

Lithuania demonstration

Problem Statement

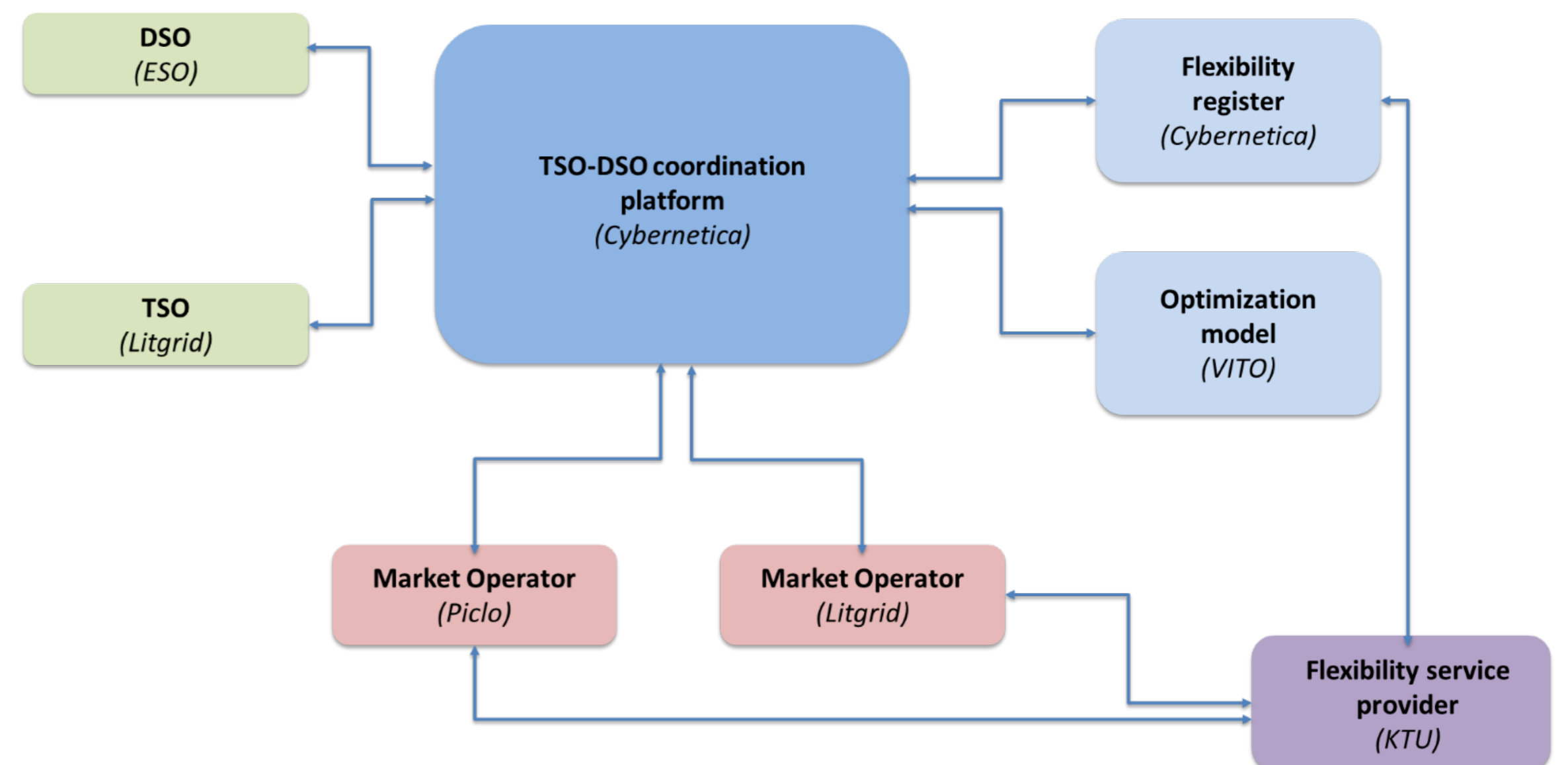
As the energy system transitions from centralized to decentralized, new challenges arise, particularly with the increased use of renewable energy sources. This shift requires enhanced flexibility for system stability and congestion management. To address this, Litgrid and ESO, the transmission and distribution system operators respectively, are investigating flexibility services.

