Gitega grid-scale energy storage

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The project aims to make a significant contribution to the energy grid by providing stored renewable energy during periods of low solar and wind energy production, this will reduce the reliance on coal and gas power plants.

The new battery park will have a storage capacity of 2.400 MWh. This means that the average energy consumption of 330.000 families can be stored here each day and fed back into the electricity grid. In this way we contribute to the energy transition, the further development of a reliable energy network and affordable energy for everyone. The chosen location is located on the high-voltage line from Van Eyck to Gramme and is connected to the Dutch grid.

Grid energy storage, also known as large-scale energy storage, are technologies connected to the electrical power grid that store energy for later use. These systems help balance supply and demand by storing excess electricity from variable renewables such as solar and inflexible sources like nuclear power, releasing it when needed. They further provide essential grid services, such as helping to restart the grid after a power outage.

Energy storage is one option to making grids more flexible. An other solution is the use of more dispatchable power plants that can change their output rapidly, for instance peaking power plants to fill in supply gaps. Demand response can shift load to other times and interconnections between regions can balance out fluctuations in renewables production.[3]

The price of storage technologies typically goes down with experience. For instance, lithium-ion batteries have been getting some 20% cheaper for each doubling of worldwide capacity.[4] Systems with under 40% variable renewables need only short-term storage. At 80%, medium-duration storage becomes essential and beyond 90%, long-duration storage. The economics of long-duration storage is challenging, and alternative flexibility options like demand response may be more economic.

Any electrical power grid must match electricity production to consumption, both of which vary significantly over time. Energy derived from solar and wind sources varies with the weather on time scales ranging from less than a second to weeks or longer. Nuclear power is less flexible than fossil fuels, meaning it cannot easily match the variations in demand. Thus, low-carbon electricity without storage presents special challenges to electric utilities.[5]

Investment in storage may make some investments in the transmission and distribution network unnecessary, or may allow them to be scaled down. Additionally, storage can ensure there is sufficient capacity to meet peak demand within the electricity grid. Finally, in off-grid home systems or mini-grids, electricity storage can help provide energy access in areas that were previously not connected to the electricity grid.[8]

The electric vehicle fleet has a large overall battery capacity, which can potentially be used for grid energy storage. This could be in the form of vehicle-to-grid (V2G), where cars store energy when they are not in use, or by repurposing batteries from cars at the end of the vehicle"s life. Car batteries typically range between 33 and 100 kWh;[21] for comparison, a typical upper-middle-class household in Spain might use some 18 kWh in a day.[22]

Storage in supercapacitors works well for applications where a lot of power is needed for short amount of time. In the power grid, they are therefore mostly used in short-term frequency regulation.[28]

Various power-to-gas technologies exist that can convert excess electricity into an easier to store chemical. The lowest cost and most efficient one is hydrogen. However, it is easier to use synthetic methane with existing infrastructure and appliances, as it is very similar to natural gas.[29]

Hydrogen can be used as a long-term storage medium.[32] Green hydrogen is produced from the electrolysis of water and converted back into electricity in an internal combustion engine, or a fuel cell, with a round-trip efficiency of roughly 41%.[33] Together with thermal storage, it is expected to be best suited to seasonal energy storage.[34]

Hydrogen can be stored aboveground in tanks or underground in larger quantities. Underground storage is easiest in salt caverns, but only a certain number of places have suitable geology.[35] Storage in porous rocks, for instance in empty gas fields and some aquifers, can store hydrogen at a larger scale, but this type of storage may have some drawbacks. For instance, some of the hydrogen may leak, or react into H2S or methane.[36]