university of groningen

Energy Academy Europe

The most sustainable educational building in the Netherlands

Harvesting energy from the four natural elements, using a minimum of technology

CODE FOR A SUSTAINABLE BUILT ENVIRONMENT
BREEAM
BRE GLOBAL
AWARDS 2017
WINNER

Sustainable, recyclable materials

The most sustainable teaching building in the Netherlands is right here in Groningen.

Jan de Jeu, Vice President of the Board of the University of Groningen

Winner BREEAM Awards 2017

On 7 March 2017, it was announced in London that the new Energy Academy Europe was the winner of the international BREEAM Awards 2017 ('Mixed Use & Other' category). Worthy recognition from a professional jury of the unique and sustainable exemplary project that has been realized in Groningen.

Proud university

'The University of Groningen is proud to have won this prestigious BREEAM award,' says Jan de Jeu, Vice President of the Board of the University. 'This unique new building project serves to endorse the way in which the University has integrated the theme sustainability into its very being. We explore avenues for sustainable innovations and energy-saving opportunities not only in our building projects, but also for our policies on waste and purchasing, for example, where our use of natural resources is an important priority. This ambition and attitude is reflected in the Energy Academy Europe building.'

Green university

Initiatives like this have helped to put the University of Groningen in 15th place in the Green Metric, the list of the world's 'greenest' universities.

‘The new building must be an icon for the pioneering role the North is playing in the energy transition process.’

Max van den Berg, King’s Commissioner (2007-2016)

Construction kick-off with Max van den Berg (King’s Commissioner), Gerrit van Werven (Energy Valley), Prof. Sibrand Poppema (University of Groningen), Dr Han de Ruiter (Hanze UAS Groningen), Anja Hulshof (Energy Delta Institute) and André Faaij (Energy Academy Europe).

Construction kick-off 21 May 2015

‘It must become an icon of sustainability.’
This was the ambition expressed by the cooperation partners during the kick-off for the realization of the most sustainable teaching building in the Netherlands.
Since it has been completed, the building has played a vital role in the collaboration between the University of Groningen, Hanze UAS Groningen, Energy Academy Europe, Energy Valley and Energy Delta Institute, aimed at developing the region into a centre of expertise in the field of energy and energy transition.

university of groningen
Hanzehogeschool Groningen University of Applied Sciences
Energy Academy Europe
energyvalley
Energy Delta Institute Business School on Energy

Use of natural resources

Energy Academy Europe has low energy requirements. It requires little technology as it makes use of the elements that nature has to offer:

Earth

The insulating properties deep down in the earth are perfect for storing warm or cool water, to be tapped as and when needed. This system of geothermal energy storage makes it possible to provide heat in winter and coolness in the summer without consuming any energy. In addition, ventilation air is cooled or heated while transported through the labyrinth.

Water

Rain from the sloping roof runs into a large basin. Purified drinking water is not squandered on flushing the toilets or watering the plants in the winter garden.

Fire

Solar panels cleverly placed to create pyramids harvest energy on the roof. Triangular windows between them allow daylight in to save artificial light.

Air

The building is ventilated by natural drafts. A 'solar chimney' creates a warm spot at the top of the building, drawing fresh air in through a thermal labyrinth underneath the building.

Want to know how the building works?
Watch the explanation on:
rug.nl/GroundbreakingWork/EAEvideo

Design and construction

Members of the design team showing off the BREEAM Outstanding design certificate.
Left to right: Roger Tan and Aldo Vos from Broekbakema; Jean Frantzen from DGMR, Peter van der Meer from ABT Wassenaar; Paul van Bussel from De Unie Architecten.

Producing more energy than it uses

A BREEAM Outstanding score of 89.62% makes the Energy Academy the most sustainable teaching building in the Netherlands. It produces more energy than it uses. The building satisfies highly stringent sustainability criteria. To achieve this, a team of experts comprising Broekbakema, De Unie Architecten, ICS Adviseurs, Arup, Ingenieursbureau Wassenaar and DGMR was set up. The building now serves as an example for prospective new building projects throughout the world.

Sustainable building process

Sustainability was also a key feature of the building process. The materials used have a low impact on the environment, water and energy consumption was kept to a minimum, waste was separated for recycling and 50% of the concrete was made from recycled granulated concrete.

