PROJECT PROFILE

Industry

MADRID PLANT DECARBONISATION

KEY DESIGN FACTORS

- ***Characterising the heating and cooling demand***
- ***Defining the required temperatures***
- ***Analysing the available area and other constraints of the installation***
- ***Establishing the control strategy***

BENEFITS OF THE PROPOSED SOLUTION

SUSTAINABLE: *The heat pumps enable fuel consumption to be minimised.*

INTEGRABLE: *The incorporation of heat pump units relies on correct design, with attention paid to every detail.*

SCALABLE: *Units can be added as required.*

RELIABLE: *The technology used in these units is the product of years of experience.*

Traditional hydronic system replaced with heat pumps

The current context and commitments to reduce greenhouse gases to mitigate the impact of climate change is one of the biggest challenges facing the industry in Spain. Increasing energy efficiency in heating and cooling generation, integrating renewable energies and reducing the consumption of fossil fuels will help to reduce the environmental impact of these systems and make our industries more competitive.

In this case study, an equipment manufacturer successfully decarbonised the heating and refrigeration system at its Madrid plant, by incorporating air-to-water heat pump units.

The project aimed to reduce the installation's environmental impact and associated energy costs, and eliminate the need to use fossil fuels.

This action reduced the system's energy consumption and CO_2 emissions, (both direct and indirect), and minimised the facility's operating costs.

Importance of temperature control

STUDY OF THE EXISTING SYSTEM

The original installation had two chillers with air-cooled condensers and screw compressors for cooling, and three natural gas boilers for heating. These units supplied hot and cold water to the air handling units and fan-coil terminal units used to air-condition the company's plant and office buildings.

A monitoring system also provides information on the energy demand and energy consumption of both systems. In this way, it will be possible to adjust the heat capacity of the proposed system and calculate the energy saving obtained.

PROPOSED SOLUTION

The proposed solution includes four AquaSnap® heat pump units with air-cooled condensers and scroll compressors, with R32 refrigerant. These units will cover the needs of the hot and cold water system throughout its operating period.

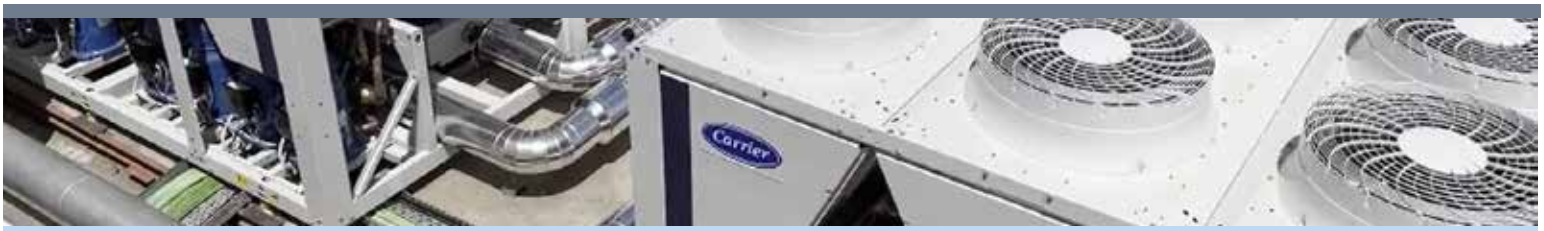
Electrification of Heating and Cooling

Along with energy efficiency and new refrigerants, electrification of heating and cooling is key to reducing the environmental impact of industry. Using heat pumps makes it possible to replace fossil-fuelled equipment with units that use electricity as an energy source. It is important to ensure that the right technology is chosen to meet the needs of the installation by reviewing the most important factors:

• **Map of operations:** Firstly, it is necessary to check the outdoor temperature ranges where the unit can operate; secondly, it must be ensured that the hot and cold water temperatures required by the installation can be generated.

• **Adaptability:** The heat pump units can be configured with options and accessories to increase their energy efficiency or to simplify installation or maintenance.

• **Reliability:** Optimum reliability is guaranteed thanks to our experience in manufacturing this technology, the use of specialised laboratories and performance of factory acceptance tests before the equipment is delivered for on-site installation.



The road to decarbonisation

Cooling and heating installations account for a high percentage of the total energy consumption in industry. Different strategies exist to help make these systems more sustainable, understanding the specifics of each industry and focussing on delivering customised solutions, to apply the technology currently available in the most effective way.

Some of the most effective strategies include: increasing energy efficiency, using renewable heat pumps, utilising all available heat sources, taking advantage of outdoor conditions for free cooling, establishing proper maintenance and designing advanced management systems.

To guarantee success in a decarbonisation project, a working methodology must be defined to gather as much data as possible, to simulate the proposed energy-saving measures and make the decision with the best information available.

• **IDENTIFYING THE NEEDS AND OBJECTIVES:** The project requirements are evaluated, working with the installation's technical supervisors.

• **CHARACTERISING THE HEAT DEMAND:** Different methodologies are used to help provide more information to determine performance.

• **PROPOSING ENERGY-SAVING MEASURES:** Various energy-saving solutions are proposed using the energy simulation tools available.

• **CHOOSING THE BEST ALTERNATIVES:** The solutions which best meet the objectives are chosen by analysing the key indicators (savings, efficiency and return on investment).

• **INTEGRATING THE CHOSEN SOLUTIONS:** The installation phase is key to maximising the results obtained from the project.

• **FOLLOW-UP, MONITORING AND MAINTENANCE:** To check that targets are met in terms of reduced energy consumption and CO_2 emissions.