REWARDHeat

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

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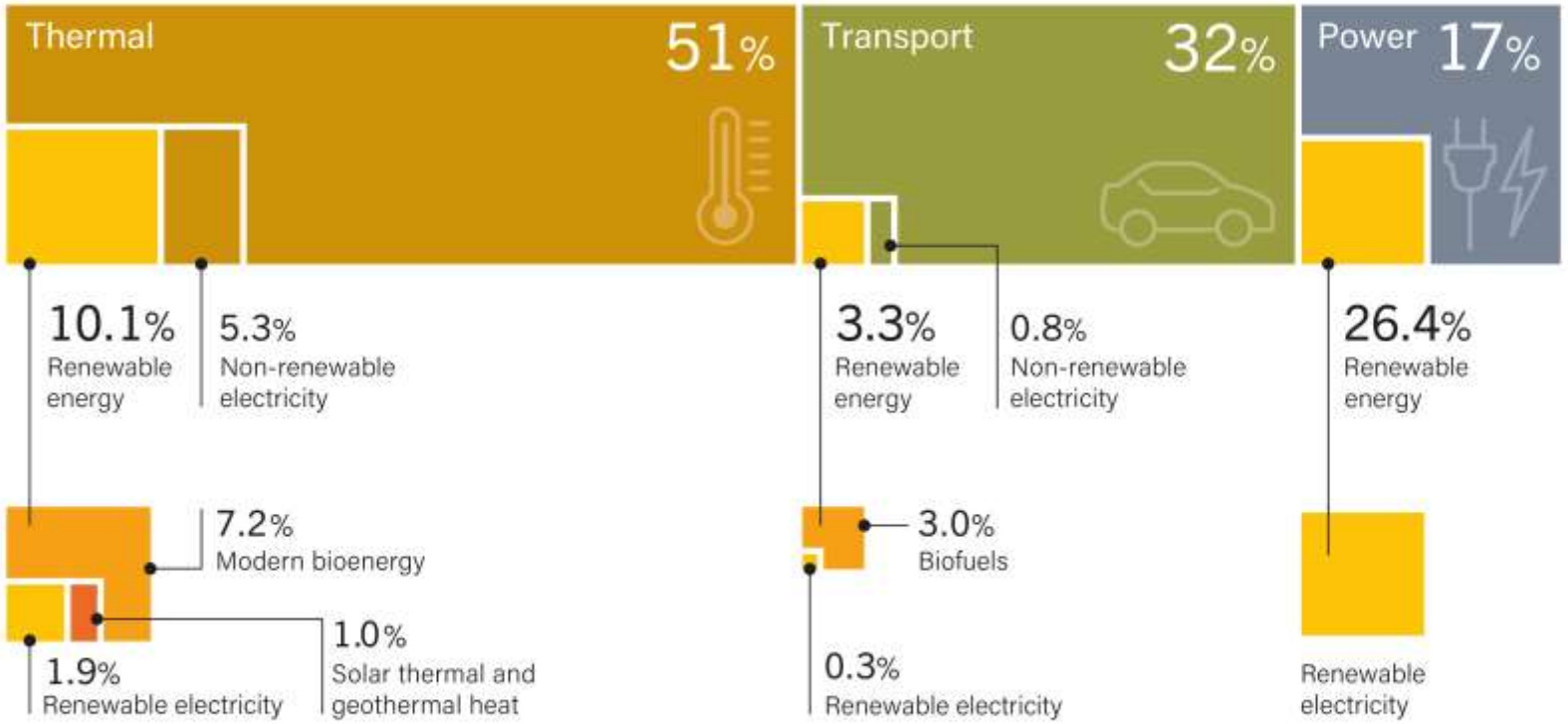
Project Overview

- 28 Partners (10 countries)
- €19 million
- 4 years (October 2019 -> September 2023)
- H2020 (IA)
- Coordinated by EURAC, Italy

Background

Renewable Share of Total Final Energy Consumption, by Final Energy Use, 2017



Note: Data should not be compared with previous years because of revisions due to improved or adjusted methodology.

Source: Based on IEA data.

REN21 RENEWABLES 2020 GLOBAL STATUS REPORT

Source: Ricardo Gomez Angel on Unsplash

The Vision

- REWARDHeat will demonstrate district heating and cooling (DHC) networks, which are able to recover renewable and waste heat available at low temperature, i.e. lower than 40°C

- To do this, we need to lower the supply temperature compared to conventional networks.
  - Low supply temp: less than 60 °C
  - Ultra-low supply temp: approx. 10-20°C.