Design:

Architecture:	broekbakema i.s.m. DE UNIE ARCHITECTEN
Installation consultancy	ARUP
Construction	abtWassenaar
Laboratory consultancy	dr. heinekamp Lab Engineering Benelux
Building Physics and Fire Safety Expert BREEAM	dGmR
Management	ICS adviseurs

Construction:

Building and construction	Nieuwbouw Energy Academy Europe GRONINGEN Bouwcombinatie Friso • Koopmans friso bouwgroep koopmans | TBI
Technical services	ENGIE
Heat pump system	unica
Laboratory	wesemann LABOREINRICHTUNGEN
Solar panels	ONE SOLAR
BREEAM Assessor	BENR Adviseurs voor duurzaamheid

The **photographic** content of this booklet was supplied by: Gerhard Taatgen, Pepijn van den Broeke, Egbert de Boer, Ronald Zijlstra and Jeroen de Lezenne Coulander.

The accompanying **video** 'How does the building work?' was produced by Strawberry Fields and can be viewed here: **rug.nl/GroundbreakingWork/EAEvideo**

Built in just 18 months

The University of Groningen entrusted the construction of Energy Academy Europe to the Friso building consortium from Sneek and Koopmans Bouwgroep from Enschede. ENGIE technical installations was responsible for installing the technology in the building.

The building was completed in October 2016, just 18 months after building work started. The public were invited to come and look around the building site on Building Day, which was held on 4 June 2016.

Front row, left to right:
H.C. Smit (Koopmans Bouwgroep), Henk Dedden (Friso Bouwgroep), Jan de Jeu (UG) and Freddy de Boer (ENGIE).

Foundations laid without sinking piles

Vibration-free pile-driving

The piles supporting Energy Academy Europe were not driven into the ground: a special method ensured that people using buildings nearby were not bothered by the usual noise and vibrations caused during pile-driving. The first step was to drill deep holes into the sandy earth. They were then reinforced and filled with concrete. Once the concrete had hardened, the resulting piles were dug out and used for the foundations of the building.

Six seismic walls are in place to absorb possible earthquakes

Earthquake-proof building process

Energy Academy Europe is one of the first buildings in Groningen to be designed to withstand earthquakes. If an earthquake occurs, six seismic walls absorb the energy generated by the earthquake. The building will sway flexibly around these solid, seismic cores.

Other special features that make the building earthquake-proof are: extra hard, laminated glass, walkways in the atrium to connect sections of the building and a roof that moves if the building shakes.

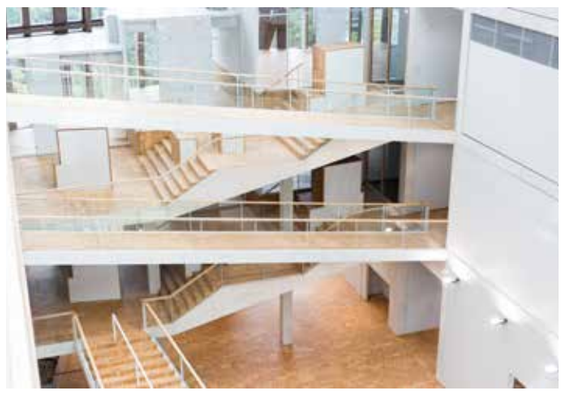
Unique type of earthquakes in Groningen

The earthquakes in Groningen are caused by drilling for gas. The effect of these earthquakes is different from that of tectonic earthquakes, which occur as a result of natural fault lines in the Earth's crust, as in Japan for example. 'Groningen-quakes' are usually short and sharp, with a vertical acceleration (compression wave) followed by a horizontal acceleration (shift wave). They can cause more damage than natural earthquakes of a similar strength. The Scale of Richter does not apply to these earthquakes as it is the effect of the Peak Ground Acceleration that counts.

In the design of Energy Academy Europe, a lot of space has been left between building elements (dilatations), giving the pillars, floors, frames and windows room to shake.

