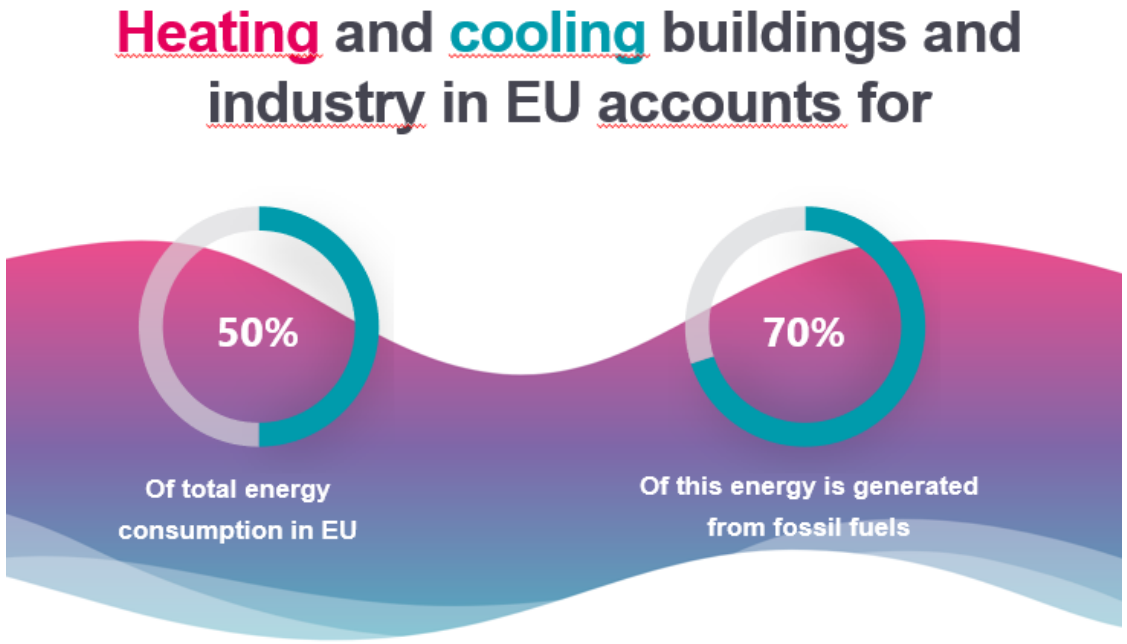
W.E. DISTRICT

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.

WEDISTRICT goal is



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

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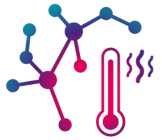
WEDISTRICT **technologies**

3 Different Solar Technologies

Data centre heat waste recovery

Low emissions Biomass technology

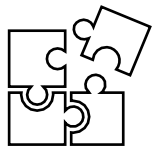


Molten salts Energy **storage**

Hybridation PV-Geothermal Energy

Advanced ICT system

2 different Cooling from renewable energy sources



Other **conventional technologies**

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Solar Technologies

- **Parabolic Trough Collector**
- **Fresnel Panel**
- **Tracking Concentrator for Fixed Tilt 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.

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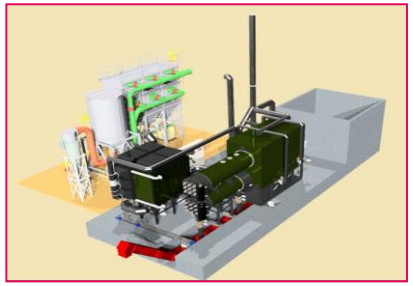
Biomass technology



- **Low pollution-biomass boiler**

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

2 different boilers design will be developed within the project for being adapted to each demosite conditions:

- High temperature low-emissions biomass boiler
- Full containerized biomass system

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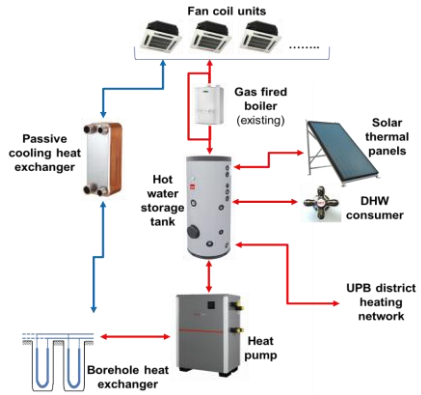
PV-Geothermal Energy



