

Factsheet T.2.2

In depth analysis of the case study
in Vienna

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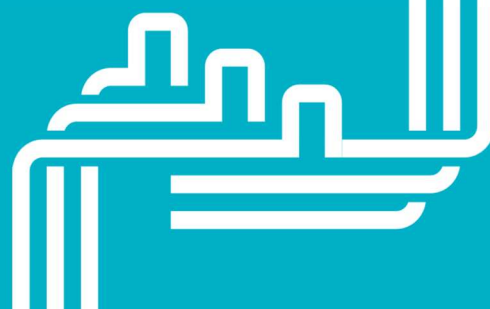
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1. INTRODUCTION

The district heating (DH) network in Vienna is the largest in Austria, and it is operated by Wien Energie. It was established in 1969 and has a maximum capacity of 3.1 GW and supplies 6,000 GWh of heat per year. Supplying around 30% of the total heat demand in Vienna, the DH network provides heat to about 460,000 connected households. Vienna City’s target is to provide space heating and hot water preparation exclusively with renewable sources by 2040. Figure 1 shows an overview over the Vienna Heating Plan 2040. The expansion of the district heating network will play a key role in achieving this goal, especially in areas with dense urban development. The heat demand density in these areas is high and the availability of local renewable energy sources limited. Also in pioneering areas, the comprehensive expansion of district heating is proactively pursued and implemented.

The recently published decarbonisation strategy¹ by Wien Energie foresees the use of large-scale heat pumps, waste heat and deep geothermal energy in the DH network of Vienna. To reach the strategic targets of Wien Energie, more than 1200 million EUR will be invested in renewable energies until 2040.

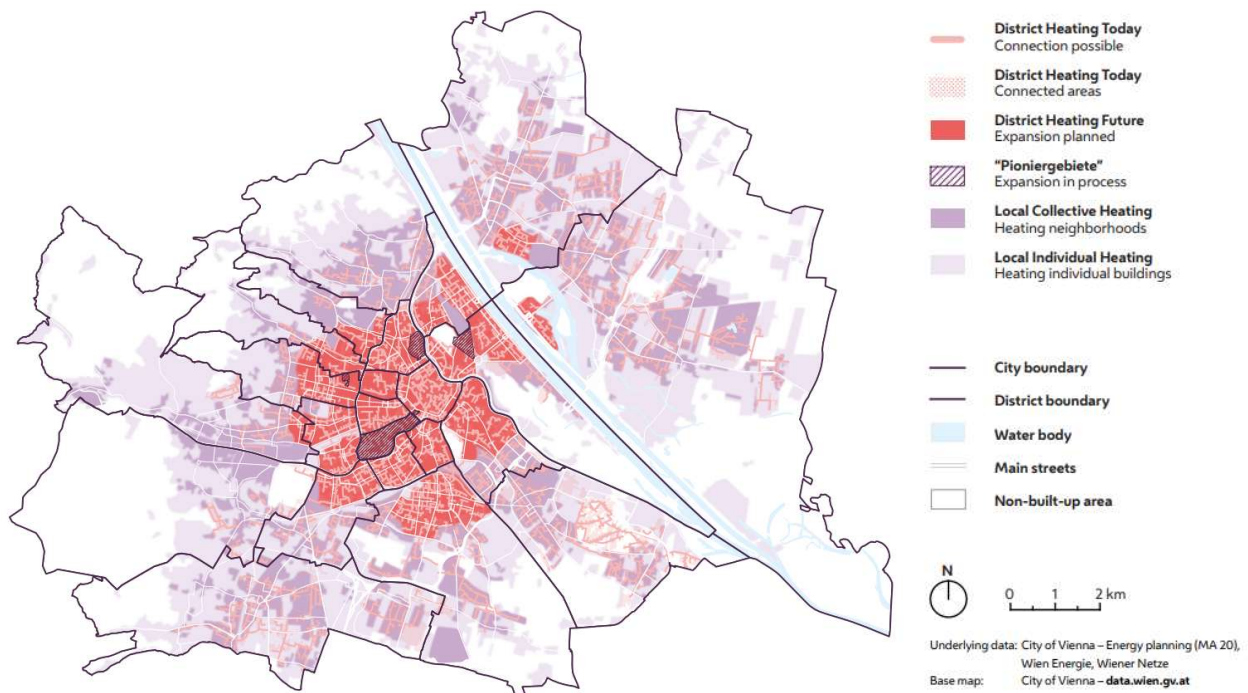


Figure 1 – Vienna Heating Plan 2040, Status: May 2024; Source: Stadt Wien

¹ <https://positionen.wienenergie.at/beitraege/decarb-studie/>

2. THE DISTRICT HEATING SYSTEM (CURRENT STATE)

2.1 Energy generation

The district heating system in Vienna operates 18 plants and generates approximately 6,000 GWh of thermal energy per year. Different kinds of plants supply the network, including hot water boilers, heat from waste incineration, a combined heat and power plant, biomass boilers, heat pumps and power to heat units. **Error! Reference source not found.**