Connections and contact

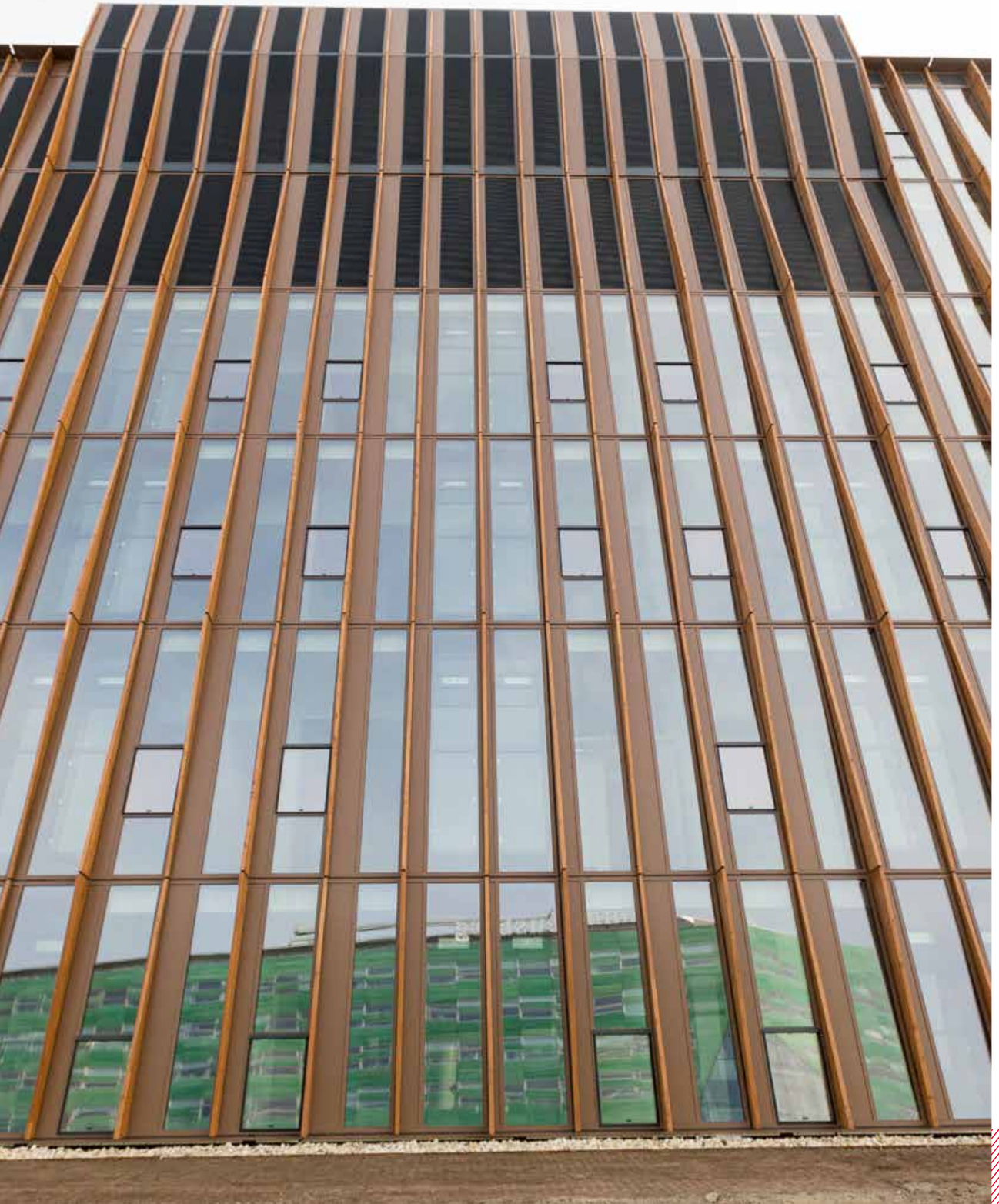
The building comprises two sections, joined by the atrium, the beating heart of the building where the two worlds meet. The research area with laboratories and related workshops have been built on the north side, while the south side houses workspaces, a winter garden and teaching rooms.



