

Submission to the Initial Public Consultation: National Energy and Climate Plan 2021-2030

Report prepared by the Irish District Energy Association

November 2018

www.districtenergy.ie

info@districtenergy.ie

1 Introduction

The Irish District Energy Association (IrDEA) promotes the development of District Heating & Cooling in Ireland. Countries with similar climates, populations, and energy systems to Ireland have proven that district energy can deliver sustainable and cost-effective heating to urban areas with millions of people. However, there is currently a major shortage of knowledge, capacity, standards, and regulations in Ireland to facilitate the implementation of large-scale district energy networks. IrDEA's objective is to overcome these barriers, by informing key stakeholders in Ireland about all aspects of district energy.

Submission

Response to Specific Questions

Question 1: Taking into account the National Mitigation Plan, the National Development Plan 2018-2027 and Ireland's target under the Effort Sharing Regulation, what further measures to reduce non-ETS emissions do you believe Ireland should take?

While EU targets are a good way to concentrate climate change efforts across member states, Ireland's drive to decarbonise should not be led by EU targets alone; Ireland's overwhelming reliance on imported fossil fuels and related security of supply issues and cost to the economy should be a major driver to a low-carbon indigenously fuelled economy.

Ireland needs a Smart Energy System Plan, which incorporates and optimises the interaction between all three energy sectors of transport, electricity and heat. In Ireland, smart energy is too often thought of as the same as 'smart electricity', and bioenergy is too often thought of as the solution to low-carbon heat. Electricity and biofuels are of course key and valuable elements of the smart energy system, but the optimal least-cost and lowest-carbon utilisation of these energy sources, and all other available energy sources, can only be found through independent and thorough analysis of all possible interactions between the electricity, transport and heat sectors. Currently there are separate plans for the electricity sector and the transport sector, while there is no national level plan for the heating sector.

Building-based non-ETS emissions

The demand for space heating and hot water constitutes a large part of Ireland's energy demand, yet there is no overarching plan of how to reduce and replace fossil fuel based heating which we heavily rely on. SEAI's latest report on Ireland's progress the targets outlines that at least 300,000 homes will be required to install renewable heating solutions to meet 2020 targets; this is on top of energy efficiency improvements. This is the equivalent of installing renewable heating in every home in the Dublin City region and more. And this is only to meet Ireland's 2020 target, not the 2030 target.

One of the largest energy uses in the Ireland's towns and cities is demand for heat. Energy efficiency upgrades reduce this demand but only to a certain extent, and retrofitting to near-zero energy buildings is not feasible for most building owners and building uses. The high level of rental properties in cities like Dublin also creates barriers to investments in retrofitting efficient heating solutions. Implementing low-carbon heat solutions is a huge challenge as it requires changes to each individual building, unlike implementing low-carbon electrical generation, which can be produced anywhere at scale and delivered to each building through the network. District heating networks offer this solution for the heating sector in towns and cities; low-cost, low-carbon and renewable heat can be produced at scale and delivered to buildings through the network. In fact, zero-carbon heat is already being produced at scale in power generation and large industrial units across the country, and is thrown away as a by-product through exhaust stacks and water cooling systems. District heating needs to be considered as one of the potential ways to decarbonise the heating sector of towns and cities across Ireland, and form part of a national heat plan.

Question 3: How do you believe the contribution to be made from the individual sectors (i.e. electricity, heat and transport) should be determined? Please include your reasoning.

Finding the optimal individual contribution target is completely inter-dependent on the potential contributions of other energy sectors. Without an over-arching evidence-based smart energy system plan, which integrates all three sectors with energy efficiency, optimises synergies and defines a clear roadmap to 2030 targets, there is no effective way to set individual contributions from each energy sector. This plan requires independent modelling, reviewed by expert European peers, and with contribution and consultation with all relevant stakeholders and industry bodies in Ireland. With such a plan, the individual contributions can be defined and set easily. Contributions or targets should not be based on what is easiest to achieve.

Question 4: What policies and measures do you believe Ireland should adopt to achieve its renewable energy contribution and what are the grounds for your recommendations?

