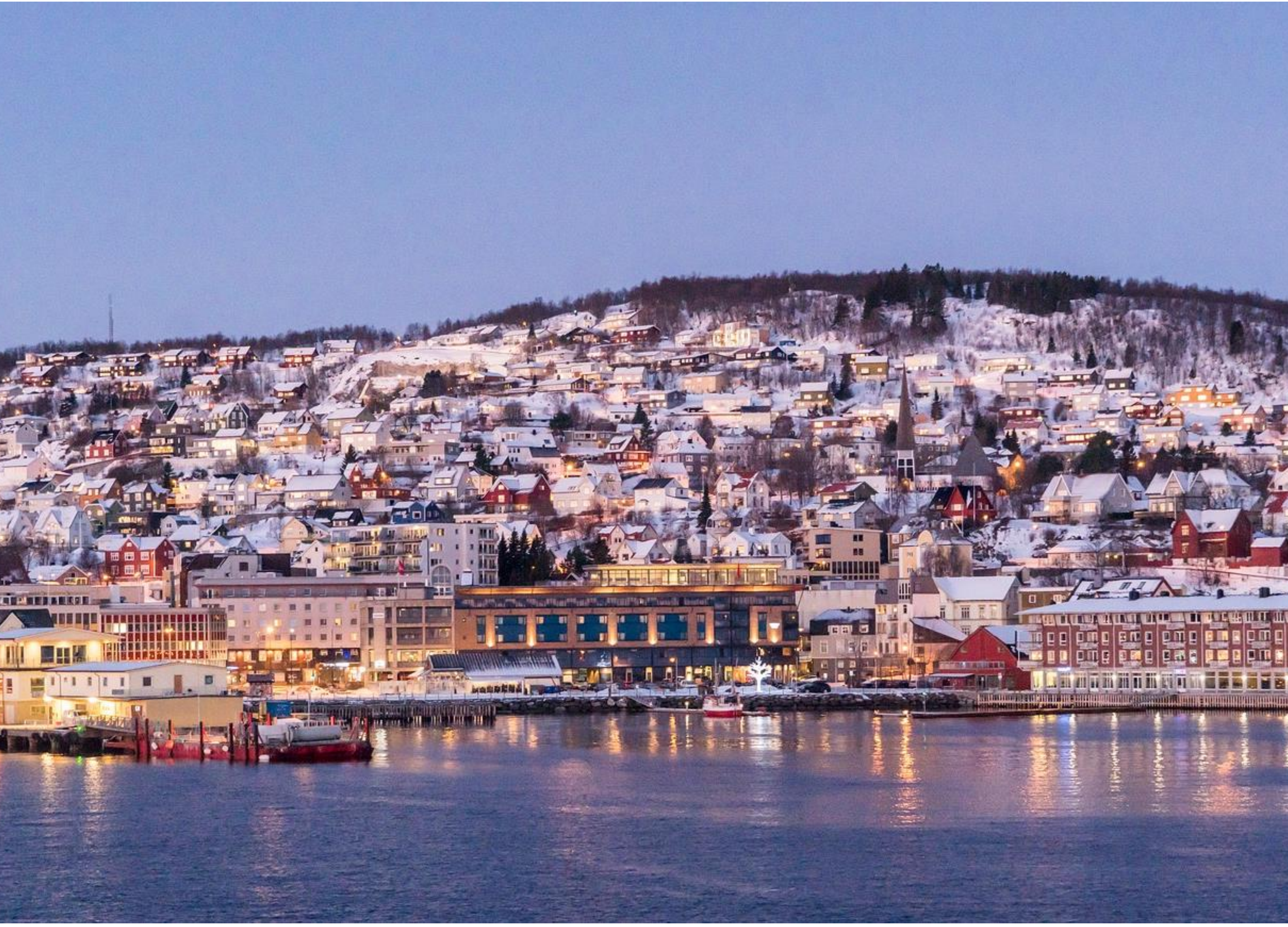


WHITEHELM ADVISERS

APRIL 2019

# FEATURE ARTICLE:
# THE EUROPEAN HEAT SECTOR – CHALLENGES AND OPPORTUNITIES IN A HOT MARKET

# Introduction

The drive to find sustainable, energy efficient solutions to the world's decarbonisation challenge is underway across the globe. At present, half of the primary energy used in the EU is utilised in the heating and cooling sector, with 75% of that energy coming from fossil fuels and only 18% from renewable energy,[1] much of it used inefficiently. The heating sector therefore presents a significant opportunity for carbon emissions reduction. Fortunately, there are already solutions available and the technology to move to more efficient decentralised heating systems powered from renewable energy sources already exists.

The decarbonisation of the heating and cooling sector can be addressed in a number of ways, primarily:

1. an increase in the use of renewable energy for heating;
2. decentralisation of the heating sector to move away from electricity and gas networks, which are fossil fuel dependent; and
3. increasing the efficiency of the heating and cooling sector by improving building insulation, replacing old and inefficient appliances, utilising waste heat from industry, and utilising Smart City applications such as smart meters and smart grids to improve energy efficiency.

Decentralised heating can be a large part of this solution by utilising district heating networks and renewable energy sources. In addition, decentralisation of the sector will increase energy security as it will reduce the reliance on imported gas. At present, the European Commission estimates that heating and cooling uses nearly 80% of total gas demand, equivalent to 90% of gas imports.[2]

As well as decentralising the heat sector, improved energy efficiency will be an essential part of the solution. At present it is estimated that 75% of Europe's buildings are using heating inefficiently, and the European Commission estimates that proper insulation alone reduces a building's heating needs by up to 70%.[2]

This article will explore heating and cooling as a key part of the world's decarbonisation challenge, with a focus on decentralised heat as a solution, along with the challenges and opportunities presented by this strategy.