Take the stairs

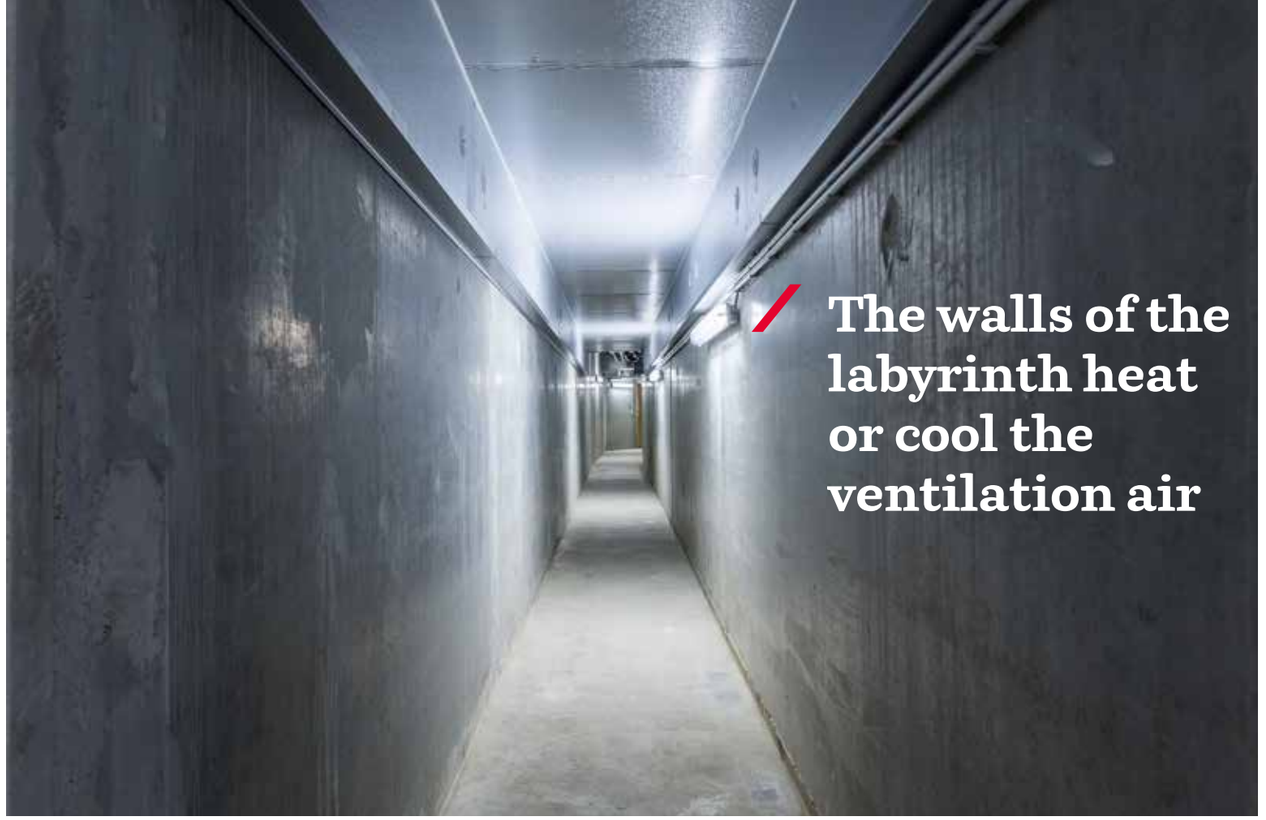
The floors have been finished with natural materials and link all the separate sections of the building. Attractive, wide, sloping ramps tempt users and visitors into taking the stairs instead of using the lift almost without noticing; a smart way to encourage exercise and personal contact, while saving energy by discouraging use of the lift.

