LET'S NOT WASTE HEAT!

How to recover and reuse excess heat from urban sources

REUSEHEAT

Co-funded by the Horizon 2020 programme
of the European Union

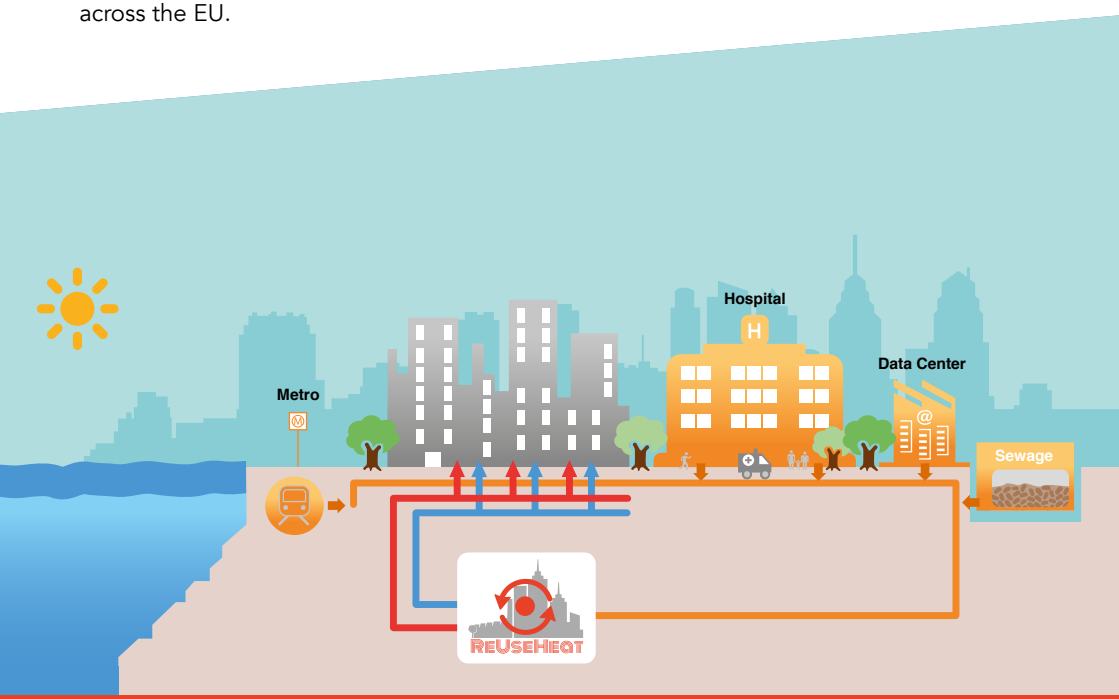
WE WOULD NOT THROW FOOD AWAY, SO WHY WOULD WE WASTE FREELY AVAILABLE HEAT?

There is clearly a lot to be done at European level and beyond on implementing this quite simple philosophy instead of massively importing fossil fuels.

The heat being wasted across Europe could cover 100% of our buildings' needs. District heating and cooling networks can utilise excess heat available from various sources (e.g. thermal power generation, waste-to-energy, industrial waste heat), as well as excess heat from urban facilities. However, only few small-scale examples of urban waste heat recovery are present across the EU.

The objective of **ReUseHeat** is to demonstrate first of their kind advanced, modular and replicable systems enabling the recovery and reuse of excess heat available at the urban level.

ReUseHeat chose to focus on four large-scale demonstrators, showing the technical feasibility and economic viability of excess heat recovery and reuse from **data centres, sewage collectors,** cooling system of a **hospital** and **underground station.**



FACTS & FIGURES

Data centres

The total energy consumption of data centres in Europe was **56 TWh/y** in 2007 and is expected to increase up to **104 TWh/y** in 2020.
A midsize data centre with 1 MW IT load releases **3,700 MWh** thermal energy per year into the atmosphere.
The potential waste heat that could be recovered from data centres in the future amounts to **48 TWh/year.**

Waste water management

More than **84% of EU population** is connected to a sewage network.
5% of total heat demand could be covered with waste heat recovered from sewage systems in urban areas with more than 10,000 inhabitants.
The potential waste heat that could be recovered from sewage systems across the EU is about **150 TWh/year.**

Tertiary buildings: hospitals

There are over 7,000 hospitals in Europe.
Considering a conservative potential waste heat recovery of 450 MWh/year, around **3.3 TWh/year** of waste heat could be captured from the cooling systems of hospitals in urban areas.
This potential can be tripled up to **10 TWh/year** if we take into account other tertiary buildings such as supermarkets, food logistics centres, slaughterhouses.

Underground transport

The EU has 50 medium- and large-sized cities with metro systems, with a total length of **2,800 km** and transporting **31 million** passengers/day.
Waste heat could potentially be recovered from **2,800 stations** across Europe, with an average heat recovery of **0.3-0.5 MW** per underground station.
A total of **6.7-11.2 TWh/year** of waste heat can be recovered at EU level from underground stations.

DEMO SITE – DATA CENTRE

BRUNSWICK (GERMANY)

The district heating network in Brunswick will be expanded to a residential area with approx. 400 housing units, which is currently under development. Just next to this residential area, a data centre is currently built. A data centre has an extensive cooling demand, which in return produces excess heat.