In order to achieve renewable energy contributions in the heating sector, Ireland needs to realise the positive contribution District Heating schemes can make to a large proportion of the country's heat demands located in towns and cities. The grounds for this recommendation is based on the evidence and experience of most other countries in Europe, and the positive correlation between countries with high levels of district heating and high levels of renewable heat supply. Studies have shown that Dublin has the heat demand densities to support the use of district heating, based on actual methodologies and metrics used by public sector energy planners in Denmark.

Question 5: Bearing in mind Ireland's current state of progress on energy efficiency, what contribution do you believe Ireland should make to the EU indicative energy efficiency target of 32.5% by 2030, and why?

Again, the evidence required to set the new EE target should come directly from A National Smart Energy System plan, as already outlined in response to previous questions.

Question 8: In terms of the areas of energy security identified in the template, are you satisfied with the resilience of Ireland's national and regional (with other Member States) energy systems and if not, what suggestions would you make for improvement?

IrDEA does not feel satisfied with the resilience of Ireland's national energy systems as they are currently vulnerable to factors that Ireland has little or no control over, namely:

- (1) Ireland's very high dependence on imported fossil fuels, and
- (2) Predicted risks of extreme weather events (more frequent and more intense storms, heat waves, cold snaps and flooding) associated with climate change identify the vulnerability of the national electrical transmission and distribution systems to the impacts of climate change. In October 2017 Storm Ophelia, which was the first storm to come from a southerly direction with damaging gusts of 120 to 150 km/h, caused extensive damage to power networks resulting in 385,000 homes and businesses being left without electricity across Ireland. In February-March 2018 the combination of the Beast from the East

and Storm Emma caused Met Eireann to issue its first Status Red warning for snow on record, with closure of all schools in the country, many business affected and water and power restrictions and outages.

In order to reinforce Ireland's resilience to these two vulnerability issues, the future development of smart local and community energy supply resources are identified as having significant untapped potential for increasing energy security. In urban regions there is untapped potential for roof-top solar PV for electricity and for heat recovery from industrial processes (e.g. electricity generation, waste incineration and data centres). In rural areas there is also much untapped potential for electricity from roof-top and farm solar PV, and for community wind farms, biomass energy systems, and biogas from farm waste.

This potential contribution to energy security from indigenous local energy supply resources is currently under developed. A more supportive national framework is recommended to be put in place, based upon more innovative concepts on how distribution networks (heat, electricity and gas) are configured, managed and regulated. Traditional systems for energy supply will not be fit for purpose for future energy systems.

Question 9: What policies and measures do you believe Ireland should adopt to achieve its energy security objectives and what are the grounds for your recommendations?

Utilise more of the already available indigenous energy sources, such as waste heat, which will reduce our dependence on imported fossil fuels.

Question 20: Are there any other comments or observations that you wish to make? Please include your reasoning.

District Heating needs to be included as part of the options appraisal for low-carbon solutions for the heat sector, as well as how it can contribute to lowering carbon in an overall smart energy system.

General Remarks

District heating infrastructure is an essential component for renewable heat, so it is essential that this technology is developed in Ireland in the coming decades. Excess heat can be used in the early stages and can be replaced with renewable heating over time, which has been demonstrated in many EU countries already.

Excess Heat Should be Included on the List of Technologies Support

A recent peer-reviewed scientific paper estimated that there is 102 PJ/year of excess heat in Ireland, which is a by-product of power plants, waste incineration, and industrial processes. In comparison, the total heat demand in all Irish buildings was calculated in the same paper as 117 PJ/year (see Figure 1) [1]. Therefore, **87% of the heat demand in buildings in Ireland is 'freely' available as a by-product from existing plants.** By replacing fossil fuels with this excess heat, fossil fuels are replaced with carbon-neutral heating, which is as important as renewable heating. Therefore, excess heat should also be included on the list of technologies considered under the RHI. If not, the scheme will likely support new renewable generation where there is already an enormous over production of sustainable heat. For example, there is enough excess heat in Dublin and Cork to supply all of the heat demands in the cities. Therefore, if this RHI scheme supports a new renewable heat facility in these areas, then it is effectively supporting a new renewable heat supply in a location that does not need it.

