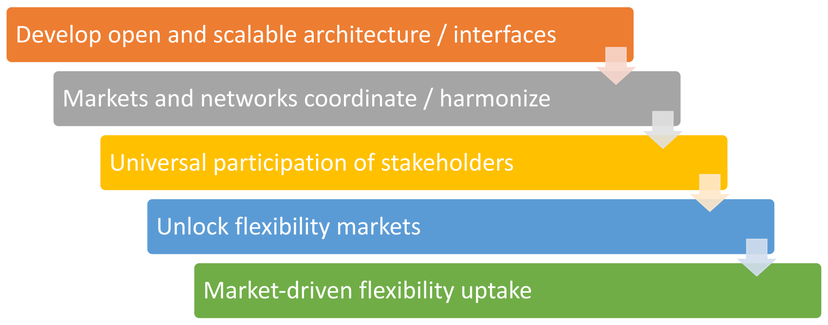
FINNISH DEMO

Volue Oy, FINGRID, KSOY & Nord Pool

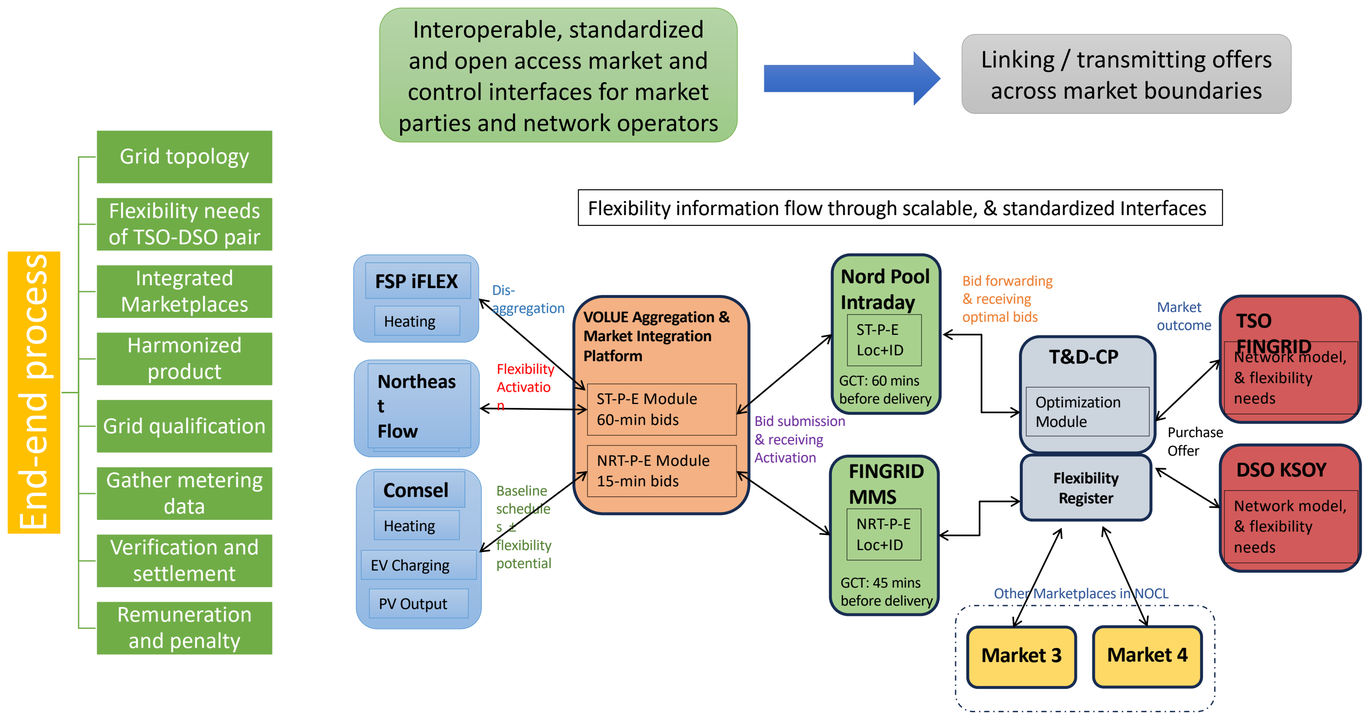
Problem Statement

Seamless integration of all market participants including TSOs, DSOs, FSPs, and MOs into a single flexibility market enabling

- universal participation of flexibility resources
- improved visibility of resource's information and availability
- procurement of grid-secure, and most economical flexibility by SOs coordination enabling value-stacking
- increased competition among FSPs, MOs and SOs
- increased market liquidity



