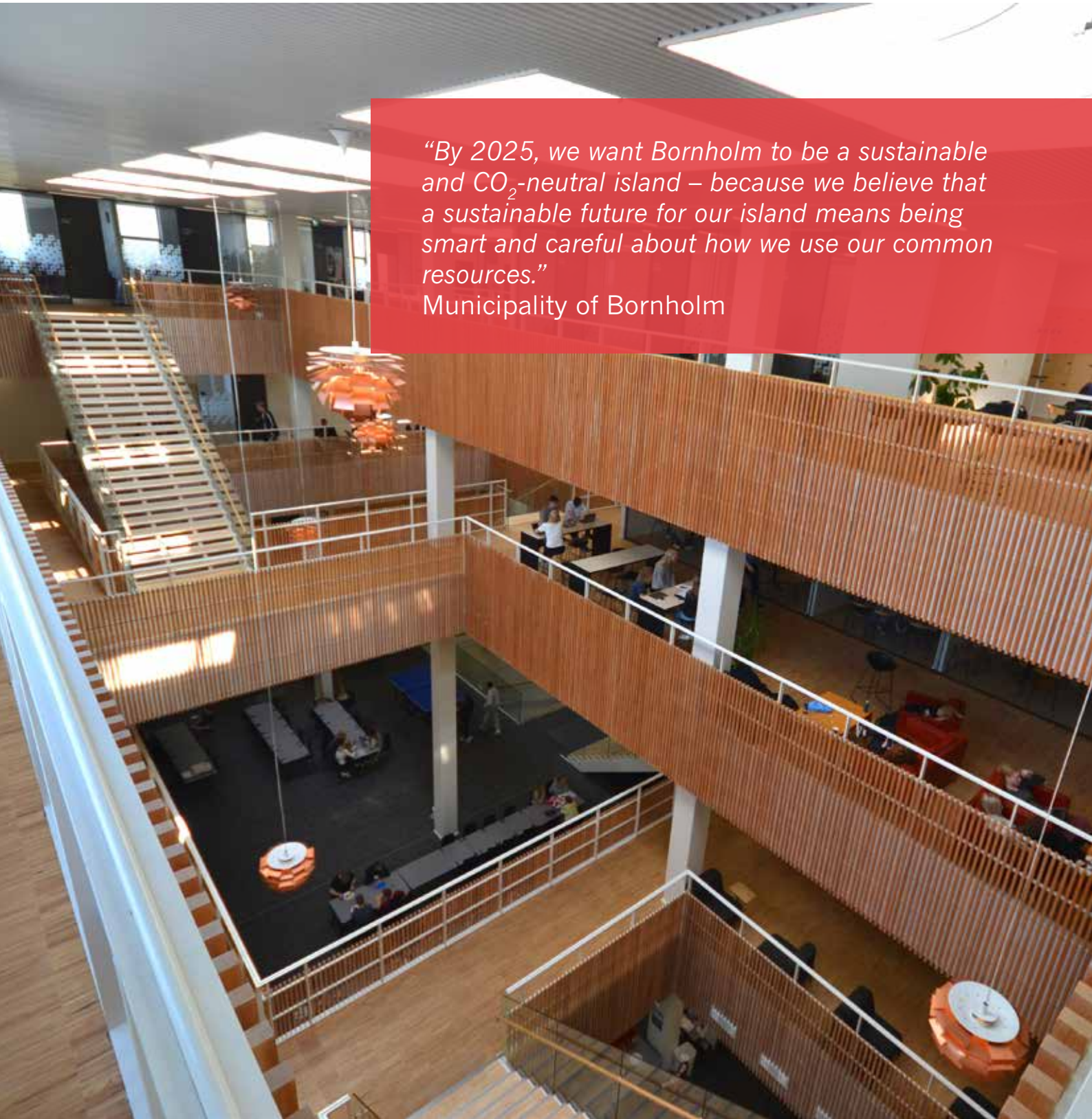
Green Campus on a green Danish island benefits from Thermia renewable energy



"By 2025, we want Bornholm to be a sustainable and CO_2-neutral island – because we believe that a sustainable future for our island means being smart and careful about how we use our common resources."
Municipality of Bornholm