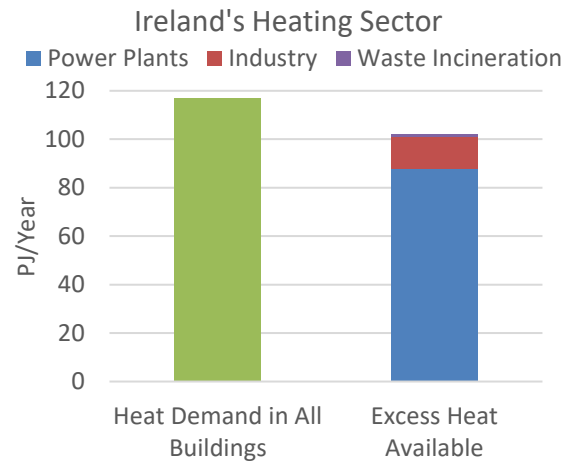


Figure 1: Excess Heat Compared to the Heat Demand in Buildings in Ireland for the year 2010 [1].

Recommendation: The scheme should support 'excess heat' at a level equivalent to the cost of developing a local district heating network in the area. The excess heat is already being produced, but the district heating network is required so this excess heat can reach the consumer and thereby replace fossil fuel boilers such as gas and oil.

The Flexibility & Maturity of District Heating Should be Valued

Flexibility for Heating: District heating is an enabling technology, since it connects central heat suppliers to individual heat consumers: similar to the electricity grid connecting power plants to individual homes. Since water is the delivery medium, district heating can use a wide variety of heat supplies including excess heat (which can come from power plants, waste incineration, and industry) and large-scale renewables such as solar thermal (see Figure 3), deep geothermal, heat pumps, and electric boilers. This makes district heating very FLEXIBLE i.e. it can use a variety of different heat supplies to meet the same heat demand. This will be essential as Ireland transitions towards more renewable energy. For example, Figure 2 shows how Denmark has varied the fuel supply to its district heating over the last 40 years. If individual solutions are implemented instead, then the **flexibility** of the heating sector will be reduced significantly. It is much easier and cheaper to change a central heat supply than changing the individual heat supply in every home. For example, biomass has increased a lot in recent years in Denmark's heat supply since the district heating plants are simply switching from coal to biomass (see Figure 2), while new forms of renewable energy are also being introduced such as large-scale solar thermal (see Figure 3). If individual solutions are implemented, then this change will take much longer and be more expensive, since each individual would need to make the change rather than just one central plant.

