

# Demand response – An industry perspective



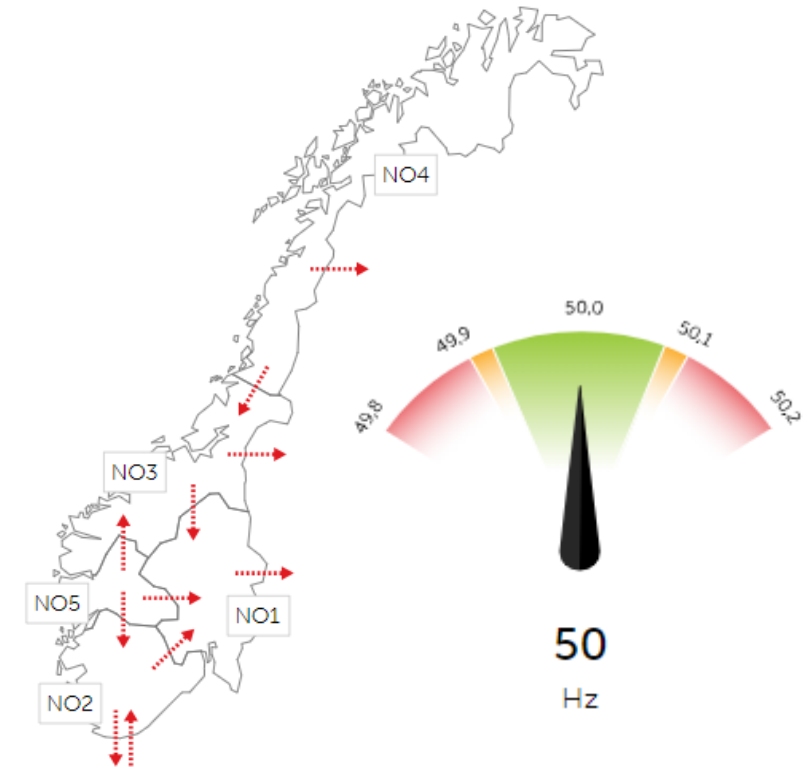
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Ancillary services and flexibility Statnett

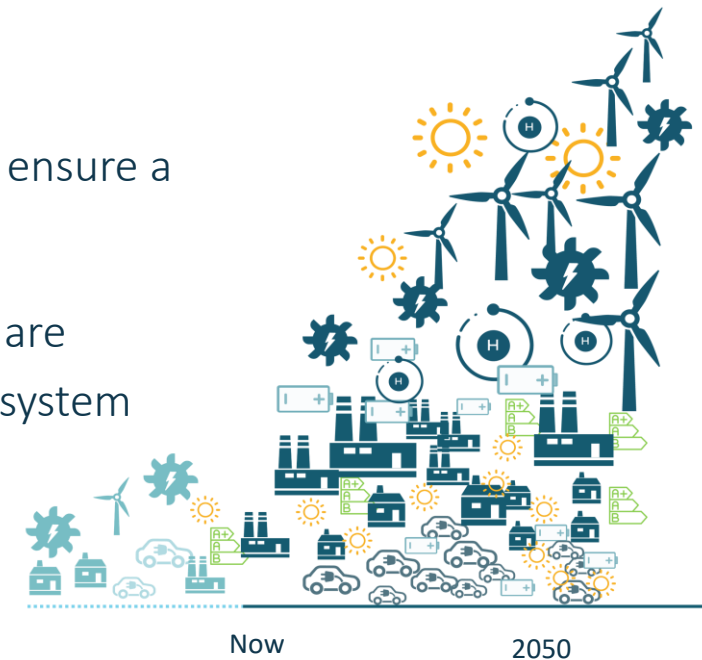
# About Statnett

- Statnett is the system operator of the Norwegian power system
- Statnett operates around 191 substations, 2 900 km of subsea and land cables, and 11 500 km of high-voltage powerlines (300 – 420 kV)
- Statnett is also responsible for interconnectors to Sweden, Finland, Russia, Denmark, the Netherlands, Germany and UK
- The National and Regional Control Centers continuously monitor the grid to ensure stable power supply



