MW.

***Current Trajectory* scenario:** There is anticipated growth of wind, solar PV and biomass CHP to 2020, with the majority of renewable electricity in 2020 coming from onshore wind. If all of the wind energy capacity within the Gate 3 grid connection process was installed by 2020, this would give a total installed capacity of 4.2 GW. This translates into 37.3% renewable electricity (RES-E) and compares with 40% RES-E 2020 target.

***NEEAP and NREAP* (target achievement) scenario:** The *NEEAP and NREAP* scenario assumes a more diverse source of renewable electricity generation relative to the *Current Trajectory*, in line with Government ambition. Given the increased demand projection, overall renewable electricity generation needs to grow at a rate of over 11% per year to meet the RES-E target of 40% by 2020. The annual growth rate between 2011 and 2015 was 8% per year. If that growth were to come from onshore wind only, between 300 MW and 350 MW of additional capacity would need to be installed every year to 2020, which compares with an average installed capacity of 200 MW over the five-year period 2011–2015.

22 A Renewable Heat Incentive (RHI) policy was recommended as part of the *Draft Bioenergy Action Plan* available here: http://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/bio-energy/Pages/Bio-Energy.aspx. Public consultation on the RHI closed in February 2017. Details available here: http://www.dccae.gov.ie/en-ie/news-and-media/press-releases/Pages/Public-Consultation-On-Design-and-Implementation-of-RHI-scheme.aspx

23 ESB Networks https://www.esbnetworks.ie/new-connections/generator-connections/generator-connection-statistics; EirGrid http://www.eirgridgroup.com/customer-and-industry/general-customer-information/gate-3/ and SEAI annual renewable energy questionnaire to self-generating installations.

1.4 Post-2020 outlook

A full suite of energy policies across energy efficiency and renewable energy are under ongoing development by DCCAE. The range of existing polices and measures in place to 2020 modelled in these projections are detailed in Ireland's National Energy Efficiency and Renewable Energy Action Plans published by DCCAE[24]. Given the post-2020 policy package is not yet defined, no assumptions have been made of the impact of energy policy post-2020 in this modelling exercise. As a result, the post-2020 scenarios presented illustrate a worst-case scenario where there is no impact of future energy policy on future energy demand.

Ongoing energy policy effort to 2030 will be further defined within the National Energy and Climate Plan, required to satisfy the requirements of the recent Clean Energy for All Europeans package (Brussels, 30.11.2016 COM(2016) 860 final) published by the European Union. At the core of this will sit the National Energy Modelling Framework, which will be administered by SEAI and will facilitate more accurate post-2020 forecasting, which will take into account future energy policy on the pathway towards 2030.

The results presented in this report highlight the importance of ongoing government action to support sustainable energy deployment to meet our longer-term commitments. Scenarios indicate that in the absence of further policy action post-2020:

- Energy demand, particularly for electricity and transport, will continue to rise in line with projections for low fuel prices and renewed economic growth in Ireland.
- The overall renewable energy contribution would fall by 3–4 percentage points below the overall renewable energy 2020 target of 16% by 2030 due to anticipated growth in energy demand.
- The renewable electricity contribution from the renewable energy capacity in situ by the end of 2020 would quickly fall due to strong growth in electricity demand. By 2030 the renewable electricity share would drop by 10 percentage points in the absence of capacity building post-2020.

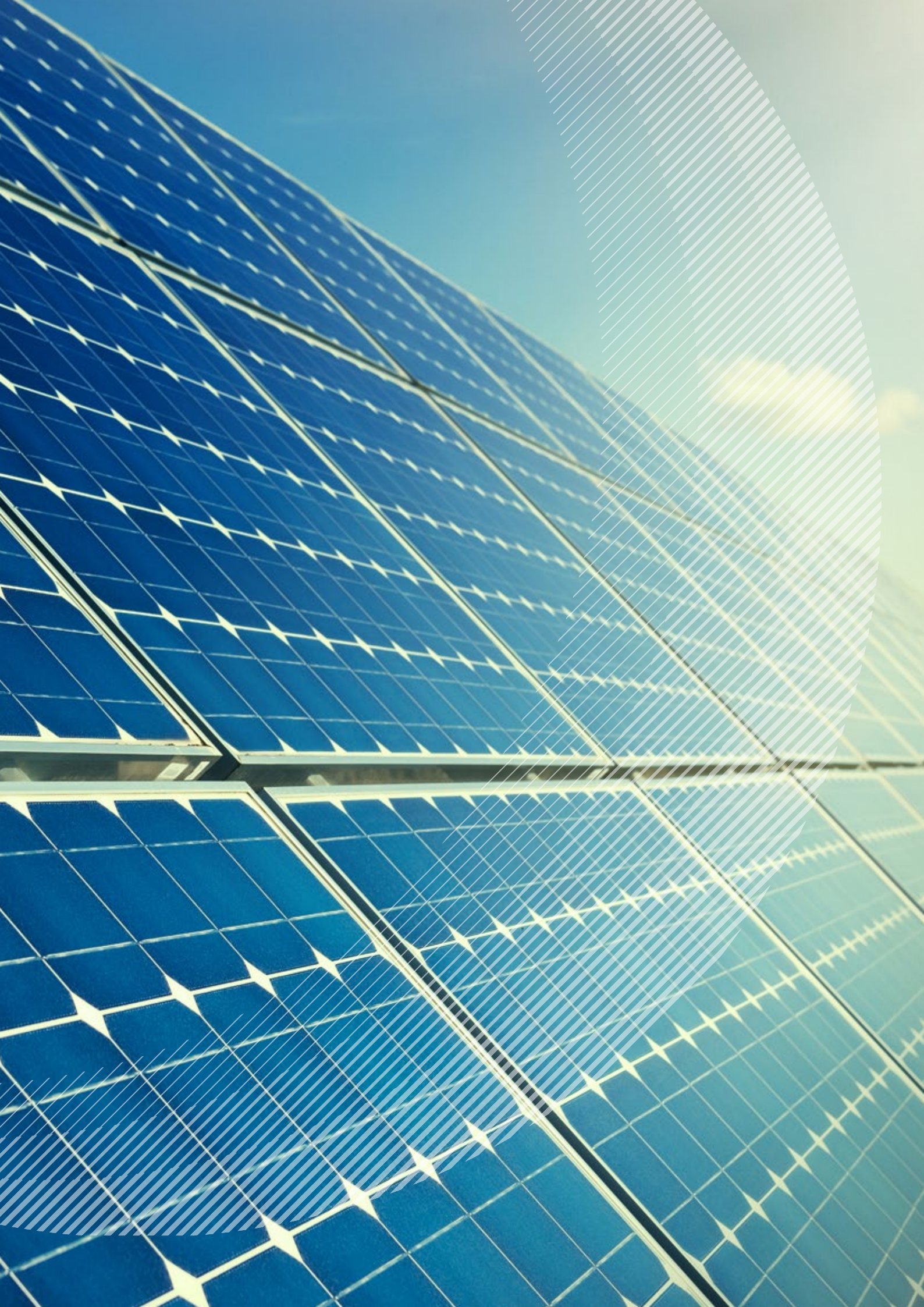
Post-2020 scenario results highlight the crucial role of energy policy in continuing to drive investment in energy efficiency and renewable energy technologies and services post-2020, as Ireland transitions to a low-carbon economy.

- Renewable transport energy from biofuels, electric vehicles and other alternative fuels must grow by 5% per year post-2020 to maintain the 2020 renewable transport target to 2030.
- Growth in renewable heat of 1 % per year is necessary to maintain the 2020 RES-H share to 2030, but in the *Current Trajectory* scenario, where the 2020 target is not met, a growth rate of 4% per year is needed to meet 12 % RES-H by 2030.
- Renewable electricity generation would need to grow by more than 3.6 % per year just to maintain the same share as achieved by 2020. If met predominantly through wind energy a total installed capacity of 5.7–6 GW, an additional capacity of 1.5 GW beyond the 2020 level, would be required to maintain the 40 % RES-E share.

Failing to achieve the 2020 targets will make Ireland's role in contributing to longer-term targets significantly more difficult and costly.

> “Post-2020 scenario results highlight the crucial role of energy policy in continuing to drive investment in energy efficiency and renewable energy technologies and services post-2020, as Ireland transitions to a low-carbon economy.

24 *The National Energy Efficiency Action Plan (NEEAP)* and *National Renewable Energy Action Plan (NREAP)* are available on the Department of Communication, Climate Action and Environment website. http://www.dccae.gov.ie.



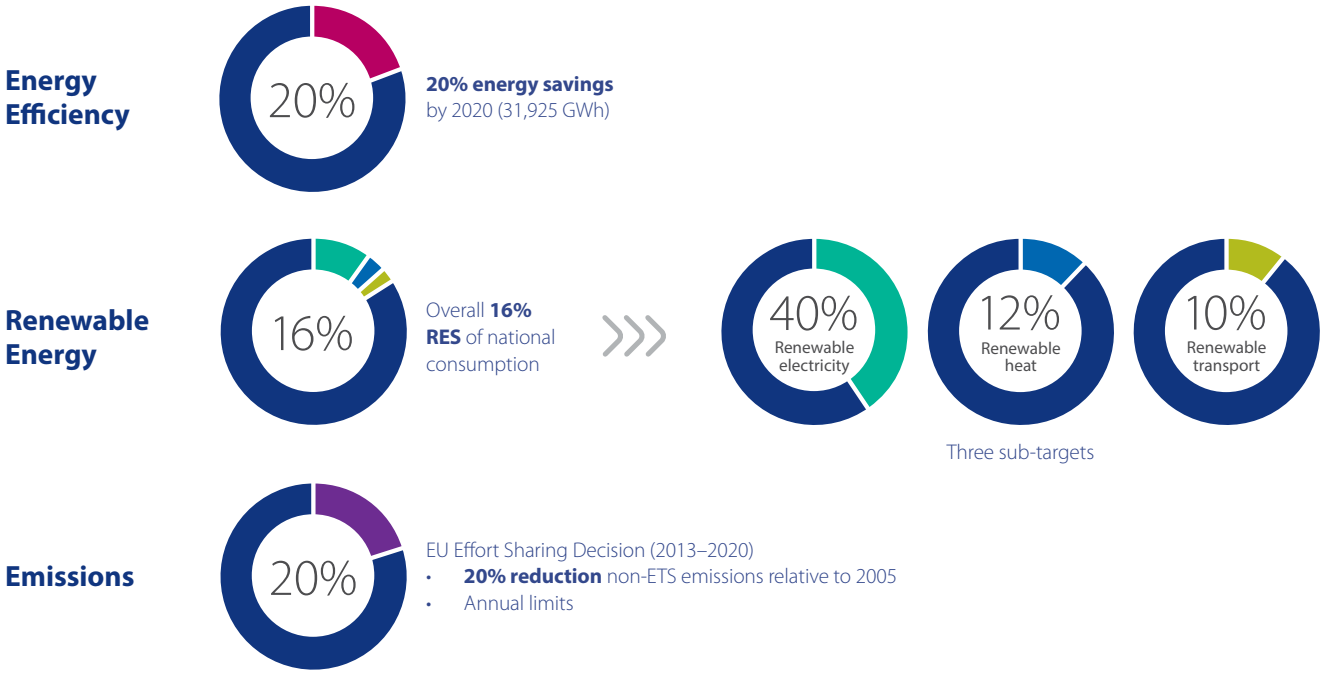
2 Ireland's energy use and targets

Ireland has a number of energy and emissions targets mandated at EU and national level. For improved energy efficiency, a target has been set to reduce energy demand by 20% of the historic average energy use during the period 2000–2005 through energy efficiency measures by 2020. For renewable energy, binding EU targets of 16% of final energy use (all sectors) and 10% of energy use in the transport sector must be derived from renewable sources by 2020.

