HELEN
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KALLE KATAILA

ALSO IN THIS ISSUE

A MEGA PLANT IN DISGUISE

A park in the Sörnäinen district of Helsinki is concealing a world-class speciality. The largest heating and cooling plant in the world is located underneath the Katri Vala Park. In terms of energy efficiency, the plant acts as an example for the rest of the world. Text Samuli Kotilainen

Helsinki is full of surprises. The lovely Katri Vala Park is located right next to the Sörnäinen metro station. It is named after a Finnish poet who lived in the early 20th century. Deep under the rocky park, hidden from view, is a special type of production plant.

'The Katri Vala plant is part of Helsinki's combined district heating and cooling system, which is a forerunner in the world in terms of energy efficiency,' explains our guide **Kosti Koski**, manager of Helen's cooling business. The plant's operating principle is ingenious.

SUPER-EFFICIENT RECYCLING OF ENERGY

A great deal of energy is wasted in traditional methods of cooling buildings. The cooling machinery of properties consumes a lot of electricity, but the heat recovered from the facilities is removed by directing it into the open air. The operating principle of the Katri Vala heating and cooling plant is different. The plant combines and recycles different kinds of

ILKKA POHJANPALO

energy flows from the city, which means that waste from one location is taken advantage of elsewhere.

The most important task of the plant is to produce district cooling for offices, homes and, for example, data centres in Helsinki. How is district cooling produced? The heat in the water is simply conducted into the district heating network. The cooling water cools down and the heating water heats up in the same process, and hardly anything goes to waste.

The second cycle is related to waste water. Purified water is directed to the plant from the Viikki wastewater treatment plant. The waste heat of the Viikki plant is also conducted into the district heating network.

'The Katri Vala plant makes our system unique because the district cooling network is connected to the district heating network. We are able to recover waste heat with district cooling and reutilise it in the heating network,' Koski explains.

THIS IS HOW KATRI VALA PLANT WORKS

Katri Vala is a heat pump plant. Heat pumps are familiar to many people in the heating and cooling of detached homes and summer cabins. This image is soon forgotten when Koski opens the door to the heat pump room of the plant. The equipment is enormous. It would just about fit inside a two-storey detached house.

The heat pump operates on the same principle as a refrigerator. In the Katri Vala plant, heat pumps transmit energy away from the return water of district cooling (about 16–18 degrees), cooling it down to about four degrees. Energy is transmitted to the other side of the pump where the return water of the district heating network (about 45 degrees) is

Katri Vala heating and cooling plant

- World's largest heat pump plant producing district heat and district cooling
- Located in a rock cavern excavated under the Katri Vala Park in the district of Sörnäinen in Helsinki
- Completed in 2006

DISTRICT COOLING (60 megawatts)

- A heat pump plant produces over 60% of the annual energy production of district cooling
- District cooling is also produced with the absorption cooling technology and, in the winter, with sea water
- Production and demand response are balanced with gigantic cooling water reserves located under the Esplanade Park and in the district of Pasila
- Waste energy recovered with district cooling is processed in the heat pump plant to be used further as district heat

DISTRICT HEAT (90 megawatts)

- Heat is recovered from the return water of district cooling and from the purified waste water from the Viikki wastewater treatment plant
- The heat production of the Katri Vala plant meets the heating need of most of the city centre of Helsinki in the summer
- On a hot summer's day, half of the district heat in Helsinki is based on surplus heat processed for utilisation in the Katri Vala heat pump plant
- In the summer, district heat is used for producing hot tap water for properties

again heated up to 88 degrees. The Katri Vala plant has five of these large heat pumps, each in their own 'cave'.

One of the caves in the main corridor contains appliances that look quite different: these are huge heat exchangers. Purified waste water from Viikki is directed into these heat exchangers at a temperature of 10–20 degrees, and the heat of this water is recovered. The amounts are huge here, too: 260,000 cubic metres of water flows through the heat exchangers every 24 hours.

These days, many well-insulated houses need more cooling than heating.

The demand for district cooling is growing steadily as offices are refurbished and homes are renovated. These days, many well-insulated houses need more cooling than heating. Therefore, it is likely that the significance of the Katri Vala plant as the heart of a smart energy system in Helsinki will carry on growing.

JUUSO PALONIEMI

Warmth on frosty days

My family and I live in an electrically heated detached house. In winter, we heat our fireplace daily, and our heating system is augmented by an air-source heat pump and heat recovery system, which make nice savings in heating costs.

We produce energy in a number of ways at Helen, too: we use several energy sources and various methods of production. Increasing energy volumes are produced from wood, the sun, wind and water. It is created by people, habitation and living. It is recovered and recycled.