Vienna’s district heating system relies on a diverse mix of energy carriers, including natural gas, biomass, waste incineration and electricity. Figure 2 shows the energy sources development between 2013 and 2023 for the heat production in GWh. From 2013 to 2023, there has been a decrease in energy generation, from about 6,400 GWh to about 5,400 GWh. And, since 2013, the coal-fired energy production has been shut down. In 2023, the system had a renewable energy share of 19%, where solar, geothermal and ambient heat have been introduced as new renewable energy sources (since 2019), and natural gas generation was reduced from 71% (2013) to 59% (2023).

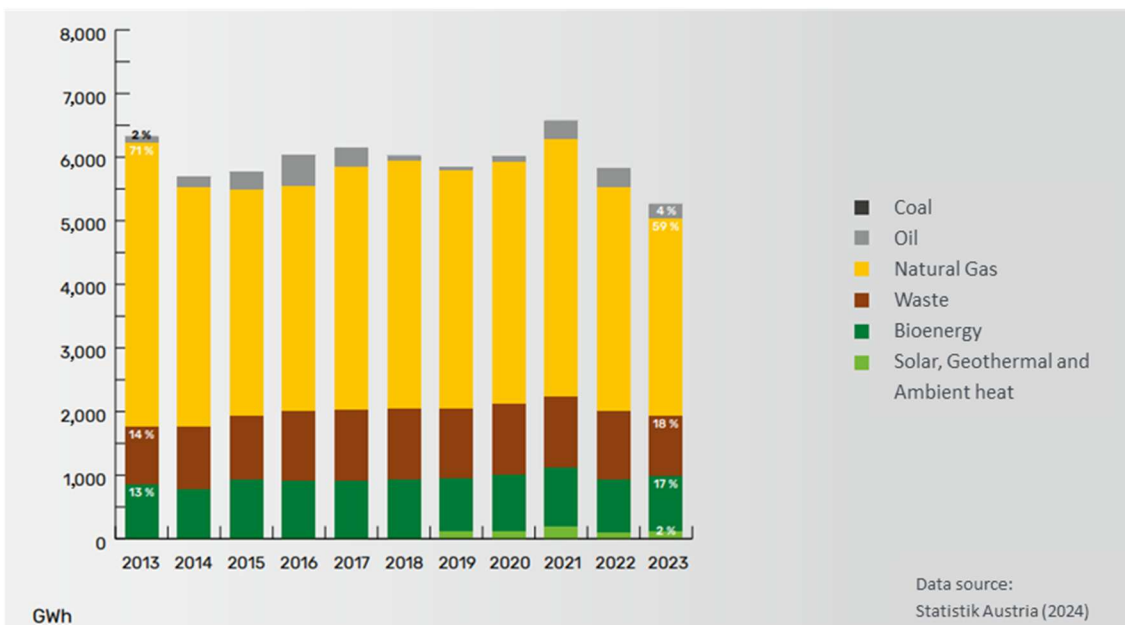


Figure 2 - District heating generation in Vienna by energy source in GWh; Source: [Global2000](#)

Table 1 contains the electricity and heat production of the Wien Energie GmbH 2023 in GWh.

Performance data of the WIEN ENERGIE GmbH	
in GWh	2023
Caloric production	4,049.9
Biomass	85.9
Hydropower	834.4
Windpower	398.2
Photovoltaics	107.2
Total electricity production	5,475.5
CGH WIEN ENERGIE	2,569.6
Waste and hazardous waste incineration	1,200.0
Peak load boiler	522.3
Geothermal and ambient energy	96.0
Heating centers	206.3
Biomass power plant	117.4
Waste heat	1,200.9
- Network losses	-485.0
District heating sales	5,427.4

Table 1 - Electricity and heat production of the Wien Energie GmbH 2023 in GWh

2.2 Energy Distribution Network and Consumers

Vienna's district heating network extends over 1,300 km. The system operates with steel pipes, either installed using shaft construction or plastic-cased and buried underground. Since 1964, heat from the waste incineration plant has been used to supply the first part of the district heating network. By 1989, it had already reached a length of more than 300 km, supplying 93,000 apartments and numerous public buildings such as the City Hall, the Hofburg, and the Parliament.