Solar chimney powers natural ventilation

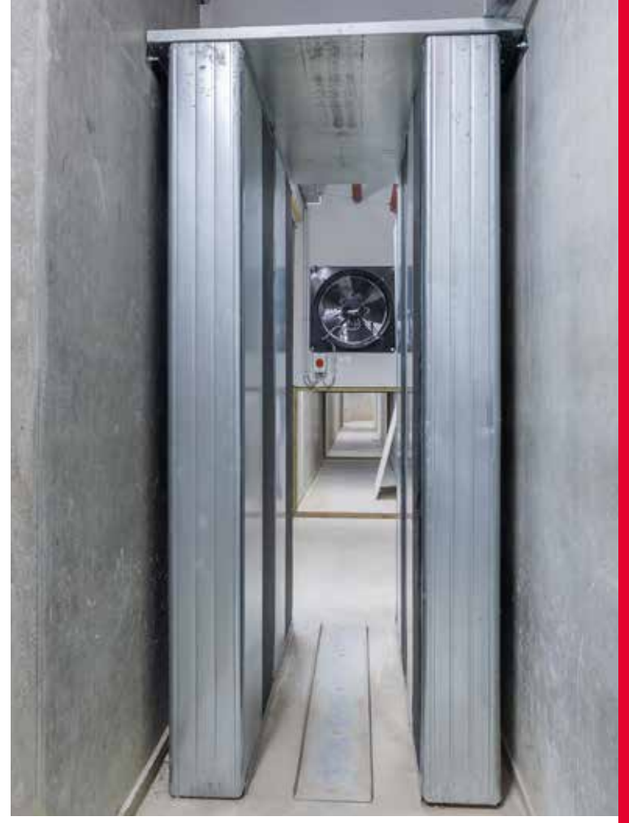


Green ventilation

A black ‘solar chimney’ has been mounted at the highest point on the north side of the building. During the day, the black surface of the chimney is heated by the sun, warming the air inside. This creates an upward air flow inside the building, and draws in cool air. In this way, solar heat (aided by the wind) provides ventilation. The ‘stale’ air also leaves the building through the solar chimney.



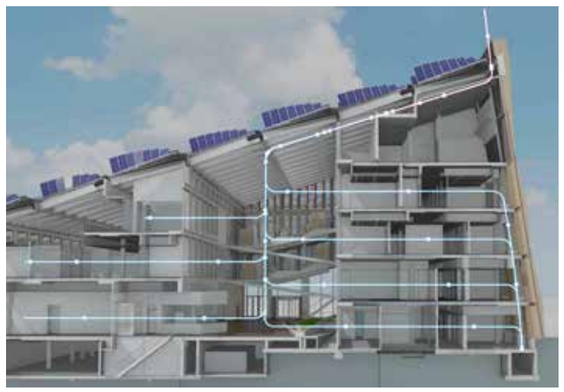
The walls of the labyrinth heat or cool the ventilation air



The view looking up through the air vent in the labyrinth

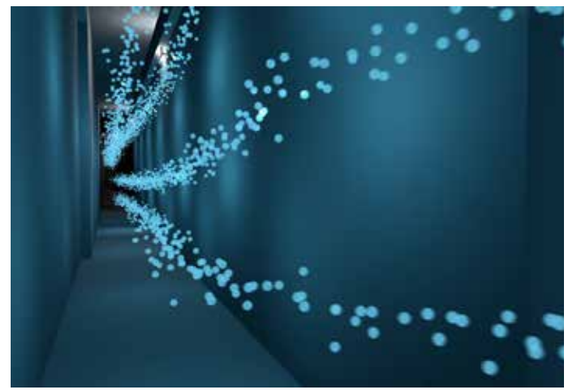
Natural draft

Fresh air is essential to a pleasant indoor climate. The building has a hybrid ventilation system, which makes optimum use of natural ventilation. Sun and wind are used to create a natural draft. The warmest zone in the top of the building draws fresh air from outside into the labyrinth at the bottom. The air is spread through the building via huge air vents, corridors and the atrium. If the weather conditions are not conducive to the system, mechanical ventilation will kick in automatically.



Using the terrestrial temperature

The basement houses a labyrinth that collects and stores daytime heat and night-time coolness, and gradually dispenses thermal energy to heat or cool the building as required. The air in this 200-metre air vent flows slowly, at less than one metre per second. The winter garden serves as an important buffer zone, where air can be acclimatized.



1,600 solar panels arranged in a smart landscape for maximum yield

Landscape of 133 triangles

Energy Academy Europe makes optimum use of sunlight for lighting and for generating energy. The south-facing sloping roof could have been completely covered by 1,600 One Solar panels. But thanks to this smart landscape of 133 triangles, a staggering 37% more energy is being generated. But that's not all; they also leave room for skylights, which provide natural daylight. As a result, the low-energy LED lighting is not always needed.