View of the Campus building

Bornholm becomes a green island

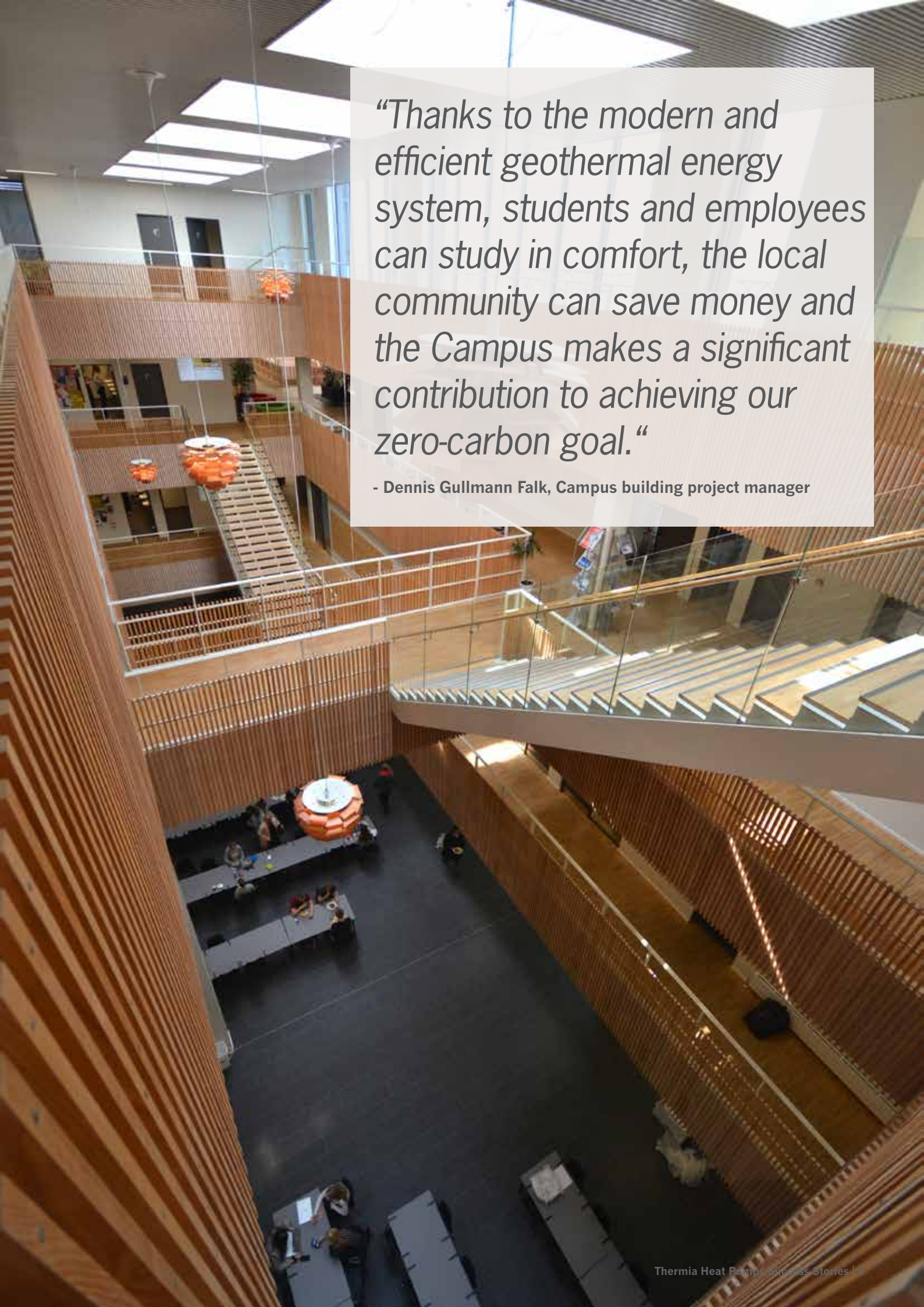
In 2008, the Regional Municipality of Bornholm decided that by 2025, the island should become a 100% sustainable and CO_2-neutral society, using only sustainable and renewable energy. Accordingly, the island has been converting its energy systems to fossil-free energy by investing in wind farms, photovoltaic panels, heat pumps and biomass. The islanders' ambition is to increase production of green energy to cover 100% of local consumption.

View of the Campus building from the parking area

A green campus that is home to all the island's education offerings

In 2018, a new campus building was inaugurated that gathers together all Bornholm's education in one place. The physical merger of the island's youth, adult and continuing education was one of the largest projects ever on Bornholm. The aim of merging all the programs into a single campus community was to create an attractive, coherent and diverse learning environment in which all education resources are fully exploited and where students

Main atrium, ground floor



“Thanks to the modern and efficient geothermal energy system, students and employees can study in comfort, the local community can save money and the Campus makes a significant contribution to achieving our zero-carbon goal.“

