

# Factsheet T.2.2

In depth analysis of the case study  
in City of Rijeka

March 2025

**Prepared for:**  
Deliverable 2.2

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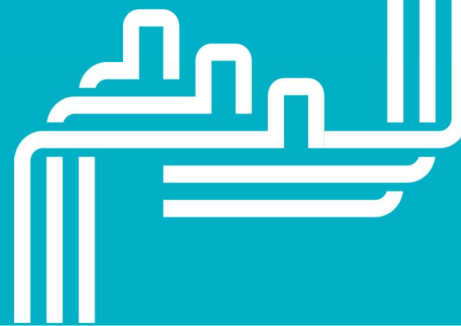


**Co-funded by  
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D2.2 Rijeka	
Deliverable number	D.2.2
Responsible partner	ENERGO
Due date of deliverable	April 30, 2025
Actual submission date	April 30, 2025
Version/document history	V1
Authors	Vatroslav Jukic, Jadranka Rogic
Reviewers	Nereo Milin
Work package number and title	WP2 – Setting the scene and engage the stakeholders
Work package leader	AEE Intec
Work package participants	All

Dissemination level (please select one)		
SEN	Sensitive, limited under the conditions of the Grant Agreement	<input type="checkbox"/>
PU	Public, fully open	<input checked="" type="checkbox"/>

Nature of the deliverable (please select one)		
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DMP	Data management plan	<input type="checkbox"/>
ETHICS	Deliverables related to ethic issues	<input type="checkbox"/>
SECURITY	Deliverables related to security issues	<input type="checkbox"/>
OTHER	Software, technical diagram, algorithms, models, etc.	<input type="checkbox"/>

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# 1. INTRODUCTION

Rijeka is the third largest city in the Republic of Croatia, with some 110,000 inhabitants, located in the western part of Croatia on the Adriatic coast.

The district heating system in Rijeka began to develop with the significant industrial development of the city after World War II in the 1960s. At that time, urban districts began to develop and be built, with each larger city district having its own district heating plant and distribution network to which multi-apartment buildings and facilities such as schools, kindergartens, sports halls, etc. were connected for heating and domestic hot water.

Today, the district heating system is managed by the company Energo d.o.o., which is majority owned by the City of Rijeka. The company manages the district heating system based on a concession obtained by the City of Rijeka in 2006, which lasts for 30 years, i.e. until 2036, with the possibility of extension. In addition to the production, distribution and supply of thermal energy, the company also deals with the distribution and supply of natural gas and the management of the public lighting system. The company has 120 employees.

The main fuel of the district heating system in the past was heating oil, while in the early 2000s, the system switched significantly to natural gas as the main fuel. In the last ten years, significant renovation of the district heating system has been carried out, during which 93% of the distribution network was renovated and the production plants were equipped with CHP units running on natural gas, with heating oil remaining available only in cases of exceptional need (back-up). The renovation project will last until the end of 2025. Parallel with the DH renovation project during the last ten years, there has been a substantial energy-efficiency building renovation on the customer side. Some 65-70% of all buildings connected to the DH system have been renovated. The two measures combined (DH system and customer side renovation) led to the reduction of supplied energy from 89,7 GWh in 2009 to 52,1 in 2024, a 42% reduction.

Some 9,463 users are connected to the district heating system, of which 9,344 are households, which makes up approximately 17% of the total number of housing units in the Rijeka.

Figure 1 gives an overview of the distribution DH network in Rijeka, distinguishing between the 'old' DH network and those renovated or newly built through the renewal project.



Figure 1 Existing DHS in Rijeka

## 2. THE DISTRICT HEATING SYSTEM (AS IS)

### 2.1 Energy generation

The heat for the DH system in Rijeka is generated at 14 separate DH plants located all around the city. With the renovation project going on until the end of 2025 the number of plants is going to be reduced to 10 by means of interconnecting separate DH systems together. Most of the plants were built in the 60s and 70s with some of the boiler's 40+ years old but most of them were renovated with the introduction of natural gas as the main fuel from the early 2000s.

The total installed power is 86,3 MW while the peak load is around 35-40 MW. The DH system uses 33 separate units (23 natural gas boilers, 3 fuel oil back-up boilers and 7 CHP units) for the heat generation. The system provides heating and domestic hot water. The baseload is supplied mostly by the CHP were available, while the gas boilers are activated when the heat demand exceeds the CHP capacity, mostly during winter. In 2024, the system generated 79,5 GWh of energy (62,5 GWh of heat and 17,0 GWh of electricity), primarily using natural gas (some 9 million Sm<sup>3</sup>).