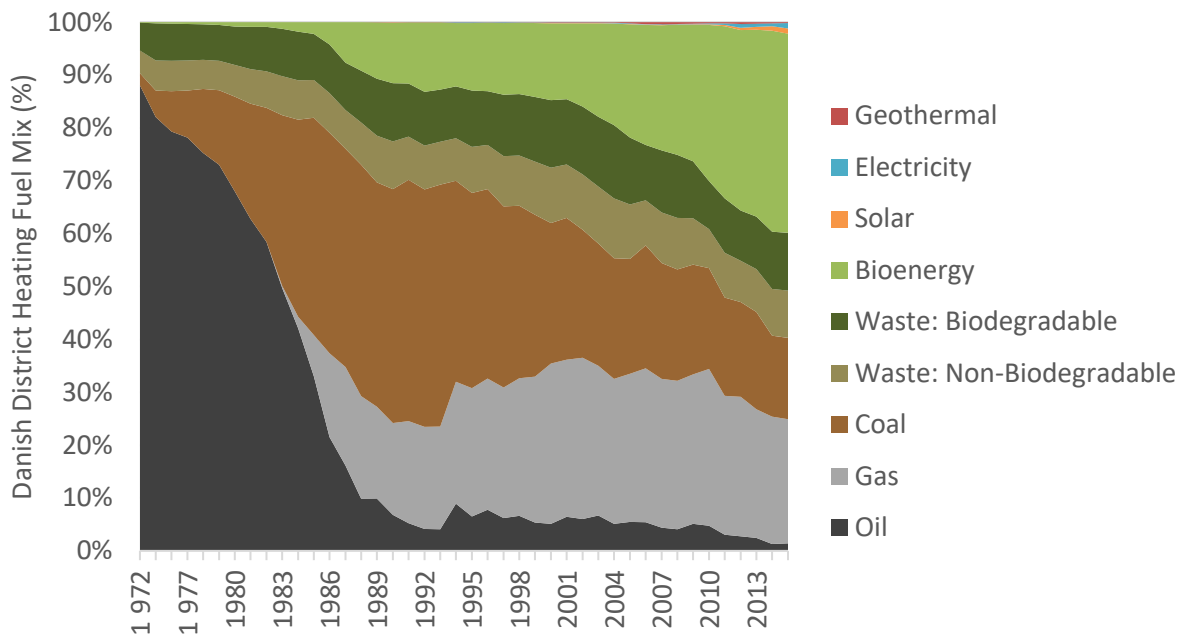


Figure 2: Fuel mix for Danish District Heating from 1972-2015 [2].

Flexibility for Electricity: District heating networks will not only facilitate more renewable heat, but they can also accommodate more renewable electricity. Thermal storage on a district heating system is approximately 100 times cheaper than electricity storage on the electric grid [3], which is why Denmark has over 50 GWh of thermal storage and Ireland has less than 2 GWh of electricity storage. When there is excess wind power in Denmark, then large-scale electric boilers and heat pumps are activated to produce heat on the district heating systems. If there is no demand for the heat at that specific time, then the heat is stored in the thermal storage facilities until a heat demand occurs. Wind power that would otherwise be curtailed is used to generate heat which can be stored for days if necessary in a thermal storage tank.

Recommendation: The consultation document suggests that district heating will not be supported explicitly and by doing so, **the scheme is overlooking these benefits that will be essential during the transition i.e. numerous supply options, that can be changed quickly, which are all currently available on the market, and which facilitate more renewable heat/electricity.** Renewable heating schemes in Ireland’s cities (Dublin, Cork, Galway, Limerick, and Waterford) should only be allowed if they deliver the heat to a building from a central heating system i.e. from a boiler/heat pump in the basement or via a district heating network. This will avoid a ‘lock-in’ to individual solutions which are developed inside each dwelling.



Figure 3: Solar thermal district heating plant in Silkeborg, Denmark [4].

DCCAE Should Look Beyond the UK for Guidance

DCCAE refer to the UK numerous times in the consultation document, but IDEA would like to see examples and best practices from other countries with higher renewable heating shares. Figure 4 below outlines the renewable heat penetration for all EU countries and as displayed, the UK has one of the lowest renewable heating shares in Europe, even lower than Ireland's, so it is prudent to look beyond the UK for best practice examples on renewable heating. Furthermore, almost all of the countries in Europe with a large renewable heat share have extensive district heating networks (see Figure 5), verifying the essential role that it plays during the decarbonisation of heat.

Recommendation: DCCAE should also look to countries like Denmark and Austria for guidance on renewable heating, who are similar in size to Ireland and have actually achieved relatively high renewable heat penetrations already (i.e. >35%).