# The need for flexible resources is increasing

- The European power system is currently going through a major transition
  - More renewable sources give larger and faster changes in flow patterns and balancing
  - Common European regulations for markets and system operation are being implemented
  - 15 minute time resolution in energy markets, more digitalization and automated system operation
- Hydro power is and has been historically the main instrument in Norway in order to ensure a reliable power supply (89% per December 23).
- Flexibility from other resources (new renewable generation, demand and batteries) are becoming more important and valuable due to the ongoing transition of the power system



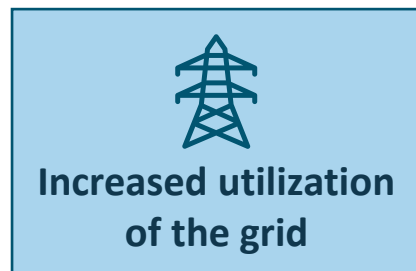
# Fleksibility have multiple purposes



Moving demand to hours with high shares of sun and wind, reduce other generation or use storage



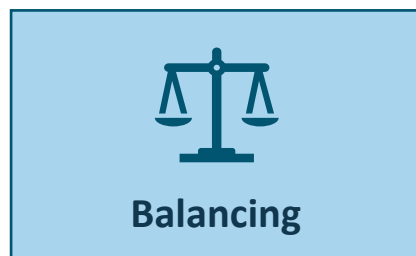
**Increased utilization of the energy:** We avoid the spill of renewable energy



New and existing grid customers enters agreements of flexibility in areas with reduced grid capacity



**Increased utilization of the grid:** More can be connected to the grid earlier. Important both for electrification and green industry as well as postpone or even reduce the need for grid investments



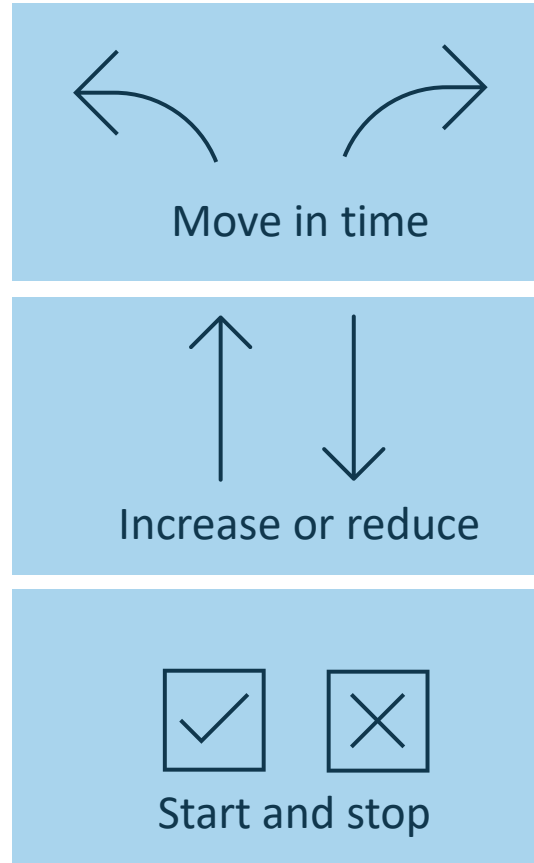
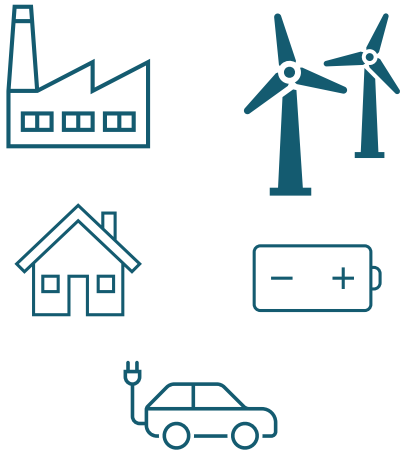
Regulate demand and generation according to momentary needs in the power system



**Balance between demand and generation:** Secure power supply 24/7

# The toolbox for potential flexibility providers

Adjust production, demand and/or energy storage ..



