Submission to the Public Consultation on the Eastern & Midland Regional Assembly Draft Regional Spatial & Economic Strategy

Report prepared by the Irish District Energy Association

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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. We represent our members, who are;

- ESB
- Dublin City Council
- Veolia
- Ramboll
- Kaizen
- Optit
- Tipperary Energy Agency
- Codema – Dublins Energy Agency
- Trinity College Dublin
- Indaver
- Covanta
- Rehau
- Fichtner
- Isoplus

1.1 Context

IrDEA would like to thank the EMRA for the opportunity to comment and input into the development of the RSES. IrDEA's interest in the RSES stems from our work to develop the use of district heating in towns and cities to increase energy efficiency and reduce carbon emissions by utilising local low-carbon resources, and some of the most feasible areas for district heating development are found in the Eastern & Midland Region.

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 areas like Greater Dublin Area 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.

2 Submission

2.1 General Comments

IrDEA would like to congratulate the EMRA on the work that has been put into this strategy, and for recognising the important role of waste heat and district heating. It is very encouraging to see the policies included which specifically address district heating, which will be vital for the progression of the development of the industry in the Eastern & Midland Region.

IrDEA are working with a European partner to develop a Heat Atlas for Ireland, which will create an evidence base for the EMRA to utilise for planning for district heating schemes, showing areas that are most suitable for implementation. This map will be available soon, and will be launched at the IrDEA District Heating conference on the 12th of April.

2.2 Chapter 7 Environment

'Support transition to a low carbon, circular & climate resilient Region' p.133:

This section highlights the role and importance of transport, electricity and bioenergy, but fails to mention heat. This is particularly important as heat is one of the largest energy sectors in urban areas within the Region, it is almost fully reliant of fossil fuel, and utilising 'waste heat' is a key part of the circular economy. The Region has some of the best waste (industrial/power generation) and renewable (geothermal) heat resources in the country, which are lower carbon and cheaper than bioenergy production.

'Decarbonising Electricity Generation' p.135:

This section headline is *Electricity Generation* but includes many references to and paragraphs on the heating sector. The title of this section therefore needs to be changed to *Decarbonising the Energy Sector* or *Decarbonising Electricity and Heat*.

There are some typos in the paragraphs on District Heating and Waste Heat; *"energy from waste"* should be changed to "industrial waste heat"; *"renewable energy solutions"* should change to "renewable and low-carbon energy solutions"; *"Sources of waste heat include data centres"* should change to "…include data centres, thermal power production and many large manufacturing facilities such as bakeries and cement production".

"In response the draft Strategy seeks to support the micro-generation and storage of heat and energy"- District heating is not micro-generation and is not only about the storage of heat. A better way to phrase this might be: "In response the draft Strategy seeks to support the use of District Heating systems to recycle and reuse waste heat resources in the Region".

Regional Policy Objectives: Decarbonising Electricity Generation p.136:

Again, the title of this section needs to change to reflect the policies unrelated to or not restricted to electricity, that are outlined in this section.

We particularly welcome the inclusion of progressive and best practice policies RPO 7.34 and 7.37 which will greatly support the roll-out of sustainable energy planning practices in the Region.

'Regional Policy Objectives: Energy' Infrastructure p.181:

Although this section is called 'Energy Infrastructure', it only outlines policies for electricity infrastructure. Other energy infrastructure policies should also be considered here, including supporting the roll-out of essential district heating networks to facilitate the use of low-carbon heat resources in the Region which increases energy security and resilience.

3 General Information for EMRA on District Heating

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

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

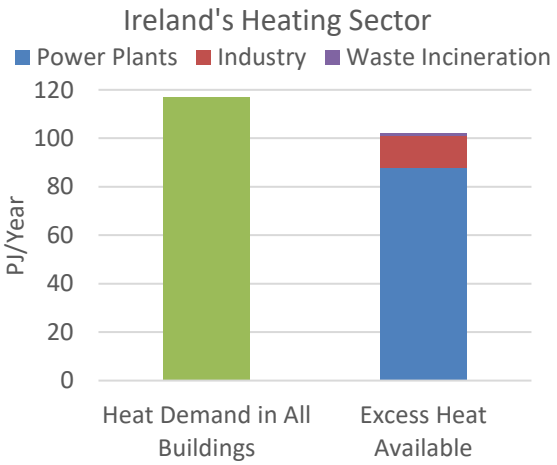

Figure 1: Excess Heat Compared to the Heat Demand in Buildings in Ireland for the year 2010 [1].

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.

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.

