

References Cases

Snapshot of latest delivered and in-progress projects



Bispebjerg Hospital
 Copenhagen, Denmark

Sector: Hospital (Retrofit)
 Energy system: ATES – Aquifer Thermal Energy Storage

Denmark's largest aquifer-based geothermal energy plant, with 4.7 MW of heating and 5.3 MW of cooling capacity. Surplus energy is supplied to a neighboring hospital building. Annually, the hospital saves 1,100 tons of CO₂ emissions and over 3.7 million DKK in annual energy costs.



DSV Logistics Center
 Horsens, Denmark

Sector: Logistics (New Build)
 Area: 300,000 m²
 Energy system: ATES – Aquifer Thermal Energy Storage

Europe's largest logistics center for trucks is heated and cooled with 100% renewable energy. Integrated with geothermal energy storage, seven heat pumps with a total capacity of 4.9 MW for heating and 2.2 MW for cooling meet the entire energy demand of the 300,000 m² property. The system operates with exceptional efficiency: COP 3.4-4.5 for heating and COP 50 for cooling.



IKEA Källered
 Gothenburg, Sweden

Sector: Retail with Restaurant (New Build)
 Area: 42,000 m²
 Energy system: BTES – Borehole Thermal Energy Storage + Waste heat from ventilation

IKEA's most sustainable store globally and one of eight IKEA stores in Energy Machines' portfolio. An energy-positive building where rooftop solar panels generate 18% more renewable electricity than is needed to heat, cool, and ventilate the property. This surplus can support neighboring buildings or be stored in a battery.



Home.Earth Nærheden
 Hedehusene, Denmark

Sector: Residential and Office (New Build)
 Area: 13,500 m²
 Energy system: PTES – Pile Thermal Energy Storage

With an LCA footprint below 4.7 kg CO₂/m²/year, this new development achieves the lowest recorded LCA for a multistorey building in Denmark – over 60% lower than the latest Danish building regulations. The property's heating and cooling needs are met through a combination of near-surface geothermal energy stored in its foundation piles, PVT solar technology, and recovered waste heat.



345 Hudson, New York
 New York City, NY, USA

Sector: Office (Retrofit)
 Area: 91,000 m²
 Energy system: Waste Heat

Winner of NYSERDA's Empire Building Challenge for low-carbon retrofits in NYC, this 1930s-built high-rise features a vertical water-source heat pump thermal network that recycles heating and cooling between floors. The building realizes a 90% reduction in operational CO₂ and a 40% reduction in electricity usage, even after completely electrifying its operations.



Sygehus Sønderjylland

📍 Sønderborg, Denmark

Sector: Hospital & District Heating (Retrofit)

Energy system: Waste Heat-to-District Heating using waste heat from hospital operations

The hospital's heating and cooling demands are fully met by reusing waste heat from its facility-critical cooling operations. The amount of waste heat generated exceeds the hospital's own energy needs and the surplus is supplied to the district heating network, heating ~1,000 homes in the area while the hospital itself achieves annual energy savings of 12,500 MWh – equivalent to the energy consumption of ~740 Danish homes.



Norrlands University Hospital

📍 Umeå, Sweden

Sector: Hospital (Retrofit)

Area: 345,000 m²

Energy system: BTES – Borehole Thermal Energy Storage + Thermal Network

Northern Sweden's premier hospital features one of the world's largest geothermal borehole installations. In addition to BTES, four hospital buildings are linked together as a thermal network. Heat from buildings with an energy surplus, like refrigeration or MRI facilities, is transferred to buildings in need of warmth, like patient areas. The system meets 95% of the hospital's cooling needs with renewable energy, reducing annual energy costs by €950,000.



Bonnierhuset

📍 Stockholm, Sweden

Sector: Office (Retrofit)

Area: 51,000 m²

Energy system: BTES – Borehole Thermal Energy Storage

This 1940s property is home to the largest geothermal installation in central Stockholm, with 27,670 borehole meters beneath the parking garage (86 boreholes in total). Almost entirely self-sufficient in heating and cooling, the property has experienced an 80% reduction in purchased energy (in the form of green electricity) and an 82% reduction in operational CO₂.



Göta Court of Appeal

📍 Jönköping, Sweden

Sector: Government (New Build)

Area: 10,000 m²

Energy system: ATES – Aquifer Thermal Energy Storage

An aquifer-based geothermal solution with four wells provides the court and government office facility with all of its heating and cooling needs. Heat pumps are activated only for peak-load cooling. With rooftop PV solar panels, the building is energy positive – producing an energy surplus that is used to heat a neighboring office building. The property is set to achieve Miljöbyggnad Guld, the highest level of environmental certification in Sweden.



