

An aerial photograph of a large data center complex. The facility consists of numerous long, rectangular buildings with flat roofs, arranged in a grid-like pattern. The surrounding area is a mix of greenery, including trees and grass, and industrial infrastructure, such as a power substation with tall metal towers and power lines. The sky is overcast and grey. The image is framed by a blue border on the top and left, and a green border on the bottom and right.

# Short term markets - How can data centers support the grid ?

Montel conference 28<sup>th</sup> of August 2024

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*FUTURE-PROOFING THE EUROPEAN  
POWER MARKET*

# REDISPATCH AND CONGESTION MANAGEMENT

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2024

European Commission has proposed a climate target of 90% emissions reduction by 2040

- Redispatch volumes will increase massively until 2040
- In a business-as-usual scenario redispatch could be as high as 800 TWh in 2040
- Costs 40 – 100 Bn. EUR in 2040, compared to 5 Bn 2022

# The need for reserves are increasing rapidly also in Finland- 134% towards 2030

FINGRID.FI **FINGRID** lehti.fi

## THE NEED FOR RESERVES IS INCREASING RAPIDLY

The energy transition is leading to a huge increase in the need for power system reserves. Regulating capacity has been decommissioned, and the rapid growth of weather-dependent wind and solar power requires contingencies for greater regulating needs than before. In the future, more regulating capacity will disappear from the reserve market, further increasing the need for new production, consumption and storage capacity that can be regulated. In addition, the actual regulation needs may be considerably greater than the presented figures from time to time.

COMPILED BY MIKKO KUIVANIEMI / INFOGRAPHIC BY LAURA YLIKAHRI

### Fingrid's reserve products

RESERVE PRODUCT	FFR	FCR-D	FCR-N	aFFR	mFFR
	<b>FAST FREQUENCY RESERVE</b>	<b>FREQUENCY CONTAINMENT RESERVE FOR DISTURBANCES</b>	<b>FREQUENCY CONTAINMENT RESERVE FOR NORMAL OPERATION</b>	<b>AUTOMATIC FREQUENCY RESTORATION RESERVE</b>	<b>MANUAL FREQUENCY RESTORATION RESERVE</b>
DIMENSIONING	Power system inertia trends. The need varies greatly.	Volume corresponding to the dimensioning fault in the synchronous area (the largest production unit or HVDC transmission link).	Currently 600 MW. The needed amount will be reassessed in the future.	When the Nordic countries join the European aFFR energy market, the volume shall correspond to the normal, short-term imbalances of balance responsible parties. Significant uncertainties surround the future development of this need.	Volume corresponding to the dimensioning fault and the normal, longer-term imbalances of balance responsible parties. Significant uncertainties surround the development of imbalances.
APPLICABLE TECHNOLOGIES					

### Procurement need of reserve capacity, 2020–2030

● mFFR up ● mFFR down ● FCR-D up ● FCR-D down ● aFFR up ● aFFR down ● FCR-N ● FFR