Litgrid aims to alleviate congestion in near real-time, while ESO procures flexibility services in advance to manage grid congestion. It is key to foster new markets for flexibility providers like electric vehicles, heat pumps, and batteries, facilitating their adaptation to the evolving energy landscape.

Kaunas University of Technology provides flexibility services in both cases, leveraging its infrastructure, including diverse power-consuming buildings, heat pump, energy storage, cooling facilities, and a solar power plant. This collaboration underscores the potential of diverse resources in maintaining a resilient and efficient energy system amidst increasing decentralization.

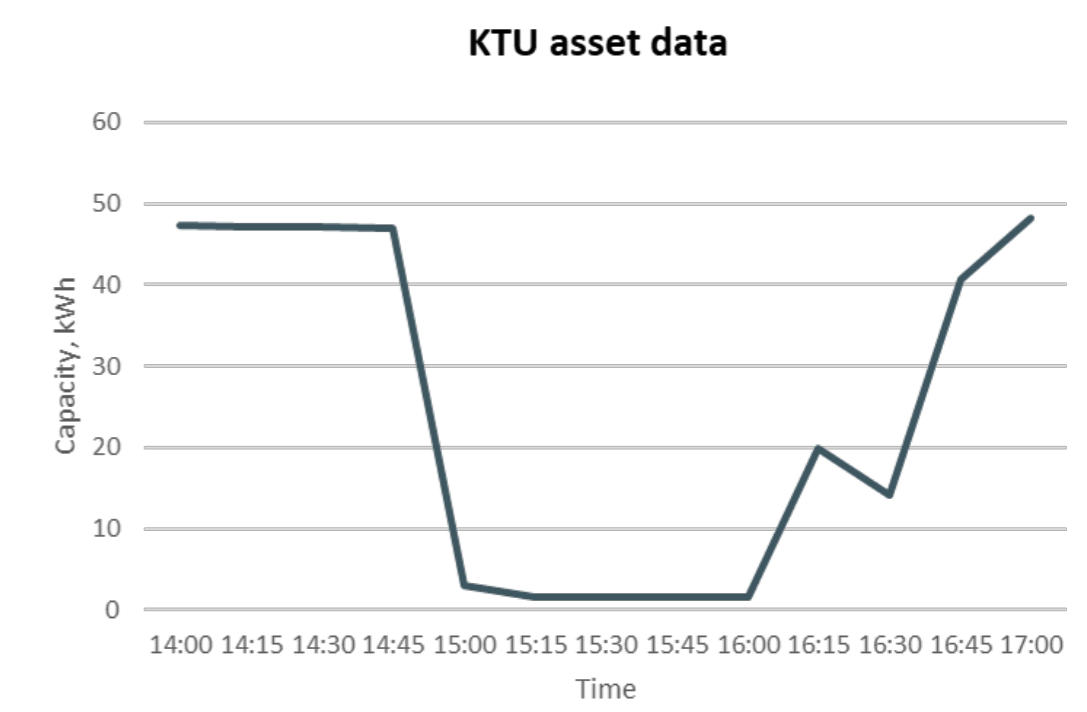
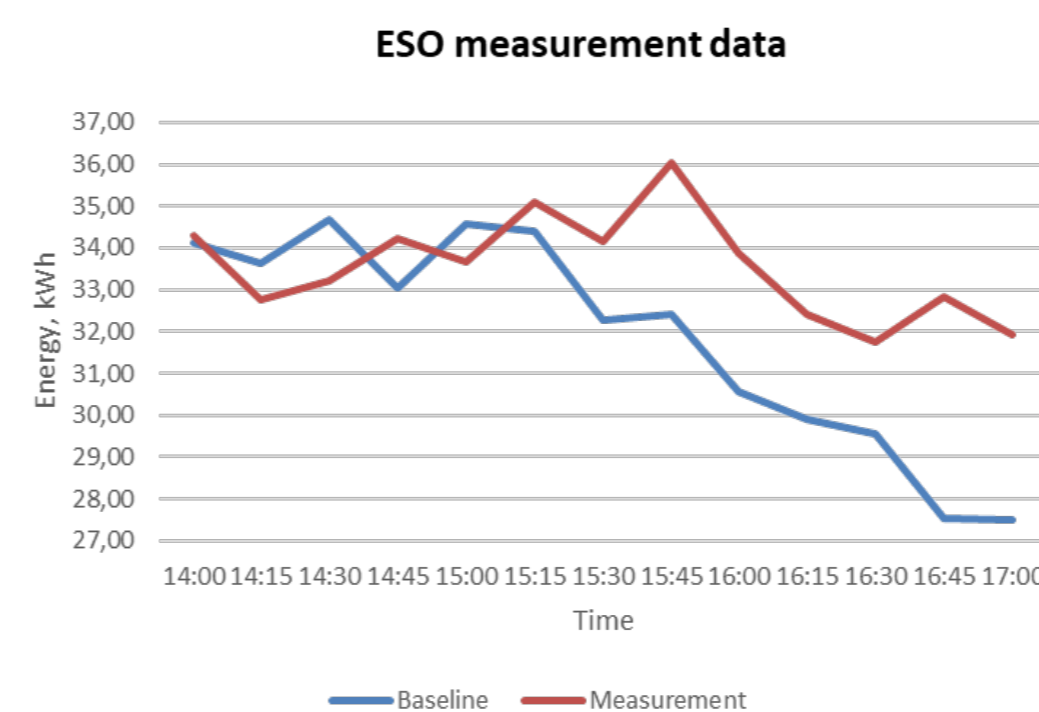
Demo's Innovation