The heat is distributed through multiple pumping stations, including Donaustadt, Simmering 1 and 2, Kagran, Spittelau, Reichsbrücke, Wehlistraße, and Arsenal, with additional pumping stations located at each plant. The pumping system is regulated by pressure differences at the pumps and several critical network points. The total pumping electricity demand amounts to 30 GWh per year. The network includes approximately 11,000 substations, with an average connected capacity of 350 kW per customer.

The temperature levels vary depending on demand and adapt to outdoor temperatures. The primary network can reach temperatures of up to 145°C, while the secondary networks are regulated between 63°C and 90°C. The peak load of the network is around 2,600 MW for an outdoor temperature of -15 °C.

In 2023, the total amount of heat sold reached 5,400 GWh, supplying 460,000 households and covering a heated area of approximately 153 million square meters. The network supplies different types of customers, including industry, trade and commerce, housing, local authorities and public services. Currently, the network has a 35% connection ratio and around 30% of the substations are equipped with digital monitoring systems.

The network is managed by Wien Energie LLC and Wiener Netze LLC and is owned by the city of Vienna. Maintenance activities include pipe inspection, leakage detection and replacements. Wien Energie uses publicly accessible geographic data to map its district heating network.

3. UPGRADING MEASURES

Vienna’s district heating network has significant potential for expansion, particularly in the integration of renewable energy sources. 2,500 MW of additional renewable generation is planned to be implemented over the next 30 years.

The planned development of the heat production is shown in Figure 3 below. Wien Energie is planning to invest approximately 400 million EUR for the heating transition, and in total, about 1,200 million EUR for the energy system transition². This initiative focuses on:

- Expansion of geothermal energy
- Expansion of high-capacity heat pumps
- Introduction of carbon capture technologies
- Installation of a green gas power station
- Seasonal energy storage

In comparison to 2021, the amount of energy from heat pumps is planned to increase from 0.2 TWh/a to 2.5 TWh/a. Geothermal energy will be implemented and should supply 2.2 TWh/a in 2040. The amount of heat from combined heat and power using gas will significantly decrease. Additionally, the strategy includes the implementation of a low-temperature district heating network.

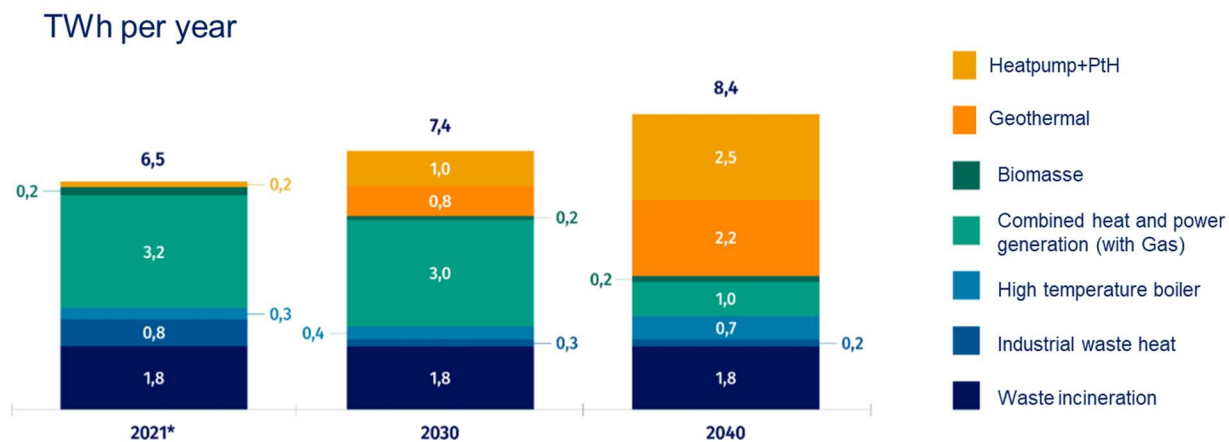


Figure 3 – Produced heat in TWh per year; Source: *Compass Lexecon, Wien Energie 2023*

In the context of the project ENABLE DHC, AIT will support Wien Energie to assess the uncertainties related to the district heating decarbonisation strategy, make sure that the district heating decarbonisation plan for 2040 is properly developed. Sensitivity analyses using Monte Carlo Simulations will be developed evaluating

² Source: Wien Energie Positionen, <https://positionen.wienenergie.at/studien/decarb-studie> (Access 15.3.2025)

uncertainties regarding key factors as prices for electricity and green gases, demand side developments and national regulatory framework.

GET IN TOUCH WITH US



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