



ETIP SNET

EUROPEAN SMART  
TECHNOLOGY AND NETWORKS FOR  
INNOVATION AND ENERGY  
PLATFORM TRANSITION

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# Reliable, economic and efficient smart grid system

## PriBas - Pricing Balancing Services in the Future Nordic Power Market

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# Short presentation of the project

PriBas - Pricing Balancing Services in the Future Nordic Power Market (2017-2020)

<https://www.sintef.no/en/projects/pribas-pricing-balancing-services-in-the-future-no/>

Budget: ~1.6 MEUR partly founded by the Norwegian Research Council

Develop a fundamental multi-market **model concept** for the Nordic power system

- ✓ Compute marginal prices for all electricity products
- ✓ Including reserve capacity and balancing energy
- ✓ Including flexible consumption and local storages



# Key exploitable results addressing energy system integration

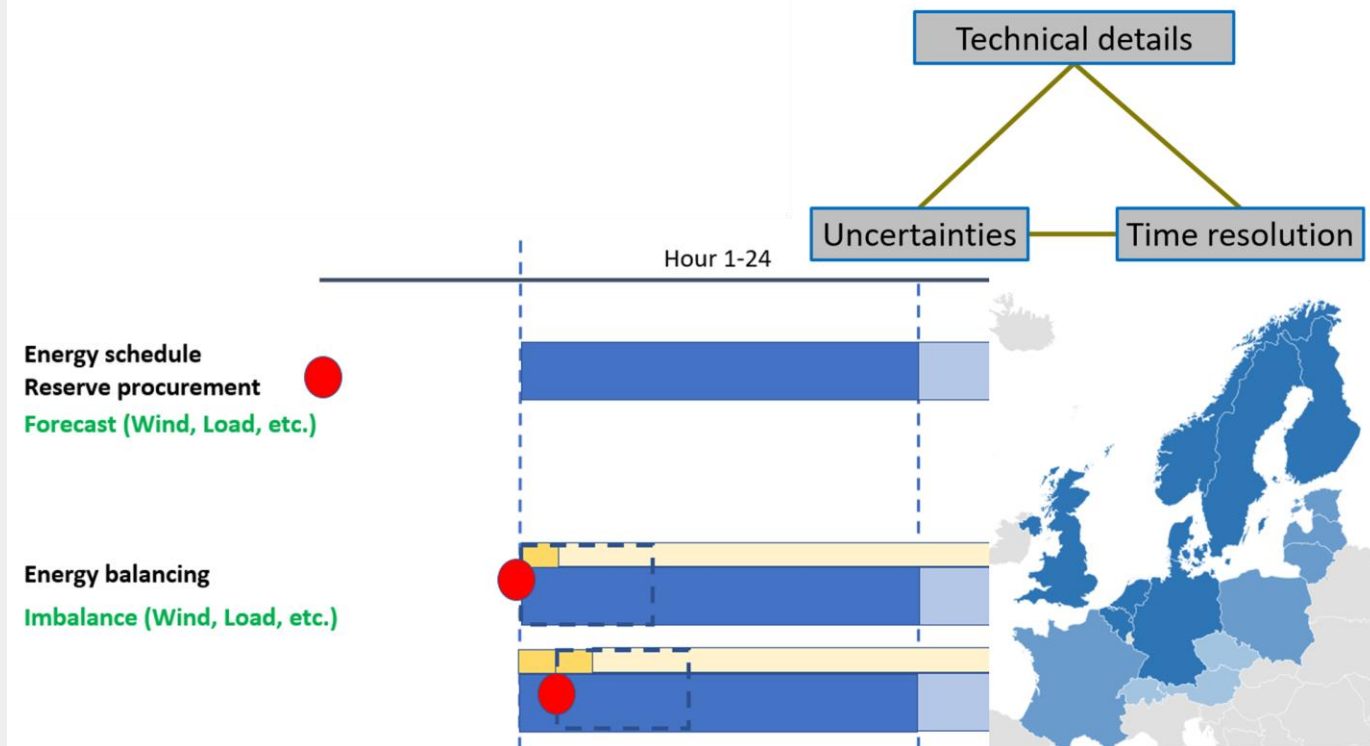
Key results from the projects:

- Sharing of operational reserves in the Nordic power system taking into account transmission bottlenecks  
=> assessment of benefit with efficient market design for reserve allocation
- Hybrid robust/stochastic method to allocate reserves in hydropower system, accounting for serial connections in water courses  
=> ensuring actual availability of resources when called upon
- Rolling horizon market modelling framework for hydropower planning including spot and intraday markets  
=> optimal redispatch of a hydropower system with increasing forecast accuracy of variable renewable energy sources

Knowledge building project as basis for future market model development and initial analyses for future short-term market design in the Nordics