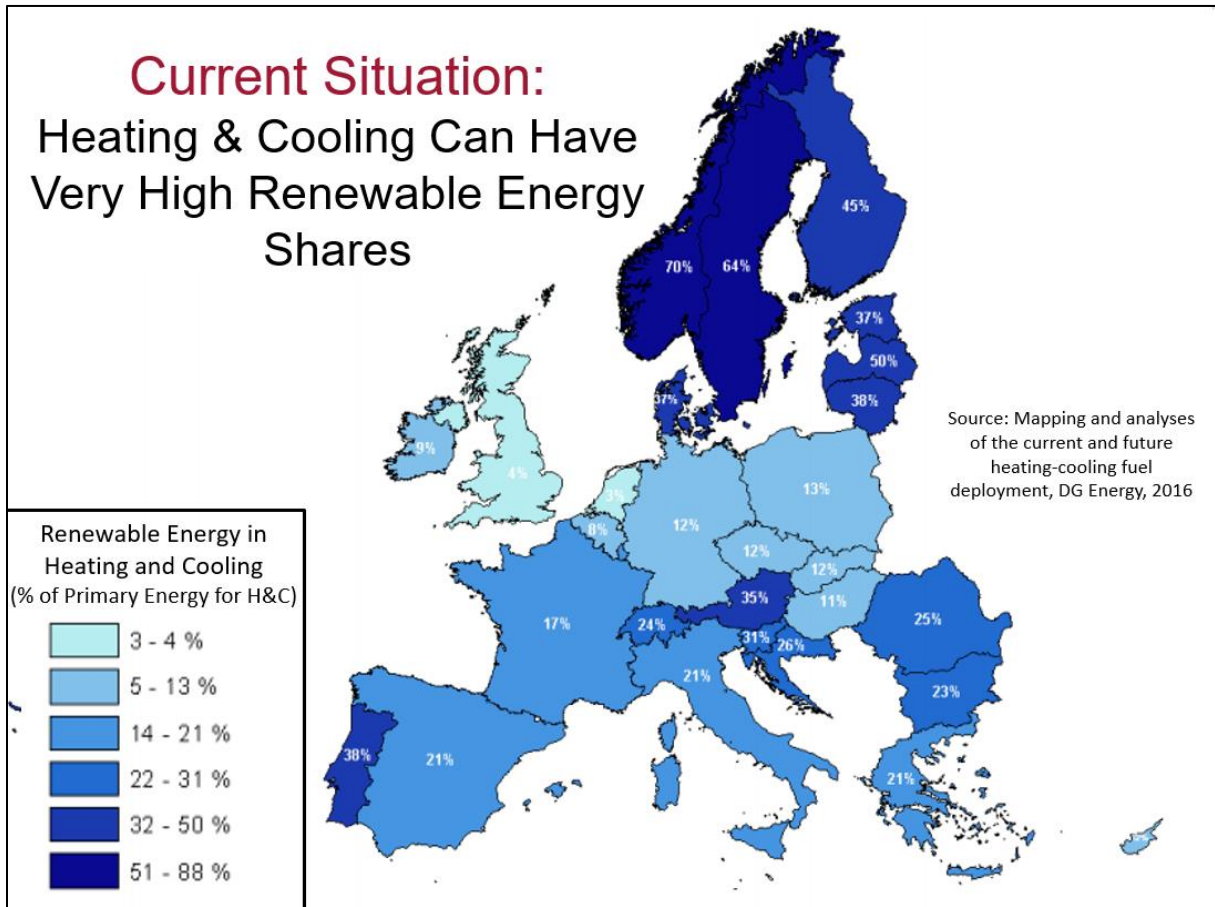


Figure 4: Renewable Energy in Heating and Cooling for Different EU Countries [5].