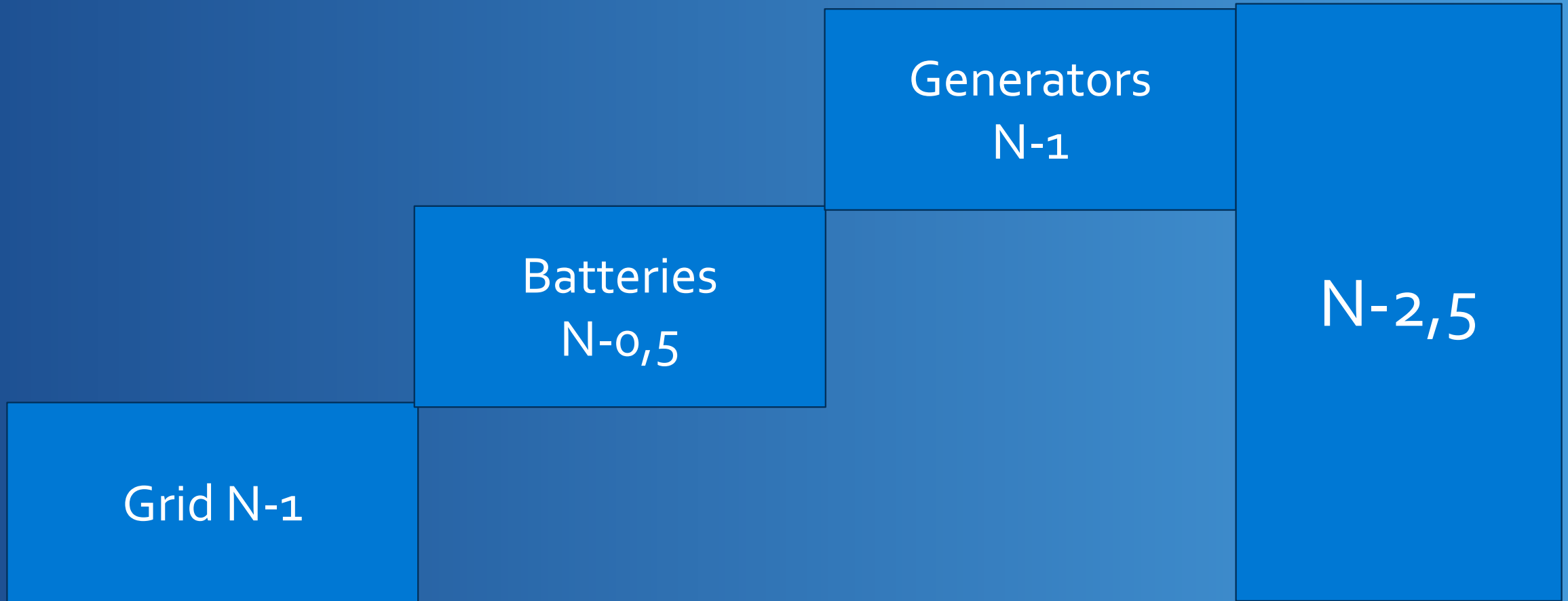
\*The procurement volumes of reserve capacity presented here are based on non-binding forecasts. Purchase volumes will be confirmed closer to delivery.

The need for reserve capacity will increase by **+134%** over the next 5 years.

In 2023 the costs were approximately 6000 MNOK in SVK and Statnett.

# How can datacentres\* deliver flexibility short term?

## Adding security levels



\* Nordic data centre 20TWh in 2030



# Data Centers – a part of the **SOLUTION**



Halvor Bjerke, Senior Advisor & Business Developer

# The critical role of data centers

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## Continuity of community services

- Preserving societal functions during crises
- Supporting contingency plans

## Robustness and Redundancy

- Designed to be robust
- Withstands challenges and system failures

## Infrastructure for communication

- Critical communication for emergency services and authorities

The average Norwegian digitaly visits 40 data centers every day!!

# Data centers as Critical Resource

## Critical Role in Crises

Data centers play a critical role in maintaining the continuity of essential public services and infrastructure in the event of natural disasters or other crises.

## Catalysts for innovation

Data centers are catalysts for innovation and development, enabling the storage, processing, and analysis of large amounts of data for the emergence of innovative technologies.

## Robustness and Redundancy

With a design that prioritizes robustness and redundancy, data centers have the ability to withstand various challenges and threats, guaranteeing the continuous operation of services.

