

Hall 4A

Chillventa Specialist Forums 2024
Chillventa Fachforen 2024

**CONNECTING
EXPERTS.**



ENGINEERED FOR EXCELLENCE

BENEFITS OF HFO HEAT PUMPS VS GAS BOILERS IN COMMERCIAL BUILDINGS

TUNCA SEKBAN | SENIOR OFFERING MANAGER

BUILDINGS ARE CRUCIAL FOR SUSTAINABILITY

40%



Buildings represent **40%** of the total energy consumption in the EU

80%



80% of the energy consumed in buildings is for heating, cooling and hot water

36%



36% of the EU's greenhouse gas emissions are from buildings

MAJOR TRENDS FOR HEATING AND COOLING

- **Electrification of end use sectors such as heating, transport...**
- **Systemic Energy Efficiency to reduce energy demand and provide flexibility to the grid**
 - Heat Pumps
 - Waste energy recovery
 - Thermal storage
 - Demand side flexibility
- **Renewable Energies**
 - Facilitate the transition to renewable energies and further decarbonise electricity
- **Digitalisation**
 - IoT and AI to further increase efficiency and help triggering and driving behavioural change

SPACE HEATING & DOMESTIC HOT WATER DEMANDS

Building heating demand in two categories:

- Space or Comfort Heating
- Domestic Hot Water (DHW)

Ratio between SH and DHW demand depends on:

- Building purpose (hospital/hotel vs office building)
- Building envelope (not insulated vs low energy building)

Needs are different:

- Space Heating: Seasonal !
- DHW: All year round ! → heat recovery potential in May-October

Possible uses	Temp. (°C)	
Floor or wall heating	30 – 45	Air Source Heat Pump
Swimming pool heating	30 – 45	
Ventilation heating	30 – 40	
Radiators Low temp.	45 – 55	Water Source HP Or AS HP + Booster
Radiators Medium temp.	55 – 70	
Radiators High temp.	70 – 90	
Domestic hot water	>60/70	

COMMERCIAL BUILDINGS | APPLICATION PRIORITIES

Office



Hospitality



Retail



Public



Healthcare



- Energy-efficient HVAC systems that reduce operating costs
- Green building initiatives with environmentally responsible technologies
- Different temperature requirements with user-friendly controls to improve facility management and minimize distractions

- Meeting comfort needs for diverse zones whilst reducing operational cost
- For hotels, simultaneous air-conditioning of bedrooms while pre-heating swimming pool with recovered heat
- Low maintenance / service cost is also a key factor for system preference