- Dennis Gullmann Falk, Campus building project manager

Reading room

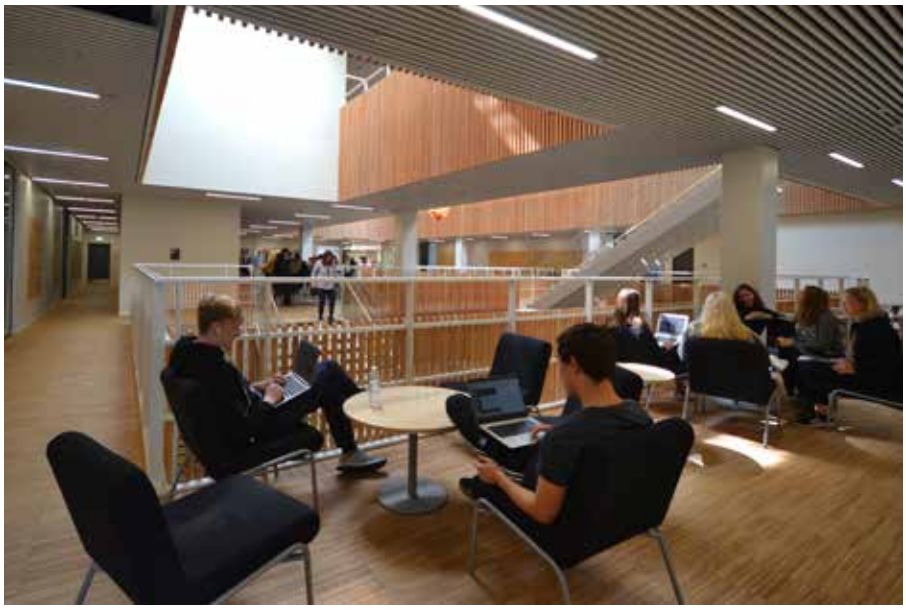
and staff can meet naturally in everyday life.

Contemporary architecture and a sustainable building

The building's architecture is characterized by its striking reinterpretation of classical design elements. The building consists of three levels that are staggered horizontally to create areas for group work, self-study and socializing. The design scheme also draws inspiration from the wider Bornholm context, with floors built up around a larger and a smaller square, inspired by Rønne town center. The atrium space serves a communication function as well as flooding the interior with light and ventilation.

The architecture is conceived to support modern forms of teaching, with plenty of rooms for work in larger and smaller groups, classrooms, auditoriums and larger living areas. The overall concept helps to break down barriers between programs and to facilitate easy interaction and exchange between students and staff. Applying a sustainable building concept meant that heating and cooling energy is drawn from renewable sources. Campus Bornholm uses ground-source heat pumps to extract energy from the ground via a series of boreholes. At the same time, the building envelope plays an active role in the heating and cooling distribution system. As well as floor heating, the Campus features Thermally Activated Building Structures (TABS). TABS use the large thermal mass of concrete structures as a buffer for changing cooling or heating loads during the day. It does this by running hot or cold water through pipes within the concrete slabs.

Sustainable building is supported by the building infrastructure as well as by the materials used in its construction. The façade is cladded with tombak, a certified material recycled from used copper cables



Living areas for students

Campus canteen

and zinc gutters. The floor on the ground floor is laid with beautiful Bornholm roan granite. The roofs are covered with sedum, a form of vegetation that absorbs part of the rainfall and thus relieves the drainage system. The lighting system automatically adapts the light level to the available natural lightning.

Thermia heat pumps – the most efficient solution for heating and cooling

From the start, the vision was to create a unique building. In line with Bornholm's "Bright Green Island" vision, the building is heated and cooled by ground-source heat pumps that use a 9 km network of ground source collectors. 1,100 m2 of solar cells provide around one fifth of the building's total electricity consumption.

The heating and cooling system is based on Thermia Mega XL

Fact Box

Commissioning date:
Summer 2018

Location: Rønne, Bornholm, Denmark

Building characteristics:
- Heated area: 15,435 m^2
- Heating: 800.000 kWh/year
- Cooling: 50.000-150.000 kWh/year
- Hot water: 25.000 kWh/year

Applied solution:
Geothermal heating
- Four Thermia Mega XL (21 - 88 kW),
- 9 km of ground source collectors (boreholes)
- Two buffer tanks for low and high temperature heating system
- Passive cooling system distribution to thermoactive ceilings, and floor heating system

Photo voltaic system:
- 1100 m^2 solar cells produce about 184 466 kWh per year

Heating room with Mega ground-source heat pumps

(21-88 kW), a new commercial ground-source heat pump with an inverter-driven compressor. The main advantage of this heat pump is that it can continuously adjust heating or cooling output to current demand, meaning that the heat pump can supply 100% of the building's energy requirements. In addition, the Thermia Mega can also provide simultaneous heating and cooling. If the primary function is cooling, any heat surplus is used to produce hot water. The system is able to swap between the hot and cold tanks without using energy from the boreholes.

Energy efficiency and environmental footprint awareness

The new energy solution has enabled the Campus management to provide extremely energy-efficient heating and cooling that is sustainable, renewable and guarantees superior comfort. A visible screen is updated in real time during the day so that building users can keep track of the amount of energy consumed and produced across the campus site.

In recognition of the success of this project, Campus Bornholm won the "Building of the Year 2018" award. It is used as a best-practice example across Denmark, in terms of sustainable, green building as well as contemporary, timeless architectural design. With the Campus Bornholm, the island has created a unique and sustainable landmark that sets new standards for design and construction, both architecturally and visually.

Fact Box

Architects and Advisors:
- Cubo Arkitekter A/S
- Nova5 Arkitekter A/S
- Dominia A/S
- Ørtoft A/S - Advisory engineering firm

The major contract of construction is done by:
- PL Entreprise A/S
- GVL Entreprise A/S
- Ribe VVS

Heating system:
- Klimadan A/S