Digipolis Kemi Invest In Veitsiluoto – local solar energy synergy benefits

1.3.2024

Rev. 1

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Background

The goal of the Invest In Veitsiluoto project is to promote the vitality of the Sea Lapland region by supporting the settlement of companies and utilizing the regional cooperation network in collaboration with various actors. This report continues the examination of the electrical grid and solar power by specifying the local synergy possibilities of a solar power plant in Veitsiluoto. The aim of the study is to investigate the integration of solar power production into the Veitsiluoto electrical grid. The report examines three potential solar power production areas:

- Holstinharju 60 ha,
- Tankokari soil dumping area 16 ha, and
- The northern part of Veitsiluoto 13 ha.

The preliminary capacities and production estimates for these areas are based on the electrical grid study conducted by Ramboll (9-12/2023), and on the solar power plant study (6-10/2023).



Area 1. Holstinharju

- The suitable area for solar power plant in Holstinharju is 60 ha.
 - Estimated solar power production capacity is 33.2 MWp
 - Annual estimated solar power production potential is 28.7 GWh
 - The production potential of Holstinharju is reduced by the area's northern slope, where solar power cannot be installed
- There are no ancient relics or nature conservation areas in the immediate vicinity of Holstinharju.
 - The nearest ancient relic is about 600 meters away, and the nearest nature conservation area is approximately 1.5 km away.
- The nearest groundwater area is the Holstinharju groundwater area, located 300 meters to the south.
- The planned solar power plant area at Holstinharju is situated on two properties. The area is partially on the site of a decommissioned landfill.
- Sensitive natural habitats/species have been mapped from the area and its vicinity.
 - As the project progresses, it is recommended that a nature survey be conducted where necessary (including to ensure protected species).



Area 2. Tankokari soil dumping area

- The Tankokari soil dumping area suitable for the solar power plant is 16 ha
 - Estimated solar power production capacity is 11.4 MWp
 - Annual estimated solar power production potential is 10 GWh
- The soil dumping area is located between a freshwater basin and a motorway.
- There are no ancient relics or nature conversation areas in the immediate vicinity of the area.
 - The nearest ancient relic is 300 meters away, and the closest nature conservation areas are approximately 1.7 km away.
 - There have been observations of protected and highly endangered species in the soil dumping area, such as the Eurasian Coot, Tufted Duck, Ruff, Western House Martin, and Willow Tit. The area may potentially serve as a resting/ dwelling place for birds.
 - A more thorough examination revealed that sensitive species have been observed in the area.
 - As the project progresses, it is recommended that a nature survey be conducted as necessary (including to ensure protected species).



Area 3. Veitsiluoto's open landfill site

- The suitable area for the solar power in the open landfill site of Veitsiluoto is 13 ha.
 - Estimated solar power production capacity is 9.2 MWp
 - Annual estimated solar power production potential is 8.1 GWh
- The area is an old landfill site in Veitsiluoto.
- There are no ancient relics or nature conservation areas in the immediate vicinity of the area.
 - The nearest ancient relic is 1.0 km away, and the nearest nature conservation area is approximately 1.0 km away.
- Within the area delineated, there have been no observations of endangered species, but about 100 meters away, both Western House Martins and Tufted Ducks have been spotted, which are classified as highly endangered in Finland and are protected.



Economic and Contractual Distribution Models

Solar energy produced in the area can be directly utilized in the Veitsiluoto area. Alternatively, all the electricity produced can also be sold to the market.



All produced electricity is sold to the market

- In this option, the electricity produced is sold under a PPA agreement, which is a long-term power purchase agreement.
- In this option, a company specialized in balance management is typically used to ensure the operator's balance responsibility. The amount of
 electricity sold by the producer and the actual outcome must be equal. The electricity producer is responsible for the costs arising from any
 imbalance (difference between the electricity sold and the actual outcome).
- The electricity producer is liable to pay electricity tax if the plant's size exceeds a nominal power of 1 000 kVA and the production is over 800 000 kWh per year.

The operator utilizes the produced electricity themselves

- In this option, the electricity produced would be used by the operator for their own consumption. Any surplus would be sold to the market.
- This option is more economically favourable to the operator than the previous one, because the income from electricity sold to the grid consists only of the price of electricity, whereas when the electricity is used in-house, savings are made on both the price of electricity and the transmission fees. This option requires the power plant to be located at the site of electricity consumption.