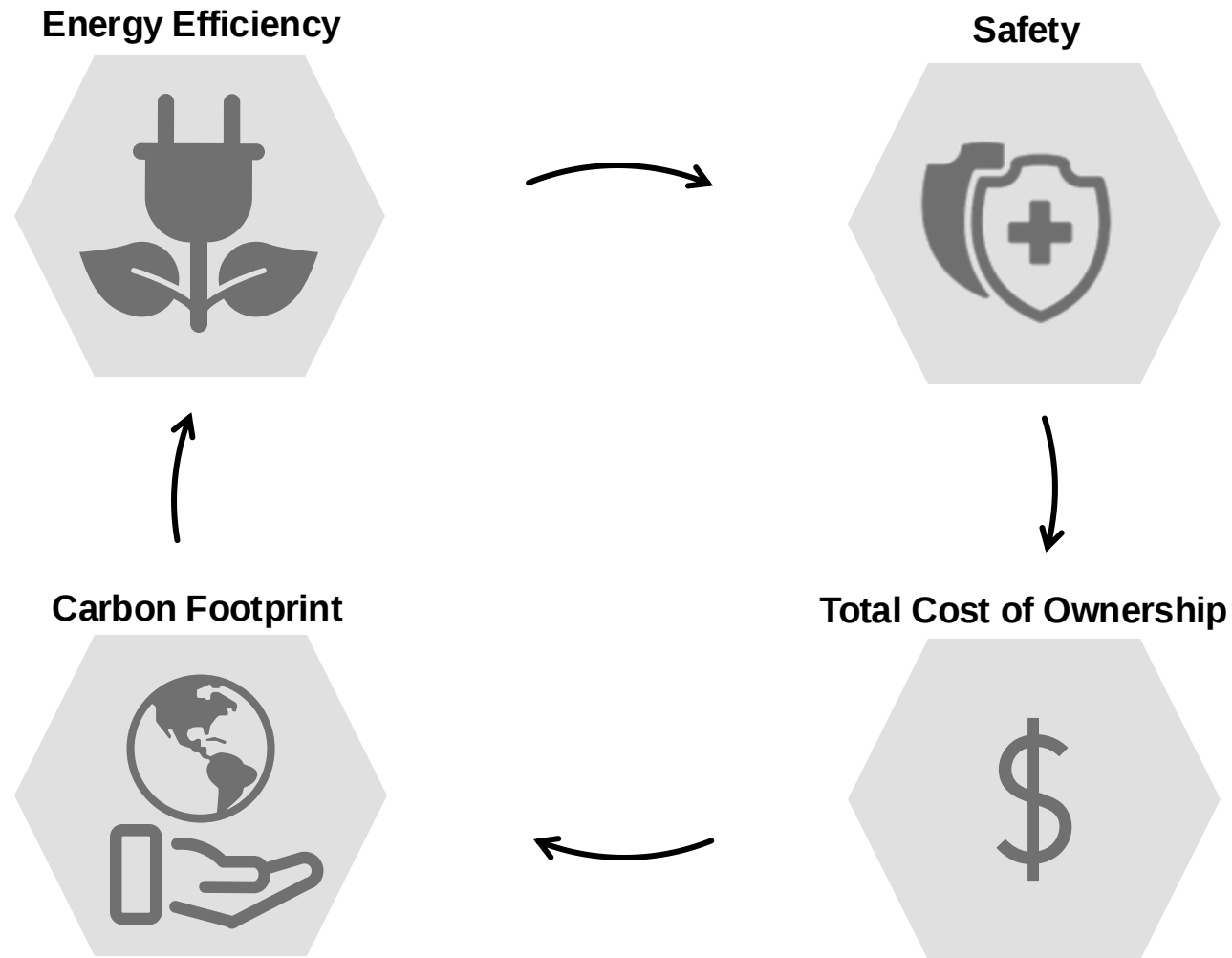
- Optimise shopping environments with improved interior air quality
- Reduce operating costs; increase productivity with environmentally friendly systems
- Focus on sustainability policies driven by lower carbon emission and operating cost targets

- High efficiency, low emission equipment to meet environmental requirements
- For theatre/concert halls, simultaneous heating of the audience while cooling the performance stage
- For education facilities, simultaneous cooling of research laboratories while reusing the heat to make students comfortable in the library and/or classrooms

- Maintain high level of patient comfort through integrated comfort systems
- Simultaneous cooling of the IT server room while re-using the heat to warm up patient recovery rooms
- Reduce operating costs while increasing productivity of operation/maintenance staff