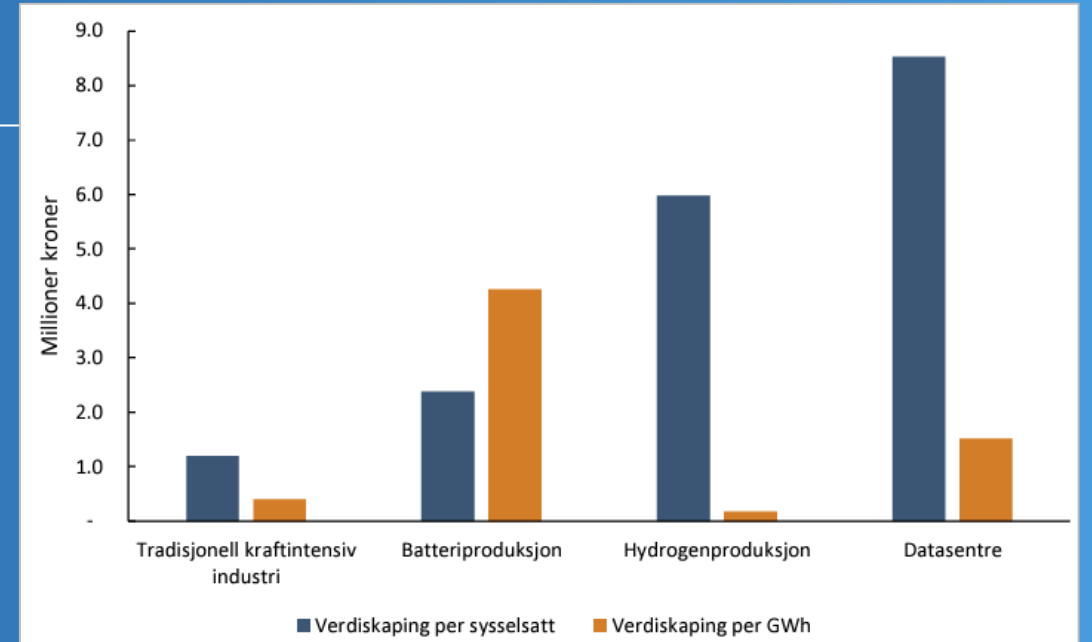


**STACK'S OPERATION IS POINTED OUT AS CRITICAL TO SOCIETY IN NORWAY**

# Value creation and jobs

## It is a myth that data centers contribute less value creation than other industries

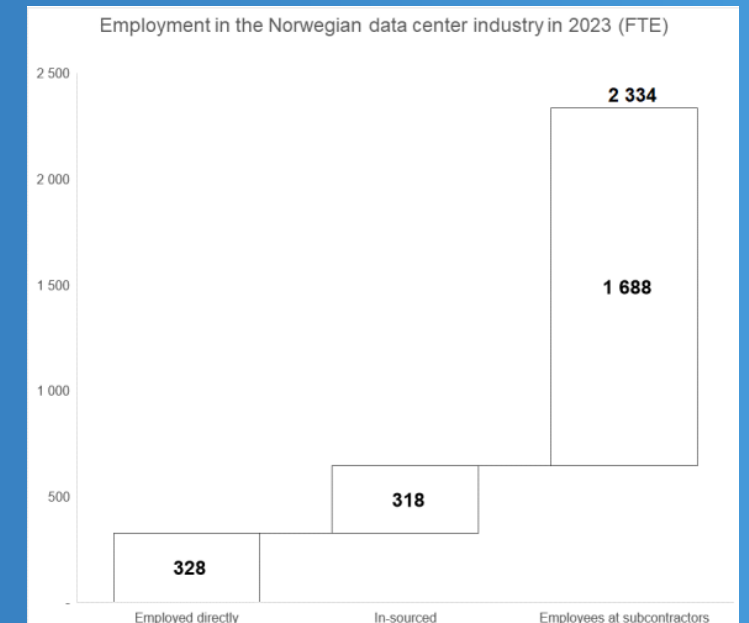
Data centers contribute twice as much value creation on the energy used than traditional power-intensive industry. The data centres have a value creation effect of NOK 1.8 million per annual GWh, compared with NOK 0.9 million per annual GWh in power-intensive industry



Kilde: Menon Economics

## Data centres create jobs, many of them outside Oslo

More than half of the data centers are located outside the Oslo area, and several of the data centers are located in smaller local areas, where they create employment that would not otherwise be found in the area



Kilde: Norsk Datasenterindustri





# Fortum Spring- Fast Frequency Reserve (FFR)

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01

Balancing the grid with existing battery fleet

02

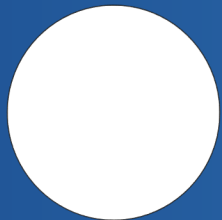
Signed in April 2021 - the first flexibility customer in Norway

03

We share some of our power capacity when the grid is about to become overloaded

04

Helps the grid become more flexible and resilient



*«This could contribute to large revenues for companies, create a more robust power grid and make it possible to build even more renewable energy plants;»*

**Stefan Bergsten, Country Manager for Fortum Spring in Norway and Sweden.**

# Heat to Oslo Citizens – a “live” solution

Hafslund Oslo Celsio gets surplus heat

Test production November 2021

Delivered approx. 3.3MW since then until 1 May (end of season). This winter approximately 20GWh was delivered

