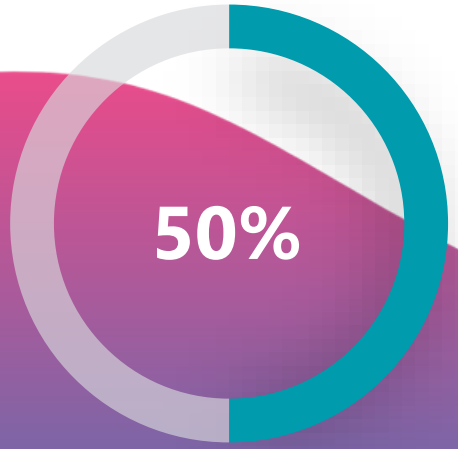
W.E. DISTRICT

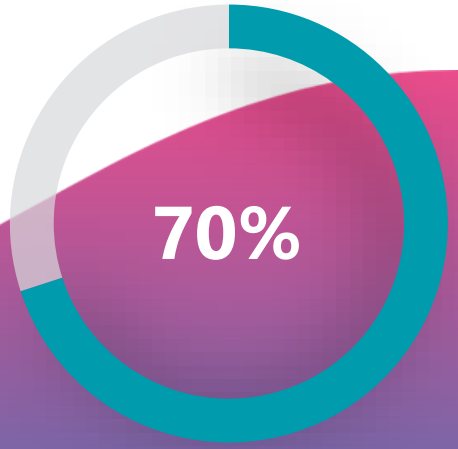
Smart and local reneWable Energy **DISTRICT heating and cooling solutions for sustainable living**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°857801.

Heating and cooling buildings in EU accounts for



Of total energy consumption in EU



Of this energy is generated from fossil fuels

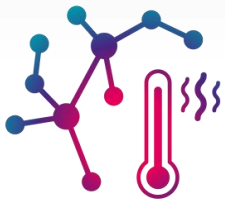
WEDISTRICT goal is

To demonstrate innovative 100% fossil free heating and cooling solutions for new and existing district heating & cooling systems.

WEDISTRICT solutions will integrate

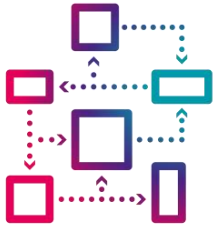
Multiple sources of renewable energy

Data Centres' excess heat



Advanced thermal storage

To redistribute heat to buildings as needed.



IT technologies

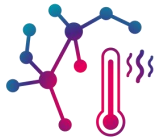
To increase the operational efficiency of the systems

WEDISTRICT **technologies**

Solar
Technologies

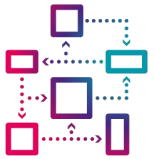
Data centre heat
waste recovery

Biomass
technologies

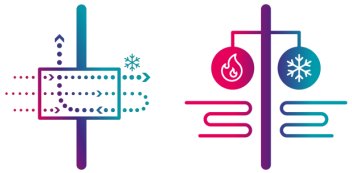


Energy
storage

Hybridation PV-Geothermal Energy



ICT
system



Cooling from renewable energy sources

Solar Technologies

- **Parabolic Through Collector**
- **Fresnel**
- **Low concentration flat collector**

The project will demonstrate solar thermal as a cost-effective solution. To do this, it will investigate various technologies for large-scale collectors and advanced hydraulic concepts designed for huge arrays.

Biomass technology

- **Low pollution-biomass boiler**

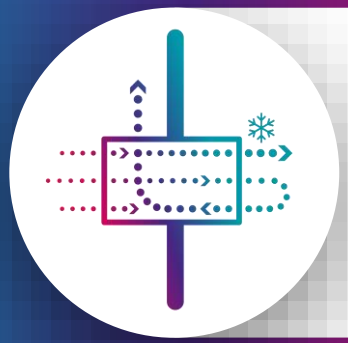
To further reduce the emissions, Selective Non-Catalytic Reduction and Selective Catalytic Reduction techniques will be tested.