Simultaneous cooling and heating required for different purposes

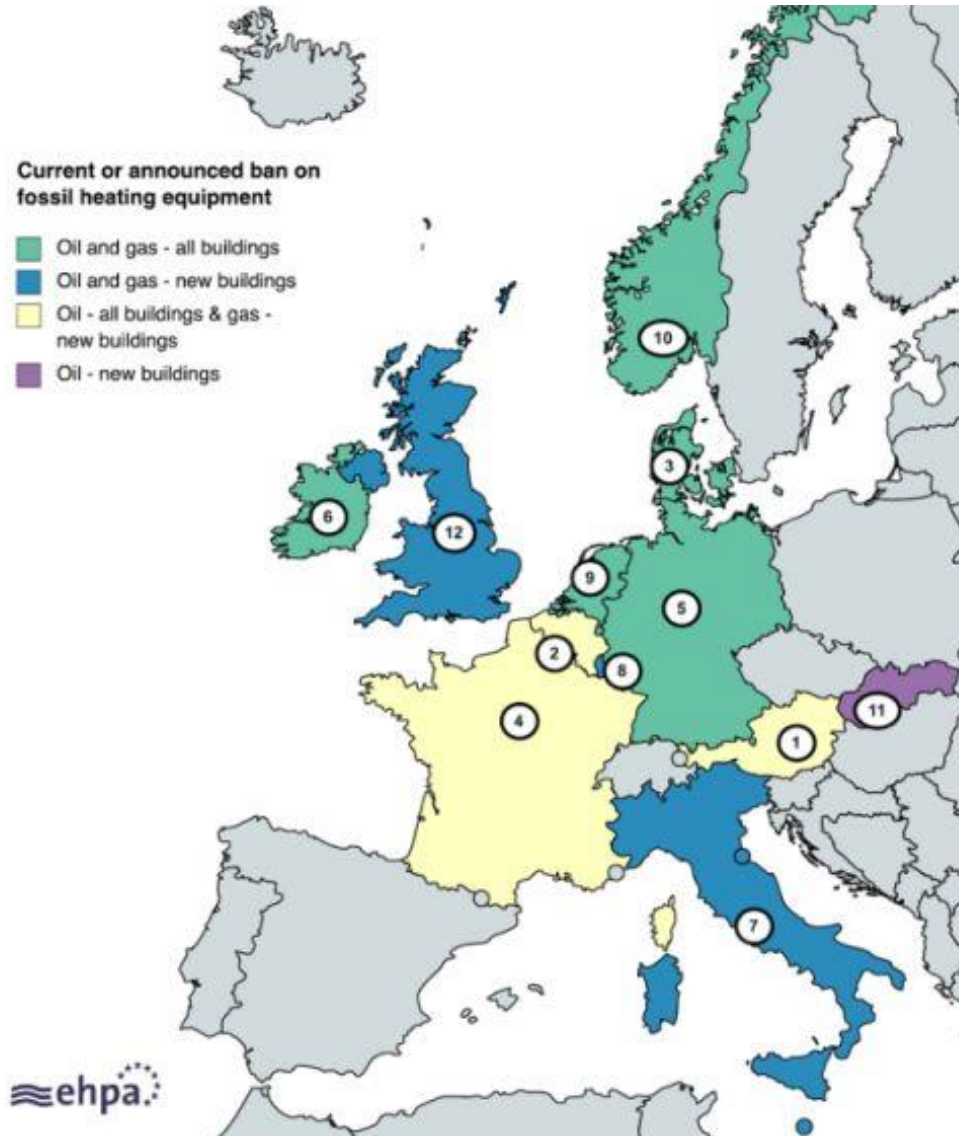
THE PATH TO DECARBONIZATION IN BUILDINGS



HFO Solutions Offer the Best Combination of Properties

REGULATORY OUTLOOK | BOILER BAND, GWP TAXES, GHG POLICIES

- HFC refrigerant prices expected to increase with year-on-year lower F-Gas quota availability
- Denmark, Spain, Norway are taxing GWP on new installations or refurbishment works. Several other EU countries have tax model defined but not yet adopted by the government
- Green Deal to eliminate fossil fuels: Some EU countries such as BEL, NL, FR, GER already banned fossil fuels in new buildings
- Zero-carbon policies of global companies drive towards ultra-low GWP refrigerant solutions, which can have a significant impact on reducing the Scope 1 and Scope 2 GHG emissions



- 1.AUSTRIA**
Ban of oil/coal boilers installation from 2020 in new homes. Plans on banning oil and gas heaters from 2023 in new buildings and on banning oil/coal boilers in existing buildings.
- 2.BELGIUM**
Regional ban in Flanders on the installation of oil boilers in new buildings and renovated ones from 2022. Gas connection ban for large new building projects in Flanders from 2021 and gas connection ban for all new buildings in Flanders from 2025. For Wallonia, no bans have been announced.
- 3.DENMARK**
Use obligation for renewable heating and different zones with exemption regulations. Plans to convert all 400 000 remaining gas boilers. About 50% of buildings will be heated by district heating by 2028 and the rest by heat pumps by 2029.
- 4.FRANCE**
From 1/7/2022 oil boilers banned in all buildings. From 2023 ban on gas boilers in new buildings.
- 5.GERMANY**
Ban on installations of mono-fuel oil/coal boilers from 2026 (new and existing buildings) and regional use of obligations for renewable heating. From 2024, a share of 65% RE in heating in new and existing building – which means a real ban on stand-alone fossil fuel boilers.
- 6.IRELAND**
Oil and gas boilers are to be banned from being installed in both new and existing homes. The ban would apply to newly built homes from 2023 and to installations in existing houses possibly from as early as 2025.
- 7.ITALY**
Share of 60% renewable energies in new buildings from 1/6/2022.
- 8.LUXEMBOURG**
Building requirements that make oil and gas impossible from 1.1.2023.
- 9.NETHERLANDS**
Ban of connection to the gas grid for new buildings from 2018. From 2026, hybrid heat pumps will be the mandatory minimum standard.
- 10.NORWAY**
Ban on the use of oil and gas for heating in new and existing homes.
- 11.SLOVAKIA**
Plans on banning sales and installation of new fuel and oil boilers by 2023.
- 12.U.K.**
Ban on gas and oil boilers in new buildings from 2025. In Scotland, the new buildings ban will take place in 2024, and existing commitment to legislation prohibiting fossil fuel heating systems in existing buildings at various trigger points from 2025 onwards.