The current suite of energy efficiency measures is described in detail in Ireland's National Energy Efficiency Action Plan *(NEEAP)* and annual reports.[25] Data from the latest *NEEAP (NEEAP#4,* 2017–2020) have been used in these projections. In order to achieve Ireland's overall renewable energy target, national sub-targets have also been set in the end-use sectors of heat (12%) and electricity (40%). The pathways to achieving these targets have been set out in the National Renewable Energy Action Plan *(NREAP).*[26]

With respect to greenhouse gas (GHG) emissions reduction, Ireland, along with Denmark and Luxembourg, has the most challenging target for GHG reductions in the EU[27]; namely a 20% reduction on 2005 greenhouse gas emissions levels by 2020.[28] Emissions targets include emissions from energy use (such as transport, households, services) and also non-energy related emissions including from agriculture and waste disposal. Energy-related emissions account for 61% of total national emissions (Figure 3). Therefore, activity

Figure 2: Headline energy and emissions targets



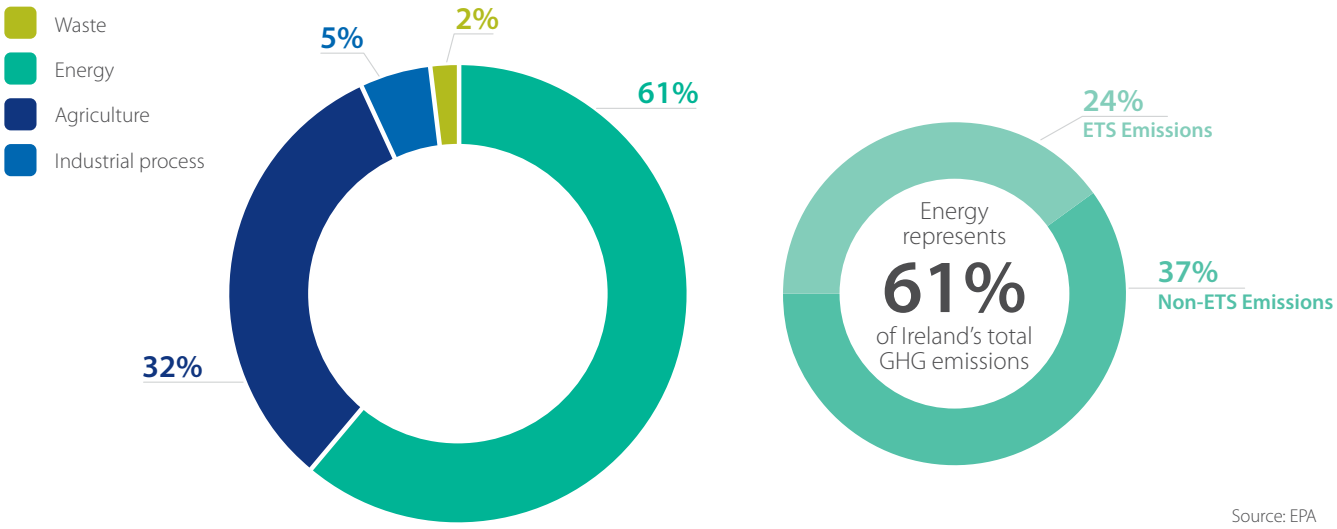
25 *Ireland's National Energy Efficiency Action Plan #4 (NEEAP #4, (DCCAE, 2017)* Available here: http://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/national-energy-efficiency-action-plan (neeap)/Pages/National-Energy-Efficiency-Action Plan-(NEEAP).aspx

26 *National Renewable Energy Action Plan, Ireland.* Submitted to the European Commission under Article 4 of Directive 2009/28/EC. Department of Communications, Energy and Natural Resources, 2010

27 Effort Sharing Decision (Decision No 406/2009/EC)

28 For the non-ETS (Emissions Trading Scheme) sectors which includes transport, buildings (excluding electricity) and small business in terms of energy use but it also relates to agriculture and wastes. The remainder of total national emissions are in the ETS and subject to a cap and trade scheme.

Figure 3: Greenhouse Gas emissions in Ireland (2015)



Source: EPA

contributing to achievement of our energy targets will help to meet the binding EU 2020 greenhouse gas (GHG) emissions target, but does not guarantee it. While Ireland has quite a large proportion of agricultural emissions relative to other European countries, it is clear that GHG emissions cannot be reduced without tackling energy emissions.

Meeting Ireland's 2020 renewable energy and energy efficiency targets will put Ireland on a low-carbon pathway and trajectory in terms of meeting future targets in 2030 and 2050. The EU, along with several other Member States, has set out ambitions to reduce greenhouse gas emissions by 80% to 95% by 2050, compared with 1990 levels, with an EU-wide reduction of 40% by 2030 already agreed by Member States.[29] Negotiations on targets for individual Member States for 2030 are ongoing. The Paris Agreement forged at COP21 provides further impetus for strong action on climate change mitigation in Ireland and internationally.

2.1 Target interactions and dependencies

Energy end-use demand can be broadly categorised into three distinct modes of energy use, namely; electricity, transport and heat. Renewable energy targets are based on a percentage of end-use demand. In addition to directly contributing to lowering emissions, this means that energy efficiency actions can contribute towards meeting renewable energy targets. Conversely, a shortfall in energy efficiency would mean that greater deployment of renewable energy technologies will be needed in order to meet the 2020 renewable targets. As the majority of energy efficiency measures relate to energy use for heat, this mode in particular is likely to be impacted by any shortfall in energy efficiency targets.

29 For details refer to the EU 2030 climate and energy framework. Available at: https://ec.europa.eu/clima/policies/strategies/2030_en

30 Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC

31 Information on the EU ETS is available from https://ec.europa.eu/clima/policies/ets_en

2.2 Electrification and non-Emissions Trading Scheme (ETS) target

One of the main means of addressing climate change at an EU level is through the Directive establishing a scheme for greenhouse gas emissions trading within the Community (2003/87/EC)[30], also referred to as the Emissions Trading Directive. The EU emissions trading system (EU ETS)[31], which came into effect in 2005, is a market-based system to reduce the emissions of climate-damaging greenhouse gases. It is based on the principle of a 'Cap and Trade' system. The cap makes sure that CO_2 becomes a commodity and, thus, CO_2 is valued at a price, which is determined by the supply and demand at the (trading) market. The ETS sector comprises of electricity generating power stations, large-scale industrial plants and the aviation sector (since 2012). All remaining emissions are termed 'non-ETS emissions'. These comprise emissions resulting from energy consumption in the residential, transport, agriculture and waste sectors, as well as small businesses/industry. It also comprises non-energy related agriculture and waste disposal emissions. Ireland must achieve a 20% reduction in non-ETS emissions by 2020 under the EU Effort Sharing Decision (Decision No 406/2009/EC).

Shifting demand between electricity, transport and heat can alter the levels of effort required in each mode to meet the overall 2020 renewable energy target. For example, transferring demand from the heat and transport sectors to electricity increases the effort required to meet the electricity component of the renewable target, but has the effect of reducing the effort required to meet the heat and transport renewable goals. In addition, electrification of the heat and transport sectors could also assist Ireland in complying with its challenging non-ETS emissions reduction target by shifting emissions into the ETS sector.

2.3 Energy efficiency target progress and ambition

By the end of 2015, almost 60% of the energy efficiency target had been achieved i.e. energy demand has been reduced by 12% relative to a 20% reduction target to be achieved by 2020. These savings were the results of tried and tested solutions across all energy-using sectors of the economy – for example, improved building regulations, energy management in large industrial installations, electricity system efficiencies, the retrofitting of existing buildings and more efficient vehicles on Ireland's roads. The latter may not have as big an impact as originally expected due to discrepancies between vehicle manufacturers' performance labels and 'real world' performance.[32]

The savings achieved at end of 2016 (18,654 GWh) represent over €1 billion[33] in reduced energy bills for businesses and householders. In other words, had the upgrades delivered across the residential, business and transport sectors not been undertaken, energy bills would have been over €1 billion higher in 2016. In addition, approximately 4.4 million tonnes of CO_2 have been saved through actions taken to improve energy efficiency to date.[34] Further details are available from the latest *NEEAP* report, which highlights the challenges of meeting the target and notes that without expansion to existing policy, the 2020 energy efficiency target is unlikely to be met.[35] The latest government policy statement on sustainable energy, *Ireland's Transition to a Low Carbon Energy Future* (DCENR, 2015) highlights a proposed range of actions and policy priorities that will contribute towards the energy efficiency target. Many of these are also described in the recently published National Mitigation Plan[36].

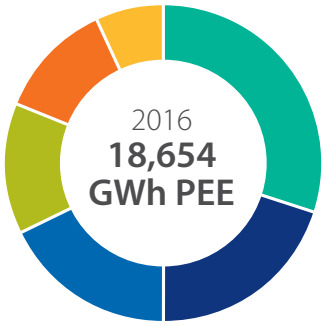
Figure 4: Annual energy savings and potential savings

Energy savings worth over **€1 billion** have been achieved through improved energy efficiency but **€2.4 billion** is possible

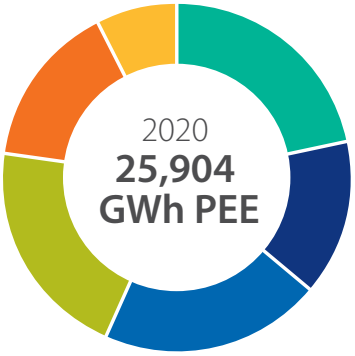
32 An aspect that will be considered further in future impact modelling.
33 €2013 as estimated for the *NEEAP* 4 update (DCCAE, 2017).
34 As per measures reported in Ireland's latest National Energy Efficiency Action Plan *(NEEAP)*
35 http://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/national-energy-efficiency-action-plan-(neeap)/Pages/National-Energy-Efficiency-Action-Plan-(NEEAP).aspx
36 http://www.dccae.gov.ie/en-ie/climate-action/topics/mitigation-reducing-ireland's-greenhousegas-emissions/national-mitigation-plan/Pages/default.aspx

Figure 5: Energy efficiency progress and target and selected actions

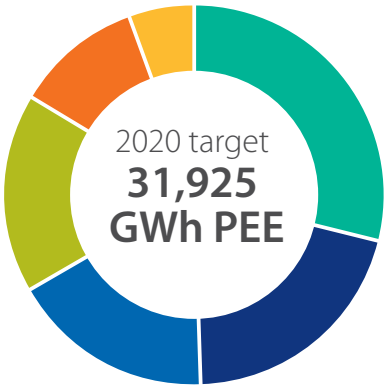
2016 Savings Achieved



Current Trajectory



Target Achievement
(NEEAP and NREAP scenario)



NEW BUILDINGS

- All new homes to be built to significantly enhanced building standards
- Scale up retrofit of existing dwellings

BUSINESS

- Large industry Energy Network, tax incentives (ACA), SME Programme
- Estimated investment €80 million p.a.

ENERGY SUPPLY

- Ongoing investment in efficient electricity supply network and generation plant

CROSS SECTORAL

- Enhanced supplier obligations
- Full impact of carbon tax

PUBLIC SECTOR

- 33% savings via the Public Sector Action Plan

TRANSPORT

- Promote technology change to electric vehicles
- Modal shift, eco-driving, land-use planning

Full achievement of the 2020 energy efficiency target of 31,925 GWh would deliver total annual emissions reductions of 7.6 million tonnes of CO_2 every year from 2020.[25] The value of achieving the target could amount to over €2.4 billion in reduced energy bills every year. The current target trajectory (as detailed in Ireland's National Energy Efficiency Action Plan #4) is likely to lead to savings of 5.9 million tonnes of CO_2 and just over half of the possible economic saving or €1.5 billion annually from reduced energy bills.

Notably, research shows that the costs of energy efficiency investments are significantly outweighed by the benefits provided over the lifetime of the investment made. It is estimated that the gap to the energy savings target can be achieved at a net benefit to society of €8 billion[37], after the costs of upgrades are taken into account.[38] Furthermore, government balance sheets could be improved by around €1.5 billion by 2020.[39]

As highlighted by the International Energy Agency (IEA)[40] and others, energy efficiency provides a range of benefits beyond energy and financial savings. These include health and comfort improvements to householders, increased asset values following efficiency upgrades, improved business competitiveness, macroeconomic and employment benefits and emissions reductions – thus enhancing the net benefit to society. In addition, as already noted, achievement of the energy efficiency target would contribute to the parallel requirement to achieve Ireland's renewable energy targets, particularly renewable heat.

37 €2013 Based on SEAI fuel cost comparison data and mix of fuel saved as described in *NEEAP* 4

38 Net present value (NPV)

39 *Unlocking the Energy Efficiency Opportunity,* SEAI (2015)

40 *Capturing the Multiple Benefits of Energy Efficiency,* IEA (2014) http://www.iea.org/topics/energyefficiency/energyefficiencyiea/multiplebenefitsofenergyefficiency/

Ongoing action

A range of actions are currently being pursued in the interest of accelerating the rate of uptake of energy efficiency in Ireland. The development of alternative finance mechanisms to enhance rates of energy efficiency retrofitting of homes and businesses, together with the ongoing implementation of an Energy Efficiency Obligation (EEO) on energy suppliers[41], will be crucial to meeting the target. Innovative solutions will also be needed in the transport sector, including continuing to incentivise the uptake of energy-efficient vehicles, promote eco-driving, increase the use of public transport, and reduce the number and length of journeys where possible.

Maximising the impact of actions such as auditing, mandated in the EU Energy Efficiency Directive[42], as well as a renewed focus on the role of behavioural science and economics, will be important. As we get closer to 2020, an increased role for regulation requiring action on energy efficiency may be appropriate in order to achieve savings from various sub-sectors.