Litgrid and ESO have tested solutions developed in Northern Cluster (namely Flexibility register and TSO-DSO coordination platform) by initiating flexibility services procurement for two products for congestion management.

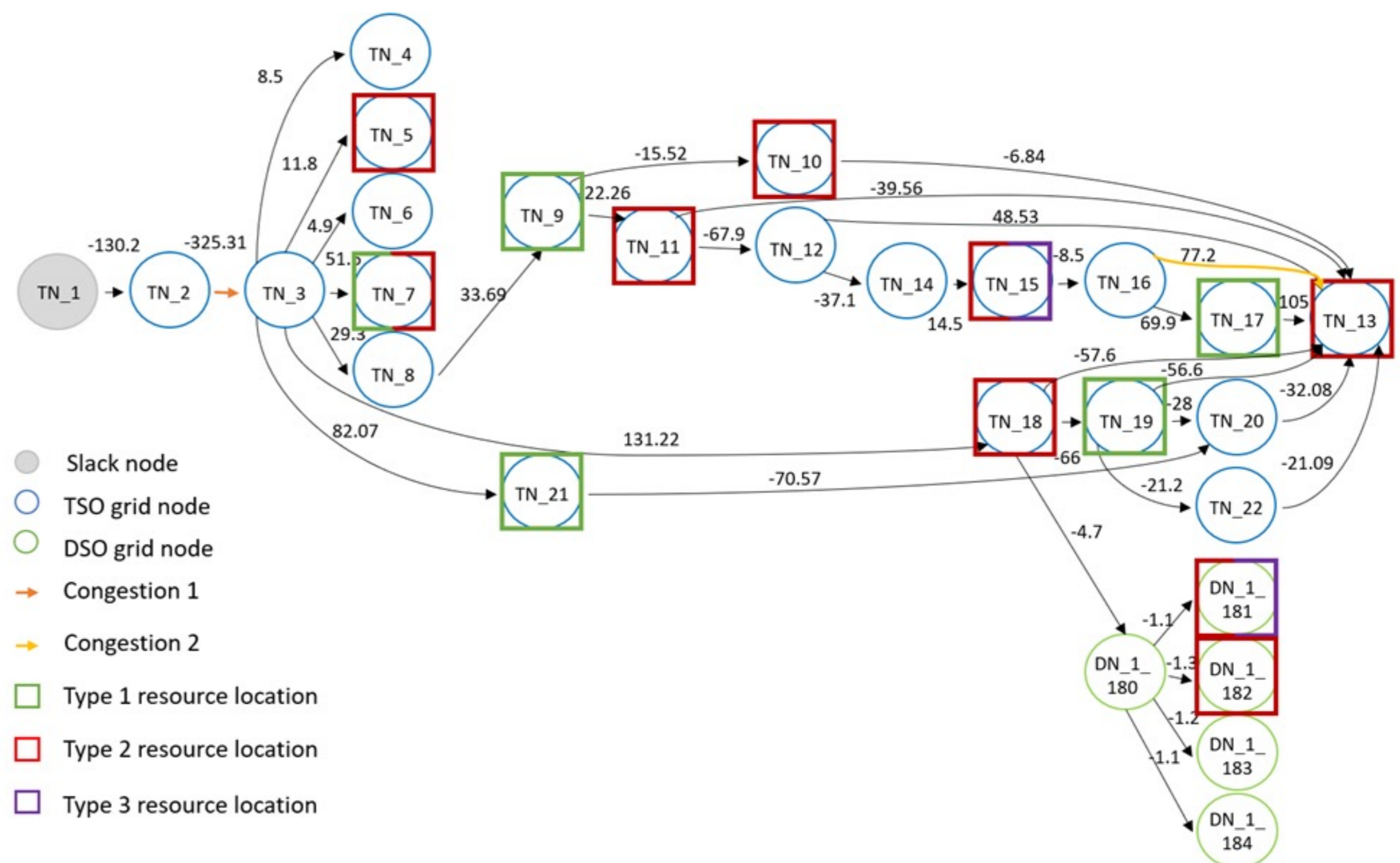


Results and Lessons Learned

- Baseline is essential for end customers flexibility volume delivery. It was found that the baseline methodology fails to accurately capture the influence of flexibility assets when using system operators' smart meter measurement data.
- The marginal cost of flexibility services was identified to be cost competitive and approximately equivalent to the existing balancing services cost of manually frequency restoration reserve (mFRR) product.
- Identified positive impact of small resources from DSO network can help reduce congestions on TSO level.
- TSO & DSO coordination is mandatory for congestion management and to unlock full flexibility potential.
- Aggregation in flexibility market enables end customers participation.



Schematic diagram of simplified Vilnius region network used in Litgrid demonstration



Main Challenges & Recommendations

Customer Engagement: It is essential to enlighten asset owners about the market dynamics and their part in it. The demonstration has proven that using flexible assets to provide services to system operators is not only possible, but also commercially viable. By gaining a clear understanding of market operations and recognizing the significance of their contributions, all participants can actively engage in the energy transformation process. System operators should employ distributed resources to unlock full flexibility potential.

TSO & DSO Coordination: As the number of assets in the flexibility markets increases, the need for TSO and DSO coordination becomes critical. The location of assets in the network is vital for TSO to access flexibility without disrupting the DSO grid. Conversely, DSO's use of flexibility may cause imbalance in the TSO grid. Hence, it's crucial to establish a flexibility model that accommodates both system operators.

Baseline: To determine flexibility volumes baselining is applied to asset owners. Within distributed resource owners a wide variety flexible assets may require different baseline approaches. It is crucial to strike a balance between a single baseline methodology focused on transparency and easy to use and greater variety adapted to specific needs but complex methodology.