PV-Geothermal Energy

- **Hybrid solar geothermal district heating system**

To increase energy efficiency and reduce costs of individual components, a system will be designed, which integrates

- Photovoltaic (PV) panels,
- Ground-source heat pump,
- Buffer tank storage technologies,
- Borehole heat exchangers for passive cooling.



Cooling from renewable energy sources

- **Air cooling unit based on renewable energy**

The project aims to create an innovative and versatile cooling technology able to produce cooled air using diverse sources of renewable heat. This technology should be compatible with any kind of district heating system (even working at very low temperature) to enable universal replication.

Cooling from renewable energy sources

- **Advanced absorption chiller with internal heat recovery**

The goal is to enhance the performance of the absorption chiller by means of internal heat recovery. If successful, this technology will allow combined district heating and cooling in a single infrastructure development, which would deliver higher efficiency and be viable for large-scale implementation.

Data centre
heat waste recovery

- **Recovery of waste heat with fuel cells**

The fuel cells will generate electricity, which will be used to power the data centre.

The excess heat will be supplied to the local district heating and cooling grid.

Energy **storage**

- **Molten Salts-based thermal energy storage**

A thermal energy storage system based on molten salts will be integrated into a district heating and cooling system.

As molten salts have a massive storage density, the volume of the storage tanks can be reduced by up to 20 times compared to other storage technologies. This means lower installation costs.

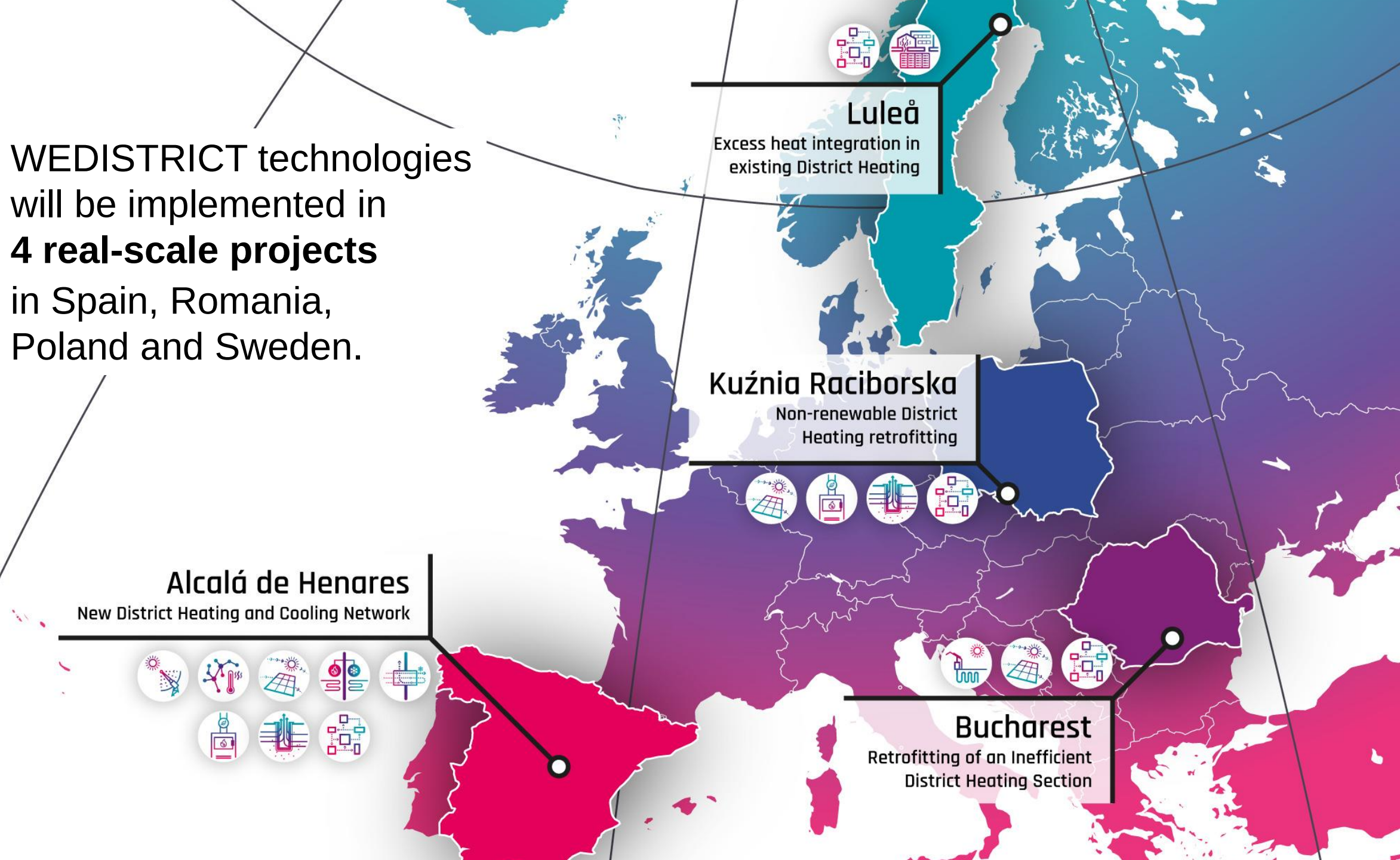
Molten salt tanks can also act as boilers, avoiding the use of fossil fuel boilers to cover demand peaks.