Widex Headquarters

📍 Lyngø, Denmark

Sector: Office and Manufacturing (New Build)

Area: 37,000 m²

Energy system: ATES – Aquifer Thermal Energy Storage

Completed in 2009, Widex Headquarters is one of Denmark's first CO₂-neutral, self-sufficient buildings. It uses an ATES system to store waste heat from machinery and air conditioning in an aquifer, providing efficient heating and cooling year-round. An on-site wind turbine (external provider) powers the system. Compared to conventional heating and cooling, the system reduces energy use by 700 MWh per year, cuts CO₂ emissions by 75% (≈1,000 tons annually), and saves around €540,000 in annual energy costs.

SANDVIK
coromant



Sandvik Coromant
Katowice, Poland

Sector: Manufacturing (Retrofit)
Energy system: BTES – Borehole Thermal Energy Storage + Waste heat recovery from manufacturing operations

Sandvik's Katowice factory is heated and cooled with geothermal energy and its own waste heat from metal tool manufacturing. Operating with 4.8x greater efficiency compared to its previous gas-based heating and standalone chiller system, the new integrated system has enabled the factory to reduce its gas usage by 95%, electricity usage by 35%, and operational CO₂ by 45%.

FORSYNINGEN
MEPRODUCTION



Frederikshavn Forsyning / ME Production
Frederikshavn, Denmark

Sector: District Heating & Manufacturing (Retrofit)
Energy system: Waste Heat-to-District Heating

An Energy Machines heat pump solution delivers waste heat from ME Production's production facility to Frederikshavn Forsyning's district heating network, reducing peak loads and extending the decarbonization impact to the local community. The heating capacity is 830 kW and operates with an exceptionally high efficiency of COP ≈ 5.8 for heating.

BIG
BJARKE INGELLS GROUP



BIG – Bjarke Ingels Group Headquarters
Copenhagen, Denmark

Sector: Office (New Build)
Area: 4,700 m²
Energy System: PTES – Pile Thermal Energy Storage

A near-surface geothermal energy storage solution with energy piles (i.e., foundation piles with energy storage capabilities) provides BIG HQ with renewable heating and cooling. The Energy Machines heat pump is made visible from the building exterior to signal the property as operating with green energy. BIG HQ is set to achieve DGNB Gold.

skandia:
fastigheter

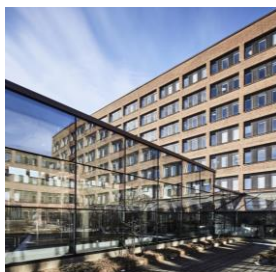


Frölunda Torg Shopping Mall
Gothenburg, Sweden

Sector: Mixed-use Retail (Retrofit)
Area: 70,000 m²
Energy system: BTES – Borehole Thermal Energy Storage

With a 700 kW energy system with BTES, the 1960s-era shopping mall has reduced its energy consumption by 82% and its operational CO₂ footprint by ~200 tons annually. Surplus heat from the building's refrigeration areas and comfort cooling operations is used as space heating and domestic hot water.

CASTELLUM



Trekanten Office Complex
Danderyd, Sweden

Sector: Office (Retrofit)
Area: 33,000 m²
Energy system: BTES – Borehole Thermal Energy Storage

A BTES solution covers 100% of the property's heating and cooling needs. The energy storage includes 51 boreholes drilled to 350 meters depth beneath the parking lot. A high-efficiency air handling unit recovers additional heat from kitchen exhaust lines. The energy system has delivered an 86% reduction in energy usage, 97% reduction in CO₂, and a 200,000€/year reduction in energy costs.



Grand Joanne Hotel

Copenhagen, Denmark

Sector: Hotel (Retrofit)
 Area: 5,700 m²
 Energy system: Waste heat from ventilation exhaust air

Copenhagen's historic hotel from 1892 is powered almost exclusively by its own recycled energy from ventilation exhaust air. The energy system, comprised of air-source heat pumps and high-efficiency air handling units, covers 100% of the property's cooling requirements (190 kW) and 90% of its demand for heating and hot water.



