A smart Heat Pump for large diffusion in renovation

by Gianandrea Masserdotti
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Evolution through innovation
Born in 2003 as a R&D center, **INNOVA** has evolved into a complete sales and manufacturing company since 2011.
Main product lines
Monobloc aircons
Air treatment units
Heat recovery from waste water
New products
Our facilities
Showroom / Training room
Manufacturing
EU research project
The first Natural refrigerant Air-Air heat pump without external unit
Purpose of the project

To demonstrate

- technical feasibility
- reliability and safety
- commercial feasibility

an innovative monobloc air-to-air heat pump for residential application that uses natural refrigerant

Duration of the project
start: 01/07/2018 - end: 30/06/2021
Project partner
Objectives of the project

Double duct heat pump Natural refrigerant

Reduction of the environmental impact

nZero GWP

Hermetic refrigeration circuit

Monobloc system with hermetic refrigeration circuit

It is NOT a split system that must be connected during installation with possible losses

Being monobloc, the quantities of refrigerant are reduced

Without outdoor unit

No aesthetic impact

Ideal for urban centers
Advantages

**SIMPLE**
it can be easily installed even by inexperienced operators, without aesthetic impact

**SAFE**
Natural refrigerant in low quantities, hermetic circuit

**EFFICIENT**
is a heat pump that uses renewable energy, it does not emit CO₂
Advantages

It is the ideal solution for the **Decarb Heating and Cooling** in existing homes.

In renovations, the use of the air / water heat pump to replace the boiler is sometimes difficult, complex and expensive.

The project leads to a product that can find one **strong diffusion** and application because of **simple installation**.

In redevelopment, it can be used as an integration to an existing system, covering also a predominant share of the overall energy needs for comfort.
### Example of reducing the environmental impact

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2021 - 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Innova DD-AC new refrigerant q.ty</strong></td>
<td>4,000</td>
<td>15,000</td>
<td>30,000</td>
<td><strong>49,000</strong></td>
</tr>
<tr>
<td><strong>ton CO2 eq using R32</strong></td>
<td>1,616</td>
<td>6,062</td>
<td>12,124</td>
<td><strong>19,803</strong></td>
</tr>
<tr>
<td><strong>ton CO2 eq using R290</strong></td>
<td>1.80</td>
<td>6.75</td>
<td>13.50</td>
<td><strong>22.05</strong></td>
</tr>
<tr>
<td><strong>annual saving ton CO2 eq on INNOVA production</strong></td>
<td>- 1,615</td>
<td>- 6,055</td>
<td>- 12,111</td>
<td><strong>- 19,781</strong></td>
</tr>
</tbody>
</table>
Diffusion potential

ZEROGWP has huge perspectives of replicability across the EU and also around the world. The global air conditioning market is growing rapidly with population growth, urbanization and electrification and rising incomes (Fig B3.1.2).

Its application is not only related to cooling but can find a strong application like integration heating in existing systems.

ZEROGWP aims to demonstrate that it is possible to replace HFC refrigerants with HC using a new technological approach.
Technical details of the product

**NO OUTDOOR UNIT**

Only two 162mm holes

DC Inverter compressor
- it modulates the power capacity on the real necessity, guaranteeing an ideal temperature level and increasing the energy efficiency

Quiet operation
- Super silent speed 2.0 12HP
  - 27dB(A) @ 1 mt

Controllable in several ways

**VERSIONS**

- **HORIZONTAL & VERTICAL**
- **2.0+FCU:** WITH ADDITIONAL FAN COIL FOR RADIATOR REPLACEMENT
- **WATER SOURCE VERSION**
Case history 1

The Meridian Cove | Vancouver

Decentralized, through-wall Air Conditioner & Heat Pump with integrated fan coil

Constructed in 1991, the Meridian Cove is an 11 storey, 125 unit, concrete frame residential building in Vancouver’s Fairview neighbourhood. Like many condos, the south and west facing units in particular require cooling during the summer; by contrast, the north and east facing units are hard to keep warm in the winter.

For this project was chosen the .2.0, a combined air conditioning and heat pump unit that can cool rooms in the summer, heat them in the winter, and dehumidify all year round. The heat pump air conditioners is a unique through the wall product that functions without the need of an outdoor compressor unit, thereby saving money on installation costs.

Mounted on an exterior wall, the INNOVA .2.0 simply requires two duct holes of 162 mm each (6.4 in). To minimize their aesthetic appearance, the duct holes are disguised with vent covers that are available in many different styles and colours to fit the building exterior.

For this type of installation, the following models have been chosen:
- .2.0 + FCU with integrated fancoil
- .2.0 Elec with integrated electric heater
- .3.0 condensation vaporizer

The option .2.0+FCU integrates in one single body both an air-conditioning system for summer cooling and winter heating, and a fancoil for winter heating with hot plant water.

The option .2.0 Elec includes an integrated electrical heater for colder climates or in applications where the floor area exceeds 700 m². In this version, the heat pump is integrated with a 1 kW
"We are very satisfied with the Innova 2.0 units, both for their aesthetics, for their performance, and for their ease of control: in fact, thanks to the integrated touch screen controls, the air conditioners can be easily programmed by our guests."

David Munson – director of the Whittlebury Hall Conference, Training Center and Hotel
Case history 2

Whittlebury Hall Hotel – Silverstone

Located near Silverstone the prestigious Whittlebury Hall Conference, Training Center and Hotel offers its guests, in addition to 5 “Executive” suites, 50 “Club” rooms and 159 “Standard” rooms, ample space for leisure and a wide range of modern facilities for catering and for the management of corporate events, conferences, exhibitions and training courses.

On the occasion of its recent renovation, the design team chose to replace the heating system of the existing rooms with heat pump air conditioners without external unit 2.0 of INNOVA.

The heat pump air conditioners have been chosen for their great potential in upgrading the energy efficiency of existing buildings thanks to their simplicity of installation, the safety of the hermetic refrigeration circuit, the high energy savings, the significant improvement in real and perceived comfort and the integrated dehumidification and summer cooling functions.

INNOVA 2.0, which brings together in one body (inside) the evaporating part and the condensing part, usually divided into two distinct units (one internal and one external) and is connected to the outside exclusively through two discrete holes of 162 mm in diameter, allowed to fully comply with all the architectural and aesthetic requirements indicated by the Whittlebury Hall, such as the perfect cleaning of the facades, made possible also by the possibility of painting the external grids of the same dark red color as the exposed bricks.

The INNOVA heat pump air conditioners without outdoor unit 2.0 have proved to be very fast to install and this feature has allowed the installation of air conditioners during the day in the absence of guests, proving decisive to avoid inevitable “room down” that would have caused severe economic and image damage to the structure.

The Wi-Fi integrated in every single machine has allowed both to connect all the units without communication cables (ideal situation in such a complex redevelopment), and to manage all the machines directly from the reception thanks to a software developed by Innova specifically for the hotel industry.