ICT system

- **Self-correcting intelligent district heating and cooling management system**

For the first time, the following will be tested in the district heating and cooling networks: machine learning for demand prediction, artificial intelligence for management support, SmartSCADA with GIS maps and automatisation of procedures.

WEDISTRICT technologies will be implemented in **4 real-scale projects** in Spain, Romania, Poland and Sweden.



Demonstration site

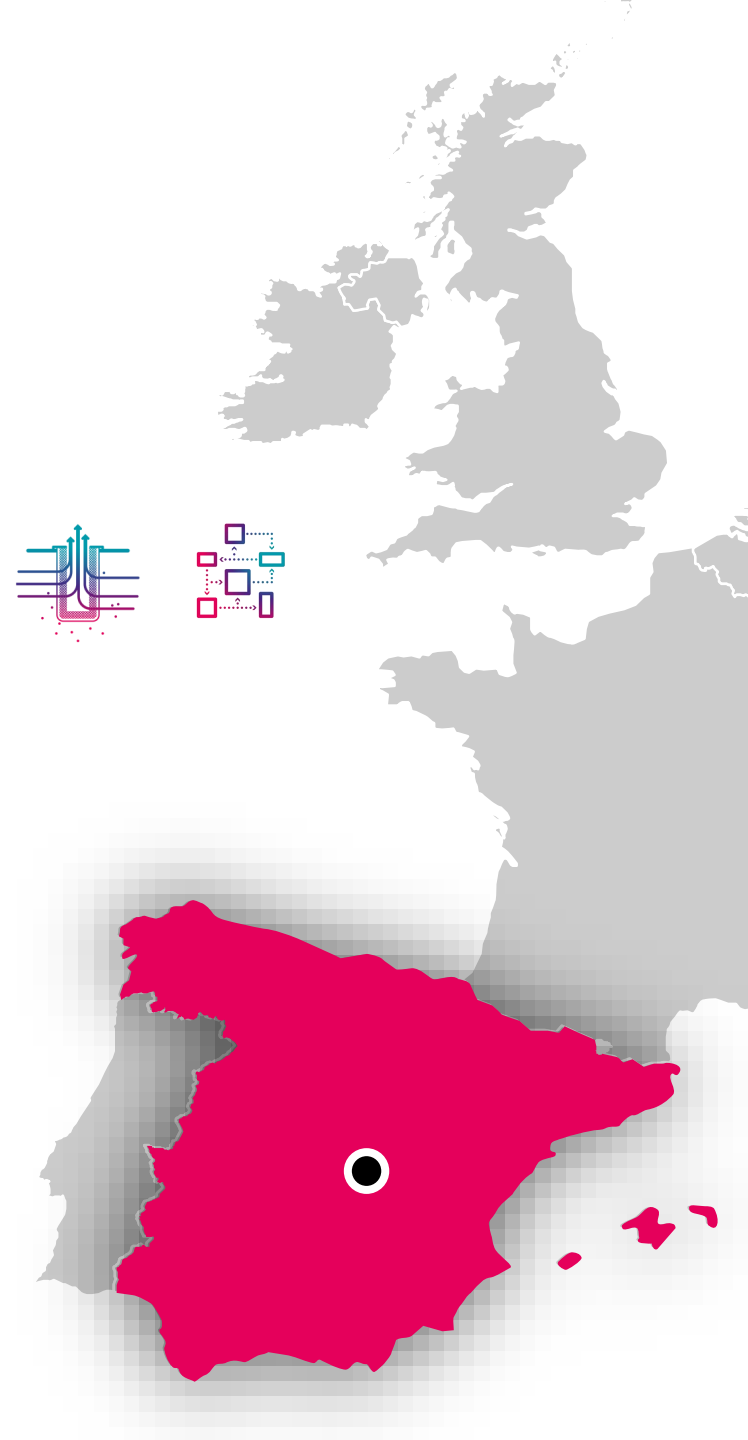
Alcalá de Henares (Spain)