..as a response to the power system



Power

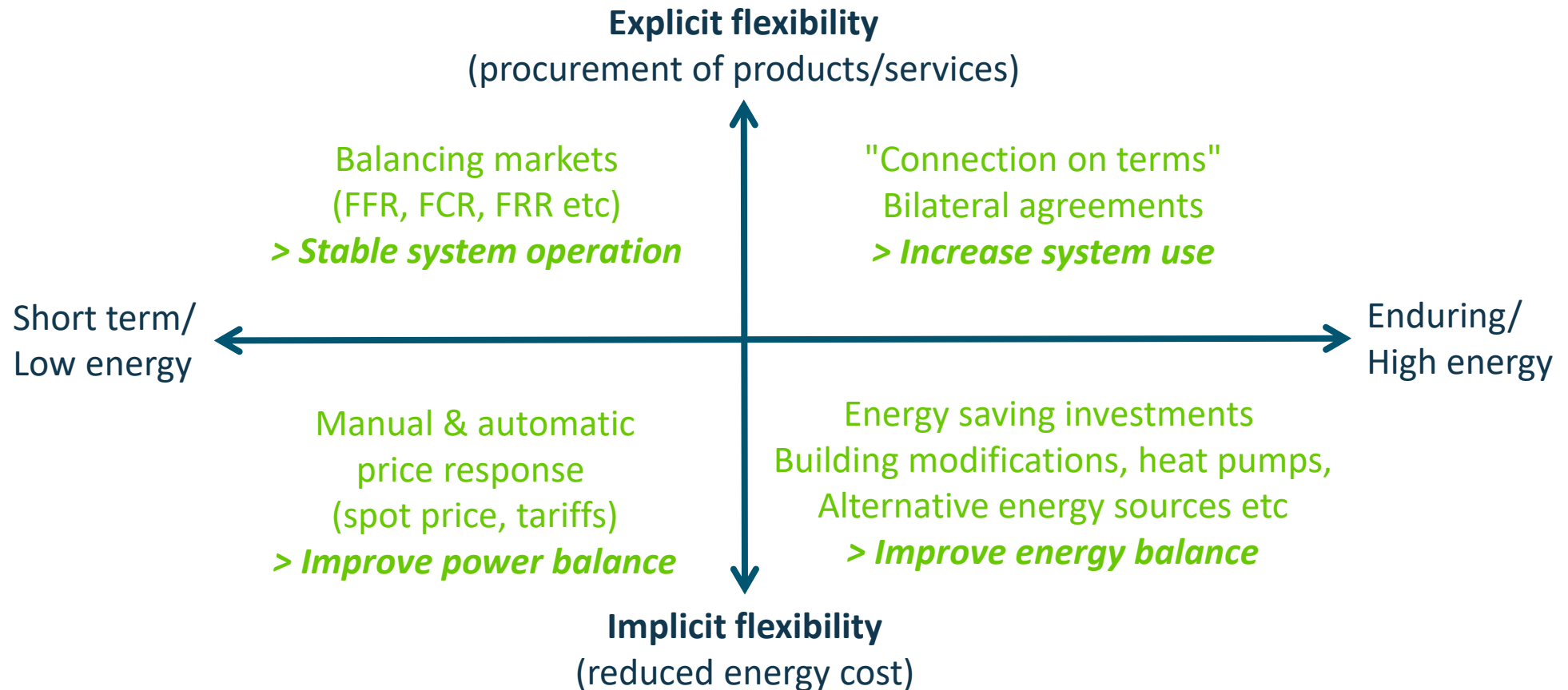


Energy

Characteristics decides area of use:

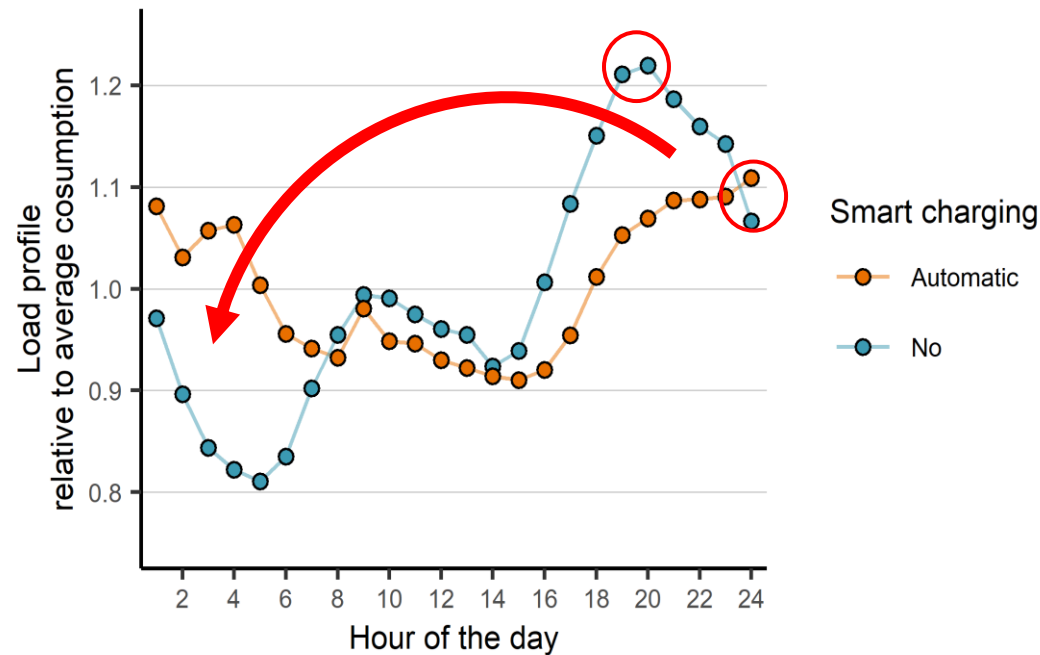
*How fast, how long, how often and when is the flexibility available?*

# Different tools for different purposes – possibilities for value stacking for flexible consumers



# Value of price sensitivity in the spot market

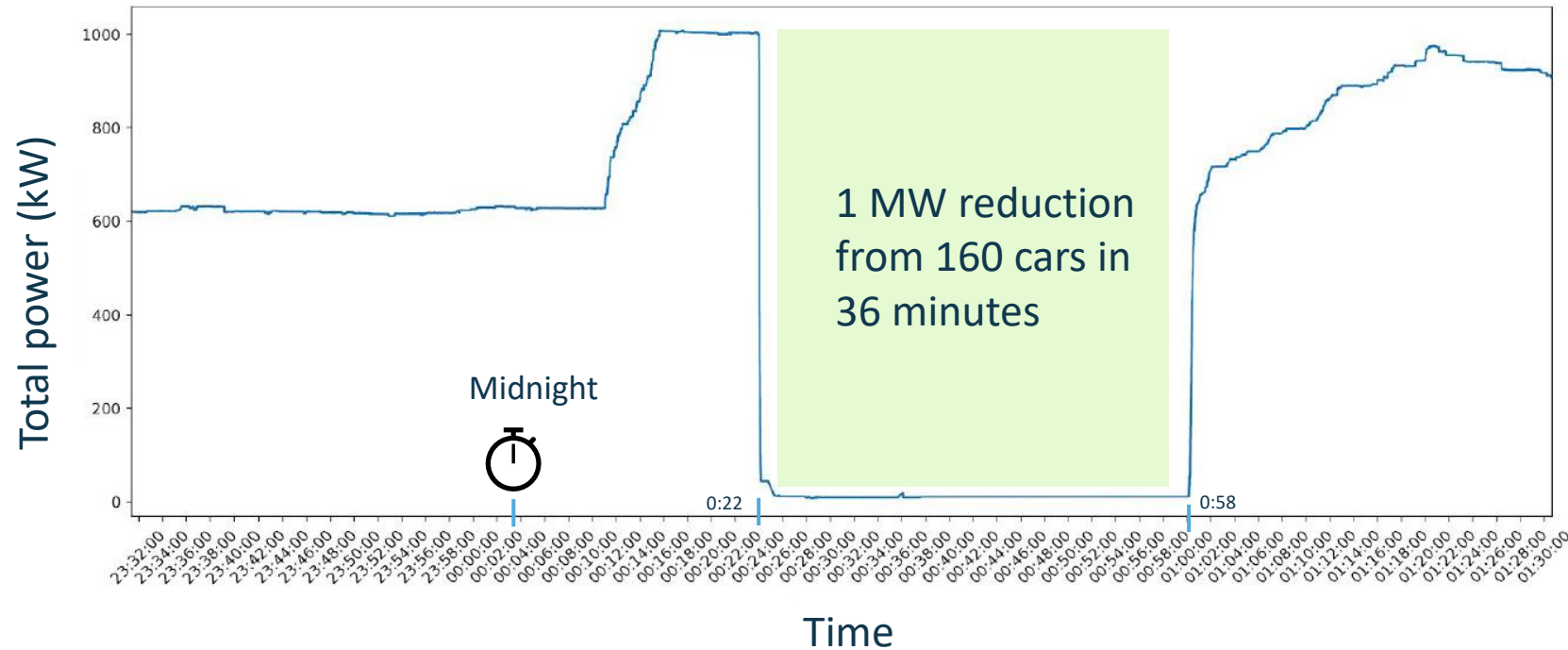
Situation: The capacity in the local grid is challenged some hours during winter