# Lessons learned and barriers to innovation deployment

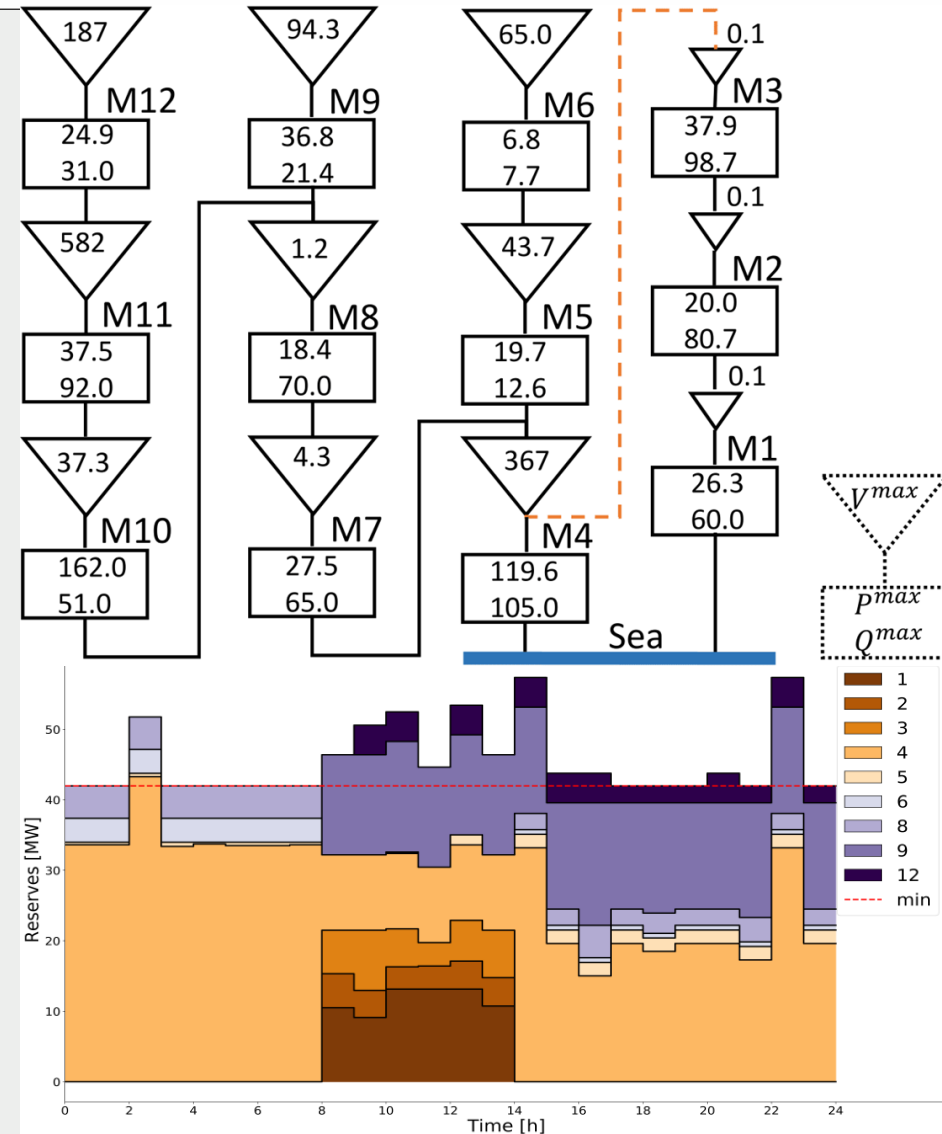
- Significant difficulty in modelling the correct market sequence.
- Recreating this sequence is essential to assess the price development in these short-term markets correctly
- Data availability and domain knowledge crucial to replicate power system operation realistically => test data systems not necessarily suited to assess specific mechanisms



# Deployment prospects of the most promising solutions

- Modelling framework for short-term power markets in hydro-dominated systems to assess price structures of multiple products => expected to be applied by project partners
- Assessment of efficient reserve procurement throughout the Nordics => input to the ongoing market design process
- Robust procurement of reserves within a water course => potential for future implementation in local hydro planning models

The project is a knowledge-building project at a low TRL level with an intention to provide the basis for future development. Model development is done in high level languages and shared with project partners on basis of the project consortium agreement. Furthermore, results are published in reports and scientific articles



# Needs for future R&I activities coming out of the project (if any !)

- Further development of methodology to more accurately quantify the real value of flexibility (generation & demand), particularly in combination with short-term uncertainty
- Application of decomposition, parallelisation, approximation to reduce calculation time
- Model- / sector-coupling to be added in the market modelling framework to assess additional sources of flexibility