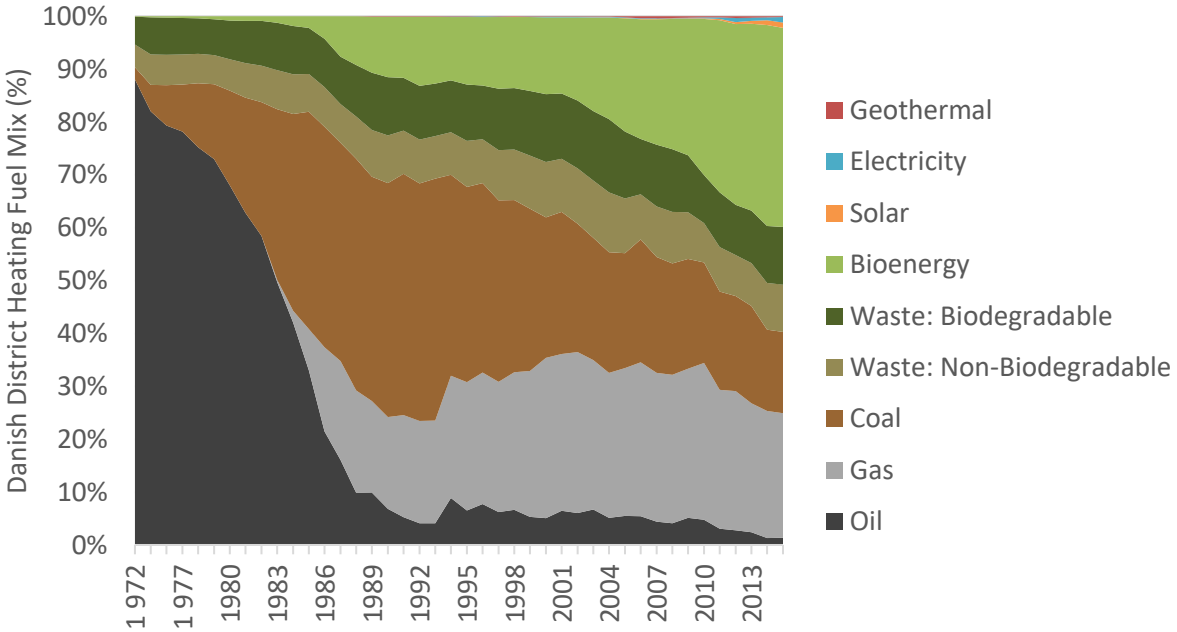

Figure 2: Fuel mix for Danish District Heating from 1972-2015 [2].

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.

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

Following International Best Practice

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.

Ireland 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%).