- Smart charging of EVs provides a significant move of demand from the hours with the highest demand of electricity
- New peak load hour is lower than the original peak load
- Customers save money – the grid capacity is used better!

# Value of participation in the balancing markets

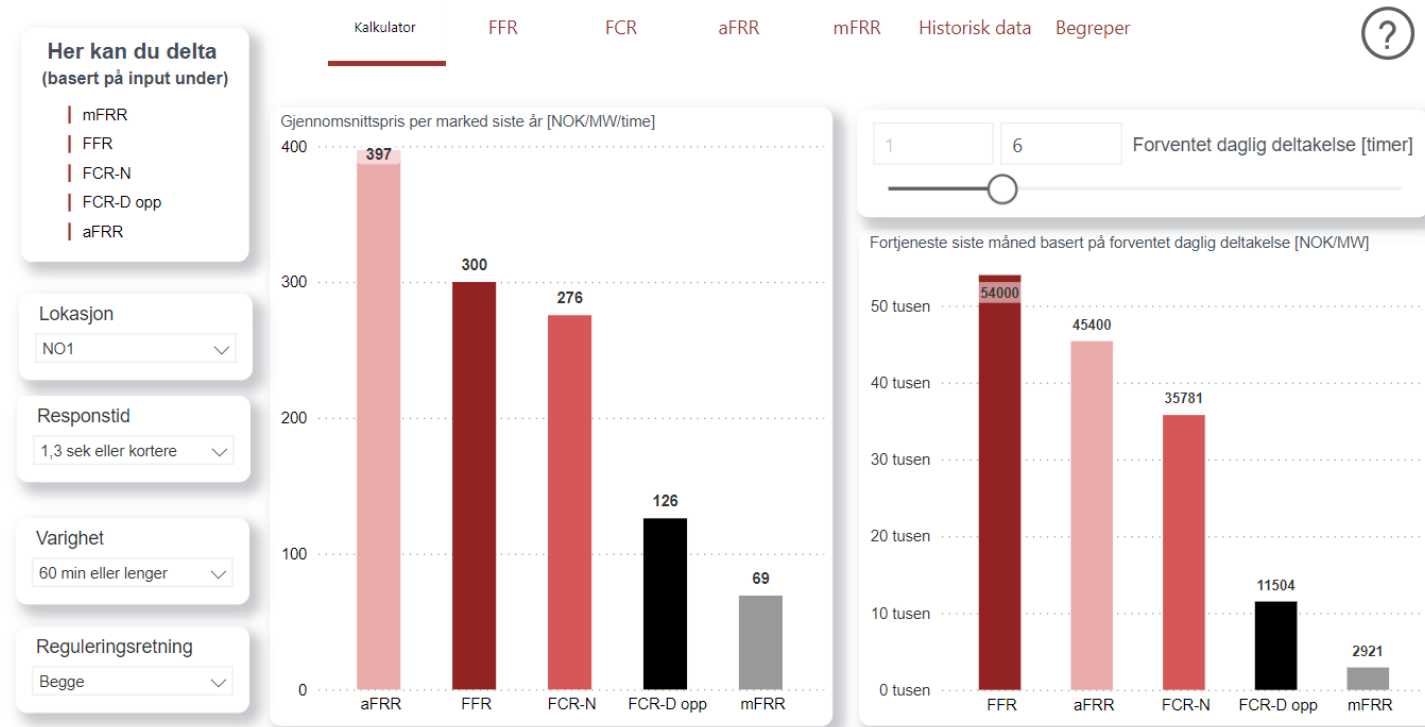
Situation: It's colder and more demand than forecasted by the market



