Norway grid-scale energy storage

Since then, nearly 3GW of interconnector capacity has been installed to connect the GB and German markets to Norway"s extensive hydro capacity.

However, across Europe battery capacity exceeds 20 GW, with GB, Germany and Italy leading this growth in capacity. Norway"s battery market remains poorly developed, even compared to its neighbours.

Sweden, however, has both a more developed residential storage sector and a bigger pipeline of grid-scale batteries than the rest of the Nordic countries put together, with around 400MW announced for operations in 2024 alone.

One of the first European-owned gigafactories for battery cell production, Northvolt"s Ett was built in Sweden, and the company is collaborating with Volvo to build the country"s second site. Northvolt also entered into a long-term partnership in 2021 with the developer and optimiser Polarium to offer storage solutions to telecoms networks.

Freyr"s Norwegian gigafactory is delayed pending a response to the USA"s Inflation Reduction Act, while Morrow"s projects will not be operational before 2028.

While Polarium largely focuses on the industrial and residential sectors, Sweden"s grid-scale storage is being driven by Ingrid Capacity, which has announced a pipeline of 400MW capacity for 2024. Other startups driving the country"s storage sector includes Flower Technologies, which recently acquired a 42.5MW battery from OX2, and optimiser Fever which is supporting Conapto"s data centre battery to participate in frequency response markets.

The Finnish start-up scene is also developing, with CapaloAI optimising Exilion"s 6MW battery across multiple markets. With their home country"s electricity market dominated by hydro, Norwegian startups like Enode appear to be taking a wider approach, and Eco-Stor is targeting Germany for its battery pipeline.

Commercial and industrial participation in energy markets has long been a feature of the Nordic markets, where a collaboration between Sympower and Vattenfall in Sweden enabled Artic Paper to become the first provider of FCR in 2020, and is now providing 60MW in FFR.

Residential customers have not been left out, with Tibber also aggregating to provide FCR since 2020. More recently, 1komma5 launched its Dynamic Pulse tariff and Heartbeat optimisation platform with the aim of delivering zero-cost energy to households from offering pooled batteries to support grid frequency.

Nordic countries have been acknowledged leaders in the electrification of residential heat and transport, with

specialist optimisers Kapacity.io managing flexibility from heat pumps in Finland and True Energy EVs in Sweden and Denmark.

The investments in batteries and residential flexibility have been driven by the increasing need for ancillary services, especially for downward regulation, where Sweden"s TSO Svenska Kraftnat has been struggling to procure its target capacity, and for Fast Frequency Response due to low inertia over the summer months. Lower weekend demand means that generation that historically provided downward regulation is offline, leading to an increased requirement to procure mFRR capacity.

But the high prices that have attracted this investment in batteries and residential flexibility may not be sustainable due to the saturation of markets. Although the need for flexibility grows with renewable generation and rising demand, the capacity of installed batteries is growing at a faster rate.

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