SEAI has recently launched initiatives including a Deep Retrofit Pilot and a range of innovative finance pilots that will inform future programme development. These actions are aimed at scaling up the number of homes and businesses undertaking an energy efficiency renovation each year, and to drive each renovation deeper, leading to greater energy savings per home or building.

In addition, SEAI's Behavioural Economics Unit will seek to better understand the context in which people make decisions around sustainable energy investments and everyday decisions that impact on energy use. SEAI will use the latest research in behavioural science to design and test interventions with the aim of increasing uptake across energy efficiency grant programmes. Using rigorous and evidence based methodologies, the effectiveness of potential interventions will be measured before they are scaled.

2.4 Renewable energy targets progress and ambition

Ireland must achieve a mandatory target of 16% renewable contribution in overall consumption and a 10% share of renewable energy in transport consumption as set out in the Renewable Energy Directive (2009/28/EC). Up to end 2015, 9.1% of overall energy demand was derived from renewable sources through a range of actions.

In addition to avoiding greenhouse gas emissions, renewable energy deployment reduces Ireland's reliance on imported fossil fuels, lowers the potential impact of future energy price shocks, and delivers economic and enterprise benefits to Ireland.[43]

Figure 6 shows the proportion of overall energy demand provided by renewables in 2010 and 2015, and the *Current Trajectory* projections in 2020 for RES-E, RES-H and RES-T sub-targets.

The figure highlights the relative contribution of each sub-target to overall renewable energy supply. Electricity is the smallest sector in terms of demand, accounting for a 20% share, and therefore the 40% electricity target contributes less to the overall renewable energy target. It is evident that the significant progress in renewable electricity deployment will need to continue but with further contributions required from the heat and transport sectors also.

The level of effort required to meet the renewables targets for transport, heat and electricity is described in the following sections on the individual targets.

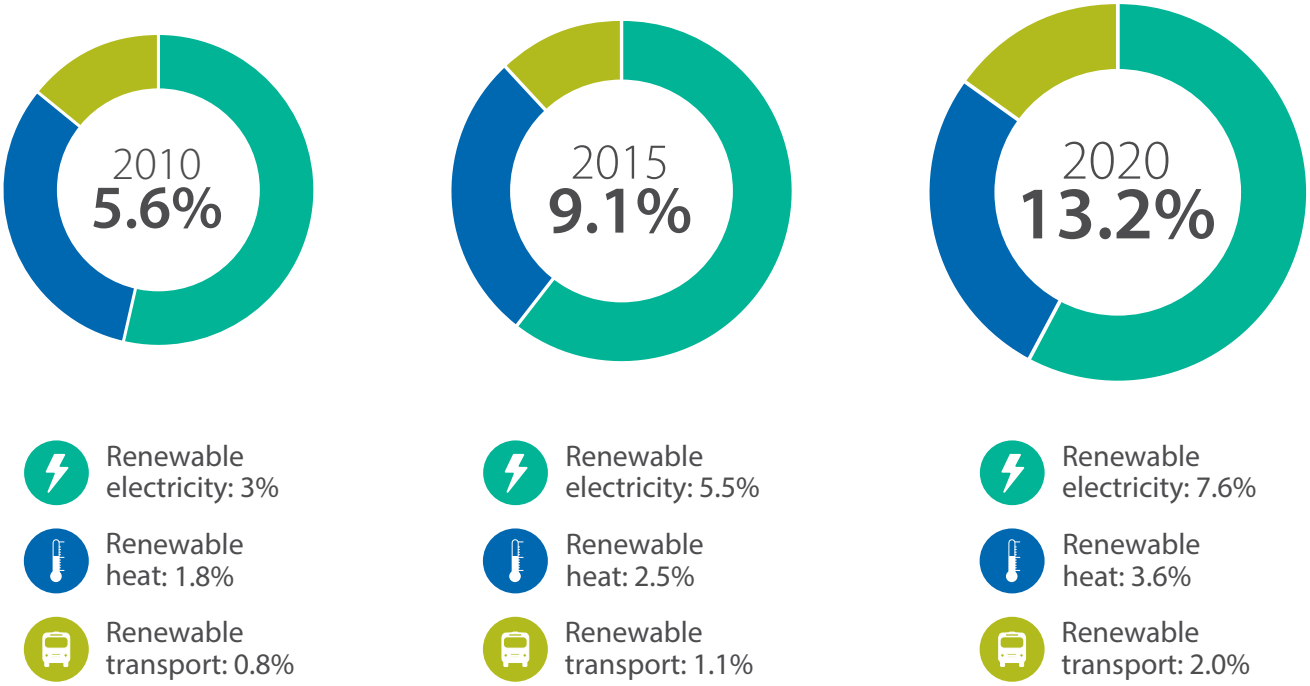
“Electricity is the smallest sector in terms of demand, accounting for a 20% share, and therefore the 40% electricity target contributes less to the overall renewable energy target. It is evident that the significant progress in renewable electricity deployment will need to continue but with further contributions required from the heat and transport sectors also.

41 More information at: http://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/business/Pages/EU-obligations-under-Energy-Efficiency.aspx

42 Directive 2012/27/EU

43 See, for example: *Macroeconomic and Net Employment Impacts of Ireland's Renewable Heat and Electricity Targets in 2020*, SEAI (2015).

Figure 6: Renewable energy share – overall progress and *Current Trajectory* (2020)



Renewable energy source – Transport (RES-T)

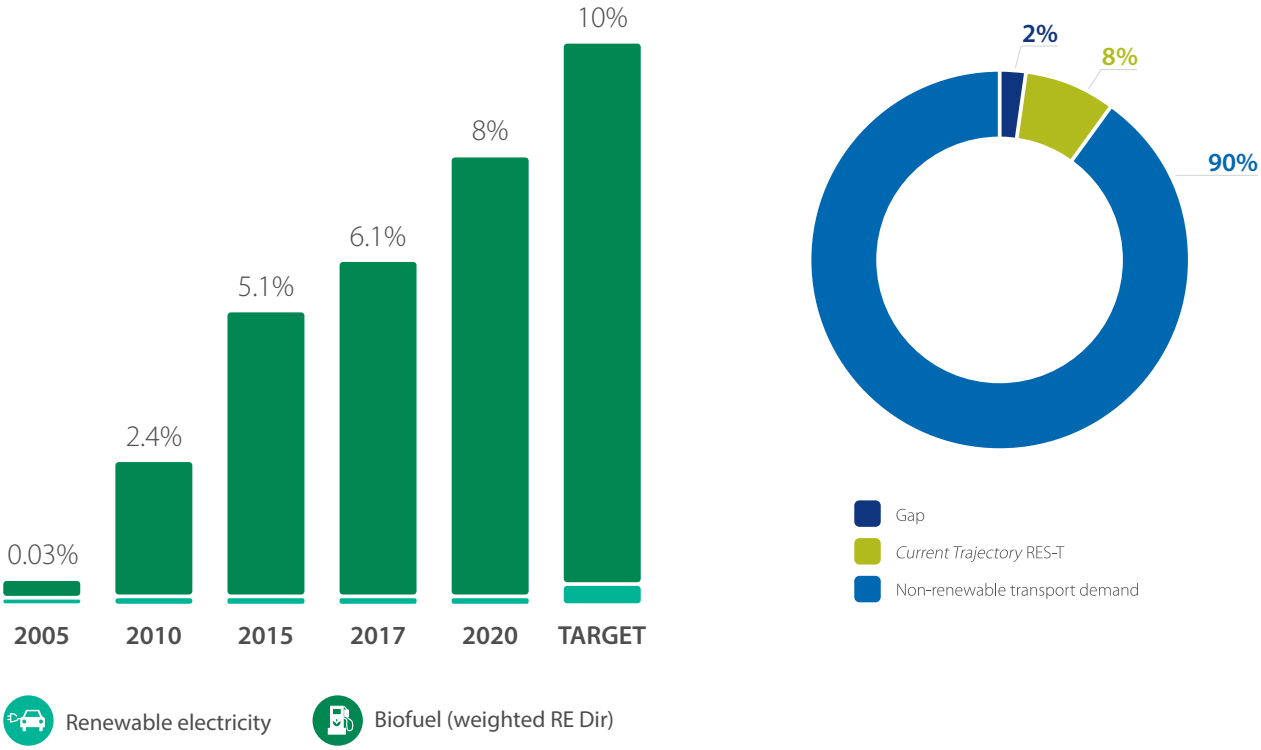
Figure 7 indicates Ireland's progress towards the 10% RES-T target – a mandatory target agreed under the EU Renewable Energy Directive (2009/28/EC) to be achieved by 2020. Most of the renewable transport contribution comes from biofuel. Currently, all transport fuel contains on average around 3.2% (by energy content or 3.6% by volume) biofuel blended with fossil-based petrol or diesel. This means that the average passenger car travels 590 kilometres per year on biofuel. Biofuel uptake in Ireland is driven primarily through the Biofuel Obligation Scheme, an obligation on fuel suppliers to blend an increasing percentage of biofuel with their fuel. Biofuels are important in helping Ireland to meet its greenhouse gas reduction targets. Most biofuels deliver significant greenhouse gas (GHG) savings over their fossil fuel equivalents. All biofuels supplied in Ireland are required under the EU Directive 2015/1513 to deliver at least 60% GHG savings relative to fossil fuel alternatives and in 2016 the average litre of biofuel in the Irish market delivered almost 80% savings (NORA, 2016).[44]

Concerns have been raised globally about possible adverse land-use impacts arising from demand for biofuels derived from food and feed crops. There is a risk that increased demand for these feedstocks for biofuel can lead to a phenomenon known as Indirect Land Use Change (ILUC). To address ILUC concerns the European Commission published a Directive in September 2015, containing amendments to the Renewable Energy Directive. The new Directive proposed revised calculation rules for the individual RES-T target, including additional weighting for advanced biofuels (which count double towards the RES-T target) and for the renewable proportion of the electricity used in electric vehicles (which count five times towards the RES-T target).

These weightings do not apply however in the calculation of the transport contribution to the overall 2020 16% renewable energy target. This means that while it is now easier to meet the 10% RES-T target with some contribution from EVs and double-counted

44 NORA (2016) *The Biofuels Obligation Scheme – Annual Report 2016* [Available online] http://www.nora.ie/_fileupload/457-X0174%20-%20BOS%20Annual%20Report%202016.pdf

Figure 7: Renewable transport (RES-T) progress and target



biofuels, the transport contribution to the overall renewable energy target is less than previously anticipated.

Most biofuel produced in Ireland is derived from wastes and residues such as used cooking oil and tallow. Biofuels derived from these feedstocks typically deliver large GHG savings and do not result in adverse land-use impacts. It is estimated that approximately 320 million litres of biofuel will be required in order to meet the 10% RES-T target.[45]

In 2008, the Irish Government set a target of 10% of all vehicles in the transport fleet to be powered by electricity by 2020. This has since been revised to a target of 20,000 EVs in the transport fleet by 2020[46], however as part of this exercise the *Current Trajectory* projects an EV fleet of 10,000 by 2020. Despite their high efficiency, EVs will only make a relatively small contribution to the overall RES-T 2020 target. Nonetheless, they play an important role in the diversification and decarbonisation of the transport fleet as well as improving air quality and noise reduction in urban areas.

Existing supports for EVs are Vehicle Registration Tax (VRT) relief, low motor tax rates, price reductions via grants and demonstration projects. There is a comprehensive network of 1,200 public charge points across the island of Ireland. These have been deployed by ESB ecars since 2010, with the support of the Commission for Energy Regulation, the European Union, Northern Ireland's Department for Infrastructure and Government Departments.