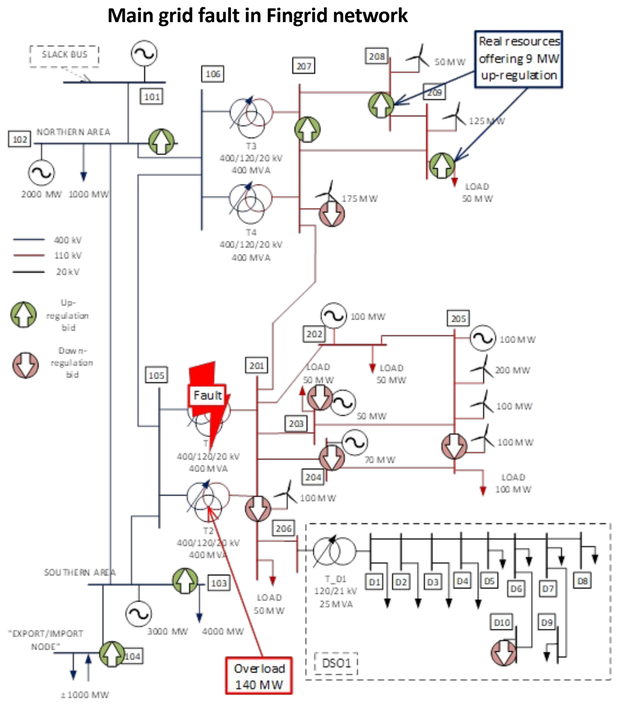
Demo's Innovation



Results and Lessons Learned

- Demonstrated TSO-DSO coordinated joint flexibility procurement using two marketplaces and real resources
- Stakeholder interactions and flexibility information flow
- New roles in the future flexibility market model
- Adding locational information to Nord Pool Intraday and Fingrid's mFRR using Flexibility Register
- Optimized flexibility procurement for multiple SOs
- Integrated OneNet solution with iFLEX (another EU project focused on customer engagement and flexibility modelling)
- Requirement of remuneration model between FSP and retailer / BRP
- Harmonized flexibility products consistent with existing balancing markets' timelines

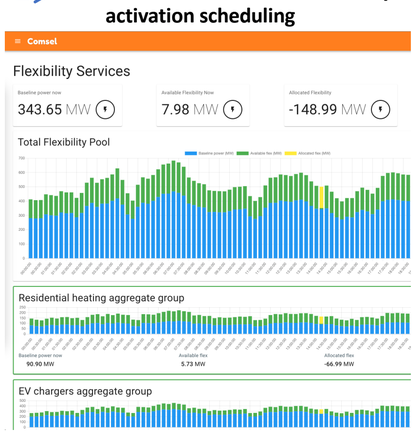
Main grid fault in Fingrid network



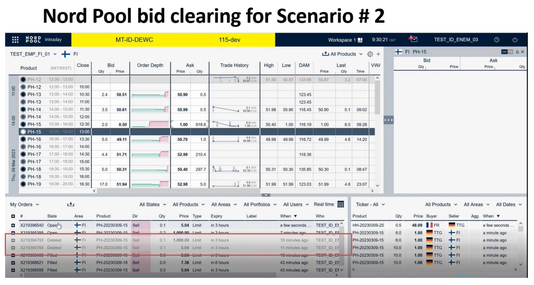
Scenario	Product	Congested network	Activated bid volume up/down (MW)	Result of optimization	Total cost of procurement (€)
1	ST-P-E	TSO	3 / 3	All congestions resolved	200
2	ST-P-E	DSO	0,150 / 0	All congestions resolved	75,6
3	NRT-P-E	TSO	149 / 155	Congestions partially solved (insufficiency of bids)	24 740
4	NRT-P-E	TSO and DSO	61 / 75	All congestions resolved	10 029
5	NRT-P-E	TSO	168 / 180	All congestions resolved	25 590

Fingrid bid clearing for Scenario # 3

FSP Comsel resources' flexibility activation scheduling



Nord Pool bid clearing for Scenario # 2

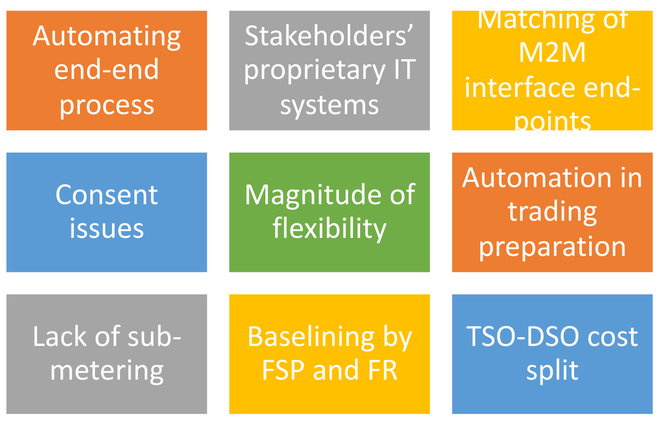


KPIs:

- No. of conflicts resulting from flexibility product activations= **0**
- Successfully pre-qualified FSPs= **100 %**
- No. of implemented joint products=**2**
- No. of implemented cross-border products=**1**
- Activation delay=**12.5 min** (NRT-P-E)

Main Challenges

- Automating complete end-end process of market-based flexibility uptake by TSO-DSO coordination
- Designing a common baseline method
- TSO-DSO cost splitting in a joint flexibility procurement
- Standardized communication between stakeholders' proprietary IT systems
- Customer engagement
- Consent issues due to shared facilities, and lack of sub-metering
- Managing resources on multiple grid levels to offer congestion management services
- Regulatory, legal and economic barriers
- Product harmonization across country borders



Recommendations

- Using standardized and existing products for congestion management will foster liquidity on the markets
- Coordinated congestion management between SOs will need highly automated and fast processes that require detailed up-to-date grid data
- Verification of flexibility services from small DERs still need further studies to understand how baselines can be created for different types of resources

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957739