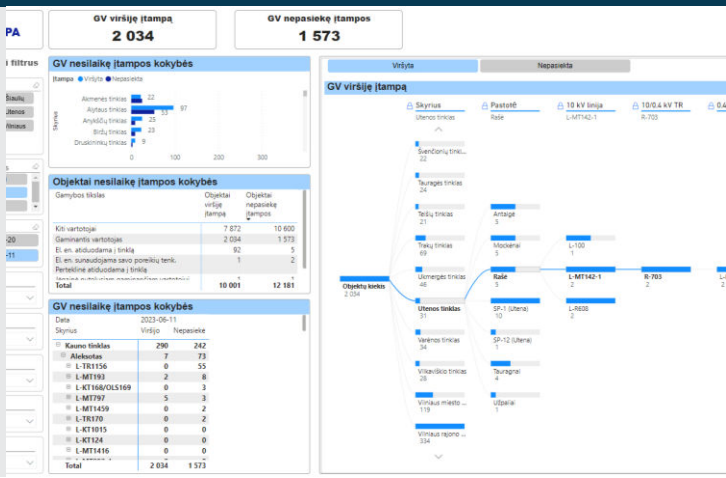
SUCCESS CASE 24.2024

Smart Data

UTILIZING SMART METER DATA TO VERIFY SOLAR PV INVERTERS COMPLIANCE WITH THE NETWORK CODE



THE CHALLENGE

Lithuania is currently undergoing a significant shift in its energy landscape in order to achieve its goal of attaining national energy independence. One key aspect of this transition is the rapid growth of customers installing rooftop photovoltaic (PV) systems, also known as **prosumers**. Over the past few years, the total installed capacity of these systems has increased dramatically, surging from 10 MW in 2018 to over 930 MW as of June 2024.

The proliferation of rooftop PV installations has led to **voltage problems within the low voltage (LV) grid**. This, in turn, hampers the ability to establish new PV connections. It becomes increasingly challenging to provide electricity to customers while adhering to Standard EN 50160 requirements, which define acceptable levels of voltage quality. To tackle this challenge, grid voltage support Q(U) (volt-var) requirements for type A generators were amended in the Lithuanian RfG network code. Prosumer connections with incorrect Q(U) settings experience 1-2% higher voltages at the connection point, leading to more power quality complaints and PV inverter trippings.

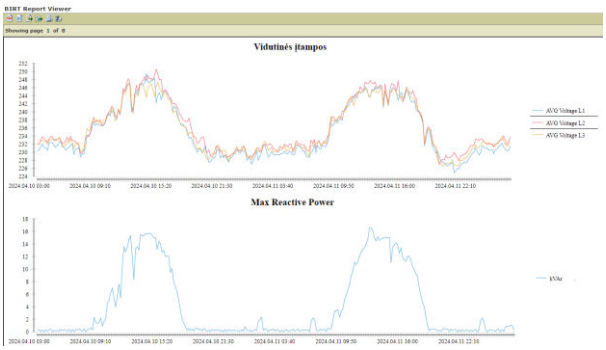
In this context, the smart meter rollout in Lithuania provides new opportunities to get better visibility on the 0.4 kV distribution grid and monitor prosumer connection points. By analysing smart meter power quality measurements, it is possible to validate if the prosumer's PV inverter Q(U) function is activated and provides grid voltage support.

THE SOLUTION

The Smart Data project was launched in 2023 with the goal to utilise smart meter data to help mitigate LV grid power quality issues, seeking better utilisation of existing grid capacity and improving customer experience.

According to the network code Q(U) grid support functionality, smart inverters must consume reactive power at certain grid voltage set-points. For example, a roof-top PV with a 10 kW inverter must consume up to 4,3 kVAr of reactive power at a grid voltage above 250 V.

By gathering 10-minute average voltage, active export power and demand reactive power data from smart meters it is possible to validate if the Q(U) functionality is activated at the prosumer's inverter. For this purpose, two separate tools were developed with different applications in mind.



To manually evaluate power quality complaints from prosumers (e.g., inverter tripping, overvoltage), a special **report** was developed to provide **simple visual voltage and reactive power dependence graphs**.

A second **tool** was developed to automatically **validate the Q(U) activation of all prosumers connected to ESO's distribution network**. The algorithm automatically validates the Q(U) activation by considering the average voltage, export active power and import reactive power during the day from 10:00 until 15:00.

Data resulting from the analysis is collected from the tool and notifications to prosumers and plant installation contractors are sent. Currently, **in 2024, the automatic Q(U) validation tool is being updated once per month with selected data from the highest PV generation day of the month.**

MAIN ACHIEVEMENTS

The results from the deployment of this solution in 2023 are:

- 4-day data (from May, June, September) were used to validate the Q(U) activation and to test tool accuracy.
- 3969 prosumers were identified to be without Q(U) activation and notifications were sent.
- 2900 prosumers activated the Q(U) after receiving notifications with a **success rate ~73%.**

KEY SUCCESS FACTORS

- The **smart meter roll-out,** which provides the necessary power quality data for the Q(U) validation algorithm.
- The **access to smart meter and asset data** (connection point information, power quality measurements data).
- The **IT infrastructure,** allowing to access various data sources and to run the validation algorithm.