Growth in EVs has been slower than anticipated[47] and at the end of 2016 the number of battery only EVs in Ireland was approximately 2,000, accounting for 0.3%[48] of new car sales. To achieve the

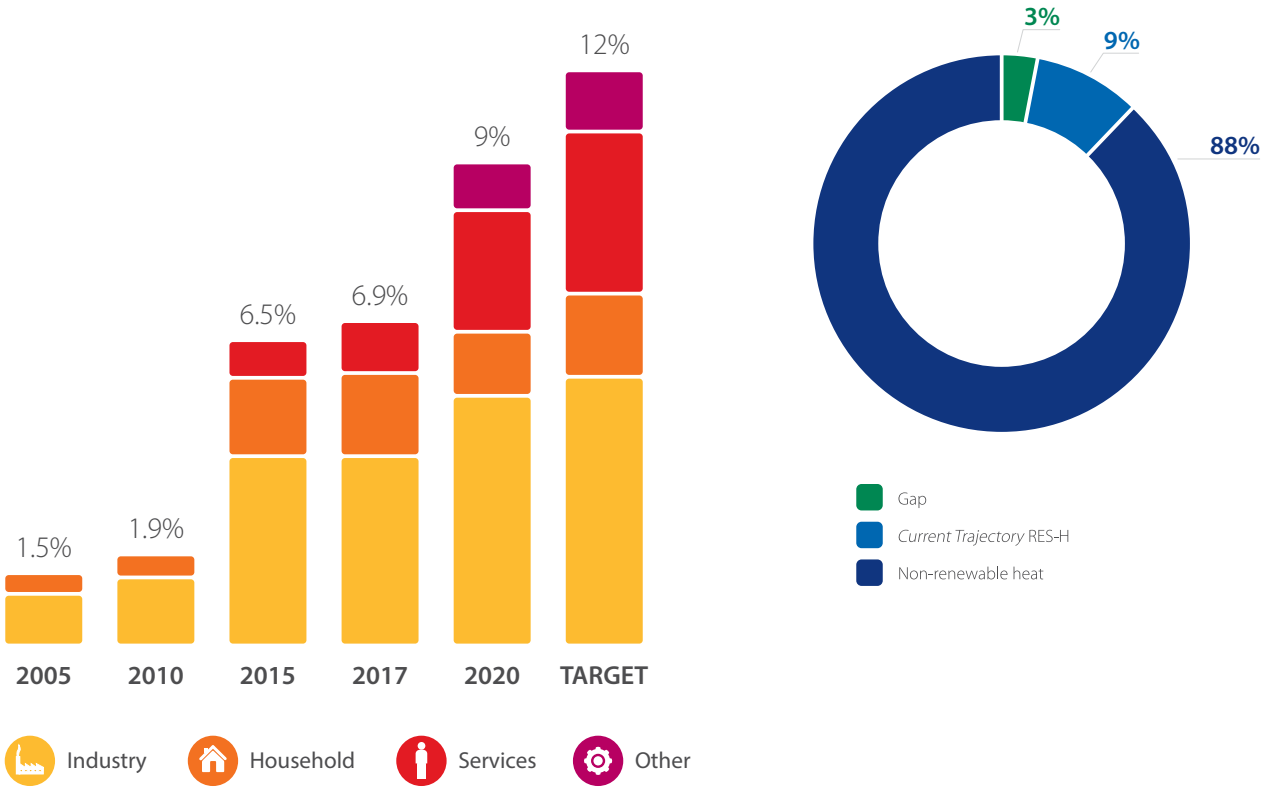
45 This is lower than previous estimates as it is assumed that 95% of biodiesel will be eligible for double counting under the new ILUC rules by 2020.

46 Department of Transport, Tourism and Sport, 2017, *National Policy Framework: Alternative Fuels Infrastructure for Transport in Ireland 2017-2030.* http://www.dttas.ie/sites/default/files/publications/public-transport/english/alternative-fuels-framework/6186npfalternative-fuels300517.pdf

47 During the recession consumers were not making purchasing decisions at the same frequency they would previously have made them, thus there was not a turnover of purchases that could be influenced to choose EVs. In addition there was a lack of choice of vehicles in the market. Since the Government grants programme commenced in 2011 the share of EVs as a percentage of new car sales has grown from 0.05% in 2011 to 0.3% in 2016. There has also been growth in second-hand EV imports from the UK.

48 Battery electric vehicles only – excludes hybrid electric vehicles.

Figure 8: Renewable heat (RES-H) progress and target



stock number of 10,000 battery EVs, modelled in the *Current Trajectory* scenario, it would be necessary for EVs to account for approximately 2% of all new cars sold in Ireland by 2020.

Renewable energy source – Heat (RES-H)

To date the most significant contribution towards the 12% RES-H target has come from the industrial sector, with more modest contributions from the household and services sectors (Figure 8).[49] Industry sub-sectors such as wood and wood products and food and beverage use production residues as renewable sources of energy. Deployment of modern renewable heat such as efficient biomass boilers and solar thermal systems has been supported by grants in the past (e.g. the ReHeat Scheme 2009–2011 targeted at commercial and industrial applications and the Greener Homes Schemes 2008–2011[50] for the residential sector). In addition, since 2011 the Residential Building Regulations include a minimum threshold requirement for renewable energy supply for new residential buildings that can be met via renewable heat technologies. A similar requirement has recently been applied to buildings other than dwellings in the 2017 revision to non-domestic building regulations.[51]

The following policies and measures will contribute towards achievement of the 2020 RES-H target:

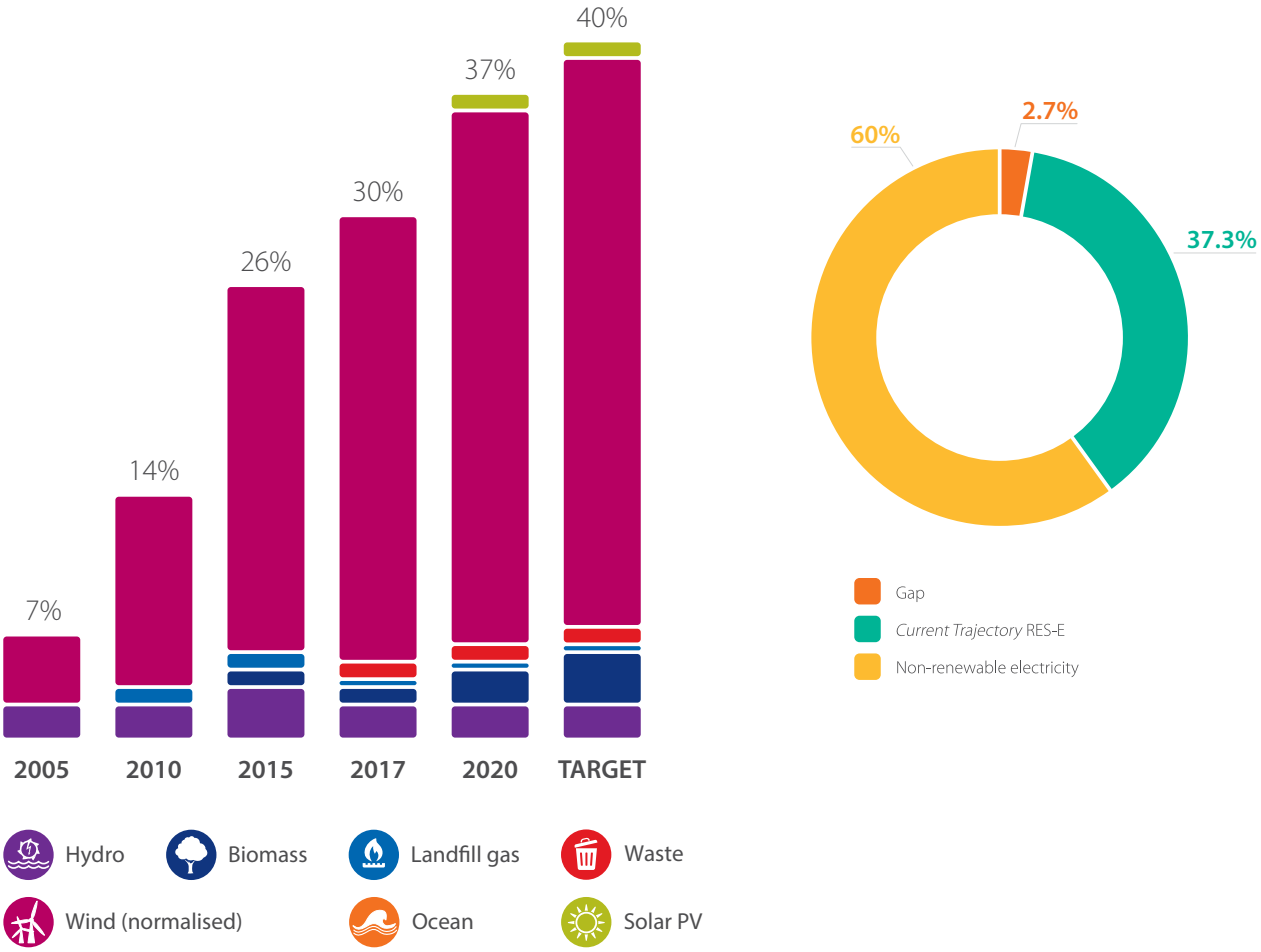
- The introduction of a Renewable Heat Incentive (RHI), currently under development.
- Deployment of biomass use for heat (e.g. efficient biomass boilers).
- Additional biomass CHP installations deployed with the support of the existing Renewable Energy Feed-In Tariff (REFIT) scheme for biomass CHP.
- Additional RES-H contribution from new homes built to more stringent building regulations from 2011 onwards.

49 The RES-H target is reported on a sectoral basis given the complexity of modelling technology use in the sector.

50 At the time of publication of this report, a grant for solar heating is included under the Better Energy Homes grant scheme, whereas biomass boilers are not currently supported.

51 2017 Building regulations: Conservation of Fuel and Energy – Buildings other than Dwellings.

Figure 9: Renewable electricity (RES-E) progress and target



The overall level of effort can be reduced by increasing the extent to which energy efficiency impacts on overall demand.[52] The renewable ambient energy use by heat pumps can also contribute to the RES-H target.

Renewable energy source – Electricity (RES-E)

Figure 9[53] outlines the level of achievement to the end of 2015, and what is required in order to meet the 2020 40% RES-E target. Wind energy deployment has made the most significant contribution to RES-E. The historic build rate (2005–2010) was 180 MW per year. Since 2010 the build rate has increased to an average of over 200 MW per year. The existing hydro capacity, which is primarily from large hydro stations such as Ardnacrushna on the river Shannon and Cathleen's Falls on the river Erne, provides a further contribution to RES-E. Biomass consists mainly of co-firing of biomass with peat in Edenderry power station, combustion of landfill gas and biomass CHP installations making modest contributions. There are also some rooftop solar PV installations in Ireland but currently their combined contribution is very small.

An increased deployment rate of all renewable electricity technologies is required to meet the 2020 RES-E target. To meet the national target, the build rate of onshore wind would need to increase to approximately 300 MW–350 MW installed capacity per year. This could be achieved by installing approximately 100 turbines[54] per year or less if more powerful turbines are used.

52 Noting the interaction of demand reduction through energy efficiency and other aspects impacting on energy demand, including energy prices, GDP etc.

53 Historical hydro numbers are represented by actual electricity generated. Future hydro contribution is normalised based on the installed capacity and a 15-year average capacity factor.

54 Assuming each turbine has a capacity of 3MW.

> The transport sector is currently the largest energy-using sector and is the sector most reliant on imported fossil fuels in the form of petroleum products and biofuels.

Use of biomass for electricity generation must also increase, for example, through the commissioning of waste-to-energy facilities and the growth in the use of biomass CHP. Deployment of 5 MW of ocean energy is also modelled in the *Current Trajectory*, in order to take account of planned deployment of demonstration projects, together with the continued use of Ireland's existing hydro resources.[55] However, at present Ireland does not have any wave or tidal energy-producing installations.

Ireland has just over 6 MWp (Megawatt Peak) of solar PV installed at the end of 2016, almost entirely on rooftops. Ground based solar PV could contribute further towards meeting the RES-E target in 2020 as system costs continue to decline, and given the relatively fast construction time in comparison to other electricity generation sources.

Some of the key dependencies on target achievement are the successful resolution of planning and regulatory issues; continued public engagement on wind; grid roll-out; and the development of appropriate market structures for an electricity system with high levels of renewables – currently being supported by the DS3 programme.[56]

Significant mobilisation of private investment will also be needed, and such investment will be heavily reliant on investor confidence. The Renewable Energy Feed-In Tariff (REFIT) scheme for wind and biomass is currently the primary policy in place to support such investment. These tariffs create increased certainty for potential investors by providing some level of guaranteed return on investment for fixed periods of time. A successor to the REFIT scheme known as the Renewable Electricity Support Scheme (RESS) is currently under development. This aims to provide a framework to ensure the continued growth in renewable electricity out to 2030.

2.5 Trends in energy demand and fuel use

Final energy demand in each sector is influenced by population, economic growth, fuel prices and the impact of energy efficiency policy. Figure 10 shows the projected growth in energy demand in Ireland to 2020 in each sector.

The transport sector is currently the largest energy-using sector and is the sector most reliant on imported fossil fuels in the form of petroleum products and biofuels. In the scenarios examined, the share of total energy consumed by the transport sector is set to maintain its 40% share of total final energy consumption. Energy efficiency measures in transport are unlikely to have a significant impact on demand, especially as the improvements claimed from vehicle manufacturer labels have not been replicated in vehicle on-road performance. Consumer choices of transport mode, and activity in the Irish economy which impacts on freight consumption and aviation also significantly influence demand.