This accounts for over 90% of the energy we have in the water, and over 70% of the total load on site

PUE ca 1,2

Seasonal stop between May and October



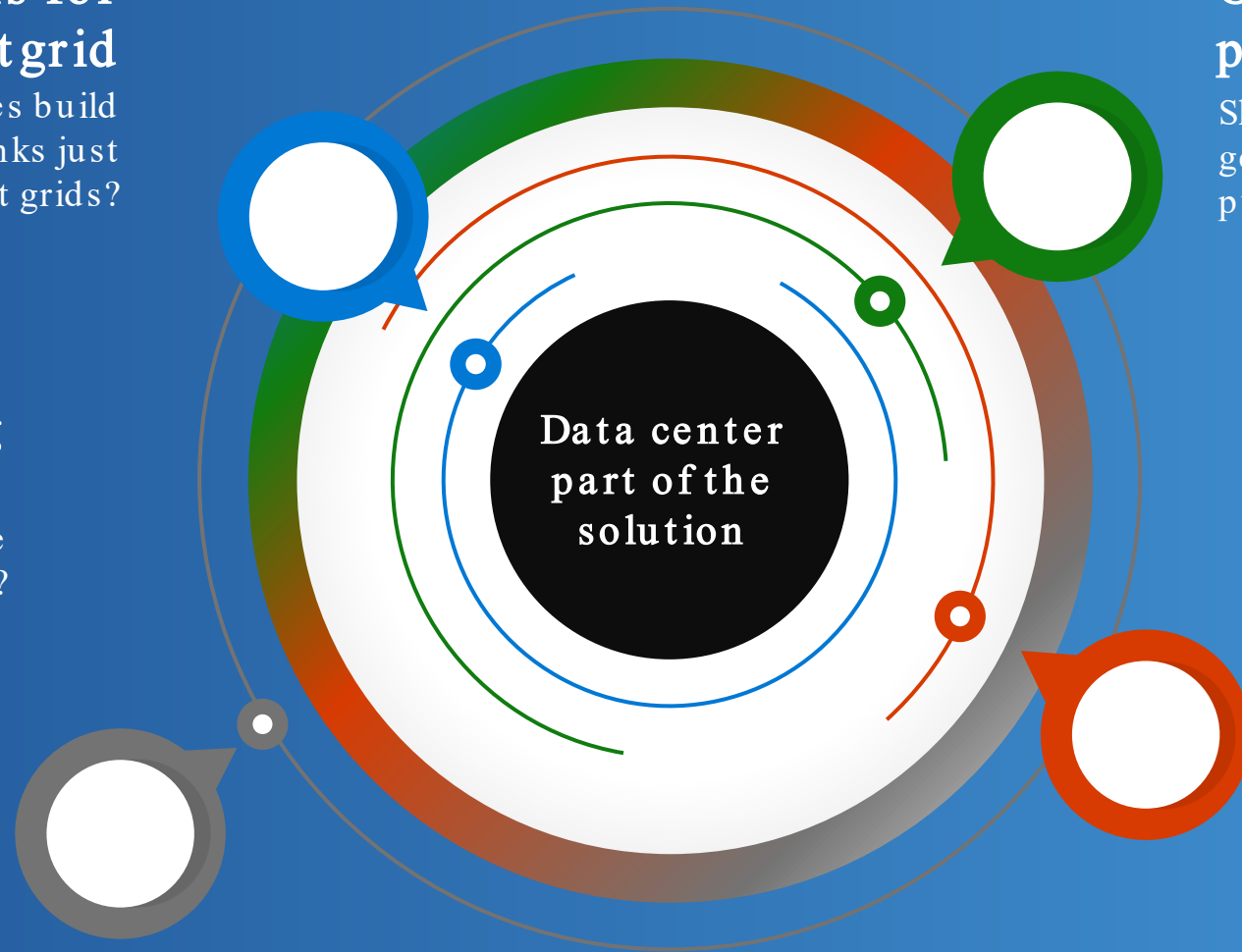
# SMARTGRID

## Battery banks for Smartgrid

Should grid companies build their own battery banks just for smart grids?

## Use of existing resources

Can we adapt and use what already exists?



## Own generator parks

Should they invest in their own generator parks solely for this purpose?



