Contribution with heat pump technology in the decarbonisation and energy security for Europe

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Self-introduction

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2016 Daikin Industries, Ltd. (Japan)
2019 Daikin Europe N.V. (HQ in Belgium)

Policy research around environment and climate
About Daikin Europe

Operation started: 1973
Head office: Ostend, Belgium
Chairman: Masatsugu Minaka
President: Toshitaka Tsubouchi
Employees: +13,000
14 major factories across EMEA

*As of March 2023
Daikin Group’s “Environmental Vision 2050” and “Fusion”

The Environmental Vision 2050 is closely linked to the strategic management plan Fusion. In the second half of the three-year FUSION 25 plan, new perspectives were added to key existing themes.
The importance of heat pump technology in the European decarbonisation and energy security and policy measures supporting the development of the heat pump market
Heat pump technology

Heat pump technology is energy saving because it 'collects and transports' heat, rather than 'creates' heat. The ambient and geothermal energy captured by heat pumps are considered to be energy from renewable sources in Renewable Energy Directive.

Is there heat in cold air?
There is heat in air even at -25°C. There are heat pumps that have been developed that can operate continuously even in cold climates.

Air to Water (A/W) heat pump transfers heat from the outside air to water inside.

Air to Air (A/A) heat pump transfers heat from the outside air to the inside air directly.
Decarbonization potential of heat pumps

Replacing fossil fuel-based heating system with heat pumps will drastically reduce GHG emissions. The revised Energy labelling has made it possible to compare existing fossil fuel-based heating and new technologies such as Air to Water heat pumps in one label. This has created awareness for consumers and a push to select more energy efficient products.

Avoided GHG Emissions through use of Heat Pumps

Energy labelling for space heaters (Lot 1)

Energy labelling: European Regulation to provide a clear and simple indication of the energy efficiency and other key features of products.

Source: EPEE HFC Outlook EU
Importance of 'A/A heat pumps'

A/A heat pumps have a long history and are favoured for their flexibility and easiness of installation, price, and resistance to freezing in cold climates, making them a large market.
Efforts to increase the efficiency of A/A heat pumps

Daikin and the industry are enhancing the energy efficiency through inverter technology and improved components. Ecodesign has been revised to better reflect technological improvements by introducing seasonal performance rating.

Ecodesign/Energy Labelling Lot 10 (air-conditioners ≤12 kW)

- **Test method**: 1 Test point From 2013
- **Ambitious efficiency requirements**: NO From 2013
- **Proper Energy labels**: From 2013

*Ecodesign: European Framework Directive which sets common EU wide minimum standards to eliminate the least performing products from the market*
High efficiency of A/A heat pumps - MEPS comparison between systems

Thanks to A/A heat pumps’ high efficiency, high values are proposed in the Ecodesign Minimum Energy Performance Standards (MEPS). Future revisions will need to take into account the balance with other systems with the same functions and other relevant regulations.

**COOLING REQUIREMENTS ECODESIGN (SEER)**

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<th>Standards</th>
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These products will not be allowed on the market.

**HEATING REQUIREMENTS ECODESIGN (SCOP)**

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<td>FIXED DOUBLE DUCT</td>
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</table>

These products will not be allowed on the market.
Daikin's efforts to reduce energy demand at system and community level
Energy savings through system combinations – Conveni-Pack

The ‘Conveni-Pack’ combines refrigeration and comfort cooling/heating functions in one system. By recovering the waste heat in winter, it reduces energy consumption.
Heat from refrigeration cabinets were used to heat indoor space.
Measurements showed 38% of total heating demand satisfied by Heat Recovery.
This results in about 20% annual savings in energy consumption.

(European average climate)
Expanding applications - pioneering application possibilities

In order to encourage wider use of the heat pump technology, Daikin is working on product and systems to meet diverse needs.

‘VRV IV-i’, which stores the heat exchanger and compressor separately, **does not require space for the outdoor unit.**

The ‘Water Loop’ system, shared by multiple users in an apartment complex, achieves **energy savings for the entire system.**

- 30% Energy saving
- 80% Heatloss reduction
Community-level contribution: demand response of residential heat pumps

Demand control that does not compromise comfort was demonstrated using residential heat pump heating, which are rapidly introduced.

Project overview:
- 2014 – 2016
- 550 heat pumps (monobloc, split, hybrid) + 23 buffer vessels (heat storage)

Goals:
- To verify the effectiveness of electricity aggregation based on demand control capacity by obtaining by controlling Air Source Heat Pumps installed in social housing.
- To establish sustainable business models for electricity aggregation.

Reference: [https://www.nedo.go.jp/content/100878404.pdf](https://www.nedo.go.jp/content/100878404.pdf)
Community-level contribution: commercial VRV demand control

In Portugal, which has a high renewable energy ratio, this project has shown the technical aspects of demand response with air conditioning systems are well established.

**Project overview:**
- 2016 – 2020
- 36 VRV (8 and 10 HP) + 30 tank units (cold storage)
- PV installed (78kWp)

**Goals:**
- Demonstration of AC systems with cold storage as flexibility providers for Automated Demand Response (ADR) and Virtual Power Plant (VPP)
- Evaluate the value of ADR/VPP platforms for different market players, in resolving problems at the local grid level and on smooth integration of renewable energy sources

**Reference:** [https://www.youtube.com/watch?v=26MegjDf-AI](https://www.youtube.com/watch?v=26MegjDf-AI)
For further technological advancement

**New EMEA R&D centre Ghent** (Planned opening in 2024)

Daikin Europe’s 140 million euro investment joins all R&D activities for low-carbon heat pump heating and cooling together into one central knowledge centre for Europe the Middle East and Africa.

- **More than 350 R&D engineers** who will work on:
  - Low carbon Heating Products & Solutions through **heat pump technology**
  - Solutions for a sustainable cold chain
  - IoT applications
  - Control solutions
  - Artificial intelligence to support smart energy management

- **> 25 test rooms**, including a unique climatised **EMC test room** (Electro Magnetic Compatibility)
Communication with stakeholders

Daikin exhibits at the COP28 Japan Pavilion its high-efficiency inverter air conditioner which contributes to 50% energy savings from November 30 to December 12, 2023. This will mark Daikin’s first exhibit at a COP event.

Daikin also took a stage at side event organized by Ministry of Environment, Japan and Ministry of Economy, Trade and Industry at COP 28.

Conclusion

- "Heat pump technology" has a lot of potential for advancement and contribution to the society.
- Policies provide significant support for technological innovation and consumer awareness of new technologies.
- Mutual communication between stakeholders, such as technology experts and policy makers, will shape a better path forward.
Thank you