Zernike
CAMPUS
GRONINGEN

One of the largest knowledge campuses in the Netherlands

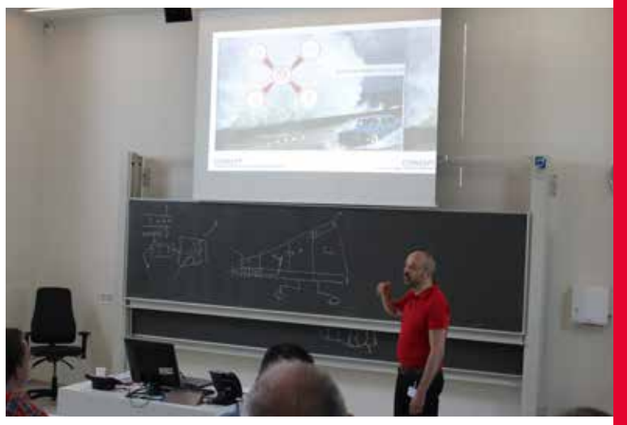
Energy Academy Europe location

The Energy Academy is located on the Zernike Campus Groningen, the hub of knowledge and entrepreneurship in the north of the city of Groningen. More than 4,000 researchers and staff, and several hundred entrepreneurs are working here to develop the innovative solutions we need for the future. Every day, over 35,000 students are being trained to become professionals at the University of Groningen and Hanze UAS Groningen. The high-tech facilities and opportunities for collaboration form an excellent breeding ground for the products and services of the 150 companies based here.

The combination of knowledge, education and entrepreneurship makes Zernike Campus Groningen a dynamic breeding ground for new ideas, applications and products.

EnTranCe (Energy Transition Centre) is affiliated to Energy Academy Europe. This applied energy research test bed belonging to Hanze UAS Groningen is also based on the Zernike Campus Groningen.

The building work attracted a lot of interest



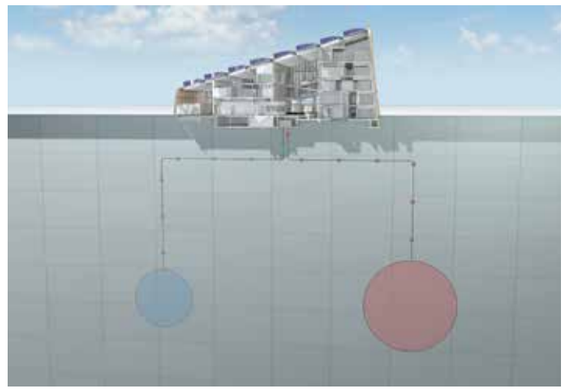
Concrete core activation from natural heat and cold sources

Under-floor heating and cooling

In addition to air-powered heating and cooling, Energy Academy Europe also uses concrete core activation. Long pipes laid in the constructive mass of the floors emit heat or cold into the floor, ensuring a constant indoor temperature. The water running through the pipes comes from tanks buried deep underground, which store cold water in the winter and warm water in the summer. This is known as geothermal energy storage.

Heat pump, sustainable cooling medium

A heat pump is part of the geothermal energy storage system. The Energy Academy Europe is the first Dutch building to be fitted with a heat pump (Carrier Aquaforce 30XW) with the new, environmentally sound and ozone-neutral coolant HFO-R1234ze(E). This substance is fully degradable in 18 days, whereas standard coolants take 14 years to degrade. The burden on the climate (the GWP or Global Warming Potential) is less than 1, which is way below the current norms. In addition, in terms of energy, the heat pump performs slightly better than heat pumps using standard coolants.