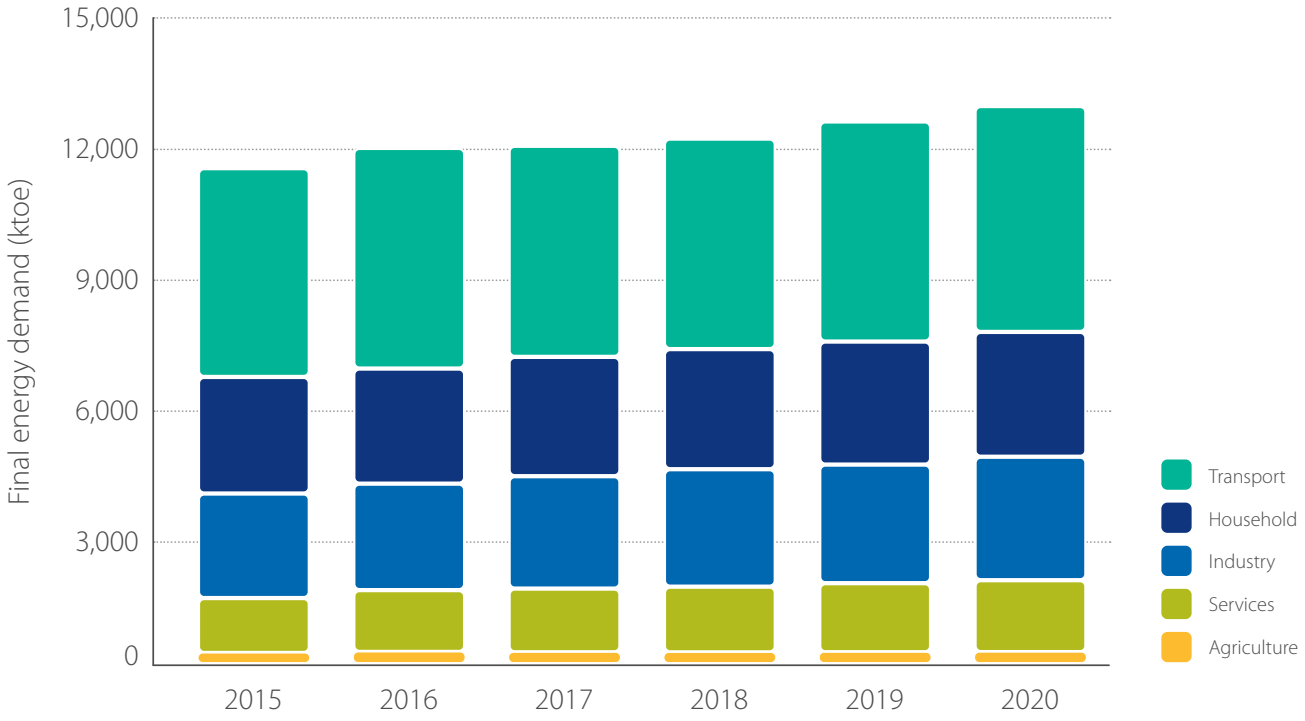
The share of electricity in total final consumption is not anticipated to change much from its historical share of 20% in the *Current Trajectory*. This means that the heat or thermal energy sector is likely to have a 40% share of final energy consumption in 2020. The plans for energy efficiency action in the industrial and commercial sectors will serve to mitigate some of the impact of increased economic growth and increasing heat energy demand. The planned improvements to the residential building stock through tighter building regulations and retrofits of existing dwellings could further reduce energy demand in the sector to 2020.

The total energy demand for Ireland, including inputs to electricity generation, based on the *Current Trajectory* is shown in Figure 11. Renewable energy is set to grow strongly to 2020 but Ireland will still be heavily reliant on fossil fuels. Oil remains the dominant fuel, driven by demand in the transport sector.

55 The eventual technology mix deployed for target achievement could change.

56 http://www.eirgrid.com/operations/ds3/

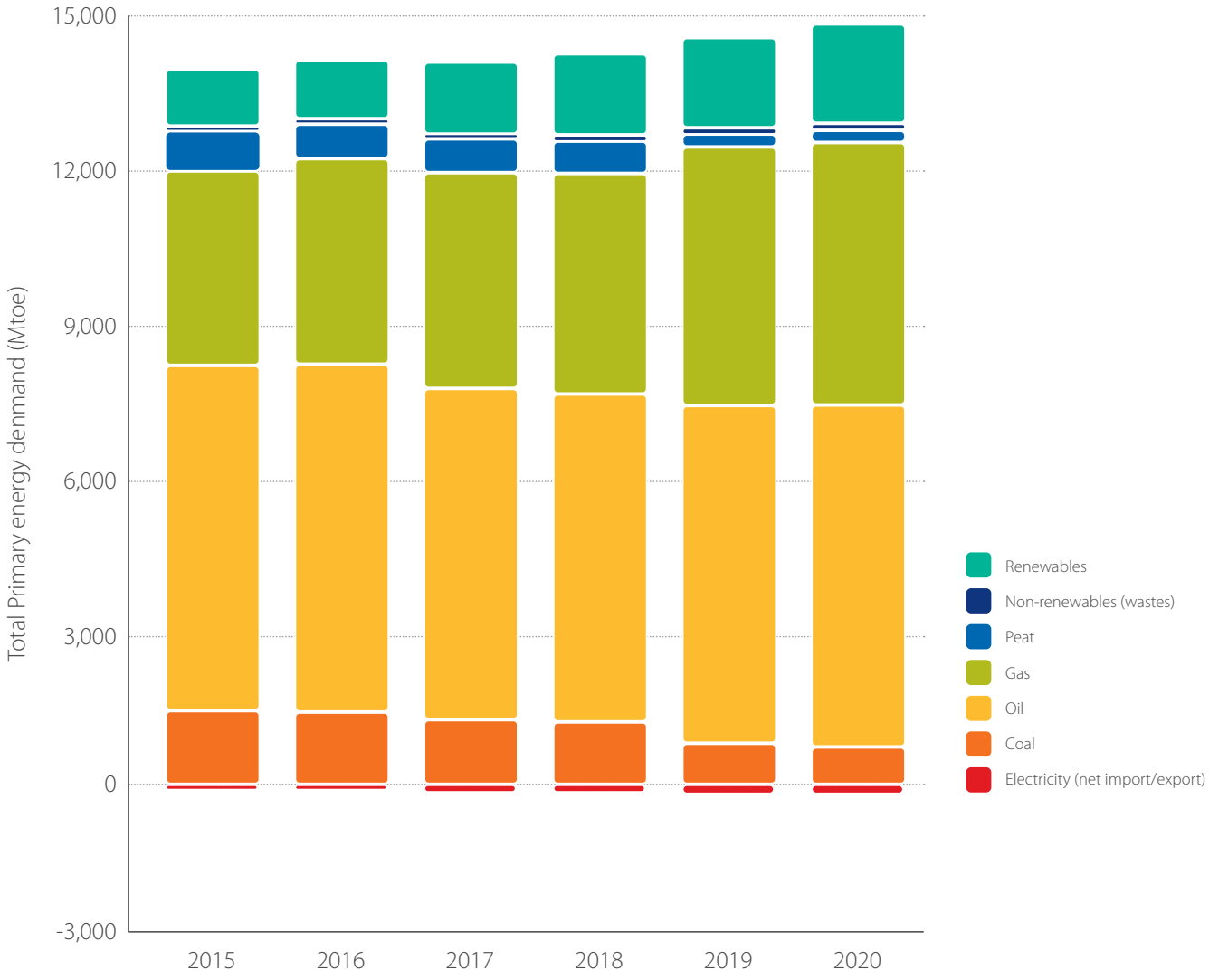
Figure 10: Projected growth in energy demand in Ireland to 2020 by sector



Renewable electricity from renewable sources, such as wind also reduces the overall quantity of primary fuel input required. Unlike fuels that are combusted to release energy, such renewable sources do not lose energy in the conversion process to final energy. Natural gas, the majority of which will be used for electricity generation, grows significantly in all scenarios primarily driven by increasing electricity demand. Coal combustion to generate electricity makes up a sizable proportion of fuel use. This pattern is unlikely to change to 2020, with the exception of peat which declines as policy support for burning peat in electricity generation ends in 2018. Over the period to 2020, the projections show that Ireland continues the recent trend of being a net electricity exporter.

Outside of transport energy demand, oil is also used for heating applications in the residential, commercial and industrial sectors. Much of the demand for oil for heating is in rural areas that do not have access to the gas grid. However, it is interesting to note that natural gas is projected to surpass oil for residential heating applications by 2023, as a result of more residential buildings in areas serviced by the gas grid.

Figure 11: *Current Trajectory* scenario – primary energy by fuel



3 Non-ETS emissions targets

The results of the National Energy Projections, produced by SEAI, are used by the EPA as the basis for their energy associated emissions projections. The results of the emissions projections indicate that from 2016/2017 onwards, in the absence of additional emissions reductions measures, annual reduction targets will not be met.

The preceding sections of this report have focused on policies and measures that impact only on the energy-related emissions. Of total emissions, approximately 61% are energy related; comprising 36% from the non-ETS sector (which covers transport, residential and low energy intensive commercial energy users), and around 24% is covered by the EU ETS (which includes electricity generation and energy-intensive industries, as well as aviation since 2012). The remaining 39% of total emissions are non-energy related emissions from the agricultural and waste sectors.

The EU Effort Sharing Decision[57] establishes a binding greenhouse gas emissions target for Ireland that is equivalent to a 20% reduction in emissions relative to a 2005 baseline (with annual limits from 2013–2020). For the purpose of reporting on compliance with the Effort Sharing Decision, the EPA combined the energy-related emissions projections with non-ETS emissions projections for the agricultural[58] and waste sectors. Figure 12 shows two scenarios based on the modelling of expected impacts of policies and measures impacting on non-ETS emissions in Ireland.[59] The *Baseline* case (green columns) depict a possible outcome on the assumption that no additional policies or measures are implemented post-2015. The comparison case (blue columns) represent the likely progress towards the *NEEAP and NREAP* targets based on the *Current Trajectory*. Both emissions scenarios presented in Figure 12 include agricultural emissions projections associated with *Food Wise 2025* and waste sector emissions.[60]

On the basis of accounting rules associated with the Effort Sharing Decision (ESD) the net (cumulative) gap to target under the *Baseline* scenario could be in the order of 14Mt CO_2 for the *'With Measures'* scenario, in which it is assumed that no further policy progress is made post-2015. Under the *Current Trajectory* (which underpins the EPA's *With Additional Measures)* scenario, it is projected that Ireland could miss its cumulative target by around 12Mt CO_2. These projections include an assumption of some accelerated deployment of renewable energy and energy efficiency technologies over the period to 2020. Failure to comply in 2020 will result in EU fines and lead to a more arduous trajectory in the context of (yet to be determined) 2030 targets – both in terms of future deployment and potential future compliance costs – an issue that is highlighted in the next section of this report. Full details on the emissions projections for Ireland are available at www.epa.ie.

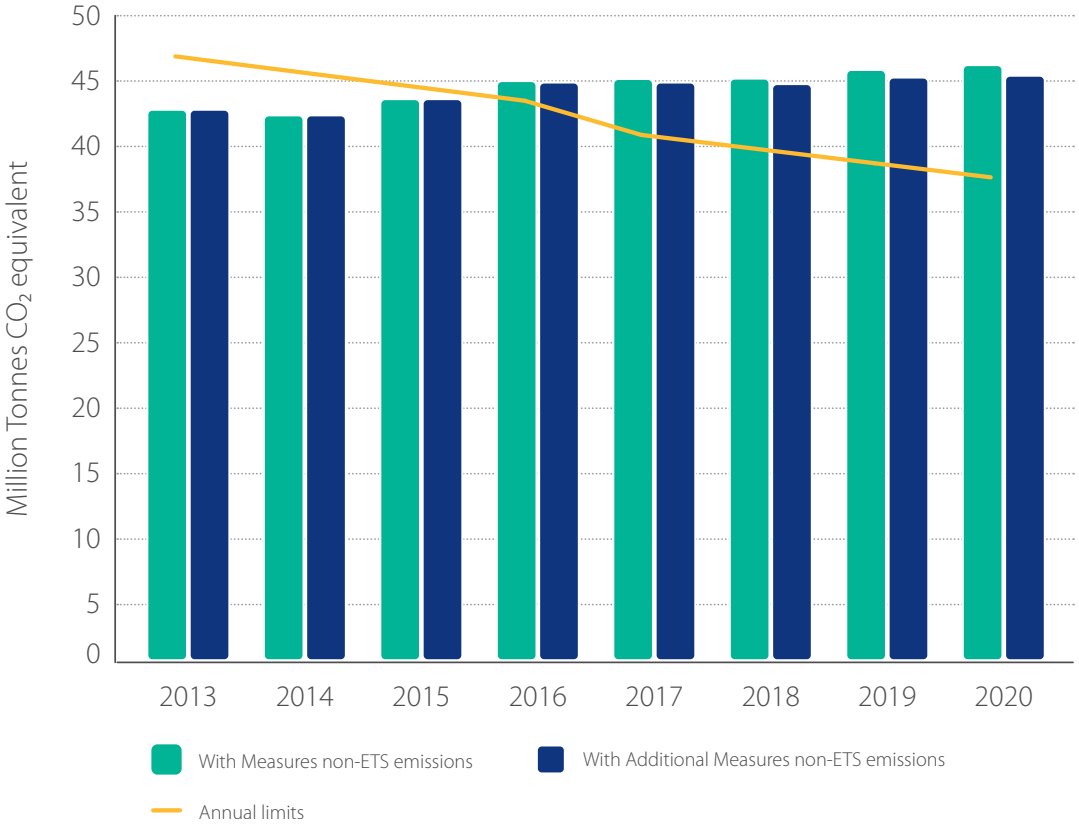
57 For details, see http://ec.europa.eu/clima/policies/effort/index_en.htm

58 Emissions forecasts based on Food Harvest 2020 expectations.

59 Non-ETS comprises energy-related consumption in the residential, transport, agriculture and waste sectors, as well as small businesses/industry. It also comprises other non-energy related Agriculture and waste emissions.