1. https://setis.ec.europa.eu/setis-reports/setis-magazine/low-carbon-heating-cooling/eu-strategy-heating-and-cooling

2.https://ec.europa.eu/energy/sites/ener/files/DG_Energy_Infographic_heatingandcolling2016.jpg

## The Heating and Cooling sector have a great impact on Climate Change

Climate change is increasing demand for energy for heating and cooling, and where most of that energy demand is met by fossil fuels, a vicious circle results.

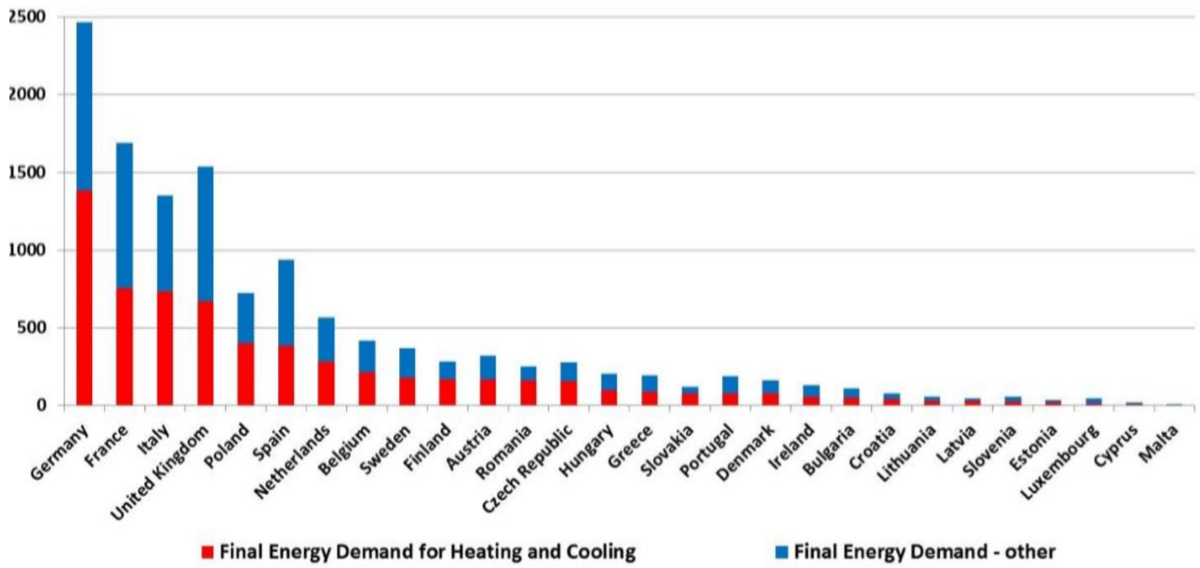
The chart below shows that in most countries, heating and cooling represent approximately 50% of total energy demand. Germany has the highest total energy demands, but its heating and cooling energy demand is also proportionally one of the largest.

The desire to keep homes and buildings at comfortable temperatures, both in winter and summer, has resulted in the development of different technologies that require large amounts of energy. There has arguably been a sociological shift whereby people are more prone to change the temperature of a room than to modify their behaviour by changing clothes or increasing activity. Technological advances have also made this easier, with adjustments to the temperature of a room possible even remotely before entering the home.

At the same time, climate change is increasing the incidence of extreme weather events, including cold snaps and heat waves, where heating and cooling are relied upon to an even greater extent.

Higher energy demand combined with extreme weather events results in peaks in demand that can then also place greater stress on energy grids.

Chart 1: Final Energy demand by EU country, 2015




*Source: The Oxford Institute for Energy Studies.*

## Heating and Cooling are Delivered Predominantly by Fossil Fuels

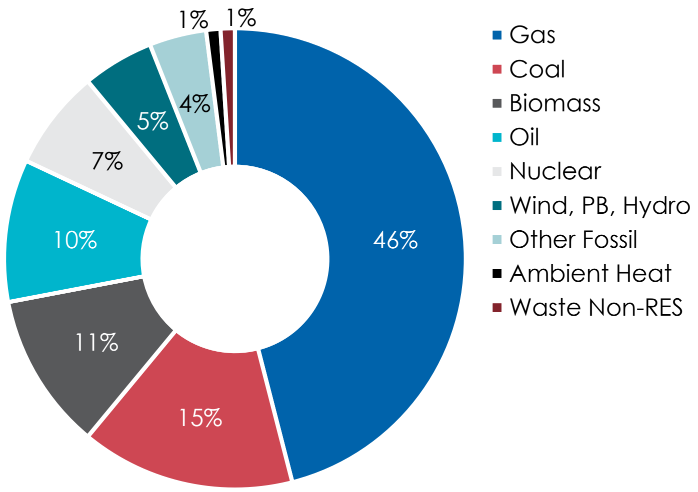
Not only are heating and cooling the largest source of energy demand in the European Union, but the technologies used to deliver these products are highly inefficient and primarily fossil fuel-based. Buildings are also often energy inefficient through poor insulation and compartmentalised heating and cooling systems.

As such, heating and cooling contribute a large proportion of total greenhouse gas emissions and therefore have a significant impact on climate change. Chart 2 represents the final energy demand for heating and cooling by fuel source in the EU.

Oil, gas and coal on their own represent 66% of the total energy sources used for heating and cooling. Additionally, other sources are also predominantly powered by fossil fuels, such as district heating, which is mainly powered by gas and electricity. This leaves the heating and cooling demand met by renewable energy at only 19% of total use.

In order to deliver a successful strategy to reduce the emission of greenhouse gases, traditional heating and cooling technologies must be replaced by cleaner and more efficient technologies.