- Focus is on the exploitation of the energy sources available within the urban context, to maximize the upscaling potential of the decentralized solutions developed

Source: Milind Kaduskar on Unsplash

Specific Objectives

To integrate multiple urban renewable and waste energy sources

- Explore alternative configurations of a DHC network
- Multiple heating and cooling sources
- Providing recommendations for the replication of the system

Source: Kelly Sikkema on Unsplash

Specific Objectives

REWARDHeat

To develop innovative technologies for flexible use of heat in DHC networks

Substations:

- Prefabrication for building solutions
  - Small-size (up to 50 kW) prefabricated substations including booster heat pump specialised to specific demonstration cases
- Standardisation for large-scale district heating plants
  - A Large scale industrialised energy centre will be developed at sub-network level

- Single pipes

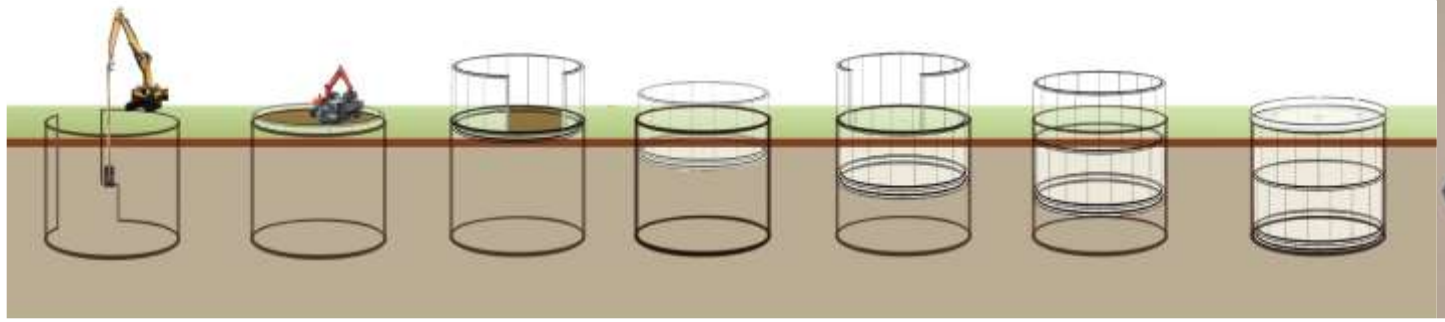
Specific Objectives

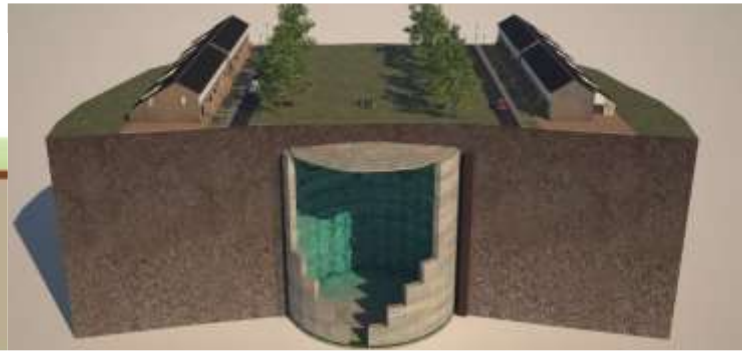
REWARDHeat

To develop innovative technologies for flexible use of heat in DHC networks

Thermal storages

- Local, intra-day storages at customer substations
- Central, intra-day storages to balance the network and store energy during off-peak periods
- Central, seasonal storage: borehole storage





Source: ECOVAT

Specific Objectives

To demonstrate digitalisation solutions allowing the optimisation of the management of the DHC network

Storage capacity and control will be used synergically to manage the system.

- Smart metering communicating real-time data
- Data-mining platform allowing communication with smart meters and to handle controls
- Fault detection and expert control strategy elaboration for optimisation and electricity grid coupling

Source: Ilya Pavlov on Unsplash

Specific Objectives

To develop business models and financial schemes to enable large public and private investments to be mobilized

The overall idea is to encourage a paradigm shift from viewing “Heat as a Commodity” to “Heat as a service”

