

CopenHill - A new era of green buildings



Cutting-edge buildings are revolutionising the way society views production and waste. In the centre of Copenhagen, Denmark, there's a great example of an environmentally friendly and waste-conscious building that indicates a greener future is on the horizon.



At a glance:

The unique properties of stone wool proved to be the perfect match for a very special building that bring joy to the inhabitants of Copenhagen as well as clean energy.



Fire resilience



Thermal properties



Robustness



Aesthetics

THE CHALLENGE

With production starting in 2014 and ending five years later, CopenHill – known locally as Amager Bakke – has an ambitious goal to eliminate carbon waste and become “zero-carbon” by the year 2025. Copenhagen has a progressive dream too: to become the world’s first carbon-neutral capital. Achieving this will mean that Copenhagen will no longer add to the amount of carbon dioxide in the atmosphere.

One of the main challenges involved in constructing the vast plant was the strict timeframe. As the aim was to complete construction within three years, it was important that the wide range of high quality insulation products needed were readily available and delivered on time. Safety was also vital. As the site would potentially burn circa 30 tonnes of waste per hour, non-combustible materials needed to be used throughout the construction.

THE SOLUTION

CopenHill today cuts a striking and shimmering shape against the skyline, thanks to its multi-functional façade envelope, created using ROCKWOOL solutions. The façade on the envelope, as well as the concrete structure of the main building, are covered by a layer of aluminium cassettes. These natural aluminium cassettes, over 3,000 in number, all contain ROCKWOOL stone wool.

“ROCKWOOL provided the high quality insulation products for all purposes that we needed to achieve – on time – the large scale façade project for the Copenhagen landmark, CopenHill,” says Michal Prokop, project manager at Sipral A/S, the company behind the complex external envelope of the building. “ROCKWOOL is a well-renowned company in the European market...for a wide range of reliable, top rated insulation products.”

Including stone wool insulation as part of the façade ensures thermal insulation, fire protection and acoustic performance. The specialised façade pre-product was produced in the Czech Republic.

Converting waste into energy

CopenHill transforms waste into energy, generating both heat and electricity. The energy-from-waste plant was created to partially replace an outdated incineration plant on Amager, an island that forms part of Copenhagen. CopenHill is comprised of a generator system, a joint turbine, and two furnace lines – an improvement from the old incineration plant’s four furnace lines.

The process of eliminating waste and converting it into energy to be used for the greater good is more intricate than it sounds. That said, the process is immensely streamlined and well-thought-through. Circa 30 tons of waste are incinerated per hour, releasing energy in the form of hot gas which is then transported to heat water held in enormous boilers. These boilers produce tons of steam that is sent to a turbine connected to a generator. Here, the energy is converted into electricity, and what is left over is used in the heat exchanger. District heating water, for example, is heated up in the heat exchanger and transferred to the district heating system to supply around 120,000 households with heat. As an added bonus, the process also provides about 50,000 households with electricity and power. CopenHill is actually twice as efficient as the incineration plant it partially replaced. But this hard-working plant is a lot more than ‘just’ an innovative way to deal with waste and energy production!





A new tourist attraction

This revolutionary building is also the only building in existence with a ski resort on its tall, sloped roof. It also serves as a hiking slope and climbing wall, both existing before the ski slope. A visitor can bring their own equipment or rent some on site. Either way, with between 1,000 and 2,000 visitors to CopenHill per week, not just for work but for recreation.

Safety first – with some help from stone wool!

Without doubt, CopenHill deals with exceptionally high temperatures on a daily basis – from burning hundreds of tonnes of waste to boiling steam to keep the generator running. Such consistently high temperatures means that protection of both the building and the people who work inside is of utmost importance. Stone wool from ROCKWOOL proved to just the kind of thermal insulation needed – one that can withstand temperatures above 1000 °C. Throughout the process, equipment and installations, approximately 16,500 m² of ROCKWOOL ProRox wired mats and pipe sections were used. These products are specifically designed for use in conjunction with process equipment that operates at temperatures of up to 700 °C. ROCKWOOL ProRox insulation was used to reduce the surface temperatures of the hot equipment operating with steam at temperatures of up to 480 °C.

Although its primary purpose was to protect the people working in the plant against burns, the insulation very significantly reduces the energy lost from the hot equipment, saving energy and avoiding unnecessary CO₂ emissions. With 300 mm of ROCKWOOL ProRox insulation, the energy loss from one square meter of boiler wall, operating at 480 °C, the heat loss is reduced from 14,000 W/m² to only 107 W/m². Per square meter, this is the equivalent of saving of 42.4 tons of CO₂ emission per year.

Circularity – an integral part of a sustainable building

The construction sector is aware that it's necessary to embrace circularity in order to slash waste and foster a more sustainable economy. One of the most valuable features of stone wool is that it can be made with materials that would otherwise be landfilled or downcycled – and can itself also be recycled. So, stone wool insulation perfectly complements the vision behind CopenHill. The plant processes around 400,000 tons of waste annually, collected from the roughly 700,000 civilians residing in Copenhagen and about 46,000 companies in the area. Each day, upwards of 250 truckloads of waste arrive at the premises to be recycled.

A greener tomorrow

CopenHill continuously makes giant strides towards its environmentally supportive goal in 2025, and already generates more clean water than it uses. Thanks to its filtration system, the sulphur emissions associated with the plant will decrease by almost 100 percent. This alone will make CopenHill the cleanest incineration plant in existence.

CopenHill is revolutionary when it comes to buildings as the world knows them. It creates an idea of what can be accomplished in the future, and ROCKWOOL's stone wool helps the plant to operate safely and effectively, burning waste and powering the homes of so many Copenhagen residents, all while protecting those working within the building and the environment.

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