DECARBONIZING WITH EFFICIENT HEATING/COOLING

HFC Chiller + Gas Boiler vs HFO Multi-Purpose HP



HFC chiller
(cooling)

VS



HFO HP
(cooling & heating)



Gas boiler
(heating)

HFO Solutions GWP<150

- Integrated Heating & Cooling with HFO in single HP leading to lower footprint, lower CAPEX and less maintenance vs two separate units (chiller+boiler)
- Higher COP (efficiency) vs boilers contributes to lower operation costs
- Low GWP and eliminating fossil fuel help reduce carbon emissions and ensure regulatory compliance



Solstice[®] Solutions Supports Energy Preservation

SOLSTICE REFRIGERANTS | COMMERCIAL BUILDINGS

HVAC Equipment	Compressor Type	Market Solution	Capacity	F-Gas Proposed Bans	Honeywell Solution			System Image
					Interim	Long Term		
Chiller / HP	Centrifugal	R-134a GWP=1430	> 12 kW	<750 GWP from 2027	Indoor & Outdoor Installation R-123 3zd A1 / GWP=3.9	Indoor & Outdoor Installation R-123 3zd A1 / GWP=3.9		
	Oil-free Screw	R-134a GWP=1430	> 12 kW	<750 GWP from 2027	Indoor & Outdoor Installation R-513 A A1 / GWP=630	Outdoor Installation R-123 4ze A2L / GWP=1.4	Indoor Installation R-515 B A1 / GWP=288	
	Scroll	R-410 A GWP=2088	<= 12 kW	<150 GWP from 2027 F-Gas ban from 2032 (subject to legislative review)	Outdoor Installation R-454 B A2L / GWP=465	Outdoor Installation R-454 C A2L / GWP=146		
			12 - 50 kW	<750 GWP from 2027				
			> 50 kW	<750 GWP from 2027	Outdoor Installation R-454 B A2L / GWP=465	Outdoor Installation R-123 4ze A2L / GWP=1.4	Indoor Installation R-515 B A1 / GWP=288	
	Rooftop	Scroll	R-410 A GWP=2088	12 - 50 kW	<150 GWP from 2027	Outdoor Installation R-454 B A2L / GWP=465	Outdoor Installation R-454 C A2L / GWP=146	
> 50 kW				<150 GWP from 2030				
VRF	Rotary Scroll	R-410 A GWP=2088	>12 kW	<750 GWP from 2029 <150 GWP from 2033	Outdoor Installation R-32 A2L / GWP=6 75	Outdoor Installation R-454 C A2L / GWP=146		

*According to the new EU regulation 573/2024 HFCs GWP is calculated as per AR4 standards and HFOs GWP is taken as per AR6 standards

A1: low toxicity, non-flammable
A2L: low toxicity, mildly flammable
GWP: Global Warming Potential

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Honeywell

SAVINGS IN COMMERCIAL BUILDINGS



Heating & Cooling

With Solstice, you can improve your environmental footprint & **reduce CO₂ emissions by more than 90%** at a **TCO (total cost of ownership) of 50% lower** vs. fossil fuel alternative

- **Reduce your energy bill** vs natural gas dependent boiler due to improved energy efficiency.
- **Reduce your investment (CapEx)** using and an integrated Heating & Cooling HP that replaces the need for boiler.
- **Decarbonize your heating & A/C** energy consumption by using a single HP system as you eliminate fossil fuel from your building and use ultra low GWP system that ensures regulatory compliance.