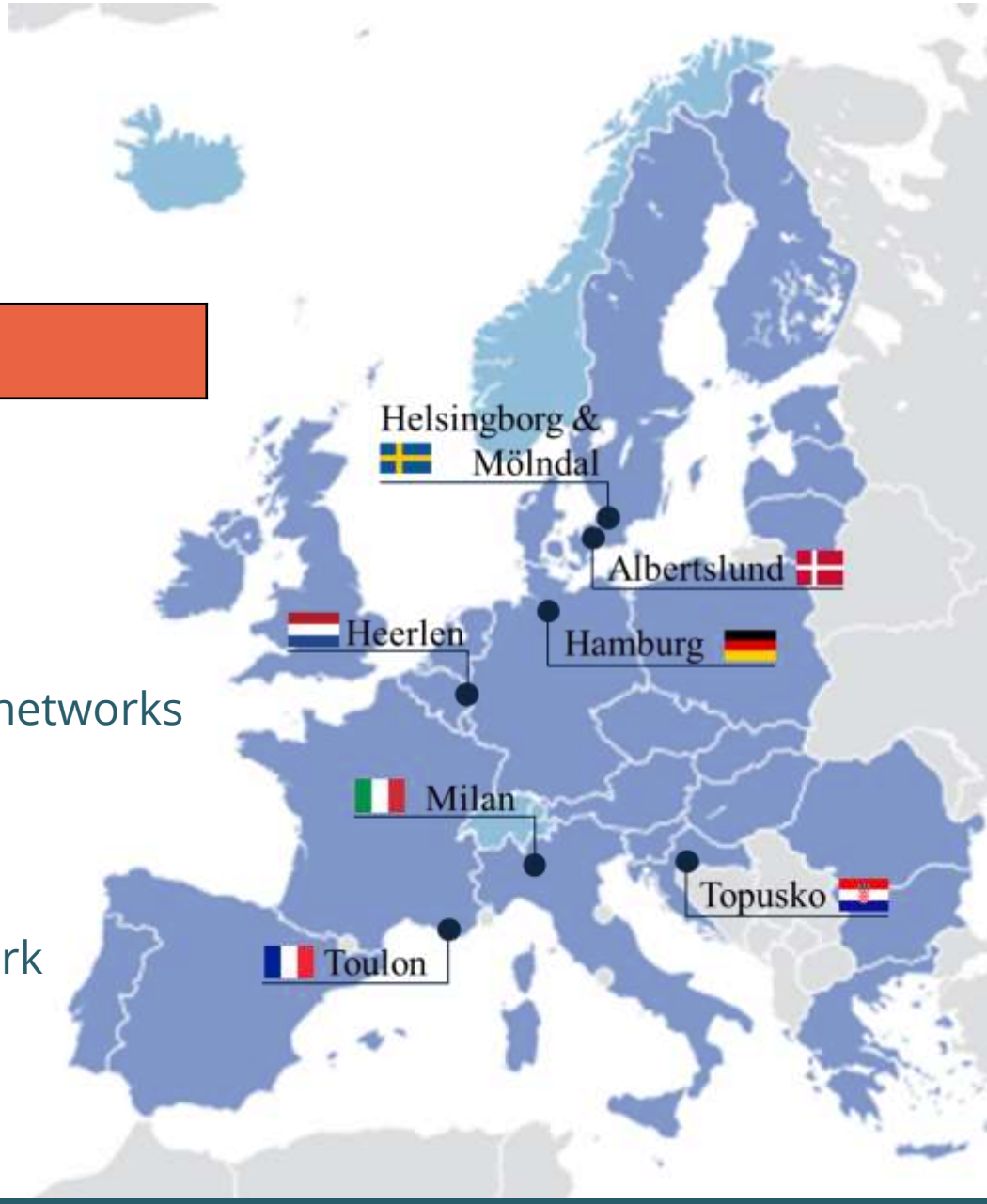
Financial support approaches will be elaborated based on reliable and transparent information, allowing for a clear risk assessment

Source: Nikita Kachanovsky on Unsplash

REWARDHeat demo cases

Demo description

1. **MILAN** - Newly built neutral-temperature networks
2. **HAMBURG** - Newly built low-temperature network
3. **ALBERTSLUND** - Retrofitted network to low-temperature
4. **HELSINGBORG & MÖLNDAL** - Newly built low-temperature networks
5. **TOPUSKO** – Heat cascading in low-temperature network
6. **TOULON** - Upscaled neutral-temperature network
7. **HEERLEN** – Intra-day storage in neutral-temperature network



