Microgrid benefits finland

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Incorporating fuel cells, combined heat and power (CHP) and battery energy storage, as well as locally produced biogas and solar power in an environmentally friendly, smart microgrid, the LEMENE project is designed to provide all the energy businesses in the industrial area need, as well as participate in various electricity markets.

Finland invests in key projects like the Marjamäki microgrid to meet their long-term climate and energy strategy goals. Their strategic aims are to reduce greenhouse gas emissions, shift from a dependence on electricity imports to self-sufficiency, and replace electricity generation based on fossil fuels.

In principle, microgrids could make the power generation in an ordinary private house more efficient and reduce electricity losses," concludes Tuomarmäki. The New Energy research group at Turku University of Applied Sciences is also investigating the potential of DC grids as part of renewable energy systems in other projects, such as TIGON ...

Finland has extremely stable electricity grid with minimal losses. One of the most advanced smart grid in the world. Smart grid functionalities such as load profiling, real-time billing, distributed power generation are already in use. Internationally open Smart Otaniemi and Åland Island test beds for smart grid 2.0.

Finland has set a target to increase its share of renewable energy to 51% by 2030, with specific goals for electricity (53%), heating and cooling (61%) and transport (45%). To achieve these goals, Finland is investing in developing its wind and solar power capacity, as well as in integrating them into hybrid systems.

Text: by Siiri Welling

For example, the electricity produced by solar panels must first be converted into electricity suitable for the normal grid, i.e. into alternating current. Conversion, in turn, inevitably means electricity loss. So how can we optimise the benefits of renewables?

The issue has been addressed by the EU-funded RESPONSE project, which has built carbon-neutral and environmentally friendly energy, building services and mobility solutions in two “lighthouse cities”, Turku and Dijon, France. In Turku, the solutions focus on the Student Village, where the Tyyssija building, completed in 2022, has attracted the most attention. Tyyssija is part of a set of buildings and energy solutions designed to produce more energy than its inhabitants consume, making it energy-positive.

A microgrid is a smaller local electricity network than the main grid. It can operate separately from the main grid, so that those connected to it are self-sufficient in electricity generation and transmission.

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The building is equipped with an innovative energy solution that provides heating and cooling for the building, using the return heat from district cooling as the heat source for the heat pump. In addition, the building generates some of its own electricity through double-sided solar panels, which can be stored in batteries. Turku University of Applied Sciences has been involved in the development of the solar panel and electricity system solutions. However, new thinking has been needed to optimise the benefits of solar panels.

“We started thinking about connecting solar panels directly to the DC grid using microgrids. Installing a microgrid and using DC power increases the overall efficiency of the grid. In practice, the solution we presented allowed us to drive electricity from Tyyssija to another building at TYS, thus smoothing out the peaks in energy consumption,” explains Tero Tuomarm?ki, lecturer in energy technology at Turku University of Applied Sciences.

A microgrid is a smaller local electricity network than the main grid. It can operate separately from the main grid, so that those connected to it are self-sufficient in electricity generation and transmission. In the case of the TYS buildings, the microgrid is intended to operate in conjunction with the main grid, allowing electricity to be transmitted back to the main grid and vice versa.

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