Insulation

Roof Insulation:

- XPS board Solstice GBA
- Up to 25% insulation value improvement = 25% thinner board
- Productivity improvements for new & roof renovation in cold climates where high thickness required.

Wall Insulation

- PIR & phenolic board Solstice LBA
- Up to 15% insulation value improvement = 15% thinner board
- Ideal solution for usable space gains in new construction and building renovation
- Enhanced flammability performance

Solstice® Solutions Supports Energy Preservation

LARGE HOSPITAL REDUCING BOILER USE

PROJECT AT-A-GLANCE:

- Public Hospital (South Europe)
- Opened in 2007
- 250,000 Sq m of space
- 825 beds / 25 Operating Rooms

THE SOLUTION:

Help the Mater Dei Hospital replace aging HVAC infrastructure and advance significant energy efficiency with fully integrated heat pumps (incl domestic hot water supply, dehumidification and space heating) while reducing reliance on fossil fuel heating based on a traditional boiler.

SUSTAINABILITY OUTCOMES:

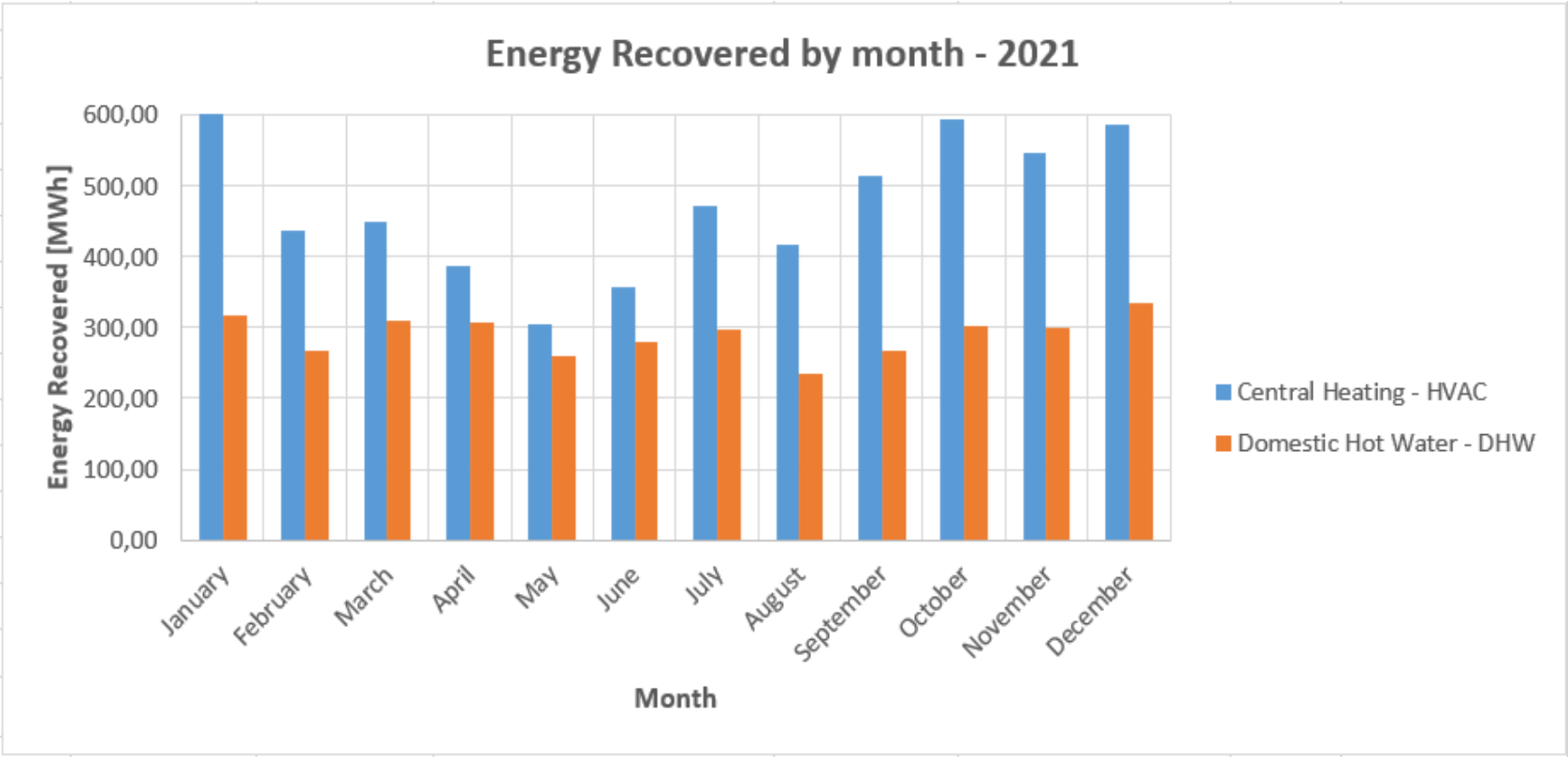
- ~ 1 million liters annual reduction of diesel fuel consumption, preventing ~2,700 mtCO_{2e}
- over **58% savings in fossil fuel related energy use**
- Improved indoor and outdoor air quality, reducing air-borne byproducts from the previous boiler system