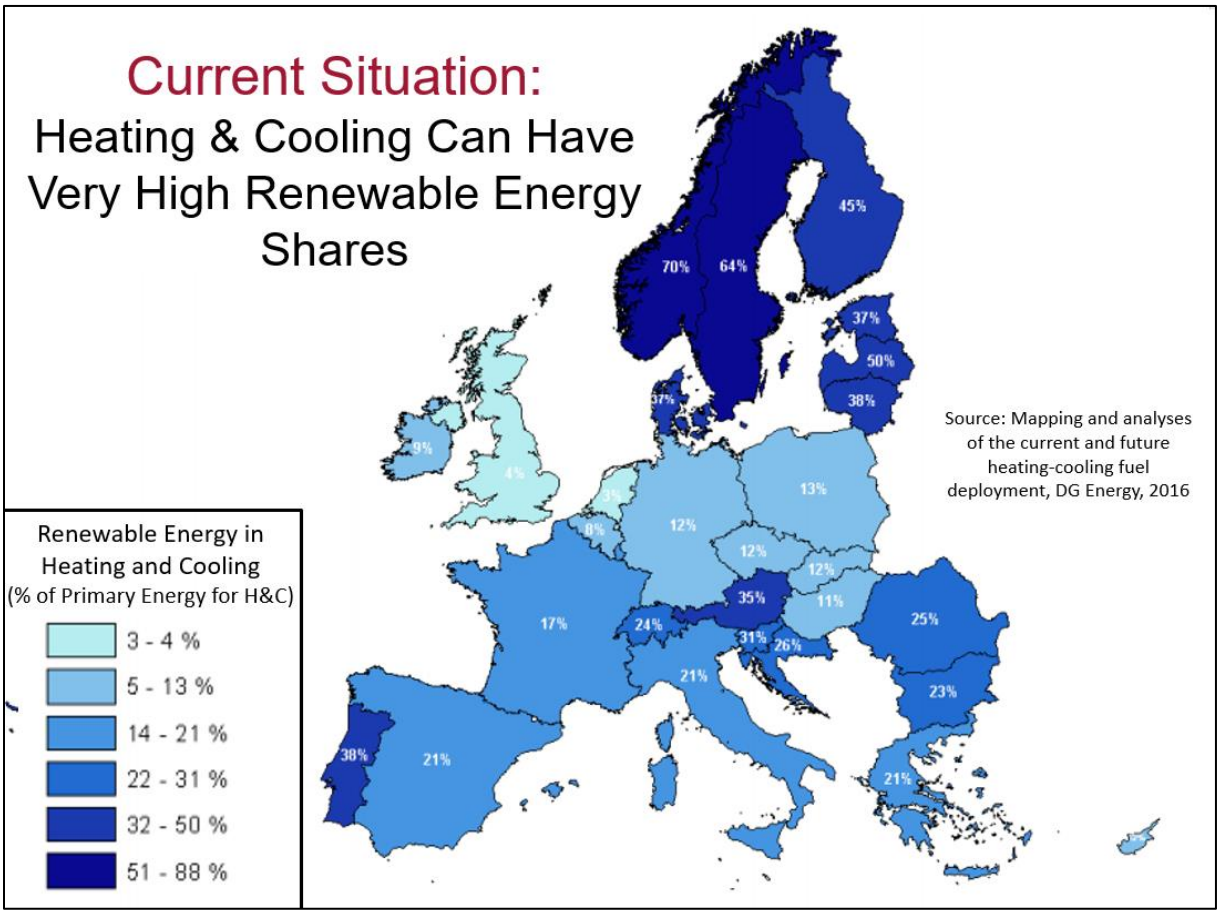

Figure 4: Renewable Energy in Heating and Cooling for Different EU Countries [5].

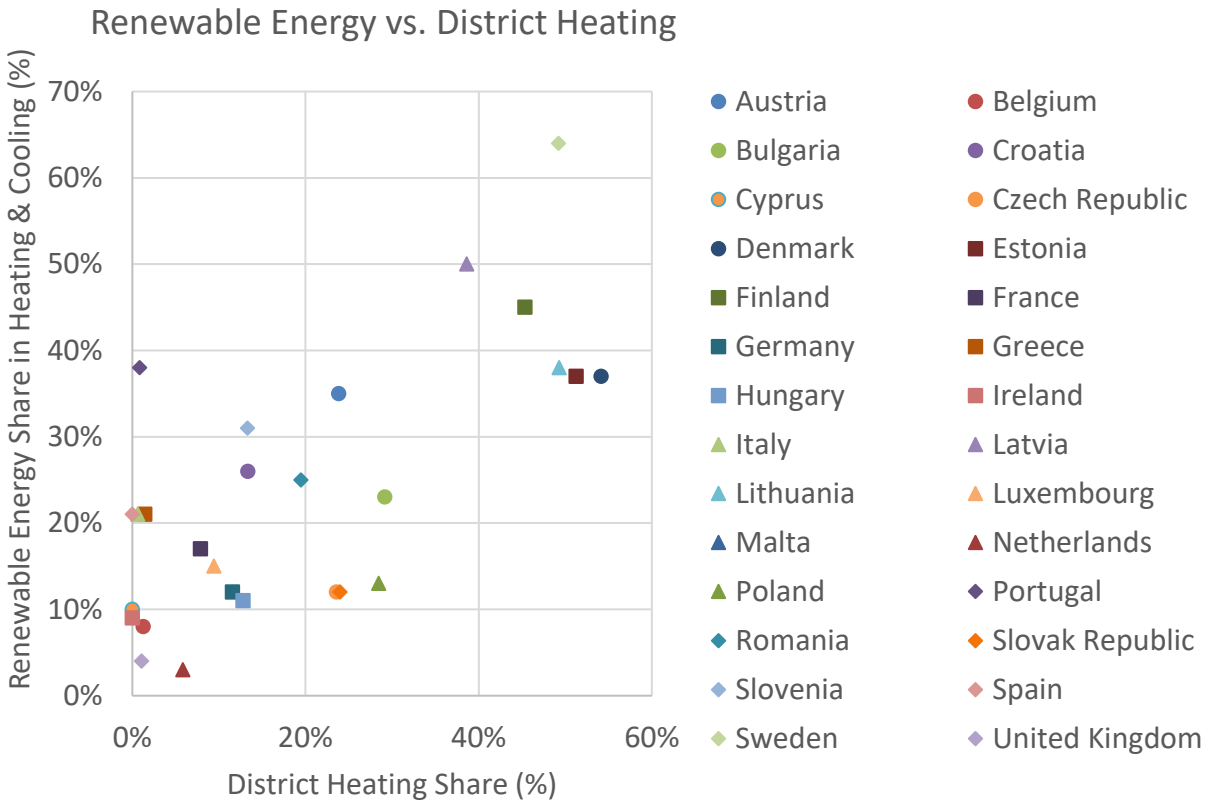

Figure 5: Share of renewable energy in heating & cooling compared to the share of district heating in different EU Member States [5], [6].

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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.