- **Hybrid solar geothermal district heating system**

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

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

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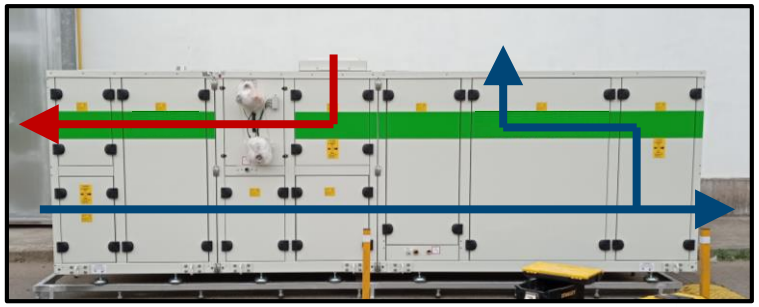
Cooling from RES



- **Air cooling unit based on renewable energy (RACU)**

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.

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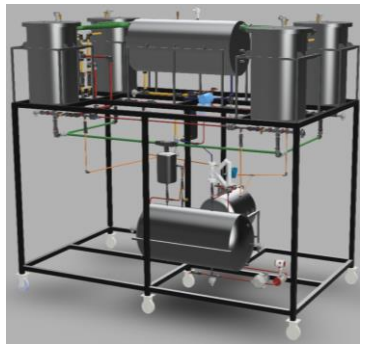
Cooling from RES



- **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.

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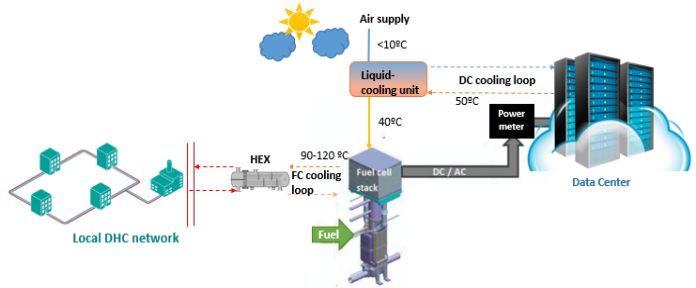
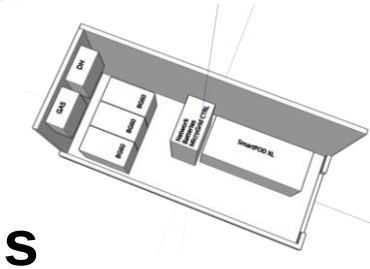
Data centre
heat waste recovery





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

Data centre will recover waste heat through the integration of fuel cells. These fuel cells can raise the temperature of waste heat, which makes this system adaptable to a wide number of district heating and cooling networks.

As part of the process, the fuel cells will generate electricity, which will be used to power the data centre while the excess heat will be supplied to the local district heating network.

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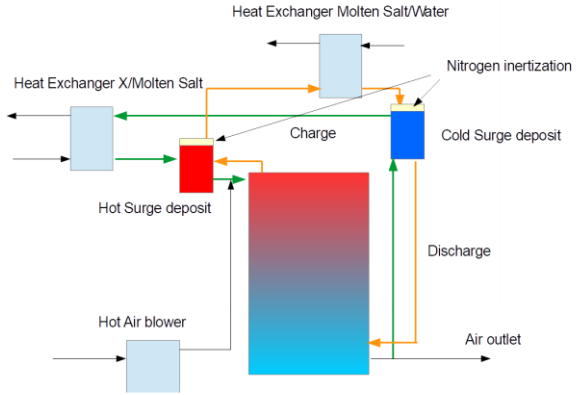
Energy **storage**



- **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.

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Conventional technologies

- **Conventional high efficiency technologies integration with WEDISTRICT systems**

Other non-innovative market technologies will be optimally integrated in the different demosites:

- Absorption chiller
- Water storage
- Heat pump
- PV panels

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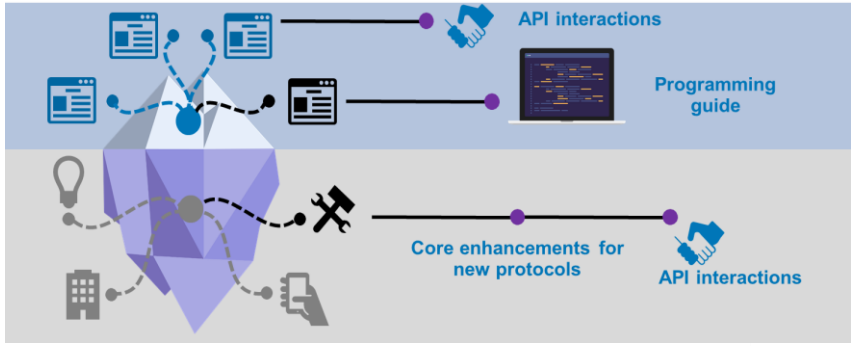
ICT system



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

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.

