D8.3- Promotional Material

Renewable and Waste Heat Recovery for Competitive District Heating and Cooling Networks

REWARDHeat

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Lead Beneficiary: European Heat Pump Association

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Demonstration Networks and partners

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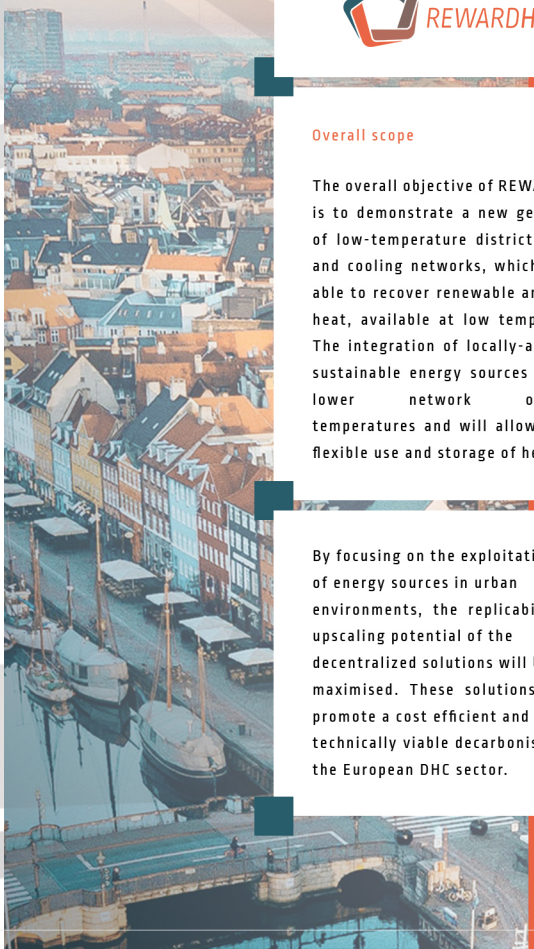

REWARDHeat

Overall scope

The overall objective of REWARDHeat is to demonstrate a new generation of low-temperature district heating and cooling networks, which will be able to recover renewable and waste heat, available at low temperature. The integration of locally-available, sustainable energy sources requires lower network operating temperatures and will allow for the flexible use and storage of heat.

By focusing on the exploitation of energy sources in urban environments, the replicability and upscaling potential of the decentralized solutions will be maximised. These solutions aim to promote a cost efficient and technically viable decarbonisation of the European DHC sector.

RENEWABLE AND WASTE HEAT RECOVERY FOR COMPETITIVE DISTRICT HEATING AND COOLING NETWORKS

Specific Objectives

1

To integrate effectively multiple urban renewable and waste energy sources:
REWARDHeat networks will integrate effectively multiple low-grade urban energy sources where they are available along the network. DHC networks operated at low temperature can provide contemporarily heating and cooling from the same pipelines, by means of reversible heat pumps located at customer's buildings.

2

To develop innovative technologies for flexible use of heat in DHC networks:
Prefabrication, standardisation and modularity will be distinctive for the solutions of REWARDHeat. This is to remove design errors and reduce installation time. The project aims to demonstrate innovative pipeline solutions that will allow for reduced installation time and optimal operation.

3

To demonstrate digitalisation, allowing to optimise the management of the DHC network:
Control strategies and fault detection solutions will be assessed that assure a thermal balance of diffused heat generation, storage and utilization. Interaction between thermal and electric systems will be addressed both on the supply and demand side. Moreover, approaches will be elaborated allowing to manage thermal and electric energy purchase from different sources.

4

To develop business models and financial schemes to enable large public and private investments to be mobilised:
By focusing on the green dimension of investments and developing appropriate business models, REWARDHeat aims to encourage a shift in thinking where heat is sold as a service rather than as a commodity.

Demonstration Activities

The project will integrate the EU top-down energy and climate policy mechanisms with a bottom-up approach to promote the decarbonisation of the local DHC systems. Through this integrated approach and demonstration at 8 demo sites, the solutions developed will be highly replicable across European cities.