Kysthus 3 – Tuborg Strandeng

Copenhagen, Denmark

Sector: Residential (New Build)
 Area: 7,700 m²
 Energy system: PTES – Pile Thermal Energy Storage

Energy Machines has delivered a geothermal solution based on energy piles (i.e., foundation piles equipped with energy storage capabilities) for the new luxury apartment building. The integrated solution supplies the property with 100% of its cooling needs and up to 50% of its heating with near-surface geothermal energy stored in the property's foundation.



Svärdet 7

Danderyd, Sweden

Sector: Mixed-use (Retrofit)
 Area: 35,600 m²
 Project type: BTES – Borehole Thermal Energy Storage

The 1980s office, restaurant, and retail property obtains 83% of its heating and 100% of its cooling from geothermal energy stored in 28 boreholes (300 meters depth) beneath the property. The energy system has delivered a 62% reduction in purchased energy, 86% reduction in operational CO₂, and 1.67M SEK reduction in annual energy costs.



Alpha Backaplan

Gothenburg, Sweden

Sector: Mixed-use (Retrofit)
 Area: 36,000 m²
 Energy system: BTES – Borehole Thermal Energy Storage

Gothenburg's new residential, retail, and grocery development is heated and cooled with geothermal energy and its own waste heat. The property's energy consumption for heating, cooling, and hot water is only 9.3 kWh/m²/year – all in the form of electricity from a hydropower-based grid. The property uses 74% less energy compared to district heating and operates with nearly zero CO₂ emissions.



Danfoss House

Sønderborg, Denmark

Sector: Residential (New Build)
 Energy system: BTES – Borehole Thermal Energy Storage

Featuring an Energy Machines-designed geothermal storage system and energy central, this "living laboratory" by Danfoss is one of only ~20 residential buildings worldwide to achieve DGNB Platinum – the highest sustainability standard set by the globally recognized DGNB German Sustainability Council.



IKEA Hubhult Meeting Center

📍 Gothenburg, Sweden

Sector: Mixed-use (Retrofit)

Energy system: BTES – Borehole Thermal Energy Storage

Energy Machines upgraded the facility’s existing ATES (Aquifer Thermal Energy Storage) system to BTES and integrated all components with advanced EM Control platform for improved system performance, energy efficiency, automation, and energy cost savings.



IKEA Furuset

📍 Oslo, Norway

Sector: Retail (Retrofit)

Energy system: Air-source heat pump system

The store’s existing chillers were replaced with air-source heat pumps to cover 100% of its cooling demand and 50% of its heating demand – resulting in improved system performance, energy efficiency, and energy cost savings.



Inspiration Rosendal

📍 Uppsala, Sweden

Sector: Residential and Leisure (New Build)

Area: 22,000 m²

Project type: BTES – Borehole Thermal Energy Storage

This 344-apartment complex with a sports and leisure is powered by geothermal energy and waste heat from a neighboring supermarket, making it Uppsala’s greenest housing project and one of the most energy-efficient apartment buildings in Sweden. The owner’s purchased energy, in the form of electricity, amounts to only 9.5 kWh/m²/year.



Gruvgatan 6-8

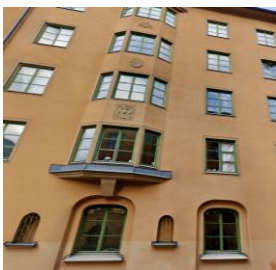
📍 Gothenburg, Sweden

Sector: Office (Retrofit)

Area: 10,000 m²

Energy system: BTES – Borehole Thermal Energy Storage

This 1950s office property with two buildings is heated and cooled using 100% renewable energy through a BTES integrated energy system. The energy system has delivered a 75% reduction in purchased energy.



Smeden 5

📍 Stockholm, Sweden

Sector: Residential (Retrofit)

Area: 5,000 m²

Energy system: BTES – Borehole Thermal Energy Storage

Heat and cold are seasonally stored within 16 x 250m boreholes beneath the building’s basement floor. The 1920s building is one of Stockholm’s most energy-efficient buildings and boasts an energy class rating of “B” – exceeding the current legal requirements for brand new buildings – even with old windows and no insulation.



NGG – Nordsjællands Grundskole og Gymnasium
 📍 Hørsholm, Denmark

Sector: Education (New Build)
 Area: 12,500 m²
 Energy system: ATES – Aquifer Thermal Energy Storage

An ATES-based geothermal system will supply the new school with 100% renewable heating and cooling, delivering exceptional energy efficiency with COP > 6.5. This means the system operates at over 650% efficiency – around 6.5 times more efficient than a conventional district heating or gas-based solutions. The property is set to achieve DGNB Gold certification.