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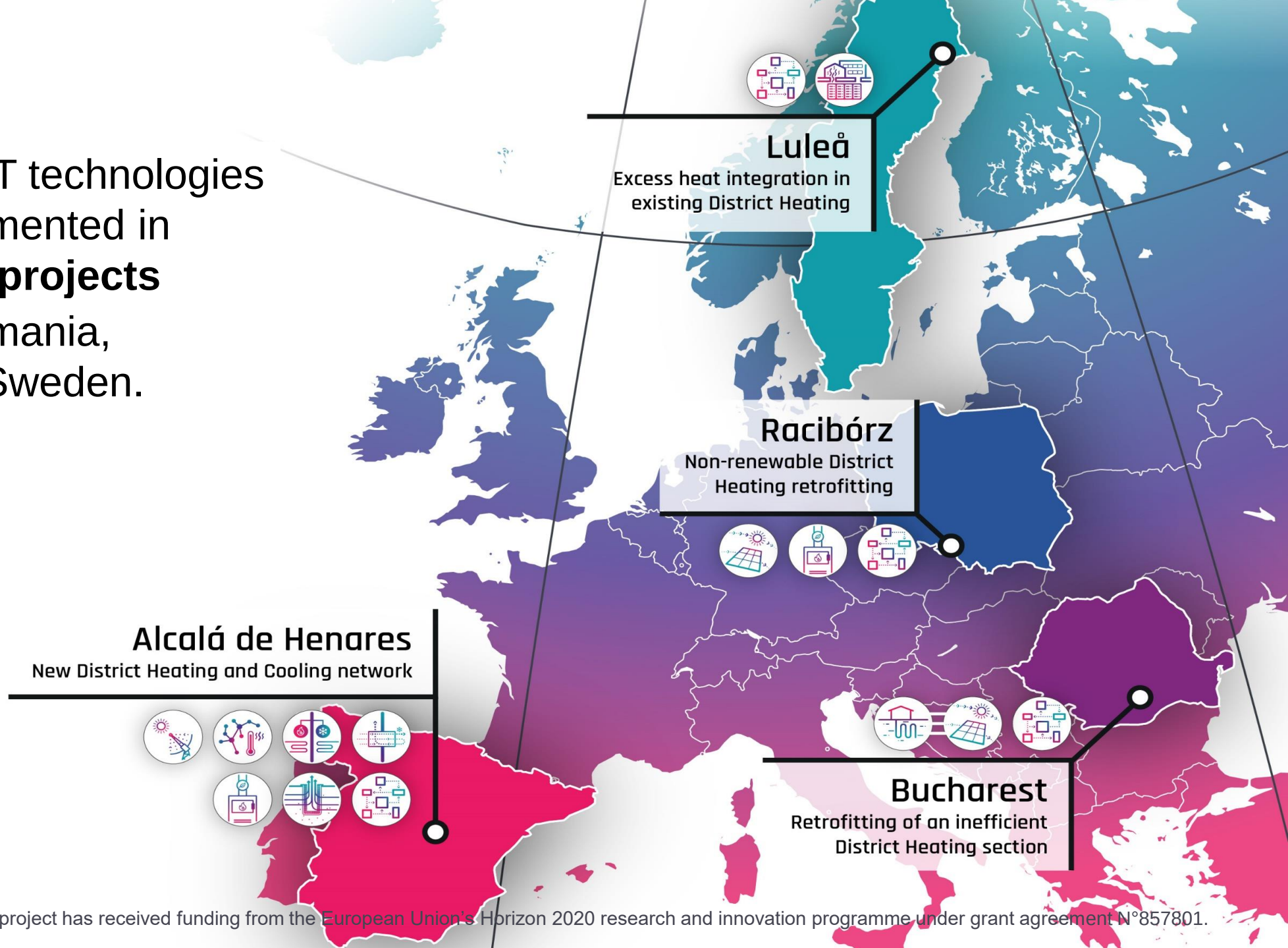
WEDISTRICT technologies will be implemented in **4 real-scale projects** in Spain, Romania, Poland and Sweden.