## The Green Shift and Digitalization

Transition to digital communication

# Short term flexibility - How can data centers support the grid?

- ✓ Peak shaving with batteries is already a part of the data centre operations
- ✓ Deliver products for balancing the grid
- ✓ Allow the system operator to disconnect power in extreme situations
  - ✓ Interruptible agreements very valuable for society and business.
  - ✓ All the Nordic TSOs are developing terms for agreements
- ✓ Deliver “price dependent bids” in the spot market, reduce the risk for peak pricing in the Nordic market

Hvordan frigjøre kapasitet i strømmettet? Elvias ambisjon er 20% økt kapasitet

Kunder   Teknologi   Strømmettet   Energikilder

G

# Backup Power, Automated Response & Reserve Markets



## Critical Role as Backup Power Sources

Data centers serve as backup power sources, ensuring continuous power supply to essential services and maintaining societal functions during crises

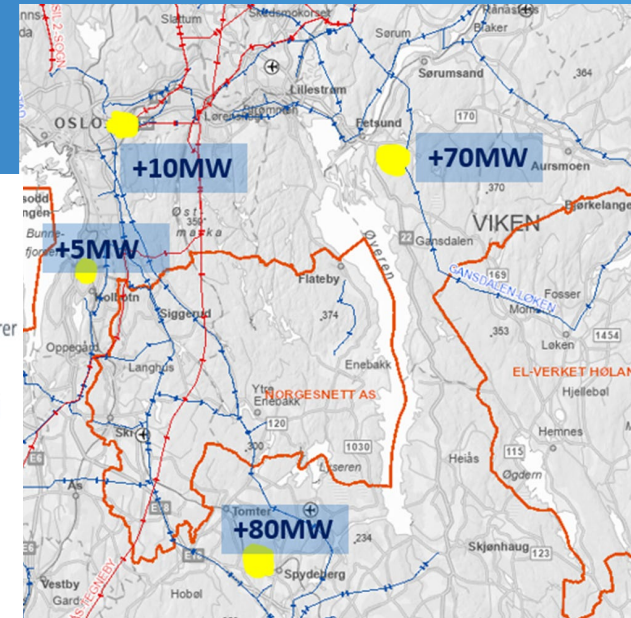
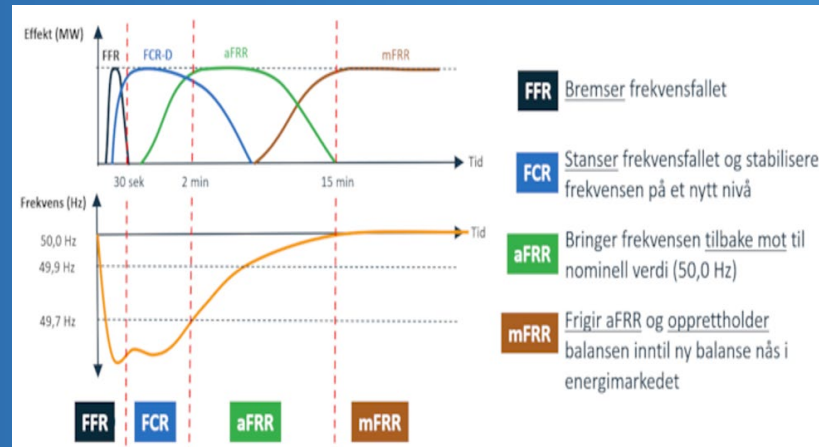
- ✓ Batteries FFR (Fast Frequency Response)
- ✓ Generators FCR (Frequency Containment Reserves)

## Instant Response to Power Issues

Data centers respond immediately to power outages, ensure minimal disruptions to services, and maintain essential societal functions in emergency situations

## Automated Energy Consumption Adjustment

Data centers are equipped with advanced technology for monitoring and can automatically adjust energy consumption or activate backup power in seconds, ensuring operational stability without the need for human intervention



# Long term flexibility-How can data centres support the grid?

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- Have peak load in the summer
- Co-location with power production
- Deliver heat
- Reduce the CO2 footprint, and use Bio Diesel for the generators
- And more.....



# Window Of Opportunity – it's happening now!

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“Norway should not export electricity; you should export intelligence!”

Jensen Huang, CEO Nvidia