**Chart 2: Primary Energy for Heating and Cooling Per Energy Carrier in the EU**




*Source: European Commission (2016b), p.81.*

## Heating and Cooling Energy Sources

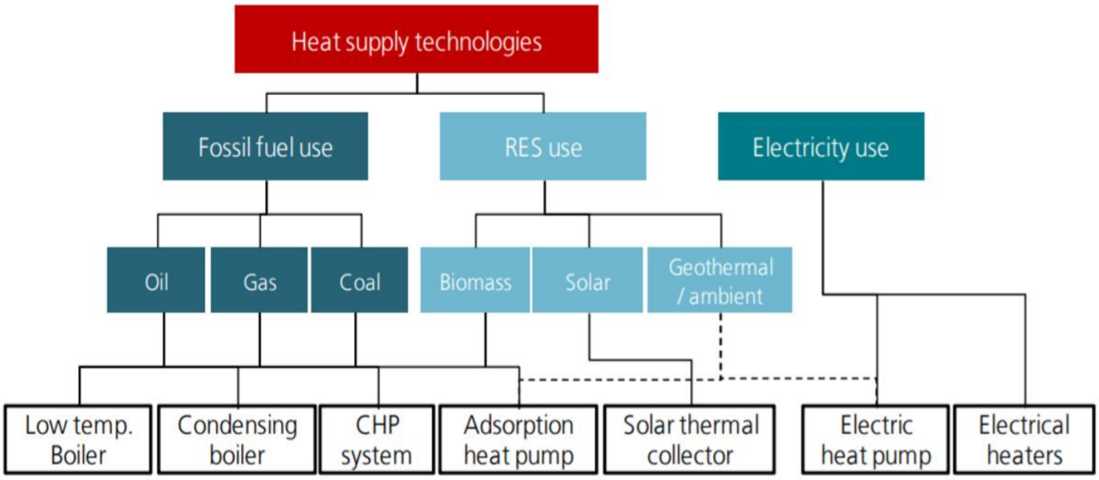
Generation of thermal energy can be delivered by a wide range of technologies. They vary from large scale, centralised generators such as power plants, combined heat and power (CHP) units or large thermal generation units, to large boilers in industrial sites or small decentralised appliances such as boilers, heat pumps or micro CHPs. Cooling can be delivered in a similar way with large chillers or heat pumps used on industrial sites, but also with smaller decentralised units such as residential air-conditioning. The installed capacity of these units may vary from several hundred megawatts to one kilowatt.

Chart 3 represents the different technologies available and the energy sources linked to them.

Boilers and CHPs fired by fossil fuels are used for the vast majority of thermal generation, while renewable energy sources still represent a low proportion of the mix.

Technology in the sector continues to develop, efforts particularly focused on improving efficiency of all forms of energy generation. For example, district heating systems can provide a form of energy storage that can be utilised when energy demand peaks. Similarly, energy storage that will allow renewable energy such as solar power to be captured during daylight hours and provide heating in colder parts of the day is being developed.

Chart 3: Main options to generate heating in buildings by fuel and operating system




*Source: European Commission (2016c).*

## Policy Objectives

Government policy has a large role to play in the decarbonisation and energy efficiency challenges of the heating sector. The EU needs to make significant changes if it is to meet the EU 2030 energy and climate change goals and fulfil its commitments under the Paris Agreement.

The key EU targets for 2030 are:

- at least a 40% cut in greenhouse gas emissions compared with 1990;
- at least 32% of total energy consumption to be from renewable energy; and
- at least a 32.5% increase in energy efficiency.[3]

These targets will require significant changes across all sectors of the economy, but given the particularly large proportion of energy use and carbon emissions coming from the heating and cooling sector, the role this sector has to play in meeting these targets is greater.

In order to reduce the impact of heating and cooling on climate change, the European Union has developed a range of policies to increase the energy efficiency of homes and buildings, but also to increase the efficiency of the generation of thermal energy and to reduce the use of heavy fossil fuels like coal or oil.

The European Union supports heating and cooling research and innovation programmes. A total of around €166 million of EU funding is allocated to research, demonstration and market uptake of energy efficient, low carbon and renewable heating and cooling.[4]

3. https://ec.europa.eu/clima/policies/strategies/2030_en

4. "Overview of support activities and projects of the European Union on energy efficiency and renewable energy in the heating and cooling sector".

## Innovation: A Key Enabler

The proliferation of renewable energy has been possible due to the combination of government support through subsidies (especially in earlier stages of development), development of the technology itself by making energy transformation process more efficient, and the economies of scale that result from a wider penetration of these technologies. These three factors have resulted in significant price reductions, such that grid parity has now occurred for a number of technologies, as well as creating a thriving renewables market which continues to innovate with improved or new renewable technologies.

Energy efficiency is the other innovation element that will be key in helping the EU meet its 2030 targets. There are two main components to improved energy efficiency. Firstly, the use of technologies able to produce energy in more energy-efficient ways, reduces the fuel requirements of combustion engines used in transport and industrial processes. Secondly, the development of technology that reduces energy loss, such as buildings that use more energy-efficient materials and design.

Within the heating sector, the key areas of inefficiency to be targeted are:

- improved insulation for buildings to prevent heat loss;
- utilisation of waste heat from industrial processes, or greater use of CHP plants;
- replacing inefficient heating appliances such as old boilers and water heaters; and
- using new technology such as smart meters and smart grids to improve supply and demand efficiencies in energy and heat networks.

## Renewable Energy

As discussed above, the EU has set targets for renewable energy as a proportion of total energy consumption, which has driven EU countries to design their own tailored renewable energy frameworks to encourage investment for the particular energy market of that country. Typical systems have included Feed-in-Tariffs (FiT) or Feed-in-Premiums (FiP), renewable energy certificates or guaranteed returns for renewable projects. For example, the FiT regime in France provides 15 years of a fixed electricity tariff for eligible renewable projects, while the Electricity Certificate system in Sweden and Norway awards certificates to renewable energy producers for every megawatt of renewable energy produced, which can then be sold in the market.

Countries are also developing regulation to encourage a move away from fossil fuels. For example, the Netherlands is currently planning to ban natural gas as an energy source for any new residential heating systems, with the goal of banning natural gas in all residential buildings by 2050. This is a significant move, given 89% of Dutch homes are currently heated with natural gas.