- Use of Statnetts balancing markets where it in this case is paid for increased generation and reduced demand
- Pausing the charging of EVs is placed as a bid in the market, and ordered by electronically by Statnett
- Customers can earn money on contributing to a better balance between demand and generation!



# Calculate potential earnings in the balancing markets



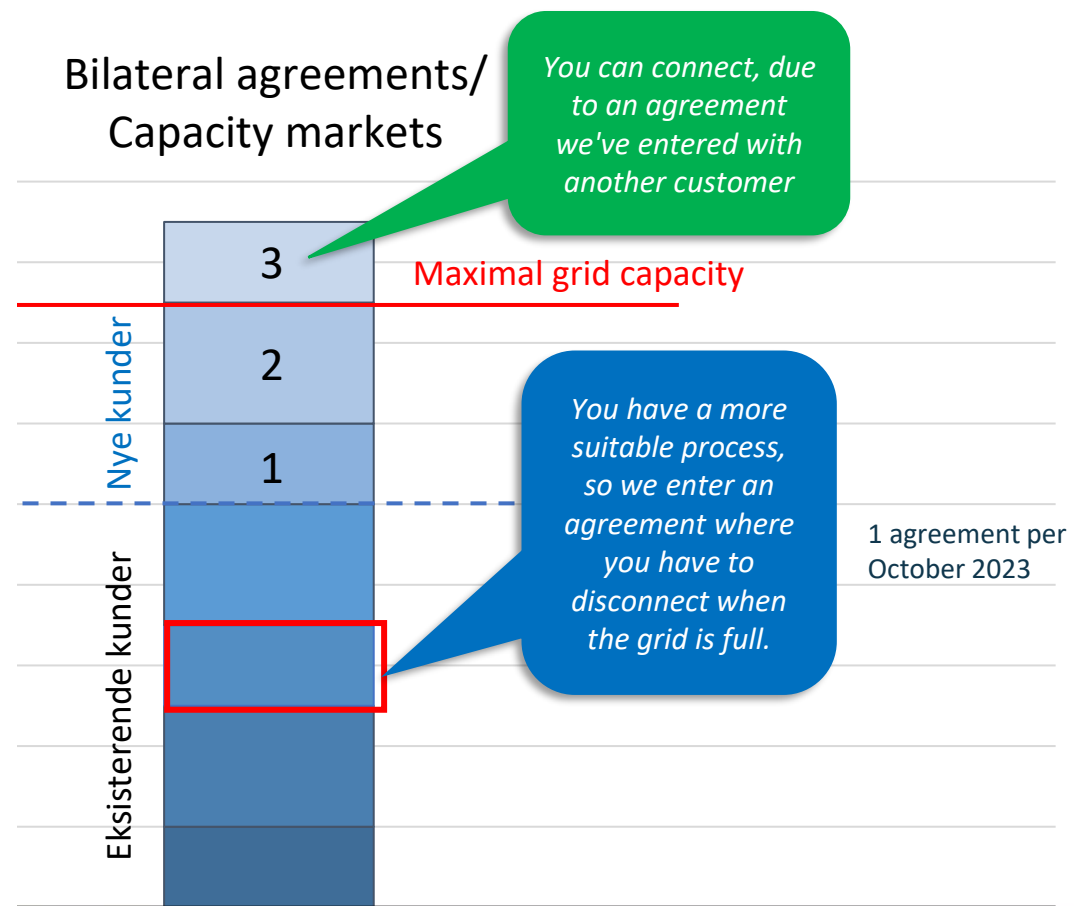
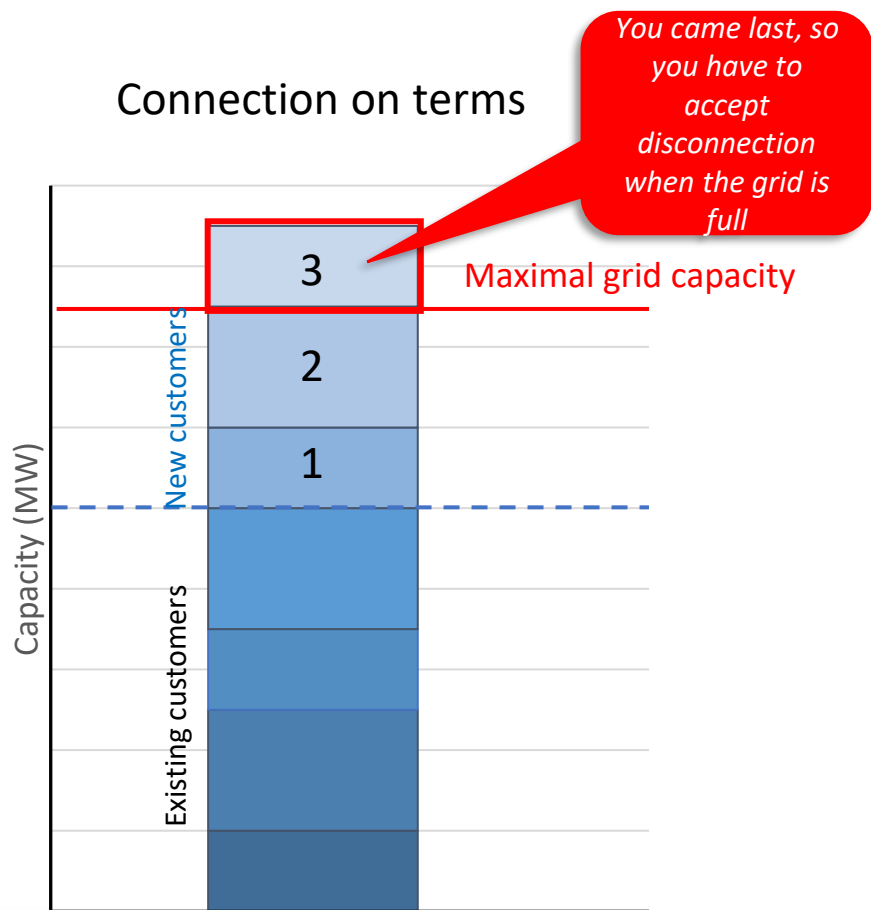
**Separate capacity and activation markets** – the calculator provides an overview over potential earning in the respective capacity markets.

Activation markets payment is in addition

<https://www.statnett.no/for-aktorer-i-kraftbransjen/systemansvaret/kraftmarkedet/reservemarkeder/reservemarkedskalkulator/>

# Value of connection on terms

Situation: More application for connection than capacity in the grid



# Summary

- The European power system is within its largest restructuring ever
- The changes in the power system drive changes in how we operate the power system – manual tools are not sufficient anymore
  - Need for automation of the balancing: New ancillary service products, markets, processes
- Statnett works in order to maximize available capacity which can be ordered and activated according to the need in the power system
  - R&D, pilots, external dialogue and workshops

**The green transition needs skilled persons with interest in both people and technologies to develop solutions all along the value chain**



# Thank you!

