



Demonstration site: Córdoba (Spain)

New renewable district heating and cooling network



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The new renewable District Heating and Cooling (DHC) Network in Cordoba (Spain) covers the energy heating and cooling demand of several buildings at the Rabanales Campus of University of Cordoba (UCO): Da Vinci Building (zones I, II and III) and Monte Cronos Sports stadium (changing rooms).

This demo site combines three different solar technologies solutions to cover the heating demand of buildings, as well as the cooling demand through absorption

chillers and a Renewable Air-Cooling Unit (RACU) prototype.

Furthermore, due to availability of local biomass sources, biomass boilers are also part of the technological design.

An intelligent energy management system (advanced digitalisation platform) supervises and controls the 100% renewable energy production, storage, transformation and distribution in this new DHC Pilot Plant.



Solar thermal technologies

- PTC, Parabolic Trough Collector
- LFC, Linear Fresnel Collector
- TC-FTC, Tracking Concentrator for Fixed Tilt solar thermal Collectors



Biomass technologies

- Biomass boilers with improved air filters for reducing air pollutants (E-filter)



Cooling from renewable energy sources

- Conventional absorption chiller
- Advanced absorption chiller
- RACU, Renewable Air-Cooling Unit

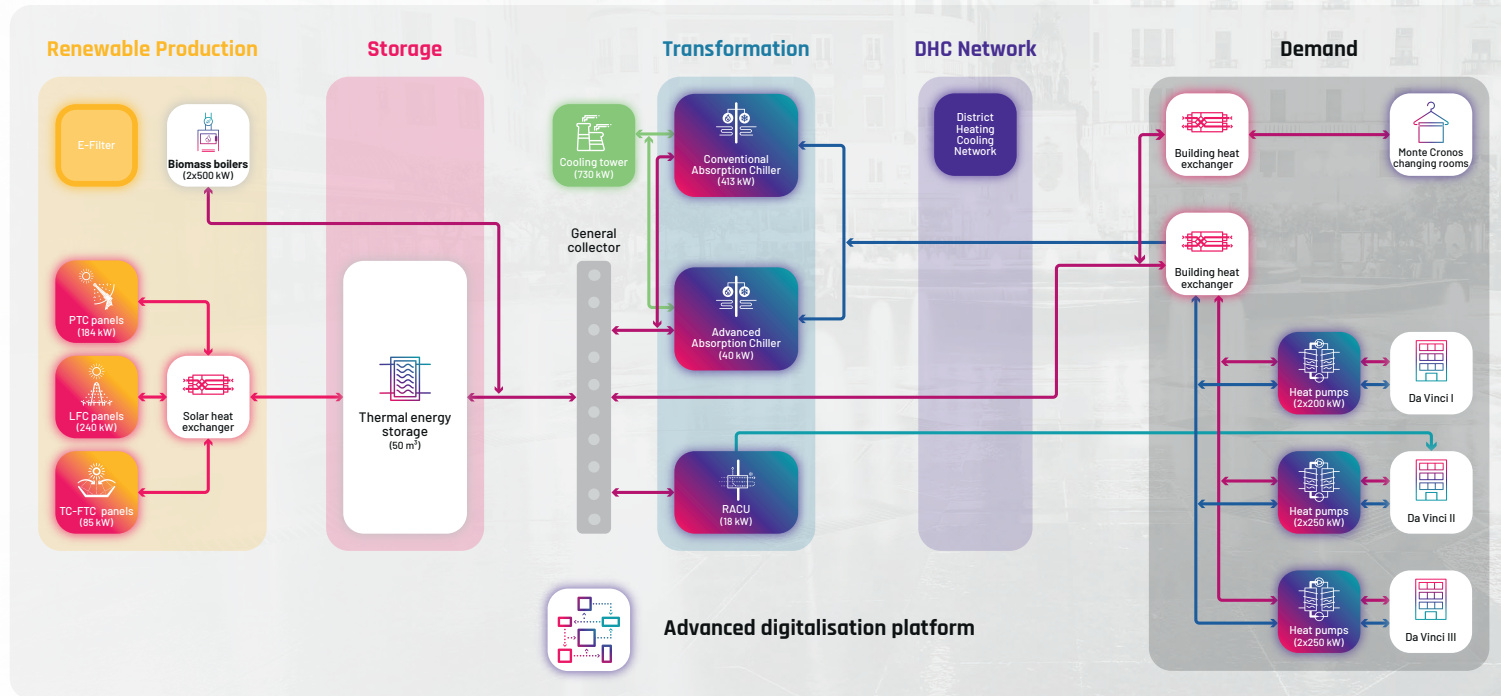


Intelligent energy management system

- Advanced digitalisation platform

Demo-Site Block Diagram

New District Heating and Cooling Network at University of Córdoba



Objective

The objective of this new demo site is to demonstrate renewable DHC as an integrated solution through the combination of renewable energy sources (RES), thermal energy storage (TES) and advanced technologies to satisfy 100% of the heating and cooling energy demand in different buildings.

Advantages

- heating and cooling of buildings with zero emissions
- fossil free district heating and cooling
- replicable, scalable and flexible
- sustainable energy services for the university community
- open-source SCADA and advanced digitalization management platform

Local Coordinators