Climate zone: Southern European Weather

New district heating and cooling network

TECHNOLOGIES PLANNED:

- **Concentration Solar Collectors:** 3 fields with 3 different technologies: CSP, Fresnel and Concentrated Flat Plate
- **Solar cooling:** 1 air cooling unit installed in the office of the central station and 1 advanced absorption chiller for district cooling supply. Additionally, a conventional absorption chiller will cover the remaining cooling needs for the district cooling
- **Thermal storage:** 1 thermocline molten salts storage and 1 water tank
- **High efficiency low emissions biomass boiler:** 1 biomass boiler and improving air filters for air pollutants reduction



Demonstration site

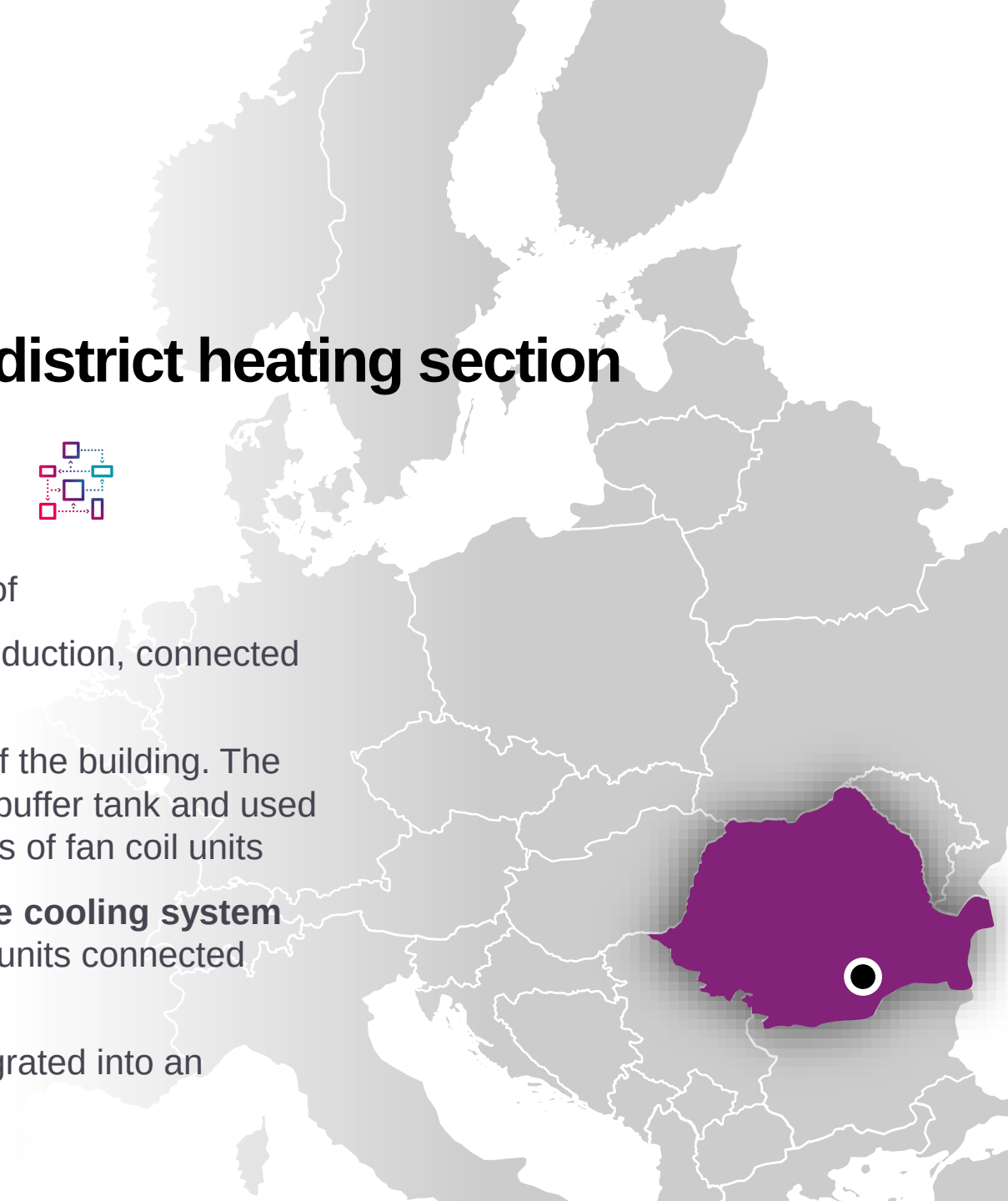
Bucharest (Romania)

Climate zone: Central European Weather

Retrofitting of an inefficient district heating section

TECHNOLOGIES PLANNED:

- **Photovoltaic panels** installed on the building roof
- **Solar thermal panels** for domestic hot water production, connected to the buffer tank
- **Geothermal heat pump** to provide the heating of the building. The heat produced by the heat pump is stored in the buffer tank and used depending on needs to heat the spaces by means of fan coil units
- The cooling demand will be assured by a **passive cooling system** using the borehole heat exchangers and fan coil units connected through a heat exchanger
- The equipment operation and control will be integrated into an **intelligent energy management system**



Demonstration site

Kuźnia-Raciborska (Poland)

Climate zone: Central European Weather

Non-renewable district heating retrofitting

TECHNOLOGIES PLANNED:

- **Biomass boilers and solar panels installation** that will power the heat pump as main suppliers
- Joined with a **thermal storage system** for facilitating the possible extra heat obtained in summer period, reaching over 50% of thermal needs
- Extraordinary electricity surplus would be directed directly to the external power grid if necessary, fulfilling the prosumer concept

