Heat pumps in high rise homes

Webinar with case studies

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Speakers

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Slido poll

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Introduction –
Marek Miara,
Fraunhofer ISE
CASE STUDY
Savona, Italy

CLAUDIO CARANO - CLIVET S.p.A.
The challenge

- **Revamping** the dock area
- **Multipurpose** = Residential, Hotel, Shopping units
- Archistar Ricardo Bofill = **19-floors** core tower
- Glass facade = **Different** comfort needs
- **No outdoor** units allowed
- **Sustainability** as a key driver
The process

- Heat Pump + **Sea water** as the thermal source (WSHP)
- Optimal energy **efficiency** + **Stability** (14 to 24°C)
- **Titanium** heat exchangers feed the backbone closed loop
- Heat Pumps are **specialised** by application:
  - Hotel = **Central**
  - Residential and Shopping units = **Local**
The outcome

- Architectural integration = ‘Invisible’ equipment
- Minimise tech rooms → Larger leasable space
- Fulfill load diversity (cool / heat / DHW / ventilation)
- Sea Water → 70% Energy Saving vs Gas boiler design
- CO₂ emission = – 100% Direct (on site) / – 50% Indirect
Boosting Energy Performance

Turon de Gloire Lourdes France

Hervé Pierret
Section Manager, Marketing & Business Intelligence
Daikin Europe
The challenge

- Social housing renovation project
- Reduce the building’s energy consumption and tenants’ energy bills.
- Complex:
  - 197 apartments in total, situated on a hill side
  - Current heating system: Electric heaters and hot water tanks
  - Energy rating: F
- Renovation target:
  - Obtain energy rating = C
  - Drastically reduce greenhouse gas emissions
The process

- Choice for air-to-water heat pumps.
  - Currently off-grid location
  - Gas connection installation = too expensive
  - Gas = not reducing CO2 emissions

- Daikin Altherma 3
  - Meeting energy performance requirement of the project
  - Provide heating
  - Hot water provide by separate domestic hot water tank.
  - Running on R-32, low GWP refrigerant
  - Allows to have a phased implementation: renovation work divided into 3 phases

- Installation
  - Outdoor unit : on apartment balconies
  - Indoor unit : kitchen
  - + new low temperature radiators
  - Replacement of electric heating with hydronic heating/piping
The outcome

- 85% completed (167 apartments)
  - Project work initiated October ‘19
  - Phase 1 finalized October ’21 (60 apts)
  - Final completion by end ‘23

- Energy level improvement (F -> C):
  - Awaiting confirmation from the Social Housing authorities

- Air-to-water heat pumps are a viable solution
  - Apartments in individual set up
  - Financially affordable
  - Tenants of social housing to have reducing heating bills
Deep renovation and new clean heating system

Arthur Enns – Glen Dimplex
The challenge

- Block of nine apartments was built in 1952 and was in such poor condition that it was no longer an attractive residential property.
- It is owned by a non-profit housing association.
- The property was in such a bad state, that it was only 50% occupied when a decision was made to carry out a full refurbishment.
- A gas condensing boiler was used for heating, and hot water preparation was decentralised.
The process

- As the building was nearly entirely unoccupied, a deep renovation could be carried out without too much disruption.
- Measures included: new heat pump system, insulation, underfloor heating, external stairwell.
- The system was designed for a low flow temperature of 35°C for very high efficiency.
The outcome

- A Dimplex 40kW LA 40TU air-to-water heat pump was installed to provide highly efficient clean underfloor heating.
- In each apartment, a ventilation hot water heat pump was installed which recovers waste heat through a central ventilation unit.
- The running costs were reduced significantly, and the apartments were made comfortable and habitable again!
CASE STUDY
DAISYFIELD, TOGETHER HOUSING

DAVID BROOM, KENSA CONTRACTING
The aim was to move away from fossil fuels, maintain residents’ comfort and safety, and save money on their heating bills.

- Replacing redundant gas boiler system
- De-gas building
- Safeguarding residents
- Reduce compliance costs
- Reduce carbon emissions
- Tackling fuel poverty
The process

- Part of £4.6m retrofit upgrade scheme
- 183 flats across 3 high-rise tower blocks – residents in-situ
- Kensa’s Shoebox ground source heat pumps
- Shared Ground Loop Array system architecture
- Heating system upgrade & additional measures
The outcome

- Kensa’s GSHP system was the lowest carbon and also lowest lifetime ownership cost solution, plus a path to net zero
- Non combustion GSHPs ensured tenant safety and improve air quality
- Estimated lifetime CO$_2$ savings of 6,556t
- Reduced lifetime ownership cost to landlord
- NDRHI income
The challenge

New build holiday accommodation with 118 apartments at the Belgian seaside with fluctuating occupancy of the building

- Holiday periods: high occupancy
- During working days: low occupancy
- Ready to connect to district heating
- Complex system due to high rise building
The process

**Chosen system:** Hybrid installation: 5 ecoTEC plus condensing boilers combined with 8 aroTHERM plus monobloc air/water heat pumps

A sustainable system with the aroTHERM plus air/water heat pumps during low occupancy

Ability to absorb peaks with the 5 ecoTEC plus gas condensing boilers

**Collective boiler room:** building will eventually be connected to district heating
The outcome

Consumption:

- 90 %/year = heat pump
- 10 %/year = gas condensing boilers
- Only 30 € energy costs/month for the residents

- Use of **Natural refrigerant R290**
  - In line with the future fgas regulations
- **COP**: maximum 5,4 (A7/W35)
- Capacity: 600 kW with gas condensing boiler and 96 kW with air/water monobloc heat pumps
- Reduced Energy costs of 60% compared to the old gas fired systems

Leandro Depaepe, Sales Manager North West Flanders
Yannick De Mol, Sales Engineer Projects
Q&A

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Thank you!