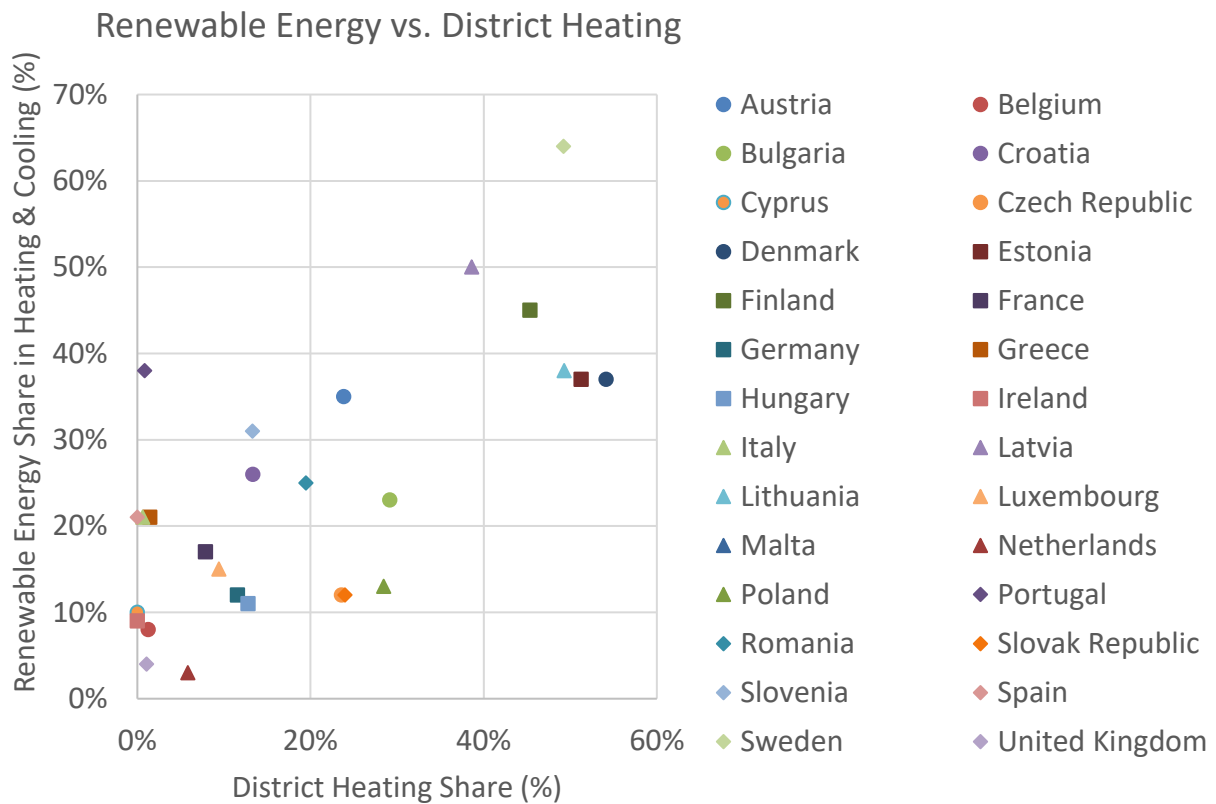


Figure 5: Share of renewable energy in heating & cooling compared to the share of district heating in different EU Member States [5], [6].

For further information, please contact Donna Gartland or David Connolly on: info@districtenergy.ie.

2 References

- [1] U. Persson, B. Möller, and S. Werner, “Heat Roadmap Europe: Identifying strategic heat synergy regions,” *Energy Policy*, vol. 74, no. C, pp. 663–681, Nov. 2014.
- [2] “Årlig Energistatistik 2015 (Annual energy statistics 2015),” 2016.
- [3] H. Lund, P. A. Østergaard, D. Connolly, I. Ridjan, B. V. Mathiesen, F. Hvelplund, J. Z. Thellufsen, and P. Sorknæs, “Energy Storage and Smart Energy Systems,” *Int. J. Sustain. Energy Plan. Manag.*, vol. 11, pp. 3–14, 2016.
- [4] SDH, “Silkeborg: Record-breaking solar district heating plant in operation,” 2017. [Online]. Available: <http://solar-district-heating.eu/NewsEvents/News/tabid/68/ArticleId/498/Silkeborg-Recordbreaking-solar-district-heating-plant-in-operation.aspx>. [Accessed: 25-Jan-2017].
- [5] T. Fleiter, J. Steinbach, and M. Ragwitz, “Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables),” 2016.
- [6] U. Persson and S. Werner, “STRATEGO WP2 Background Report 4: Quantifying the Heating and Cooling Demand in Europe,” 2015.
- [7] D. Connolly, H. Lund, and B. V. Mathiesen, “Smart Energy Europe: The technical and economic impact of one potential 100% renewable energy scenario for the European Union,” *Renew. Sustain. Energy Rev.*, vol. 60, pp. 1634–1653, 2016.