## Regulation

There are four main areas in which the EU and its member states are acting through regulation:

- the EU Emissions Trading System;
- renewable energy generation;
- reducing energy consumption; and
- reducing CO2 in the transportation sector.

The EU Emissions Trading System (EU ETS) is a cornerstone of the EU's policy for emissions reduction. It is the world's largest carbon market and covers 45% of the EU's greenhouse emissions. Smaller producers, such as waste-to-energy plants, are subject to national regulation. For instance, Norwegian waste-to-energy plants that supply energy to residential consumers are exempt from buying allowances.

In 2020, emissions from sectors covered by the ETS are forecast to be 21% lower than in 2005 and 43% lower by 2030.

### Reduction of Energy Consumption

Developing and upgrading low energy efficiency buildings and industries is a key priority for the European Union. The heating sector is currently incredibly inefficient; for example, the EU estimates that waste heat alone could cover 100% of the heating needs of Europe's buildings.

Regulation has been implemented both at the EU level and by member countries, as well as programmes designed to incentivise improvements in the sector. At EU level, the target is for new buildings to have nearly zero emissions by 2020 with all buildings to have zero emissions by 2050. Similarly, the EU has targets for the proportion of renewables in heating and cooling under the Clean Energy Package.

These targets are then being implemented through regulation. For example, the Energy Performance of Buildings Directive (EPBD) requires certain energy efficiency ratings for all new buildings and provides requirements for long-term renovation strategies for existing buildings.

ELENA is an EIB and European Commission project which provides grants for the implementation of energy efficiency, distributed renewable energy and urban transport programmes. To date ELENA has funded projects including extending or building new district heating networks, as well as energy refurbishment of residential buildings, among many others. The EIB has recently announced an additional EUR 97million of funding for ELENA to support energy efficiency in residential buildings.

### Reduce CO2 from Transportation

Emissions from transport in the EU represents almost 25% of total emissions and are 21% higher than in 1990. Transport is the only major sector where greenhouse gas emissions are still rising.

The EU is acting on several fronts, including:

- having EU legislation binding emission targets for new car and van fleets;
- for heavy-duty vehicles, the European Commission backed a law in October 2018 to cut heavy-duty vehicles' CO2 emissions by 35% (compared to 2019) by 2030;
- increasing efficiency of transport systems using digital technologies and smart pricing;
- hastening deployment of low-emission alternative energy for transport, such as advanced biofuels, electricity and hydrogen;
- CO2 labelling of cars, including a label showing a car's fuel efficiency and CO2 emissions; and
- moving towards zero-emission vehicles and low emission vehicles.

# How Decentralised Heat Can Address Decarbonisation

Decentralised heat can be defined as heat generated close to the end-user, and can include demand side management, thus reducing reliance on the electricity or gas networks. For example, one of the most common forms of decentralised heating is district heating fuelled by heat plants, which can use a variety of different generation technology. In 2012, district heating represented 606.3 TWh or 87% of the total derived heat[5] in the EU, which according to the European Commission was mainly used in the residential sector (45%).[6]

However, most district heating facilities currently utilise fossil fuels rather than renewable energy sources. Although usage of fossil fuels is declining, as shown in Chart 4, it still constitutes the majority of derived heat production in the EU. Energy for district heating is mostly derived from natural gas (35%), coal (32%), and biomass (16%).[6]

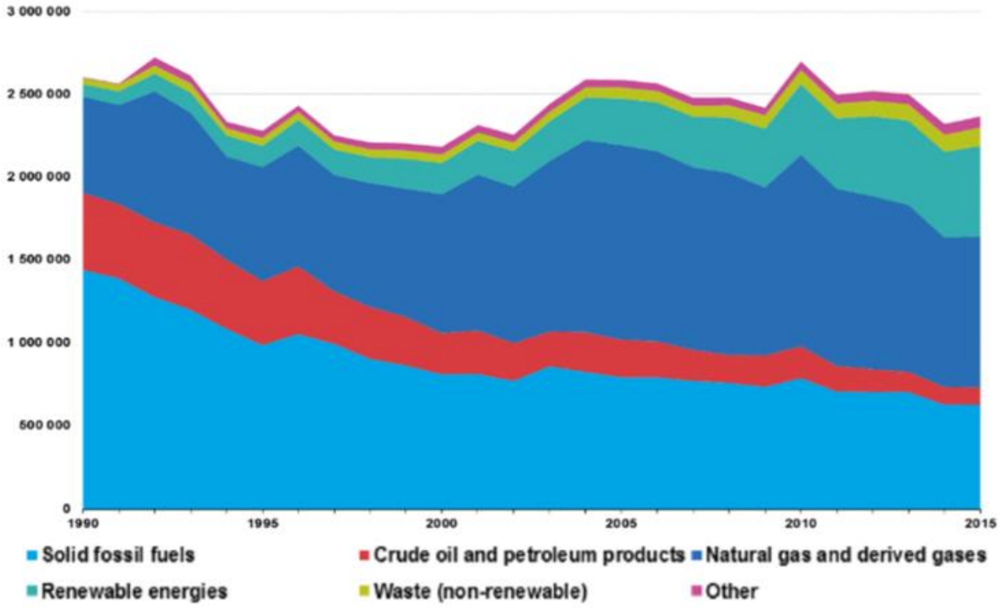
District heating can be a key part of the decarbonisation challenge, as it is suitable to be fuelled by a range of renewable energy sources, including waste-to-energy, and more efficient fossil fuel options. For example, district heating can utilise biomass, geothermal heat, solar heat and storage, waste-to-energy, and waste heat from nuclear power generation or industrial processes. Increasing the use of these less carbon-intensive technologies such as biomass, waste-to-energy boilers, or heat pumps will be a key factor in decarbonising the heating sector.