Grundtvighus
 📍 Copenhagen, Denmark

Sector: Hotel (Retrofit)
 Area: 10,000 m²
 Energy system: BTES – Borehole Thermal Energy Storage

This listed historic building in the center of Copenhagen will be the first in the city to be equipped with a borehole-based geothermal energy storage system. Independent of district heating suppliers, the new energy system will reduce energy consumption by 84% and operating costs by 97%, and is on track to achieve DGNB Platinum certification.



Ripple Residence
 📍 Copenhagen, Denmark

Sector: Residential (New Build)
 Area: 13,000 m²
 Energy system: BTES – Borehole Thermal Energy Storage

A BTES-based geothermal system with 20 boreholes under the building will supply the new apartment complex with renewable heating and cooling, with no connection to district energy providers. The heat pump system is partially powered by rooftop PV solar. The property will operate with an extremely low LCA footprint below 5 kg CO₂/m²/year and is on set to achieve DGNB Gold certification.



Hornbæk Hotel
 📍 Hornbæk, Denmark

Sector: Hotel (Retrofit & New Build)
 Area: 5,500 m²
 Energy system: BTES – Borehole Thermal Energy Storage

The newly renovated spa hotel will be heated and cooled through a fully electric geothermal system with 22 boreholes for energy storage. With an annual COP of 4 for combined heating and cooling, the system uses 4x less energy than gas or traditional district heating and chillers.



Blästem 6
 📍 Stockholm, Sweden

Sector: Office (Retrofit)
 Area: 30,000 m²
 Project type: BTES – Borehole Thermal Energy Storage

District heating has been replaced with a geothermal integrated energy system for heating (850 kW) and cooling (800 kW) at this 1940s building. The employed heat pumps use propane, a natural refrigerant. The project's 40 boreholes were drilled using electricity instead of diesel, eliminating an additional 106 tonnes of CO₂. The energy system has delivered a 57% reduction in purchased energy, 65% reduction in energy costs, and enables the property to operate with nearly zero CO₂, with electricity being sourced from a green-only grid.



Porvoon Energia / Ensto

📍 Porvoo, Finland

Sector: District Heating & Manufacturing (Retrofit)
Energy system: Waste Heat-to-District Heating

Seven heat pumps replace existing chiller system at Ensto's electrical manufacturing facility, providing efficient process cooling to the factory while delivering waste heat to Porvoon Energia district heating network. Energy efficiency and sustainability are significantly improved for both Ensto and residents of Porvoo.

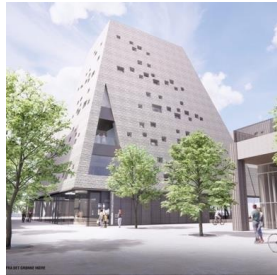


Hudiksvall Hospital

📍 Hudiksvall, Sweden

Sector: Hospital (Retrofit)
Area: 70,000 m²
Energy system: BTES – Borehole Thermal Energy Storage + Thermal Network

The 1960's-built hospital will obtain 1/3 of its heating and cooling from geothermal energy and its own waste heat from hospital operations. The new heat pump system operates with an impressive COP of 5, resulting in significant energy savings, CO₂ savings, and operating cost savings for the hospital.



Vandkulturhuset på PAPIRØEN

📍 Copenhagen, Denmark

Sector: Leisure – Poolhouse (New Build)
Energy system: BTES – Borehole Thermal Energy Storage

Copenhagen's new cultural center and pool house will be heated and cooled using geothermal energy stored in 14 boreholes beneath the site. The system will use this renewable energy to heat the outdoor pools and cool the indoor ice baths and community spaces.



NOLI August Schade

📍 Copenhagen, Denmark

Sector: Residential (New Build)
Area: 15,000 m²
Energy system: BTES – Borehole Thermal Energy Storage

With no connection to district heating providers, the new apartment complex will source all of its heating, cooling, and hot water from geothermal energy. The system uses 75% less purchased energy than a conventional district heating setup, and all purchased energy is electricity.



Zinko

📍 Stockholm, Sweden

Sector: Office (Retrofit & New Build)
Energy system: BTES – Borehole Thermal Energy Storage

An integrated BTES solution will heat and cool the 5-building property using geothermal energy and the property's own waste heat. The property will require < 20 kWh/m²/year of purchased energy (electricity) to meet its entire heating, cooling, and domestic hot water needs. The development is on track to achieve BREEAM Outstanding certification.