Energy Community

- In this option, the operator has the opportunity for self-financed utilization of electricity at multiple premises connected to their electrical subscription.
- The typical goal within communities is to increase the use of renewable energy and to reduce costs related to energy.
- In the case of an energy community, the combined nominal power of energy production can be a maximum of 1 MVA.
- This option does not require a power sales agreement or a separate balance responsible party.

Connecting to the electrical grid

In Finland, connecting an electricity production facility to the electrical grid requires compliance with current legislation and guidelines. Connecting to the electrical grid requires consent from the grid operator and a project permit in accordance with the Electricity Market Act from the Energy Authority for the construction of a high-voltage line if the line's voltage is at least 110 kV. If the production connected to Fingrid's electricity network exceeds 2 MVA, a capacity reservation fee is also charged for the connection of the production facility.

There are two 110 kV power lines going to Veitsiluoto, which are owned by Stora Enso Veitsiluoto Oy. Fingrid's 110 kV line (Isohaara - Simojoki) runs 2 km away from Holstinharju. According to the response received from Fingrid's connectivity inquiry (February 13th, 2024), there is currently no free connection capacity in Fingrid's 110 kV power line (Isohaara - Simojoki). Based on the response to the connectivity inquiry, the capacity situation will improve slightly after network reinforcements in 2026, but it is important to consider other projects in the area that compete for capacity.

It is possible to connect additional solar power production capacity to Stora Enso's electrical grid. Connecting solar power to Stora Enso's power line can be implemented with two different options, either the main power line or the backup power line as the connection option. Another separate option is to connect the electricity produced in the Holstinharju area to Fingrid's network after network reinforcement.



Connecting solar power to the grid

Adding solar power to Stora Enso's power line does not require a separate grid license due to an existing grid license. When a solar power operator enters into a connection agreement with Stora Enso, the grid connection is faster due to the expedited process and lighter licensing requirements. According to the response received from Fingrid's connectivity inquiry (February 13th, 2024), the maximum connection capacity for the Isohaara - Simojoki power line is 60 MW, if capacity is available.

Connecting to Fingrid's electrical grid is more challenging because other production areas must be considered in the line strengths. The Holstinharju area requires a grid license with Fingrid because it is not on Stora Enso's land. Additionally, a grid license and connection permit are required for the Holstinharju property, as well as Stora Enso's electricity distribution license for the said property area.

Adding solar power production to Stora Enso's power line theoretically increases the connection capacity if Stora Enso's own electricity consumption is low, and both Stora Enso's and the solar power plants' electricity production are high. However, it must be noted that this situation places a greater strain on Fingrid's grid, and Stora Enso must consider the electrical constraints of the line's transfer capability.

The Veitsiluoto area has a continuous electricity consumption and always draws power from the grid. Connection capacity to Fingrid can be reserved for both Isohaara and Simojoki. A 30 MW connection capacity for Simojoki has been planned for the year 2033. The Determination of the connection point in the Veitsiluoto area takes place near the Veitsiluoto substation, which is located next to the Holstinharju area.

A connection point to the Stora Enso is possible without a connection fee. To connect to the line, a transformer, disconnect switch and circuit breaker are needed.

It is possible to connect new solar power production of 11 and 15 MW to Stora Enso's 110 kV powerline without restrictions.

Area	Surface area ha	Production capacity MWp	Production potential GWh/a
Area 1 Holstinharju	60	33.2	28.7
Area 2 Tankokari	16	11.4	10.0
Area 3 Veitsiluoto	13	9,2	8,1
Total	89	53,8	46,8

Conclusions

The integration of solar power from the Tankokari soil dumping area and the open landfill site in Veitsiluoto into Stora Enso's 110 kV power lines is feasible with light permitting. The solar electricity production from these areas increases Veitsiluoto's electricity usage capacity.

The Holstinharju solar power plant enhances the availability of green energy in the Veitsiluoto area.

If all potential solar power sites feed electricity into Stora Enso's power lines, additional consumption is needed in the Veitsiluoto area.



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