REWARDHeat
will demonstrate cost-effective solutions for DHC systems, which can satisfy at least 80% of the energy demand of the system with locally-available renewable energy and waste heat sources.

1. Albertslund, Denmark

The Albertslund demonstrator is owned and operated by Albertslund Kommune. The overall scope of the demonstration activities in the Porsager housing area is to demonstrate moving from a high temperature district heating network supply (85°C) to a low-temperature one (60°C), by installing a shunt valve between the backbone and the local network. In addition, a mix of centralised and local production from waste heat will be pursued and innovative business models will be developed accordingly.

2. Heerlen, Netherlands

The Mijnwater demonstrator in Heerlen includes an existing neutral-temperature district heating network. It exploits a large underground seasonal storage in the mines that stores heat (28°C) and cold (16°C). The aim of the demonstrator is to install and test an inter-day, large-scale (5,000m3), underground thermal storage tank, capable of exploiting high temperature industrial waste heat or solar thermal energy heat.

3. Helsingborg and Mölndal, Sweden

The two Swedish demonstrators have been designed and installed in cooperation with the local SMEs, ARVALLA and INDEPRO, and are made up of newly built low-temperature networks. Each network consists of a 4-pipe distribution system that supplies space heating (40°C) and domestic hot water (60°C). The systems utilize a borehole seasonal thermal energy storage, charged by the main district heating network, PV-Thermal solar collectors and waste heat from air-conditioning in summertime, in addition to geothermal energy. Centralised, reversible heat pumps exchange heat between the seasonal energy storage and the buildings.

4. Milan, Italy

New district heating systems will be developed in Milano by a2a Calore & Servizi. Two pilot-sites will be explored, recovering waste heat and geothermal heat already available in the city. The newly built district heating networks will operate at neutral temperature and will exploit excess heat from an electric transformer station and groundwater from existing wells. The demonstrators aim to install substations at building level, implement smart monitoring and control, and investigate the development of business models adapted to the local context.

5. Szczecin, Poland

The Szczecin demonstrator is a newly built low-temperature network, installed as part of a new development on Łasztownia island. The 2-pipe,"reversible" system is operated at 30-50 °C in winter and at 25-35 °C during summer, distributing cooling. The system will exploit local waste heat and heat pumps, pursuing a flexible use of heat and cold, and prosumer integration.

6. Topusko, Croatia

The system consists of a pre-existing district heating network publicly owned by Health SPA Topusko. The network exploits geothermal water at 64°C from four wells to supply heat to a number of residential, business and public customers. Network also supplies geothermal water to SPA and swimming pools for both therapeutic and recreational purposes. The overall goal at this demonstrator is to improve the efficiency of the network by means of pipelines renewal, smart control and monitoring, overall lowering extraction of geothermal water and waste heat generated during exploitation is pursued.

7. Toulon, France

The French demonstrator is operated by Dalkia and EDF, and is located at La Seyne-sur-Mer. It consists of a neutral-temperature DHC network that exploits renewable energy from seawater. The temperature varies throughout the year depending on the seawater temperature and the balance between the heating and cooling loads. Smart monitoring and control hardware/software is being developed to optimise the performance of the network, as well as innovative contractual arrangements (EPC).

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REWARDHeat aims to exploit energy sources diffused within the urban texture by means of active metering, thermal storage management, network smart control and suitable business models deployment.

To this purpose REWARDHeat will:

- explore alternative configurations of a DHC network to elaborate planning schemes, pre-design tools and recommendations for replication overall.
- demonstrate how prefabricated substations can facilitate the bidirectional heat exchange with the network, both from the technical and investment perspective.
- develop a data mining software tool allowing to manage and analyse monitoring data from installed smart meters.
- elaborate fault detection techniques and predictive control strategies to optimise management of heat fluxes and thermal storage utilisation.
- devise business models adapted to selling "heat as a service" and financing support approaches centered around the new concepts of DHC network.
- develop a Business Game based on planning schemes and replication scenarios, focused on authorities and professionals to help them make decisions when developing new DHC infrastructures.

INNOVATIVE SOLUTIONS

Demonstration Networks and Partners

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