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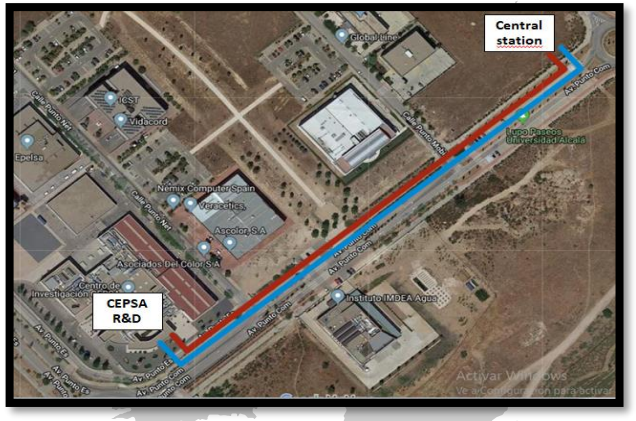
Demonstration site

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: PTC, Fresnel and Tracking Concentrator for Fixed Tilt
- **Solar cooling:** 1 air cooling unit installed in CEPSA building 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

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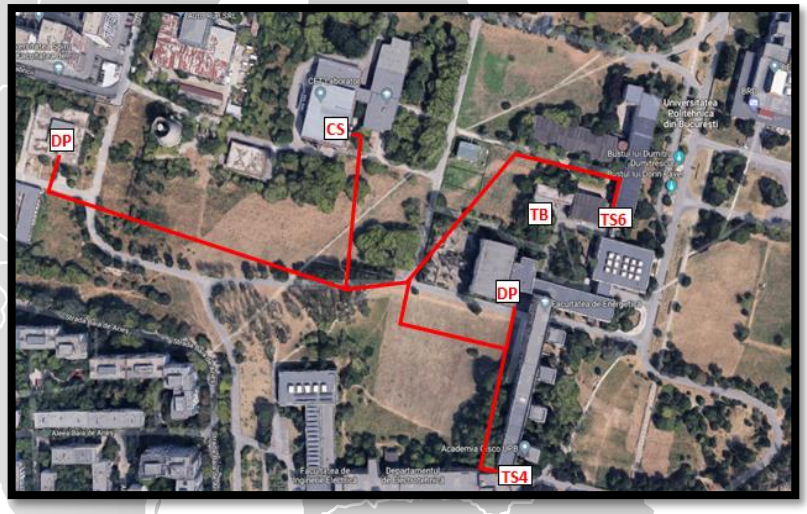
Demonstration site

Bucharest (Romania)

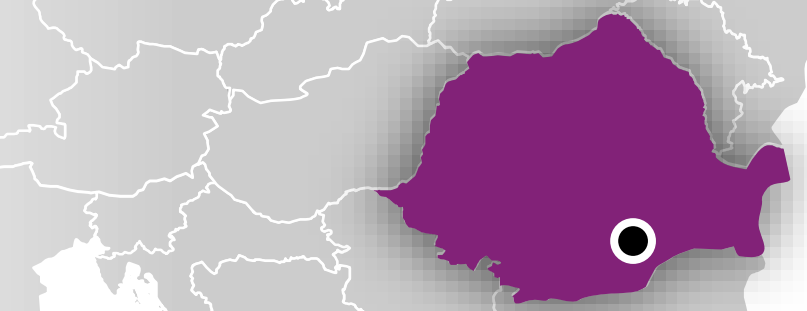
Climate zone: Central European Weather



Retrofitting of an inefficient district heating section

TECHNOLOGIES PLANNED:

- **Photovoltaic panels** installed on the building roof
- **Hybrid Solar photovoltaic and 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 and active cooling systems** using the borehole heat exchangers and fan coil units connected through a heat exchanger



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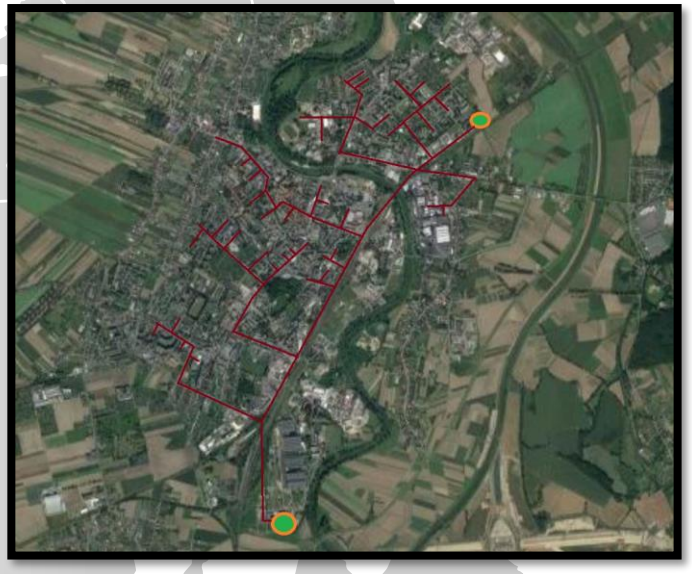
Demonstration site