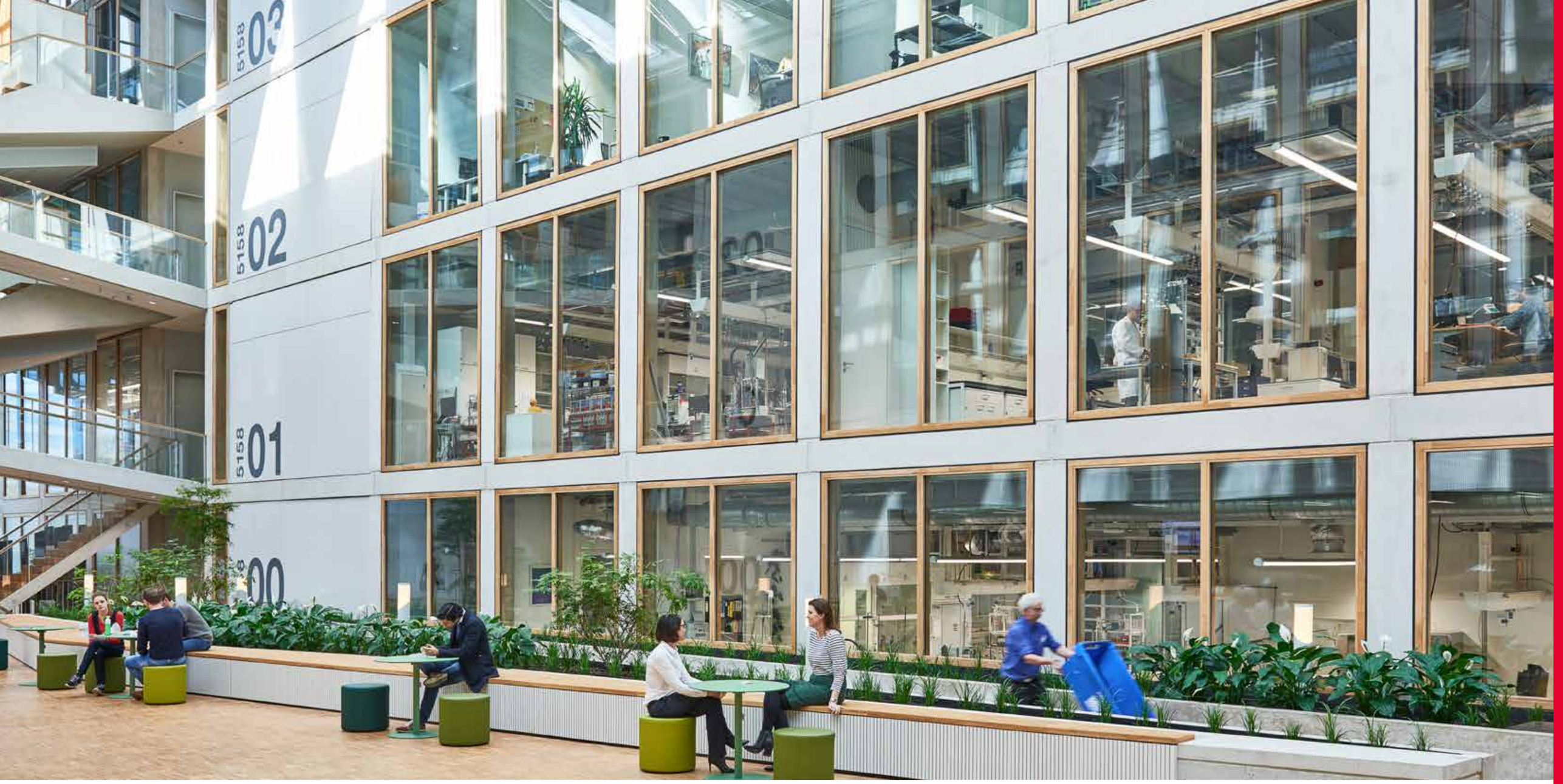
Unique cladding for optimum insulation and daylight

Larch wood fins

Energy Academy Europe has unique outer cladding, which helps to create an optimum indoor climate. The cladding keeps heat and coolness inside, while repelling sunlight when necessary. The façades are covered in fins made from FSC-certified larch wood. These wooden fins create gentle shade, dispensing with the need for extra sun blinds.

Winter garden: buffer zone and meeting place

The large winter garden serves as a public park, a place to meet during breaks and a workplace for users. The floor-to-ceiling glass and luscious plants make the winter garden an important buffer and heating zone for the natural ventilation, and a place where fresh air can enter the building from outdoors. Visitors can sit back and enjoy the green setting.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Smart energy match

Start of building work in May 2015

Completion in October 2016

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Contact

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May 2017

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SNN provincie groningen Ministerie van Economische Zaken