Energy-from-waste as the energy source for district heating is a particularly attractive solution given that it is readily available technology, economically viable, a renewable energy source, and also utilises waste products that would otherwise be going to landfill, thus tackling a further environmental issue.

5. Derived heat is defined as the portion of heating or cooling that is sold on the market from CHP's or heat plants.

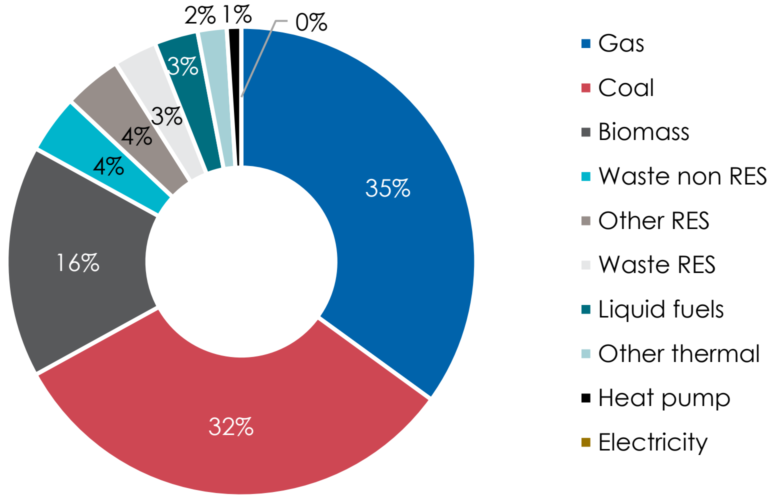
6. European Commission 2th June 2016: A European agenda for the collaborative economy.

Chart 4: Gross Derived Heat Production By Fuel in the EU




*Source: Eurostat.*

Chart 5: Fuel mix for district heating sales in the EU (2012)




*Source: European Commission (2016b), p.122.*

As of 2012, fossil fuels made up two-thirds of the fuel used for district heating in the European Union as shown in Chart 5.

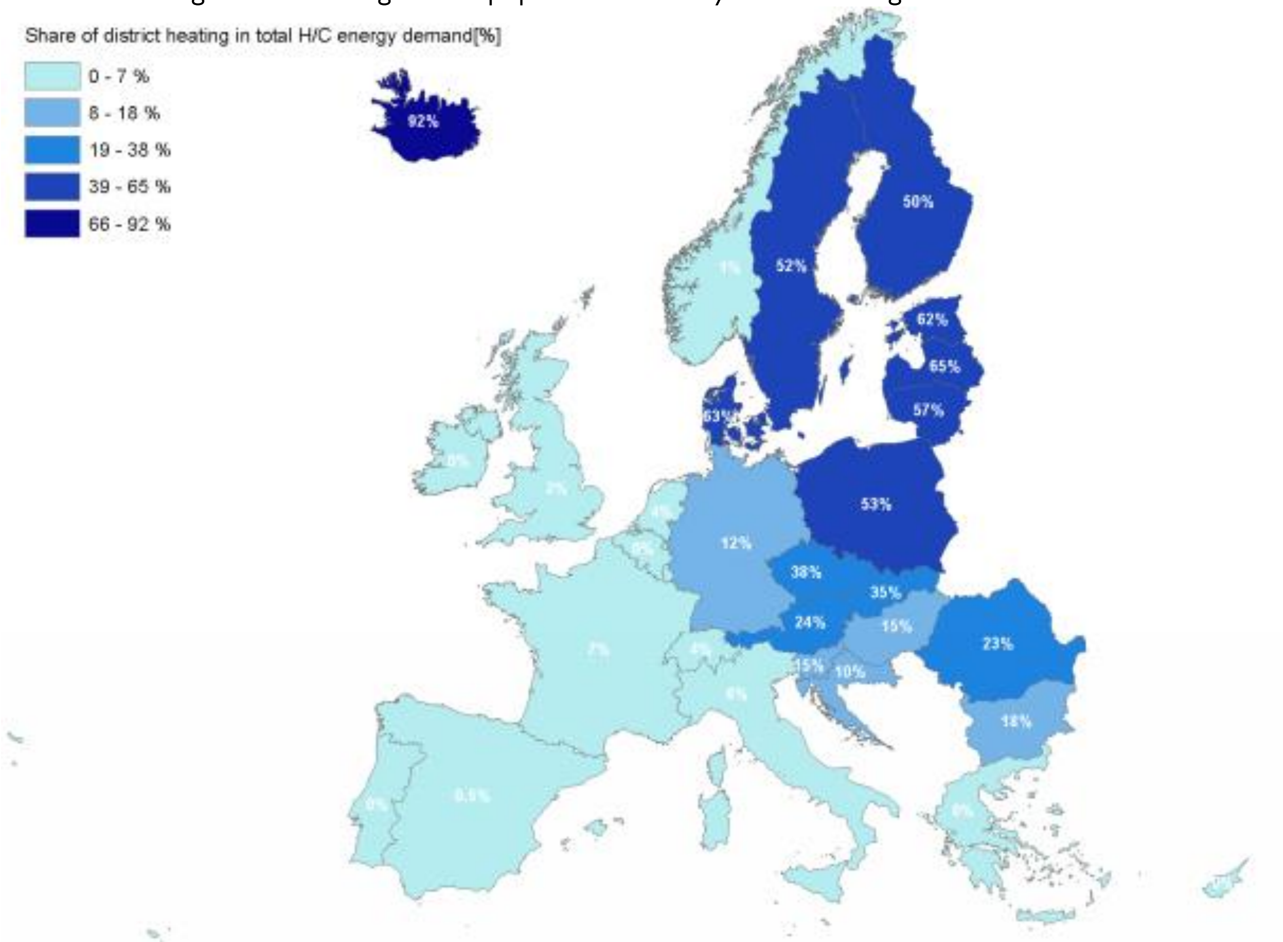
There are large differences in the take-up of district heating across each European country, as shown in Figure 1. All EU Member States have adopted renewable energy targets for heating and cooling in their National Renewable Energy Action Plans, but the extent to which this has been supported by further regulation and incentives varies greatly from country to country. The energy supply for district heating differs greatly between countries. Poland (74%), Czechia (71%), and Germany (40%) all utilise a high degree of coal production as fuel for their district heating systems, while Sweden (49%), Austria (41%), and Estonia (35%) utilise a high degree of biomass. The example of Norway, where district heating is currently a small part of the market but growing rapidly, is discussed below.