Source: <https://trane.eu/uk/about-trane/story-details.html?storyId=37>

Heat pump replacement of boiler reduces energy usage 58%

SAVINGS BY HEAT RECOVERY FROM HEAT PUMPS

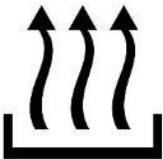


58%

savings in fossil fuel related energy use

2700
mtCO_{2e}

savings on carbon emissions



improved indoor and outdoor air quality

Total Year 2021	9159,47 MWh	32974,09 GJ	SAVED	2722 Tonnes CO ₂
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SOUTHWARK COUNCIL BOILER REPLACEMENT

PROJECT AT-A-GLANCE:

- Ambition to be carbon neutral by 2023
- Wanted to decarbonize the gas-powered heat networks which were serving 17,000 council homes.
 - Phase 1: over 2,000 homes, with plans to move all public housing stock to low carbon heat in future

THE RESULTS:

- Partnered with Vital Energi, plus ICAX, J&E Hall
- Replaced legacy gas boilers with modern heat pumps using non-flammable Solstice N15
- The system met project requirements for safety, efficiency and cost, and used existing pipework which minimized disruption
- Support temperature up to 100°C (council's network usually operates 75-80°C)
- Reduce capital costs through less complexity

Source: <https://sustainability.honeywell.com/us/en/initiative/solstice-refrigerant-helps-decarbonise-london-homes>



Meeting project requirements for safety, efficiency, and low TCO with HFO

UNIVERSITY OF NOTTINGHAM – UNITED KINGDOM

Key Facts & Figures	
End User	University of Nottingham / Cool-Therm
Equipment Provider	Geoclima
Plant Description	Located on the University’s award winning innovation Park, the new carbon neutral laboratory building provides unrivalled facilities for chemistry. The project is housed in a brand new carbon neutral laboratory, the first of its kind in the UK with the specific requirements concerning very low environmental impact and high sustainability.
Equipment Used	VHR radial fan ducted chiller
Refrigerant Used	R-1234ze by Honeywell
Total Cooling Capacity	60 kW
Results / Benefits	The use of HFO refrigerant satisfies specific requirements in terms of low carbon emissions and low environmental impact as well as great performance and high efficiency. Additional BREEAM and LEED credits gained



Source: <https://www.geoclima.com/pro/university-of-nottingham/>

DERBY COLLEGE – UNITED KINGDOM

Key Facts & Figures	
End User	Derby College Group
Equipment Provider	Trane
Plant Description	Broomfield Hall Campus (Derby, UK) - Public college for education in agriculture and horticulture. Installed a combination of air-sourced heat pump with a water-sourced heat pump in cascade configuration. Water-sourced heat pump boosts hot water up to 80°C. Full replacement of gas boilers in May 2022.
Commissioning Date	2022
Equipment Used	Air-sourced heat pump + Booster heat pump
Refrigerant Used	R-454B + R-1234ze by Honeywell
Total Cooling Capacity	600 kW
Results / Benefits	790,000 kWh less energy consumption Approx £70,000 per year saved in energy costs 160 Tons of CO _{2eq} emission reduction Project won Heat Pump Award 2022





THANK YOU

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