60 For the full EPA report, see: http://www.epa.ie/pubs/reports/air/airemissions/#.Ve7mfZiFPct

Figure 12: Projected emissions trajectory for two scenarios of future policy action



Source: EPA

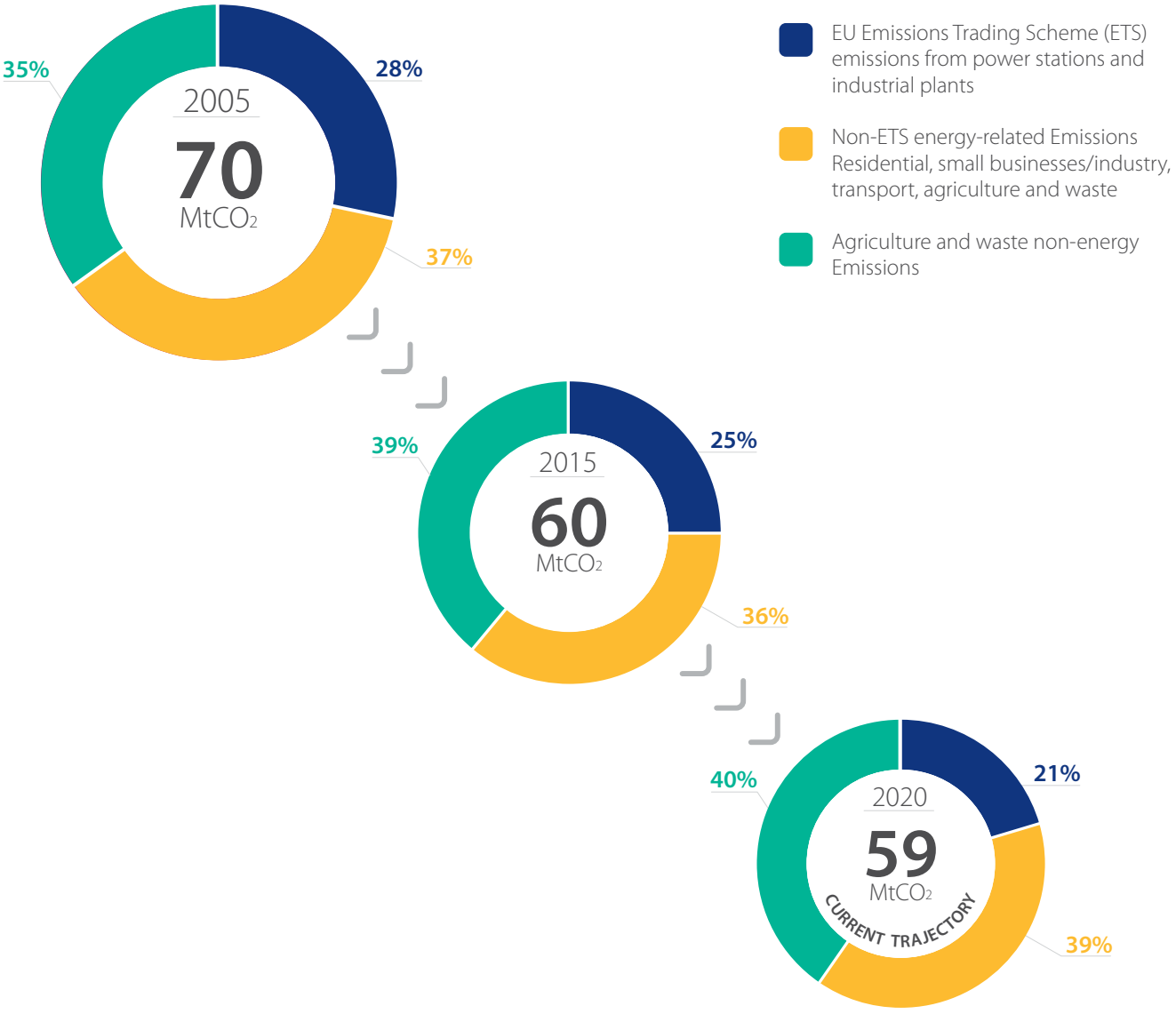
3.1 Total EU ETS and non-ETS energy-related emissions only 2005–2020

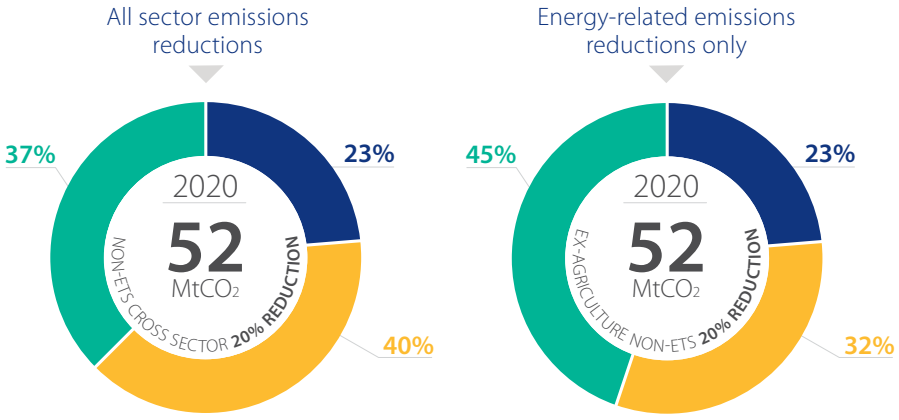
Figure 13 represents Ireland's total emissions (2015) with the blue segment comprising emissions covered by the EU ETS (i.e. large industry and power stations). EU ETS emissions occur within the cap and trade system established by the European Commission, and therefore are outside the scope of the Effort Sharing Decision target. The 20% emissions reduction target must be achieved in the non-ETS (yellow and green segments in Figure 13) portion of Ireland's overall emissions; these include energy-related emissions from the transport, residential, commercial and public sectors, as well as some process emissions from industry and direct emissions from the agricultural and waste sectors. Transport emissions are projected to account for half of all 2020 non-ETS energy-related emissions in the *Current Trajectory.*

Also included in Figure 13 are two alternate 2020 emissions reductions target achievement outcomes. In one outcome, the Effort Sharing Decision 20% reduction of non-ETS emissions on 2005 level is met by a shared reduction in emissions across all non-ETS sectors.

In the second outcome, agricultural emissions do not change from their current (2015) level, thus requiring emissions reductions of more than 20% in the non-ETS energy-related sectors in order to meet the Effort Sharing Decision target.

Figure 13: Total energy-related emissions only 2005–2020





4 Post-2020

Given that the package of energy policies post-2020 is currently under development and not fully defined (at the time of writing) the post-2020 projections do not include any modelled impact of energy efficiency or renewable energy policies. As such the post-2020 trends represent a hypothetical base scenario to illustrate what future projections might look like without ongoing policy activity to 2035.

It should be noted that some energy efficiency and renewable energy regulations continue to have an impact post-2020 (for example, building regulations stipulating the requirement for more energy-efficient homes and a minimum share of energy from renewable sources). Such impacts are included in the projection scenarios and result in small increases in the quantity of renewable heat and self-generation or behind-the-meter renewables only post-2020.

4.1 Policy context – post 2020

The Energy White Paper, *Ireland's Transition to a Low Carbon Energy Future*, published by the Department of Communications, Energy and Natural Resources in late 2015, provided an update on the Government's energy policy framework to guide energy policy between now and 2030. A comprehensive range of policy options and any future targets set for post-2020 at the national level will be modelled in future energy projections, in order to provide more detailed insights for projected energy supply and demand post-2020.

The European Commission has proposed a roadmap to move to a low-carbon economy by 2050.[61] The roadmap aims to reduce EU-wide emissions by 80% to 95%, compared with 1990 levels. The roadmap sets out milestones for a 40% emissions reduction by 2030 and 60% emissions reduction by 2040. EU leaders have agreed to reduce emissions by at least 40% by 2030, with a 27% target for renewable energy penetration. Negotiations are taking place to determine how the burden of this reduction is to be shared among Member States.

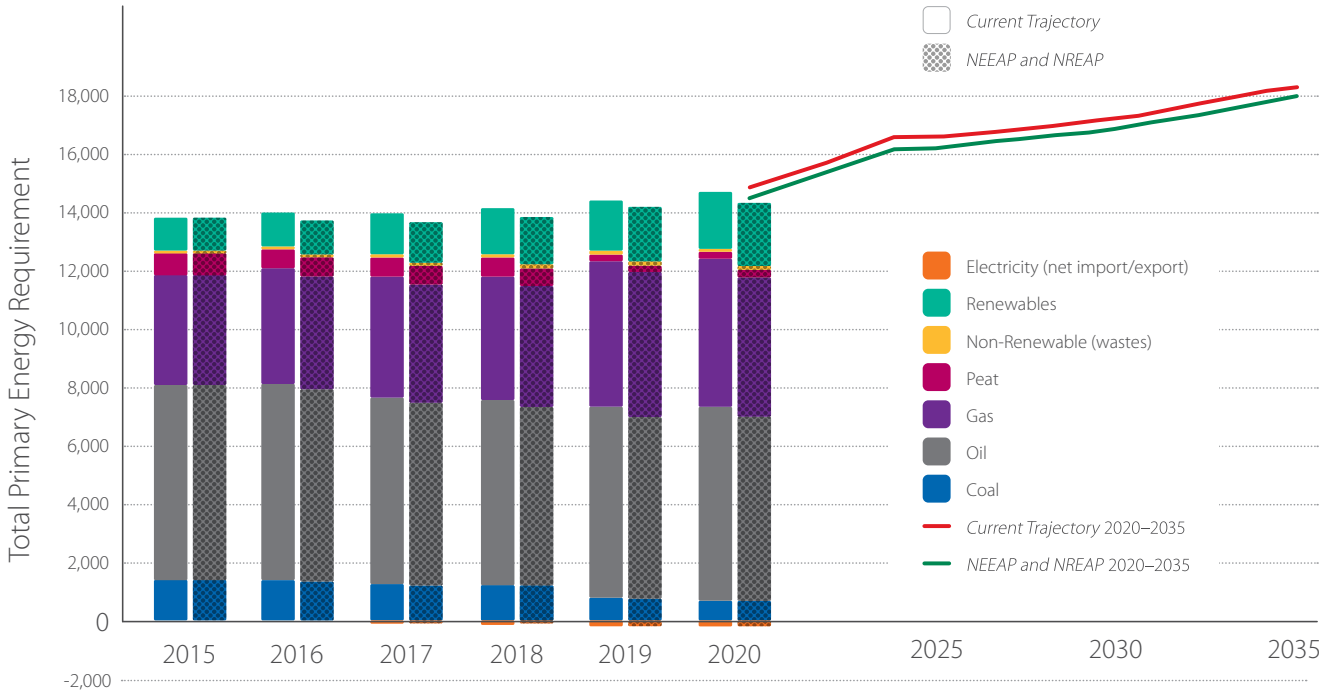
In addition to reporting to the European Commission regarding the *NEEAP and NREAP* targets to 2020, under the Climate Action and Low Carbon Development Act 2015, the Minister for Communications, Climate Action and Environment must submit a National Mitigation Plan (NMP) to Government for approval. The NMP was published in July 2017.[62] It provides details of a Government-wide approach to tackling greenhouse gas emissions particularly, in the key sectors – electricity generation, the built environment, transport and agriculture. This plan provides further detail on post-2020 energy policy.