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New Renewable Technologies

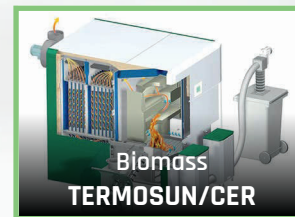
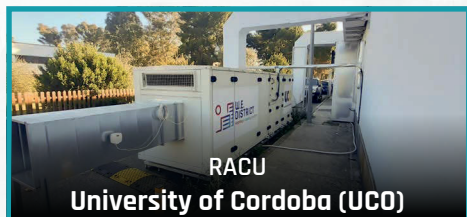


Three different types of solar collectors (PTC, LFC and TC-FTC) are used and tested for the generation of thermal energy. Spain is one of the most attractive countries in Europe for developing solar energy due to the amount of solar radiation available. This makes solar technologies a promising solution to cover the heating and cooling demand of buildings.



The advanced absorption chiller converts hot water coming from the district network into cold water. Its energy efficiency and compactness are higher than that of a conventional absorption chiller.

The RACU prototype is mainly composed of an indirect evaporative cooler and a desiccant wheel. This system can independently control the indoor air temperature, humidity, and CO₂ concentration, with low electrical consumption.



Two biomass boilers are also used and tested for thermal energy generation in this new district network. Due to the availability of local biomass sources, these hot water boilers are also part of the technological design.

The biomass comes from the local olive oil industry in Cordoba and Andalusia (olive chips, olive stone and even olive pomace), also fruit shells (almonds, walnuts, etc.) and usual wood chips.



Advanced supervision and control of this new DHC network - from the acquisition of data of the different technologies to the presentation of information to the end users.

Renewable Thermal Production

- Three solar thermal technologies:
 - PTC (184 kW)
 - LFC (240 kW)
 - TC-FTC (85 kW)
- Two biomass boilers with E-filters (2x500 kW)

Thermal Energy Storage

- Thermal energy storage (50 m³)

Transformation

- Conventional Absorption Chiller (413 kW)
- Advanced Absorption Chiller (40 kW)
- RACU (18 kW)

DHC Network

- Renewable heating and cooling distribution
- Demand of different types of buildings:
 1. Da Vinci (zone 1)
 2. Da Vinci (zone 2)
 3. Da Vinci (zone 3)
 4. Monte Cronos Sports stadium (changing rooms)

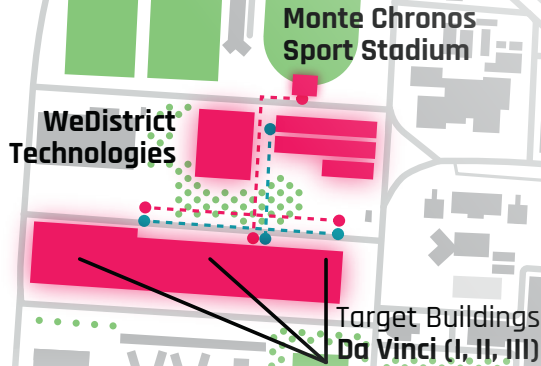
Advanced digitalisation platform

- Supervision and control of DHC network

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