When things are done really efficiently, the same amount of fuel produces both light and heat for homes. The combined heat and power generation we use at our Helsinki power plants saves as much energy every year as the annual consumption of 500,000 detached houses. That is a great deal, and we have good reason to be proud. This has also been noticed in the world at large: our smart energy system has been awarded several prizes, and people come to see it from all over the world.

We have also combined district cooling with the system, which utilises the waste energy from buildings. As an example, last summer we used district cooling to recover as much energy as is received by buildings from the sun, equivalent to that produced by 22 hectares of solar collectors.

Our aim is a carbon-neutral future, and we are working towards it on many fronts. We want to provide the best city energy in the world.

Pekka Manninen
CEO

SAFETY FROM TECHNOLOGY

1. The new features of modern home appliances improve our daily safety. Items like cookers and irons may have automatic power cutoffs, and the EU also requires certain safety features in new household appliances.

Nevertheless, we can't rely entirely on the accessories on appliances – at the end of the day, it is the users themselves who ensure they use them safely. Appliances should never be left switched on if you are not at home, and washing machine taps should be turned off when not in use.

Reading the instructions for use and installation is also an important safety measure.

2. Technology brings safety at different life stages – both during the hectic years and at retirement age. Devices equipped with automatic power cutoffs or lighting attached to timers may prove to be valuable helpmates for everyone coping with a busy workaday life.

There is plenty of choice in safety devices for cookers, and a child lock and timer are found in many homes. An alarm measuring temperature or reacting to smoke can be fixed to the cooker hood. For anyone suffering from dementia, a safety power cutoff device installed between the cooker and power connection may be the best.

Regardless of the cooker safety device, a fire blanket belongs in the safety arsenal of every home.

3. Lighting is also part of safety and should never be skimped on, even to save energy. Energy should be saved through new technology, not by sitting in the dark.

Through routes used at evening twilight or at night should be lit to prevent falls. A dim night light is sufficient for sleepy eyes for a trip to the loo, and an energy-miser night light may also have a twilight sensor. Lighting of stairs and other steps is important both indoors and out. Movement sensors may be installed in existing home light fittings.

In the yard, you can prevent vandalism and improve your own safety by adding outdoor lighting with timers or movement sensors.

EXPERT: **MARJA EINESALO**

TAKING IN THE SUN

Finland's largest solar power plant is in Suvilahti, Helsinki. A total of 1,188 solar panels have been installed on the substation roof.

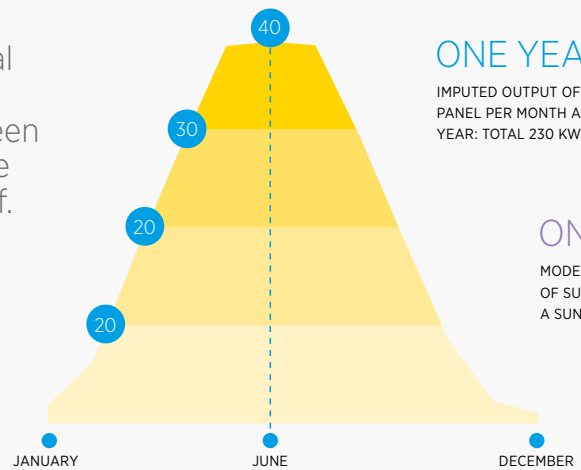
10 %

SUVILAHTI'S ADDITION TO FINLAND'S SOLAR POWER PRODUCTION CONNECTED TO THE NETWORK EXCEEDS 10%

DID YOU KNOW?
SOUTHERN FINLAND HAS AS GOOD CONDITIONS FOR SOLAR POWER PRODUCTION AS NORTHERN GERMANY.

DID YOU KNOW?
MODERN TECHNOLOGY ALLOWS ENERGY RECOVERY EVEN ON CLOUDY DAYS.

DID YOU KNOW?
ABOUT HALF OF THE POWER GENERATED BY A SOLAR PANEL COMES FROM DIFFUSE RADIATION.

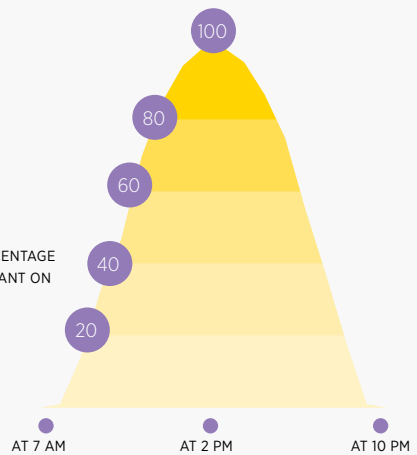


ONE YEAR

IMPUTED OUTPUT OF A SINGLE SOLAR PANEL PER MONTH AND TOTAL PER YEAR: TOTAL 230 KWH

ONE DAY

MODELLED OUTPUT PERCENTAGE OF SUVILAHTI POWER PLANT ON A SUNNY JULY DAY



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