Racibórz (Poland)

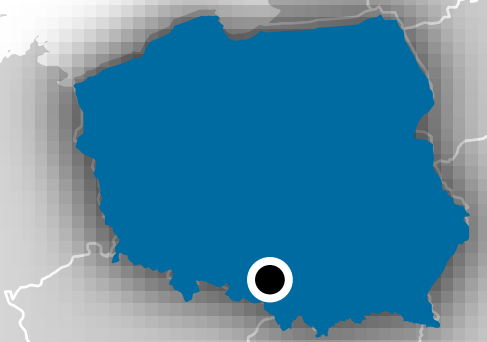
Climate zone: Central European Weather



Non-renewable district heating retrofitting

TECHNOLOGIES PLANNED:

- **Biomass boilers and PV solar panels installation** that will power a heat pump for DHW
- Joined with a **thermal storage system** for facilitating the possible extra heat obtained in summer period, reaching over 100% of thermal needs
- Extraordinary electricity surplus would be directed directly to the external power grid if necessary.



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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 in a first step.
- The excess heat from the liquid cooling will be boosted to temperatures suitable for supplying the Luleå's district heating by **fuel cell technology** fed by hydrogen or biogas.
- Electricity generated will fed the own data center.

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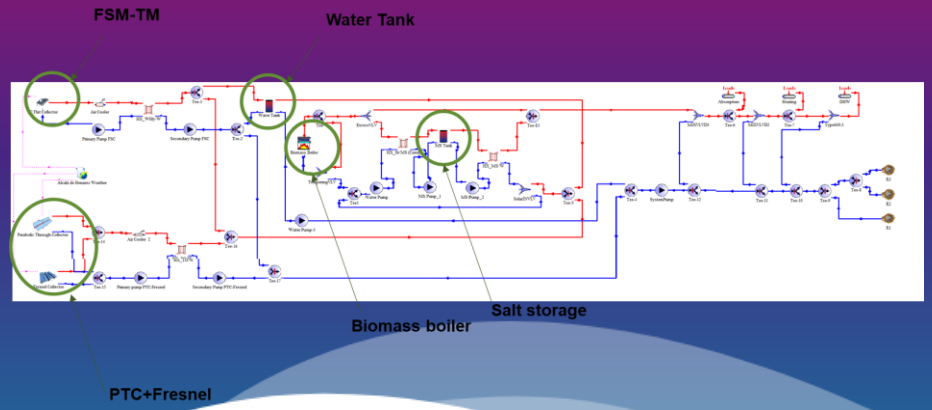
WEDISTRICT Replication Simulation Activity



A set of virtual demos selected from the identification of potential **demo-followers** will be simulated by the WEDISTRICT Simulation Working Group and different scenarios with technologies developed within the project will be integrated in order to evaluate the **most cost-effective system** for each particular demo follower.

The main objective of the activity is to **improve the current system by integrating renewable energy solutions** and demonstrate **WEDISTRICT replicability from 3rd to 5th GDHC**.

	Demo-Follower	Country
1	Alcalá extension	Spain
2	Focsani	Romania
3	Parc de l'Alba	Spain
4	Cyprus university	Cyprus
5	SeiMilano	Italy
6	UPM campus	Spain
7	Luban	Poland
8	Valladolid	Spain
9	Żyrardów (2)	Poland
10	Canary Islands	Spain
11	Chile	Chile

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WEDISTRICT expected main results

100% renewable district heating and cooling systems

A portfolio of replicable solutions for DHC systems

Higher public acceptance of DHC systems

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WEDISTRICT
Main data

EU Funding:

14.972.852,64 €

Start:

Oct. 2019

End:

March 2023

22 Partners

9 Countries

4 Demosites

10 Technologies developed

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W.E. DISTRICT

Heating & cooling solutions

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Our Partners

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Thank you for your attention!

María Victoria Cambronero Vázquez

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