Further, as part of its commitments under the Energy Union strategy, Ireland must develop an integrated National Energy and Climate Plan (NECP) for the period 2021 to 2030. This will include consideration of the impacts of energy and climate policy commitments to 2030. As part of our statutory role, DCCAE has mandated SEAI to develop an enhanced National Energy Modelling Framework which will build on the analysis in these projections to support development of the NECP. The analysis for the NECP will assess the impacts of ongoing and new policies out to 2030 and will provide significant value as a framework within which the potential impact of policy options can be tested. The National Energy and Climate Plan will also provide much greater clarity around our trajectory towards 2030, facilitating the delivery of more accurate National Energy Projections beyond the 2020 timeframe.

61 The EU Energy Roadmap 2050 is presented here: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-energy-strategy.

62 http://www.dccae.gov.ie/en-ie/climate-action/topics/mitigation-reducing-ireland's-greenhouse-gas-emissions/national-mitigation-plan/Pages/default.aspx

Figure 14: *Current Trajectory* and *NEEAP and NREAP* Total Final Consumption

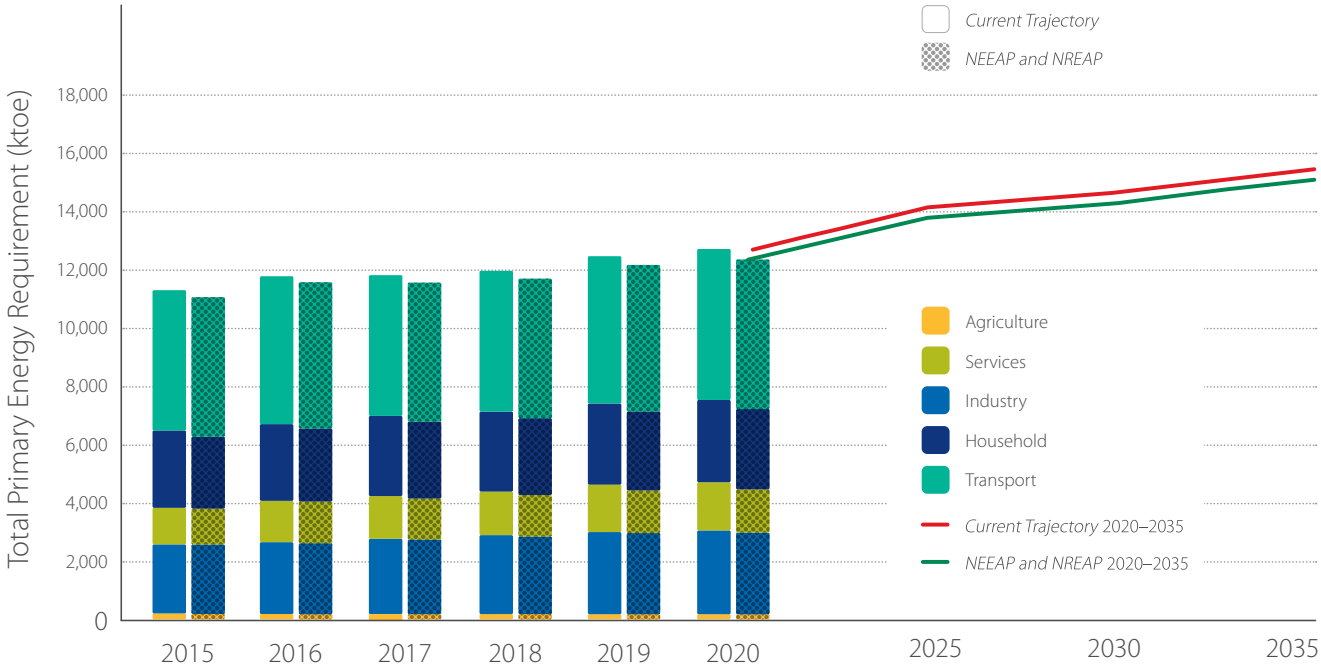


4.2 Post-2020 projections

Figure 14 illustrates both the *Current Trajectory* where Ireland's 2020 targets are not achieved and the *NEEAP and NREAP* scenario where the targets are achieved. In both scenarios, no further policies are implemented from 2020 onwards. The result of modelling future trends without the impact of future energy policy is an increasing trend of energy use post-2020 in line with the growth in the economy that would clearly have negative consequences for future energy-related emissions. Achievement of the 2020 targets would position Ireland to meet the challenges of future targets from a more advantageous starting point.

With continued economic growth, and in the absence of further policy action, the pace of energy demand growth increases post-2020, while the quantity of renewable energy supply remains close to the levels achieved by 2020 and thus reduces as a proportion of total fuel use. Achievement of Ireland's 2020 targets would lead to an overall renewable energy contribution of 15.4% in 2020 – this would reduce to 12.4% by (down 3 percentage points) by 2030 in the absence of additional renewables deployment post-2020. On the *Current Trajectory* however, where the 2020 targets are not met, the overall anticipated contribution from renewables falls from 13.2% in 2020 to 11.1% in 2030. There is a dramatic drop in the renewable electricity contribution between 2020 and 2030 – from 37.3% to 26.1% – due to strong growth in electricity demand. The RES-H contribution drops from 9% to 7.6% and RES-T from 8% to 7.1%.

Figure 15: *Current Trajectory* and *NEEAP and NREAP* Total Primary Energy Requirement



To maintain the 8% share of renewable transport between 2020 and 2030 an average annual biofuels growth rate of 1% per year, three times the existing rate, would be needed. Similar strong growth in renewable heat (2–3% percent per year) would be needed to maintain the 2020 RES-H share of 9%.

There is strong growth in electricity demand and transport energy demand post-2020. These energy demand trends have implications for fuel use with continuing dependence on oil and an increase in the share of natural gas in total energy consumption.

Figure 15 shows the primary energy fuel requirement use to supply demand.

Coal use will drop significantly should Moneypoint power station close at the end of its useful life, assumed in the *Current Trajectory* to be 2025. More natural gas will be combusted to meet the electricity demand previously supplied by coal generation, and also due to increasing demand from a larger housing stock and more industrial applications.

> With continued economic growth, and in the absence of further policy action, the pace of energy demand growth increases post-2020, while the quantity of renewable energy supply remains close to the levels achieved by 2020 and thus reduces as a proportion of total fuel use.

Figure 16: Energy-related emissions only (ETS and non-ETS)

Figure 16 shows the impact of the energy use trends for energy-related emissions only, given the assumptions described for modelling the Irish energy system post-2020. These emissions do not include agricultural and waste emissions, which currently account for 35% of total greenhouse gas emissions. Projections for those emissions are generated separately by the EPA.

Highlighted in Figure 16 are the emissions reduction levels required to meet the 40%, 60% and 80% benchmarks (on 1990 levels) as indicated by the ambition for Europe. This includes non-energy related emissions. The chart emphasises the crucial role of ongoing policy action on sustainable energy.

5 Conclusion

The return of strong growth to the Irish economy and the anticipated continuing low oil price leads to a projection of increased energy demand to 2020 and beyond. This makes the task of meeting our energy efficiency and renewable energy targets more challenging. Ongoing action on energy efficiency can help – but it won't be enough to counter energy demand growth driven by economic growth. In addition, increased rates of renewable energy technology deployment are needed.

Also, the low fossil fuel price environment provides a more limited incentive for consumers to shift to sustainable energy compared to high price trajectories, highlighting the importance of ongoing energy policy to stimulate deployment of energy efficiency and renewable energy technologies and services.

While substantial progress has been made towards achieving Ireland's energy efficiency and renewable energy targets, a continued expanded effort is needed. The results of this analysis highlight some challenges and risks associated with delivery of Ireland's 2020 targets, specifically:

- Between 300 MW and 350 MW of additional wind capacity must be installed every year.
- Supply of approximately 320 million litres of biofuels must be secured for blending with fossil fuels for transport, doubling the existing supply and increasing biofuel penetration to 8%.
- More large scale industrial and commercial sites must be encouraged to install renewable heat options
- More homes and businesses must be upgraded for improved energy efficiency every year – and the depth of retrofit increased.
- Roll-out of electric vehicles must be accelerated – this can shift energy demand in transport to the ETS sector.
- High performance heat pumps could be encouraged in efficient buildings to shift further demand to the ETS and increase the renewable heat contribution.

Ongoing analysis of the impacts of all policies and measures impact on energy supply and use is required in order to ensure that any policy gaps are filled in a timely and cost-effective manner and to respond to the significant challenge of decarbonising our energy system.

The range of benefits associated with pursuing a sustainable energy system are now better understood and accepted – and provide a clear case for delivery. Benefits include increased comfort and health gains for households; increased asset values; increased competitiveness for large and small businesses; employment opportunities in clean energy technology and businesses; improved energy security through reduced reliance on imported fossil fuels, increased energy affordability and most importantly reduced greenhouse gas emissions. To reap these benefits, government and citizens must commit to achieving renewable energy, energy efficiency and emissions reduction targets. SEAI is committed to providing ongoing support to Government through the provision of robust evidence and analysis, and through the delivery of Government programmes.

References

Department of Agriculture, Fisheries and Food, 2013, *Food Harvest 2020.*
Available from: http://agriculture.gov.ie/media/migration/publications/2011/FoodHarvestProgressReport260711.pdf

DCCAE (Department of Communications, Climate Action and Environment – formerly DCENR)[63], 2017, *National Mitigation Plan.*
Available from: http://www.dccae.gov.ie/documents/National%20Mitigation%20Plan%202017.pdf

DCCAE, 2017, *National Energy Efficiency Action Plan 4, 2017–2020.*
Available from: http://www.dccae.gov.ie/documents/NEEAP%204.pdf

DCENR (Department of Communications, Energy and Natural Resources – now DCCAE), 2015, *Ireland's Transition to a Low Carbon Energy Future.*
Available from: http://www.dccae.gov.ie/documents/Energy%20White%20Paper%20-%20Dec%202015.pdf

DCENR (now DCCAE), 2014, *Draft Bioenergy Action Plan.*
Available from: http://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/bio-energy/Pages/Bio-Energy.aspx

DCENR (now DCCAE), 2010, *National Renewable Energy Action Plan.*
Available from: http://www.dccae.gov.ie/documents/The%20National%20Renewable%20Energy%20Action%20Plan%20(PDF).pdf

Department of Housing, Planning, Community and Local Government, 2017, 2017 *Building regulations: Conservation of Fuel and Energy – Buildings other than Dwellings.*
Available from: https://www.housing.gov.ie/sites/default/files/public-consultation/files/tgd_l_-_conservation_of_fuel_and_energy_for_buildings_other_than_dwellings.pdf

Department of Transport, Tourism and Sport, 2017, *National Policy Framework: Alternative Fuels Infrastructure for Transport in Ireland 2017–2030.*
Available from: http://www.dttas.ie/sites/default/files/publications/public-transport/english/alternative-fuels-framework/6186npfalternative-fuels300517.pdf

Eirgrid, 2016, *EirGrid Generation Capacity Statement 2016.*
Available from: http://www.eirgridgroup.com/site-files/library/EirGrid/Generation_Capacity_Statement_20162025_FINAL.pdf

EPA (Environmental Protection Agency), 2017, *GHG Emissions Projections Summary Report.*
Available from http://www.epa.ie/pubs/reports/air/airemissions/ghgprojections//

ESRI (Economic and Social Research Institute) 2016, *Ireland's Economic Outlook: Perspectives and Policy Challenges.*
Available from: http://www.esri.ie/publications/irelands-economic-outlook-perspectives-and-policy-challenges

European Commission, 2016, *EU Reference Scenario 2016.*
Available from: https://ec.europa.eu/energy/en/news/reference-scenario-energy

European Commission, 2011, *EU Energy Roadmap 2050.*
Available from: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-energy-strategy

European Union, 2016, *EU 2030 Climate and Energy Framework.*
Available at: https://ec.europa.eu/clima/policies/strategies/2030_en

European Union, 2012, *Energy Efficiency Directive (Directive 2012/27/EU).*
Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012L0027&from=EN

European Union, 2009, *Effort Sharing Decision (Decision No 406/2009/EC).*
Available from: http://ec.europa.eu/clima/policies/effort/index_en.htm

European Union, 2009, *Renewable Energy Directive (Directive 2009/28/EC)* on the promotion of the use of energy from renewable sources.
Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0028&from=en

European Union, 2003, *Establishing a Scheme for Greenhouse Gas Emission Allowance Trading within the Community and Amending Council Directive 96/61/EC (DIRECTIVE 2003/87/EC).*
Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003L0087&from=EN

63 The Irish Government department with responsibility for energy was renamed the Department of Communications, Climate Action and Environment in 2016. DCENR (now DCCAE), 2014, Draft Bioenergy Action Plan.