District heating is well established in Scandinavia, the Baltics, and some Eastern European countries. In these countries, district heating is viewed as offering attractive economic prospects for companies and consumers and as a vehicle for decarbonisation.[7] New efforts and policies aim to modernise, expand, and develop district heating networks as a way of increasing energy efficiency and deploying more renewable energy while keeping heating prices affordable.

On the other hand, in some Central and Eastern European countries such as Romania, Bulgaria, Slovakia, and Poland, the situation is the opposite. Although a significant portion of the population is served by district heating, the number of district heating systems have been reduced. Many of the district heating facilities are old and struggling, with pipes bursting and general operational issues due to the lack of investment. Old legacy systems are shrinking or being shut down due to the lack of investment or unfavourable price regulation according to the European Commission.[7] Insufficient capex investment and maintenance has led to poor district heating performance and a negative consumer perception.

Some Central and Eastern European countries are due to have an increase in district heating production from the use of renewable energy with the support of €6 billion from the European Structural and Investment Funds, which has been allocated to renewable energy over 2014 to 2020.[7]

Figure 1: Percentage of the population served by district heating in 2013



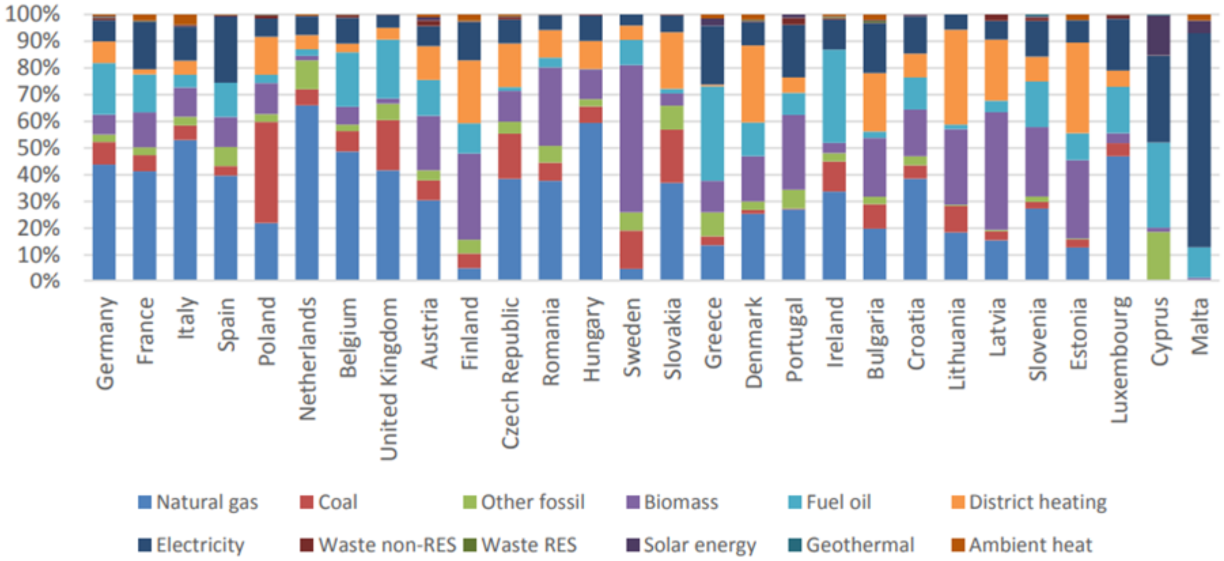

*Source: European Commission: Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment .*

7. European Commission 2016 Part 1 of 2, 16th February 2016: EU Strategy for Heating and Cooling

As evident from Chart 6, there are a still many countries in the EU that rely on non-renewable energy sources as fuel for heating and cooling.

The European Structural and Investment Funds aims to lower the heating sectors dependency on fossil fuel.

Chart 6: Final energy demand for heating and cooling in the EU by country in 2012




*Source: European Commission, An EU Strategy on heating and Cooling, 2016.*

## Case Study: Norway

With a dominant hydro-power system, district heating is currently a minor part of the Norwegian energy supply, but it is considered an important backup for the power system in larger cities. Production in district heating facilities can rapidly be increased or decreased to balance out the growing share of intermittent power production technologies such as wind and solar. The importance of having flexibility in power supply is crucial for a well-functioning power system.

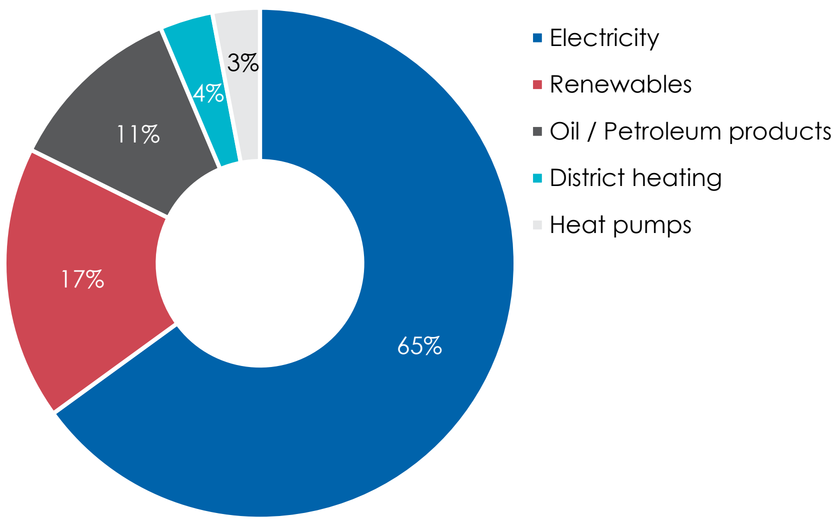
This is especially true for a country such as Norway, where the power supply relies heavily on hydro power that can be affected by abnormal weather conditions, such as low water inflow from warm summers or cold winters.[8] For example, Norway experienced a sharp increase in energy prices in the summer of 2018. This was due to an extremely warm winter, which led to historically low levels in reservoirs, reducing the availability of hydroelectricity. District heating helped balance the power supply during this period and reduced the need to rely on fossil fuel-fired peaking plants.