For the system plants running and control a new SCADA solution is in implementation parallel to the renovation until end of 2025. The plants are all able to run 24/7.

Table 1 below summarises the key DH system data for 2024.

**Table 1 Basic data of Rijeka DH system**

Year	2024
Number of heating plants/boiler rooms in operation	14
Total installed power (MW)	86,3
Total energy input (GWh)	89,9
Total heat output (GWh)	62,5
Efficiency of production facilities (%)	88,4%
Total heat supplied (GWh)	52,1
DH distribution network efficiency (%)	83,5%
Overall DH efficiency	76,9%
Total length of distribution network (km)	17,3
Fuels used in production plants	NG, RES
Total electricity produced from CHP plants (GWh)	17,0
<b>Share of high-efficiency CHP, waste heat and RES in heat generation (%)</b>	<b>34,3%</b>
Total number of consumers	9.463
Heated area of households (m <sup>2</sup> )	514.075
Heated area of other consumers (m <sup>2</sup> )	100.625
Total heated area (m <sup>2</sup> )	614.700

## 2.2 Energy Distribution Network and Consumers

The DH network in Rijeka is 17,3 km long with most of the network being pre-insulated. Some 93% of the network will be renovated by the end of 2025. There are 9.463 customers connected to the network by means of 159 substations. Of the customers mentioned 9.344 are households while the rest 119 are business users. The 9.344 households mentioned represent some 17% of all households in Rijeka.

The network operates with a supply/return temperature regime of around 85°C/65°C in winter, with lower temperatures during the summer season for domestic hot water and the thermal losses are around 10-12%. With the finishing of the network renovation, the losses should drop below 10%, and around 8% is expected yearly.

The heat supplied to customers amounts to some 52,1 GWh/year. The substations owned by the customers range from 50 kW to 1.500 kW (300-400 kW on average) mostly 30+ years old. Only some 20-25 out of the 159 substations have been renovated with new plate heat exchanger ones. The old ones use tube exchangers. They cannot be monitored and controlled for temperature, pressure and flow rates. Temperature regime on the secondary (customer) side supply/return is 70°C/50°C.

There are some 45 pumps altogether, ranging from 0,5 kW to 55 kW, used for the heat distribution regulated by variable speed drivers. The consumption related to the pumps amounts to some 1 GWh/year.

For the monitoring and data collection of the network a new SCADA solution is in implementation parallel with the network renovation.

The contracts with customers have a bimodal tariff structure. It consists of two components: a fixed charge for installed power, which is due regardless of their energy consumption and typically covers infrastructure, maintenance and other fixed costs, and a variable charge for energy, based on heat consumption.

### 3. UPGRADING MEASURES

Through the implementation of the DH renewal project, the district heating system of the City of Rijeka will fully comply with the Energy Efficiency Directive's (EED) 2028 targets and become one of the most modern systems in the Republic of Croatia. Two-time EED horizons (2035 and 2050), as these represent more challenging objectives in terms of the share of renewable energy sources (RES) in DHS systems, as required, will be considered for upgrading measures. To achieve greater RES integration and meet the EED targets for 2035 and 2050, it is essential to prepare and initiate investments in new production plants and expand the distribution network.

To meet the **Energy Efficiency Directive's** requirements for **2035**, the following measures are proposed:

- Measure 1 – Construction of a unified distribution network;
- Measure 2 – Reconstruction of DHS thermal substations;
- Measure 3 – Construction of a large-scale wastewater treatment plant large-scale heat pump;
- Measure 4 – Construction of urban solar power plants (both PV and thermal);
- Measure 5 – Signing PPA agreements for green electricity supply.

To meet the **Energy Efficiency Directive's** requirements for **2050**, assuming the 2035 measures have already been implemented, the following measures are proposed:

- Measure 6 – Construction of an additional large-scale seawater heat pump;
- Measure 7 – Connection of new customers on the unified distribution network;
- Measure 8 – Installation of individual air-to-water heat pumps in some remote DHS zones.

With this combination of measures, assuming the measures for 2035 have already been implemented, the 2050 Directive requirement could be fully met, meaning that the DHS of the City of Rijeka will operate entirely (100%) on renewable energy sources and/or waste heat of which 90-100% even by 2040.

In the context of the ENABLE DHC project, Energo will be supported through digital tools in modelling the interconnections of the district heating network, as well as in the simulation of the integration of the large-scale heat pump system.

## GET IN TOUCH WITH US



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