International Energy Agency (IEA), 2016, *IA-HEV Annual Report (2016).*
Available from: http://www.ieahev.org/assets/1/7/2016_IA-HEV_BOOK_web_(1).pdf

IEA, 2014, *Capturing the Multiple Benefits of Energy Efficiency.*
Available from: http://www.iea.org/topics/energyefficiency/energyefficiencyiea/multiplebenefitsofenergyefficiency

Irish Government, 2016, *Statutory Instrument no. 225 of 2016, National Oil Reserves Agency Act 2007 (Biofuel Obligation Rate) 2016.*
Available from: http://www.irishstatutebook.ie/eli/2016/si/225/made/en/pdf

Irish Government, 2015, *Climate Action and Low Carbon Development Act 2015.*
Available from: http://www.irishstatutebook.ie/eli/2015/act/46/enacted/en/html

National Oil Reserves Agency (NORA), 2016, *The Biofuels Obligation Scheme – Annual Report 2016.*
Available from: http://www.nora.ie/_fileupload/457-X0174%20-%20BOS%20Annual%20Report%202016.pdf

SEAI (Sustainable Energy Authority of Ireland), 2016, *Energy in Ireland 1990–2015.*
Available from http://www.seai.ie/resources/publications/Energy-in-Ireland-1990-2015.pdf

SEAI (Sustainable Energy Authority of Ireland), 2015, *Unlocking the Energy Efficiency Opportunity.*
Available at: http://www.seai.ie/resources/publications/Unlocking-the-Energy-Efficiency-Opportunity-Summary-for-Policymakers.pdf

Many further supporting publications are available at www.seai.ie.

List of figures

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Acronyms and abbreviations

DCCAE: Department of Communication Climate Action and Environment
DECC: United Kingdom Department of Energy and Climate Change
EPA: Environmental Protection Agency
IEA: International Energy Agency
NEEAP: National Energy Efficiency Action Plan
NREAP: National Renewable Energy Action Plan
RES: Renewables
RES-E: Renewable Electricity
RES-H: Renewable Heat
RES-T: Renewable Transport
SEAI: Sustainable Energy Authority of Ireland
TFC: Total Final Consumption
TPER: Total Primary Energy Requirement

Annex A: Modelling process and description

Under the Sustainable Energy Act 2002 (Article 6 (2)(b)), SEAI has the national mandate to compile and disseminate projections relating to energy production and use.

SEAI has published energy demand and supply projections for the Republic of Ireland since 2006 in collaboration with ESRI. These energy projections are used for a variety of purposes including the preparation of national action plans by the Department of Communications, Climate Action and Environment and the projections of energy-related greenhouse gas and air pollutant emissions by the Environmental Protection Agency (EPA). The most recent emissions projections were published in April 2016 and are available at www.epa.ie.

The energy projections produced by SEAI present scenarios of Ireland's energy use to 2035 using information on the relationships between energy use, economic growth, energy prices, and energy policies – as embodied in past energy use trends. These relationships provide the basis for projecting how energy use may develop into the future following changes in fossil fuel prices, economic growth and energy policy. The projections are developed in collaboration with the ESRI and are based on the most recent set of macroeconomic projections for Ireland, as produced by the ESRI in December 2016 in a report titled *Ireland's Economic Outlook: Perspectives and Policy Challenges* and is available here.

Previously, the ESRI's HERMES model was used to project domestic economic activity which in turn depends on international factors captured in the NiGEM[64] model – including international oil prices. Key macroeconomic assumptions relate to GDP, GNP, personal consumption, housing completions, car stock, population and labour market participation. With the retirement of the HERMES model from the ESRI, the energy projection process is in transition. For this 2016 projections an interim module between the HERMES energy modelling module and the ESRI'S new macroeconomic model COSMO (Core Structural Model of the economy) was created.

Three projection scenarios were produced and are described as:

- The *Baseline* scenario includes all policy measures legislated for up to the end of the 2015 and represents a hypothetical worst case scenario in which no further policy actions or measures are taken post 2015. This provides a basis for comparison with other projections in which the expected additional effects of government policy are modelled. This scenario underpins the EPA's *With Measures* scenario.
- The *NEEAP and NREAP* scenario accounts for both the National Renewable Energy Action Plan *(NREAP)* and the National Energy Efficiency Action Plan *(NEEAP)*. The *NREAP* details a pathway for Ireland to meet the binding commitments of 16% Renewable Energy Share (RES) of national energy consumption and a 10% RES of road and rail transport consumption (RES-T) by 2020. The *NEEAP* outlines how Ireland will achieve 20% energy efficiency savings, calculated on the basis of the average energy demand from 2001 to 2005.
- In recognition that Ireland may not be on a path to meet the 2020 energy efficiency and renewable energy targets a *Current Trajectory* scenario was developed. In a change from previous years this scenario underpins the EPA's *With Additional Measures* scenario submitted in March 2017.

The methodology builds on a number of years' work previously undertaken in association with the Economic and Social Research Institute (ESRI).

The projections process took the following steps:

(i) The ESRI calibrates the HERMES energy sub-model adapted for the COSMO macroeconomic model outputs based on agreed input assumptions on fuel price and renewable energy capacity. The results produce demand projections for fuel and electricity based on the underlying historical statistical relationships between economic activity and energy consumption in main energy using sectors.

(ii) ESRI and UCC run an electricity dispatch model (PLEXOS) taking into account the SEAI adjusted demand and the input assumptions for the electricity sector and there is an iterative process where the COSMO demand projections are adjusted for the electricity price produced by the dispatch model.

(iii) SEAI adjusts the ESRI output to account for energy efficiency measures considered too recent to affect the historical statistical trend. This results in the *Baseline* scenario energy consumption which underpins the EPA *With Measures* scenario.

(iv) SEAI generates the *NEEAP and NREAP* to account for the impact of all energy efficiency measures outlined in the *NEEAP* and their anticipated energy savings, as well as Ireland's *NREAP*. The *NREAP* outlines how Ireland will meet the two binding targets specified in the EU Renewable Directive 28/EC/2009:

a. 16% of total energy consumption from renewable sources by 2020 (RES-16%)
b. 10% of consumption in the transport sector from renewable sources by 2020 (RES-10%)

(v) The *Current Trajectory* scenario was introduced in the 2016 projections in recognition that Ireland may not currently be on track to meet 2020 energy efficiency and renewable energy targets. The scenario is based on the recent growth rate of renewables and energy efficiency, as well as some policy and measures that are in the advanced planning stage and likely to have an impact between 2017 and 2020. This scenario underpins the EPA *With Additional Measures* scenario submitted to the European Commission in March 2017.

Annex B: Summary of model input assumptions by scenario

This annex provides a detailed description of the scenarios modelled and the assumptions underpinning the inputs chosen for those scenarios.

Baseline scenario

This is a worst case hypothetical scenario where the 2020 energy demand is modelled using the 2015 renewable energy contribution.

RES-E

- Wind (onshore and offshore) to remain at 2015 installed capacity of 2402 MW from 2015–2035.
- Solar PV to remain at 2015 installed capacity of 5 MW from 2015–2035.
- Moneypoint to remain as coal to 2035 – 285 MW x 3 units to remain as coal to 2035.
- Poolbeg waste to energy plant is included as 31 MW in 2017 and 62MW from 2018.
- These assumptions result in a RES-E share of 22.7% by 2020.

RES-T

- Overall renewable transport share of 3.2% (same as 2015), when double certificates are included RES-T = 5.5%.
- No additional EV consumption included in the analysis i.e. EVs are considered negligible.

RES-H

- RES-H a similar quantity of renewable heat as 2015 is assumed in all sectors from 2016 to 2035. This results in a RES-H share of 5.8% by 2020.

Energy Efficiency

- When compared to the end of 2015 no additional energy efficiency improvements applied.

Current Trajectory scenario

The *Current Trajectory* scenario recognises that energy efficiency improvements or rate of deployment of renewable energy technologies are not sufficient to reach the 2020 targets.

Most of the policy measures that can help achieve the 2020 targets are now in place, whereas for previous modelling exercises it was deemed that new policy measures would make up the gap to the targets. The assumptions underpinning the *Current Trajectory* scenario are based on the recent growth rates of renewables and energy efficiency, although in some cases an anticipated acceleration is included due to policy measures that are under development but are not yet impacting energy demand.

RES-E

- Wind (onshore and offshore) installed capacity grows by 300 MW per year to 3910 MW by 2020 and remains at 3910 to 2035.
- Solar PV increases to 2015 installed capacity of 5 MW from 2015 to 200 MW by 2020 and remains at 200 MW to 2035.
- Biomass CHP installed capacity grows from 25 MW in 2017 to 107 MW in 2020 (as per EirGrid Generation Capacity Statement).
- Wave installed capacity changes from 0 to 5 MW in 2020 and remains at that to 2035.
- Moneypoint changes to gas in 2025 (480 MW).
- Poolbeg waste to energy plant is included as 31 MW in 2017 and 62 MW from 2018.
- These assumptions result in a RES-E of 37.3% by 2020.

RES-T

- Overall renewable transport share of 4.56%, when double certificates are included RES-T = 8%.
- 10,000 EVs included.

RES-H

- Share of 9% achieved which includes some growth due to a Renewable Heat Incentive (RHI) scheme.

Energy efficiency

- Approximately 80% of the total *NEEAP* 2020 energy efficiency savings achieved.

Policies – *NEEAP and NREAP* scenario

The *NEEAP and NREAP* scenario assumes meeting all obligations referenced in the National Energy Efficiency Action Plan *(NEEAP)* and in the National Renewable Energy Action Plan *(NREAP)* by 2020.

RES-E

- Wind (onshore and offshore) installed capacity grows to 2020 in order to meet the 40% RES-E by 2020. No further growth in installed capacity post 2020.
- Solar PV increases to 2015 installed capacity of 5 MW from 2015 to 200 MW by 2020 and remains at 200MW to 2035.[65]
- Biomass CHP installed capacity grows from 25 MW in 2017 to 150 MW in 2020 (as per Government targets).
- Wave installed capacity changes from 0 to 10 MW in 2020 and remains at that to 2035.
- Moneypoint changes to gas in 2025 (480 MW).
- Poolbeg waste to energy plant is included as 31 MW in 2017 and 62 MW from 2018.
- The 40% RES-E by 2020 is achieved with these assumptions.

RES-T

- Overall renewable transport share of 5.43%, when double certificates are included RES-T = 10%.
- 50,000 EVs included.

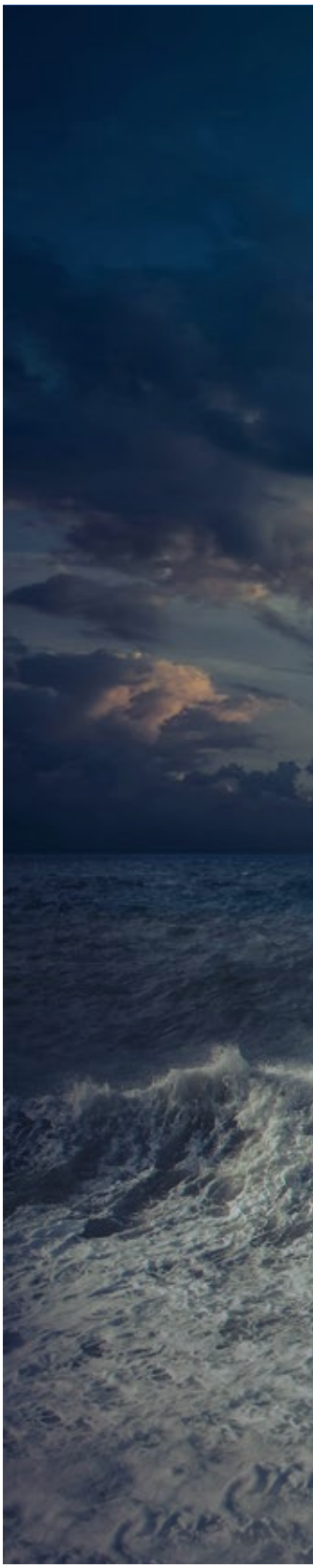
RES-H

- Same share as the 2020 target of 12% by 2020.

Energy efficiency

- 100% of the total *NEEAP* 2020 energy efficiency savings achieved.

65 As solar PV is included in the *Current Trajectory* scenario it is also included in the *NEEAP and NREAP* scenario. This does not pre-empt a policy decision on solar PV.



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