Technologies Deployed

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Demo Site	Waste Heat Exploitation	Heat Pumps	District Cooling	Geothermal	Solar	Biofuel	Thermal Energy Storage
Albertslund (DK)	Supermarket						Intra-day
Topusko (CR)	Cascading Heat						
La Seyne Sur Mer (FR)			Free Cooling		PV		
Milano (IT)	Electric Transformer						Intra-day
Helsingborg + Mölndal (SE)	Industrial	Centralised			Thermal		Borehole
Heerlen (NL)							Flooded Mine

Topusko (CR)

- Heat cascading in an existing low-temperature network
- The network exploits high temperature (64°C) geothermal energy from four wells
- Improve efficiency by using hot water to drive adsorption chillers
    - space cooling can be provided to customers during Summer

Helsingborg + Mölndal (SE)

- Newly built low-temperature networks
- Borehole seasonal thermal energy storage system with a centralised heat pump
- Borehole charged by industrial surplus heat and PV-T field
- Network consists of a 4-pipe distribution system that supplies space heating (40°C) and domestic hot water (60°C)
- Mölndal sub-network connected to an existing DH network based on 100% biofuel

Toulon (FR)

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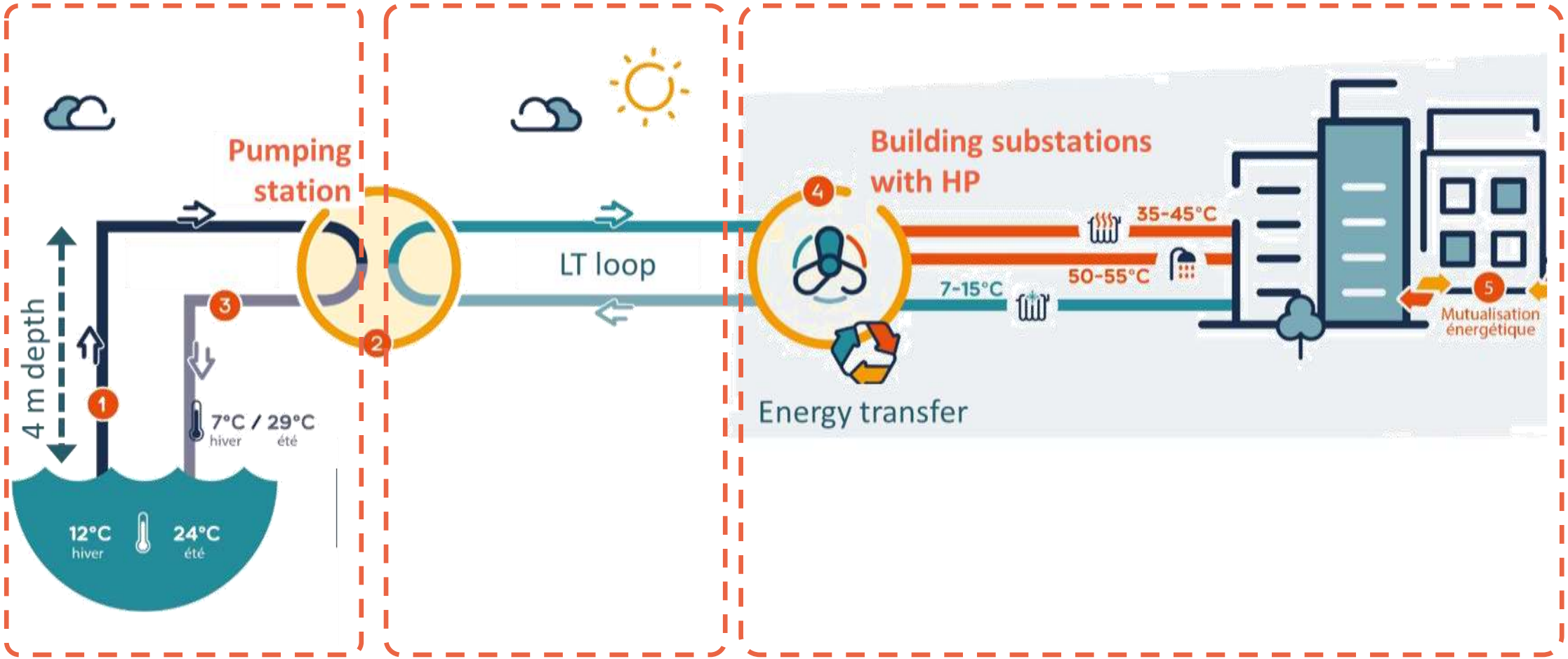
1. Sea water loop
2. Low temperature loop
3. Building level



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Thank you

www.rewardheat.eu

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