



ENERGY

Batteries for use in distribution networks; regulatory concerns

The Energy Market Regulation Department (Norway)

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Agenda



- DNV GL?
 - Not many ships in the electricity industry
- Conclusions
 - Our advice to NVE
- Services
 - Multiple services and potential revenue streams
- Market
 - Is there a market for battery services?

Global classification, certification, technical assurance and advisory company

OUR PURPOSE

**TO SAFEGUARD
LIFE, PROPERTY
AND THE ENVIRONMENT**

Global reach – local knowledge



154

years

250

offices

100

countries

13,000

employees

13 000 employees in five business areas

TECHNOLOGY & RESEARCH



- 2,500 experts
 - Technology
 - Systems
 - Markets
- Understand and manage risks



MARITIME

OIL & GAS

ENERGY

BUSINESS ASSURANCE

DIGITAL SOLUTIONS



Policy advice

- Efficient and attractive alternatives to reinforcing grids
- Competing against flexible demand
- End game: Buy battery services rather than batteries
- Short term: Accept experiments, pilots and tests, also including different ownership models and contracts for battery services



Flexible alternatives to traditional reinforcement of grid



Modular

Mobile

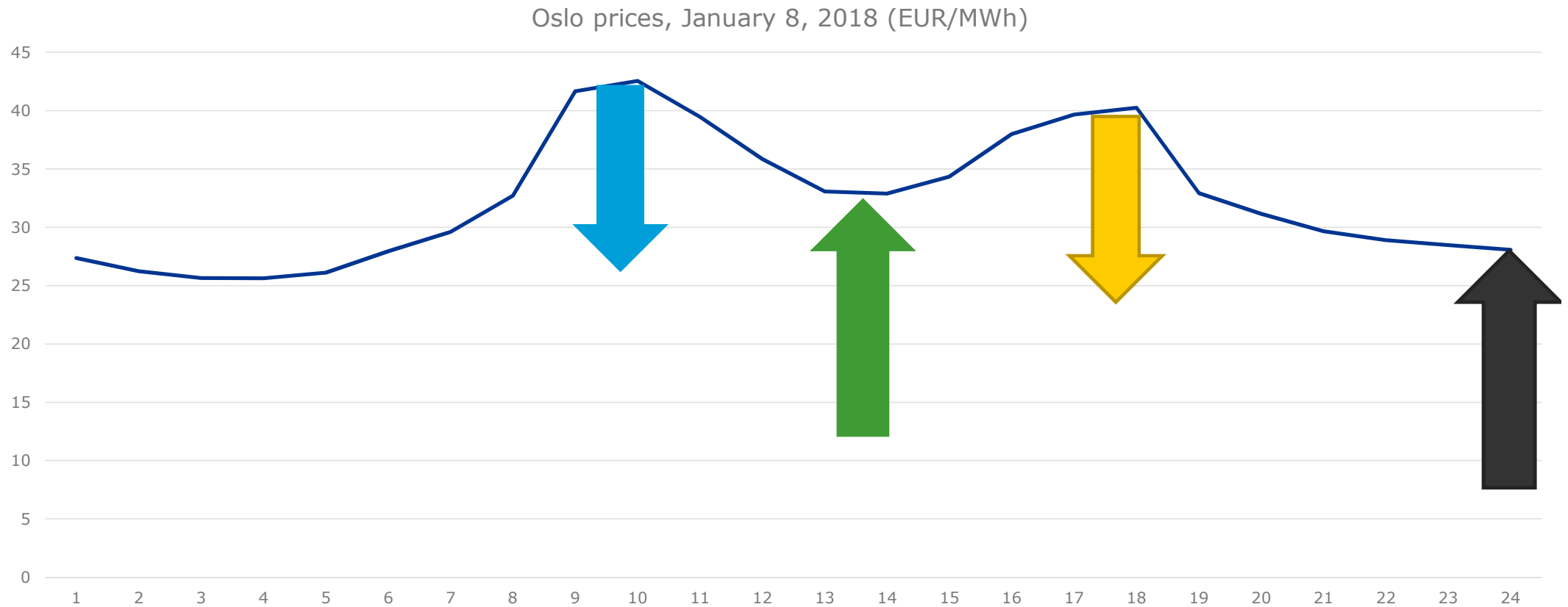
Quick

Multiple
services

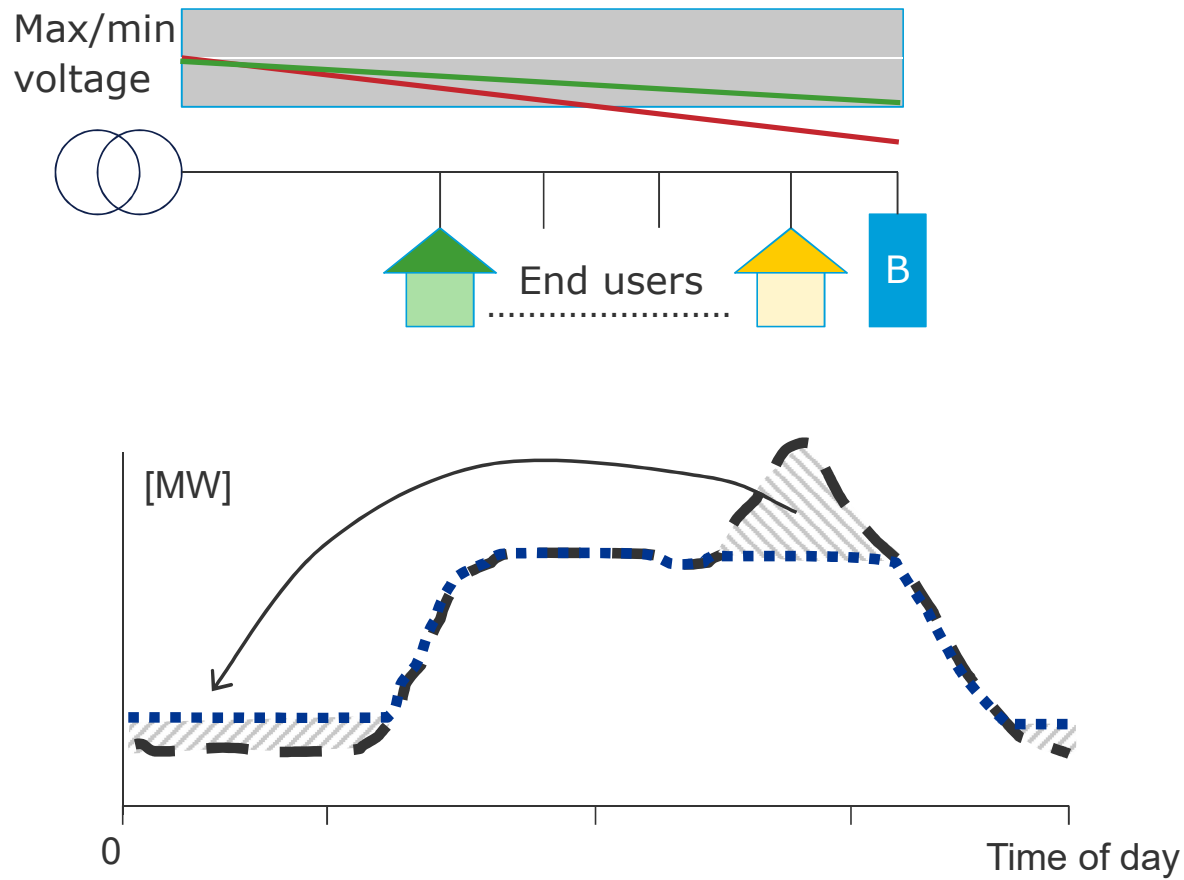
Batteries have multiple potential revenue streams. Any unused potential is a waste – even if the battery itself didn't have a cost



Services (1): Trade in organised markets; day-ahead, intraday or real-time