Additionally, the Norwegian government banned landfill of biodegradable waste in July 2009, which helped fuel the waste-to-energy sector in the country. Coupling waste-to-energy with district heating is an efficient way of decarbonising the country's power supply, while at the same time addressing the need for an alternative to landfill. While currently only a small share of Norway's heat demand is met by district heating (3%), 94% of this is generated from renewable energy sources and recycled heat,[9] providing an attractive model for other countries to follow.

8. https://energifaktanorge.no/en/norsk-energiforsyning/kraftproduksjon/

9. https://www.euroheat.org/knowledge-hub/district-energy-norway/

Chart 7: Head Demand By Energy Source in the Norwegian Residential Sector (2015)




*Source: Euroheat & Power.*

The increased use of district heating in Norway in the last decade has been made possible by an effective market framework put together by the Norwegian government, which has encouraged public and private investment in the sector. Below are some of the key government regulations that have helped de-risk the district heating sector, which has consequently reduced the cost of capital for these projects in Norway.

1. **Concession agreements:** The government grants concession agreements to district heating networks, which provides security for a project to be developed.

2. **Government grants (Enova):**[10] Enova grants help underpin the investment needed in the installation of district heating and cooling systems when using renewable energy as a fuel source.

3. **Consumer incentive:** The cost of district heating within concession areas in Norway cannot be higher than price of electricity by law. Not only does this give customers a cheaper alternative to electricity, but it also reduces the monopoly previously held by the large energy companies.

4. **Landfill ban:** In 2009 the Norwegian government banned landfill for bio-degradable waste. In the short-term this increased waste export to Sweden for incineration, but it also created a more robust market for waste-to-energy plants which can be used to fuel district heating networks.[11]

10. Enova is owned by the Ministry of Climate and Environment in Norway and contributes to reduced greenhouse gas emissions, development of energy and climate technology and a strengthened security of supply. Enova does this by giving grants/financial contribution to renewable energy projects that utilises new and innovative technologies. Enova invests more than NOK 2 billion a year in such projects.

11. https://www.eea.europa.eu/soer/countries/no/waste-state-and-impacts-norway

# The Role of Private Capital / Infrastructure and Private Equity

To decarbonise the heating sector, there needs to be an effective heat networks market tying together a sound investment proposition with robust consumer protection. To fund this clean growth strategy, the heating sector needs a vast amount of capital. In the UK alone there is an estimated £16 billion of capital investment needed by 2050 to achieve the country's Clean Growth Strategy.[12] Despite government subsidies such as Norway's Enova grant scheme and the UK's Heat Networks Investment Projects ("HNIP"), there is a need for significant additional private capital in the heating sector. To incentivise the private sector to fund this transition and take the pressure from budget constrained governments, there needs to be a higher level of certainty around the future cash flows of such projects. Given the high upfront capex requirements and long-term nature of heat networks, these assets are a natural fit for long term infrastructure investors.

Improving cash flow certainty will be mutually beneficial for both the private sector and consumers as it lowers the risk profile of projects, driving down the cost of capital. In turn, this will be reflected in lower energy bills for consumers. When it comes to de-risking infrastructure projects, the two major risks investors face are demand and price risk

12. Department for Business, Energy & Industrial Strategy, Heat Networks: Ensuring sustained investment and protecting consumers, December 2018.

### Demand Risk

1. **Consumption risk**: The risk of overall heat demand being lower than forecast, or that the timing of heat production is misaligned with demand (primarily problematic for renewable energy-driven heat sources, such as solar and wind).
2. **Connectivity risk**: The risk that new development projects have a lower customer connectivity than forecast. Uncertainty of how many and when customers will connect to the district heating network is a key risk in greenfield projects. Customers do not want to enter into agreements before the district heating network is operational. On the other hand, investors and lenders are less likely to finance projects without legally binding contracted heat demand with creditworthy counterparties.
3. **Counterparty risk**: The risk that customers lack liquidity to pay for their heat consumption.
4. **Pricing risk:** District Heating prices tend to be linked to electricity prices. Consequently, in the absence of mitigating factors, merchant power risk can be inherent in the forecast cash flows.

In short, investors need to be confident about the scalability, timing, use of heat network connections, and to some extent the final heat price they will receive (at least for the first 10-15 years) before investing in new greenfield district heating projects.

In order to reduce both demand and price risk, there needs to be an appropriate framework of government regulation in place. Demand risk can be addressed by utilising concession agreements, as in Norway. The concession agreement would grant the district heating network operator the sole right to operate within a concession area, reducing the risk associated with competitors. Additionally, it can require all new buildings to connect to the heat network ensuring scalability going forward.

Energy laws requiring district heating to be cheaper than electricity ensures it is more attractive for consumers to connect the to the district heating network than to use traditional electric or gas heating.

Government grants such as ENOVA reduce the connectivity cost, further incentivising customers to connect.

Price risk in greenfield projects can be addressed by government support schemes such as feed-in tariffs,[13] feed-in premiums,[14,15] quota obligations with tradable green certificates, investment grants and tax incentives.