Demonstration site

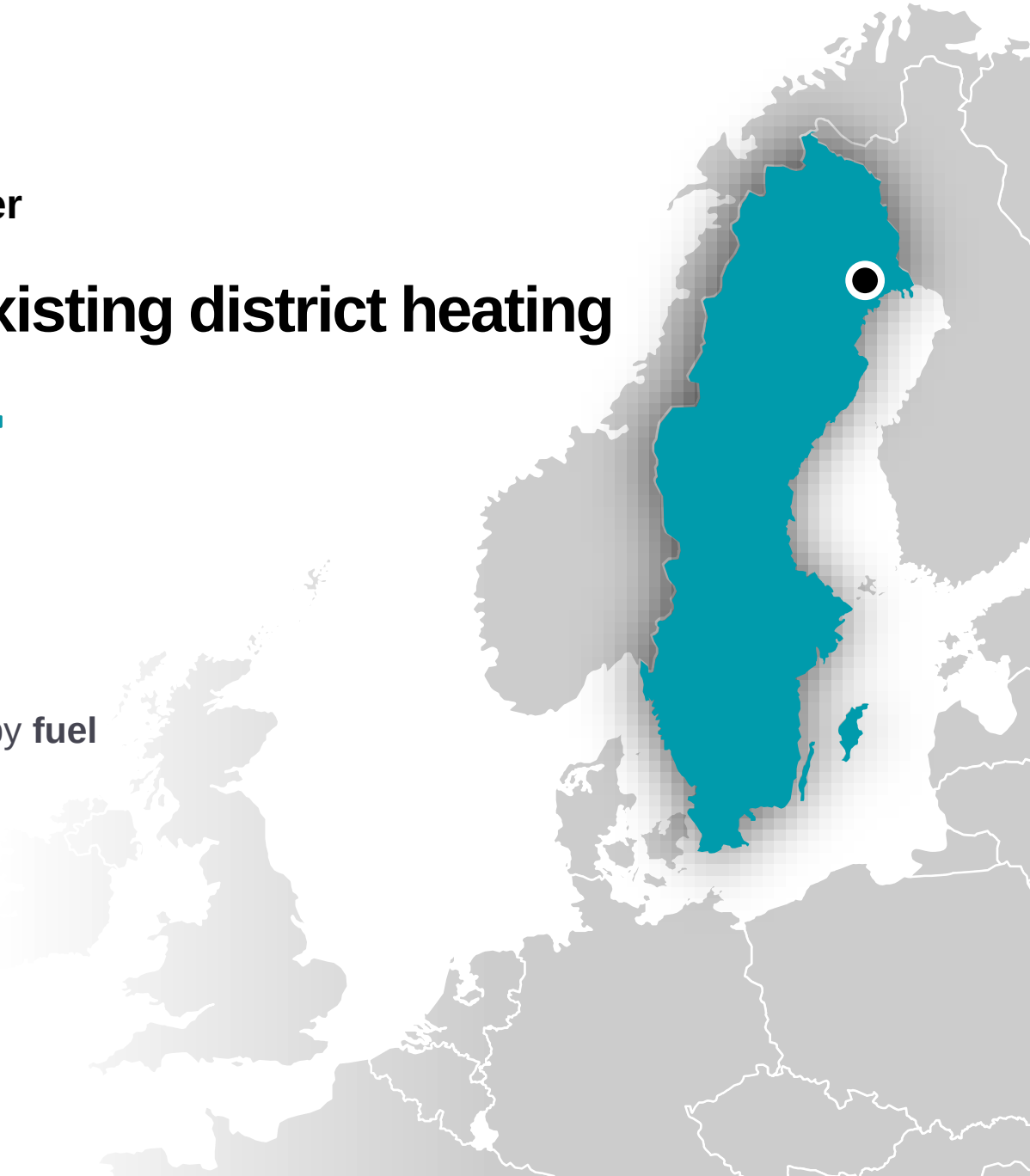
LULEÅ (Sweden)

Climate zone: Northern European Weather

Excess heat integration in existing district heating

TECHNOLOGIES PLANNED:

- The **excess heat from the data centres** will be recovered by liquid cooling technology
- The excess heat will be boosted to temperatures suitable for supplying the Luleå's district heating by **fuel cell technology**.



WEDISTRICT
Main data

EU Funding:

14.972.852,64 €

Start:

Oct. 2019

End:

March 2023

21 Partners

9 Countries

4 Demosites

10 Technologies developed

Our Partners

Thank you for your attention!

W.E. DISTRICT

Heating & cooling solutions

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