Services (2): Optimise grid operations

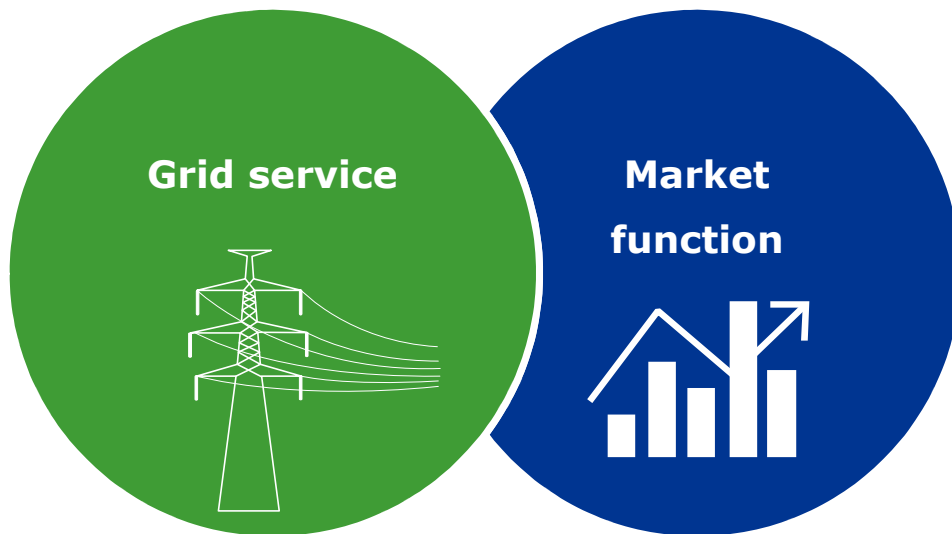


Is there a market for battery services?


- There is a market for batteries!
 - Not yet numerous potential suppliers of services
- Minor experience among Norwegian DNOs for leasing assets
- Paying a battery owner to e.g. improve voltage at the end of a radial requires a **complex contract**
 - Defining the service
 - Verifying delivery
 - Making sure the battery owner can use the battery for other purposes (e.g. trading) when not 'busy' improving voltage
- DNOs are now initiating pilots, tests, etc. to explore what batteries can do and how services can be combined
 - Make sure to test contract formats also!



How can we grow a market for battery services?



- DNOs compete
 - Revenue regulation incentivises cost reductions and improved efficiency
- **If** batteries reduce grid costs, the service that batteries provide has a high value
 - Some investors will understand this, arrange a fleet of mobile batteries and offer services
- A clear signal from the regulator about the end game accelerates service innovations
 - Gives investors confidence that regulators will help generate demand
 - Allows for economies of scale in battery management
 - Also servicing remote areas

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1. Gain experience – technical as well as commercial and regulatory
 2. Develop contracts and business models
 3. Be consistent; pursue neutrality

Thank you!

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