If the above challenges can be addressed in an efficient manner, there is no reason why this asset class should not grow significantly in the coming years. With the correct level of government regulation, district heating investment should offer attractive returns as it becomes an attractive asset for long-term investors. Attracting private investment to significantly increase the build-out of district heating networks across the EU will contribute significantly to the decarbonisation of the heating sector.

The role of private capital is not only beneficial for greenfield projects, but also brownfield projects as it provides liquidity to the market, helping developers and corporates to recycle capital into new developments. As investors become increasingly comfortable with the district heating sector, the interest for operational brownfield assets will increase. In turn, developers and investors who financed the construction can now sell at higher multiples / lower discount rates, increasing their returns. As the return and certainty of exit increases for developers, so should the number of investors wanting to finance greenfield projects until the market becomes more balanced.

There currently appears to be significant demand for operational district heating assets in the European market, however there is insufficient private capital seeking greenfield projects. As discussed above, increased government support and regulation can increase the investment in the greenfield sector, addressing this imbalance. The momentum in the district heating market is evident from the number of deals in the sector as shown in the below figure. There has been a particular focus on deals in Sweden, France and the UK.[16]

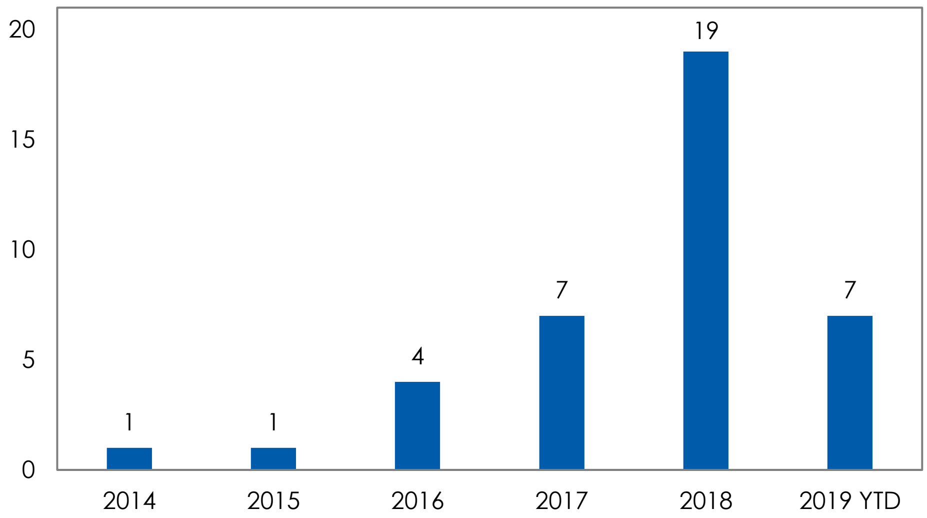
13. FIT guarantee continuous retail prices for plant operators utilising renewable energy sources plant for a given period.

14. In an FIP, plant operators have to market the electricity generated directly at the electricity market and receive an additional payment on top of the electricity market price - either as a fixed payment or adapted to changing market prices in order to limit both the price risks for plant operators and the risks of providing windfall profits at the same time. The revenue risk is increased in a FIP compared to a FIT.

15. https://climatepolicyinfohub.eu/renewable-energy-support-policies-europe

16. Inframation deals as of 11th April 2019.

Chart 8: European district heating sector deals closed




*Source: Inframation.*

## Case Study: KVAS

Whitehelm Capital ("Whitehelm") is actively engaged in the decarbonisation of the heating sector. In the summer of 2018, Whitehelm successfully acquired an interest in Kvitebjørn Varme AS ("KVAS"). KVAS is the owner and operator of a district heating facility in the city of Tromsø, the largest urban area in Norway within the Arctic Circle. KVAS's portfolio includes a 24 MW waste-to-energy plant with 40 MW of additional capacity, which fuels the district heating facility. The plant was commissioned in 2017 and has an incineration capacity of 56,000 tonnes of waste per annum. It produces 115 GWh of thermal energy per year, which is supplied to the local hospital, university and residents through a 55 km district heating network.

KVAS is great example of how government regulation has helped de-risk the district heating sector, enabling a private investor such as Whitehelm to get comfortable with the risk return profile linked to the long-dated cash flows.

Firstly, a 30-year concession agreement with the government provides KVAS exclusivity to supply heat in Tromsø. This provides the certainty for KVAS to enter into long term waste agreements. KVAS can therefore offer better pricing to the local waste providers. The concession agreement also states that all new buildings need to connect to the district heating facility, ensuring scalability of the network.

Secondly, ENOVA grants assist with the cost associated with building out the network needed to connect new customers to the district heating facility. This lowers the energy bill for consumers.

Thirdly, having a law stating that district heating within concession areas needs to be sold at a discount to electricity prices provides an incentive to customers to opt into the more environmentally friendly district heating network.

Lastly, from an ESG perspective, it makes sense for the government to support KVAS in Tromsø. Previously, waste was shipped around 400 kilometres daily by truck to Kiruna in Northern Sweden for incineration. This was both costly and carbon intensive, and the government's support ensures it is economically viable to finance the district heating facility and waste to energy plant.

# Future Outlook

There is significant investment required to develop the heat sector to meet decarbonisation and energy efficiency challenges. As government policy and regulation continues to develop to support these efforts, and technology continues to improve the range of options available, more investment opportunities will come to market.

Whitehelm considers the district heating market to provide attractive investment opportunities within those countries with well-developed regulatory systems such as Norway, France, Italy, and the UK. For those countries with existing district heating networks, there will be opportunities to leverage existing assets to build networks out, while greenfield opportunities will be attractive where regulation provides suitable protections.

In addition to district heating networks, there are likely to be smart city opportunities within the heating sector, including investment in smart meters and smart grid applications to improve the efficiency of the heating sector.

Whitehelm considers that these investment opportunities are not only attractive from their economic merits, but also play a role in our drive to be responsible investors, contributing to the global sustainability challenges such as decarbonisation.

# Disclaimer