Innovation type:
Tool/prototype

Innovation:

TRL: # 6

Year: 2022

Contact:
Aina Serigstad og Jan Egil Lund, Lnett

Maren Istad, SINTEF Energi

Potential users:

User	X
DSO, TSO	X
Technology provider	
Member organisation	
Market operator	
Research/consultancy	
Teaching	

The battery system used in the pilot.

Pilot project: Batteries as voltage support

Lnett has conducted a pilot project to test whether batteries are suitable as voltage support in the low-voltage grid . The pilot project started in 2019 and was completed in 2022 The purpose of the pilot project was to evaluate whether the battery could compensate for both slow and fast voltage variations in the low-voltage network, evaluate the cost-benefit of the solution, and define potential uses for the battery from the grid company's perspective. The results from the pilot show that the solution can only compensate for slow voltage variations, provided the battery has sufficient capacity. The operation of the battery solution has been somewhat unstable, but this is because the solution was under development.

Challenge

There are several areas of the grid with poor voltage quality, either due to long distances from the substation to the customer or due to undersized lines. If the delivery quality does not comply with FoL, the grid company is required to make improvements without undue delay. This can result in a large investment with few customers to share the cost. In some cases, it may be more appropriate to postpone the grid upgrade for a few years. Can batteries function as a temporary solution in such cases?

Solution

Lnett put into operation a small battery pack with a storage capacity of 19.2 kWh and 18 kW power in a low-voltage network with few connected customers to gain experience and evaluate cost-benefit. As part of the pilot, a prototype of a movable installation with a connection cabinet with a fuse was made, so that it could be connected directly to the low-voltage grid, for use in cases more profitable than the pilot area.

Potential

The cost-benefit results show that it is more profitable to reinvest in the grid than to use batteries, both as a temporary and permanent improvement measure. The cost-benefit is only assessed for this specific low-voltage grid. Experience figures show that the battery solution contributes to energy loss in the network of about 10-11 kWh per day, which also affects the profitability of the system. Still, batteries could be a viable option in other grids and situations, i.e. if additional benefits from the battery could be harvested, often called value stacking.

Reference in CINELDI

- Pilot "Batteries as voltage support" report (in Norwegian)