Helsinki energy storage policy updates

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Vantaa Energy plans to construct a 90 GWh thermal energy storage facility in underground caverns in Vantaa, near Helsinki. It says it will be the world"s largest seasonal energy storage site by all standards upon completion in 2028.

Vantaa Energy, an urban energy company jointly owned by the cities of Vantaa and Helsinki, is planning the construction of the world"s largest seasonal heat storage system. At more than 1 million cubic meters in size, the underground heat storage system will have a total capacity that corresponds to the annual heating demand of a medium-sized Finnish city.

The 90 GWh seasonal thermal energy storage will be built in Vantaa, near Helsinki. A total of three caverns about 20 meters wide, 300 meters long, and 40 meters high will be excavated. The bottom of the caverns will be 100 meters below ground level.

The operating principle of the "Varanto" seasonal thermal energy storage is to store heat in underground caverns so that it can be used to heat buildings via the district heating network whenever needed.

The underground caverns, with a total volume of 1,100,000 cubic meters, including process facilities, will be filled with hot water. Pressure will be created within the space, allowing the water to reach temperatures of up to 140 C without the water boiling or evaporating.

The development stage of the Varanto project began in summer 2021. Back then, Vantaa Energy said it was working with Finnish construction company YIT and engineering consultant AFRY. Originally, the construction stage was supposed to begin in fall 2022 and the targeted time of completion was 2026.

Now, with all permits in place, the project is expected to break ground in summer this year and slated for completion in 2028. The project cost is estimated to be around EUR200 million ($217 million), and it has already been awarded a EUR19 million investment grant from Finland"s Ministry of Economic Affairs and Employment.

"The world is undergoing a huge energy transition. Wind and solar power have become vital technologies in the transition from fossil fuels to clean energy. The biggest challenge of the energy transition so far has been the inability to store these intermittent forms of energy for later use," said Vantaa Energy CEO Jukka Toivonen. "Unfortunately, small-scale storage solutions, such as batteries or accumulators, are not sufficient; large, industrial-scale storage solutions are needed. Varanto is an excellent example of this, and we are happy to set an example for the rest of the world."

Two 60 MW electric boilers will be built in conjunction with Varanto. These boilers will be used to produce

heat from renewable electricity when electricity is abundant and cheap.

"Through the intelligent control of Varanto, electricity generation, waste heat and district heating, Vantaa will receive a hybrid system enabling us to take full advantage of the different energy sources," said Toivonen. "Our heat-producing system will work like a hybrid car: alternating between electricity and other forms of production, depending on what is most advantageous and efficient at the time."

The developer said that using and distributing stored heat aligns with underground district heating networks in Finland and other Nordic countries, to which most properties are automatically connected.

District heating is by far the most popular form of heating for buildings and homes in Finland. There are more than 600 km of underground district heating networks in Vantaa. Around 90% of Vantaa residents live in homes heated by district heating.