

## Specific energy storage applications lithuania

The project, which is owned and operated by state-owned firm Energy Cells for Litgrid, is largely to enable the Baltic state grids - Lithuania, Latvia and Estonia - to stand on their own after disconnection from the BRELL Ring (Russia, Belarus and Baltic grid) electricity network, which will occur in 2024. They will then join the Continental European Synchronous Zone in 2025.

In this Q& A interview, which took place at the Energy Storage Summit Central Eastern Europe 2023 in Warsaw, Poland, Baranauskas discusses exactly what the four projects will be used for and what they could potentially do in future as well as the TSO's broader approach to energy storage.

The storage-as-transmission or "Grid Booster" concept has also taken off in Germany, where three out of four TSOs have announced large-scale projects, with Fluence enlisted for two out of three of those.

Audrius Baranauskas: We as Litgrid have a 1MW/MWh pilot battery storage as a transmission system asset and we use it to implement the grid booster concept in three different ways.

Another way is to react to the voltage. If the voltage drops, you can reduce the charging at that moment, or even start to generate from the battery in order to increase the voltage. So it's a frequency and voltage dependence grid booster.

And the third one we have implemented is a separate signal from the separate system to send the command directly to the storage, just to start to generate or charge the battery. For example, if you lose one existing physical line, from the relay protection you can send the signal directly to the battery to start to generate or consume depending on the need of the grid. So we have already implemented this. We have 10 different inputs here.

We have four sites with 50MW/MWh each, in four different parts of Lithuania. The German case is a point-to-point, north-to-south energy storage setup where they can imitate the physical transmission line.

In Lithuania we can implement this virtual grid concept with six virtual lines going between the four locations. I've never actually heard of this concept before and I really want to start this idea as an innovation pilot in Lithuania to demonstrate that we can control the grid, control the congestion, not only with redispatch of power on generator's side but also using storage as a virtual grid to increase the capacity.

For us, our national strategy is to have 100% renewables in the total energy balance by 2050, for electricity even sooner. To reach that goal we need flexibility. To build new lines would take at least six years but storage systems allow us to integrate more renewables sooner.

What we're doing right now - we changed our law in Lithuania where we now don't limit the connection capacity for solar and wind generators, we allow those resources to connect to up to 200% of the transmission line capacity, because the two will overlap only a small percentage of the time.

Moreover we can connect another 100% of line capacity if it is energy storage, because, if the market functions correctly, they will be charging while solar and wind are generating, and therefore not overload the grid.

For those periods where solar and wind generation will overlap, we are now creating a new RES control system to which we additionally integrate the dynamic line rating (DLR) technology. DLR actively monitors, estimates and forecasts the lines' capacity. Taking this into account, we create the system which actively controls wind or solar generation to avoid congestion in emergency cases.

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