The newly built energy efficient housing area will enable the deployment of a low temperature 4th generation district heating network. The peak heat demand and the base load will be fully covered by the waste heat potential of the data centre. A connection to the existing high temperature district heating network will also be provided, enabling flexibility in the system and demand peak shaving.

Find more information on the technology in Brunswick demo site and heat recovery from data centres on the ReUseHeat website: www.reuseheat.eu.

DEMO SITE – SEWAGE COLLECTOR

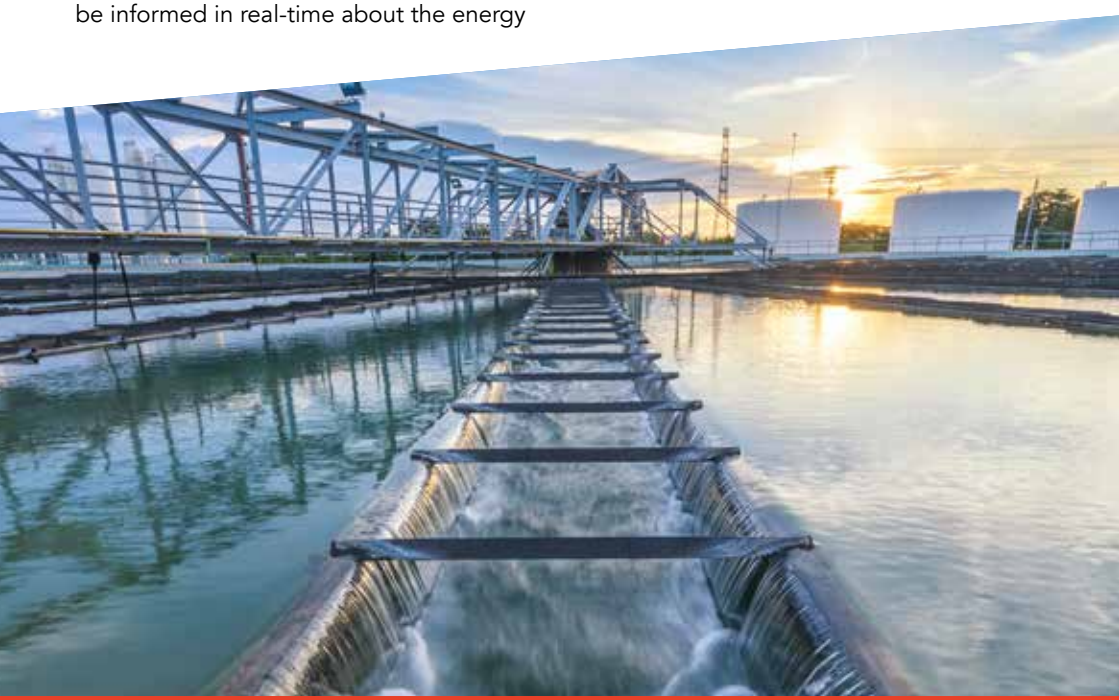
NICE (FRANCE)

Metropolis Nice Côte d'Azur has decided to become a front-runner in sustainability by developing the project "Nice Grand Arenas". ReUseHeat will showcase its innovative waste heat recovery process to serve a neighbourhood through a low temperature (15-25°C) district heating network with waste heat coming from the sewage system.

In order to promote this solution, a Cockpit planner will be set up. This dashboard will gather all real time monitoring data at district level to map all power flux (from heat source to end-users) and CO2 emissions. This will enable inhabitants to be informed in real-time about the energy source they are using.
The control system will be able to provide the following key information:

- Energy balance of the district showing the share of renewable energy
- Source of energy used as a function of time and optimal configuration
- Societal benefits arising from energy solidarity between users

If successful, each waste heat based heating system could be equipped in the future with such a dashboard.



DEMO SITE – HOSPITAL

MADRID (SPAIN)

The Madrid demonstrator is a hospital building. It was chosen because it is a very common urban tertiary building with local district heating and cooling infrastructure and has a great replication potential. Southern European hospitals have high cooling needs during the whole year and, in addition, these kinds of buildings have in general a high thermal energy demand.

The Hospital Universitario La Paz is connected to a local district heating network, supplying buildings with heating and cooling. The demonstrator will recover low temperature heat from the cooling circuit of the water-water electric chillers. The booster heat pump will capture the heat from the outlet water and upgrade it in order to supply it to the district heating system.

Find more information on the new advanced control system of this demo site and heat recovery from tertiary buildings on the ReUseHeat website: www.reuseheat.eu.

DEMO SITE – METRO NETWORK

BUCHAREST (ROMANIA)

In order to ensure thermal comfort for passengers and working staff, waste heat is a concern in underground transport systems. The Bucharest metro operator aims to develop an innovative heating network that can recover the waste heat from the ventilation system of the metro network. The heat will either be used in the Bucharest district heating network or a separate heat supply network. Both the underground platform area and the area around the station will be used for the waste heat recovery.

The waste heat source is the underground ventilation shaft in a station with an air temperature of 15-27°C. Heat pumps will capture this excess heat and then upgrade it to the level needed for district heating (75-90°C). The heat can then be fed directly into the district heating network.

JOIN US IN OUR CAMPAIGN "LET'S NOT WASTE HEAT!"

ReUseHeat partners

Imprint

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Get in touch with us through the project website www.reuseheat.eu and Twitter account @ReUseHeat. Subscribe to the ReUseHeat newsletter!