

# Reserve Dimensioning in Europe

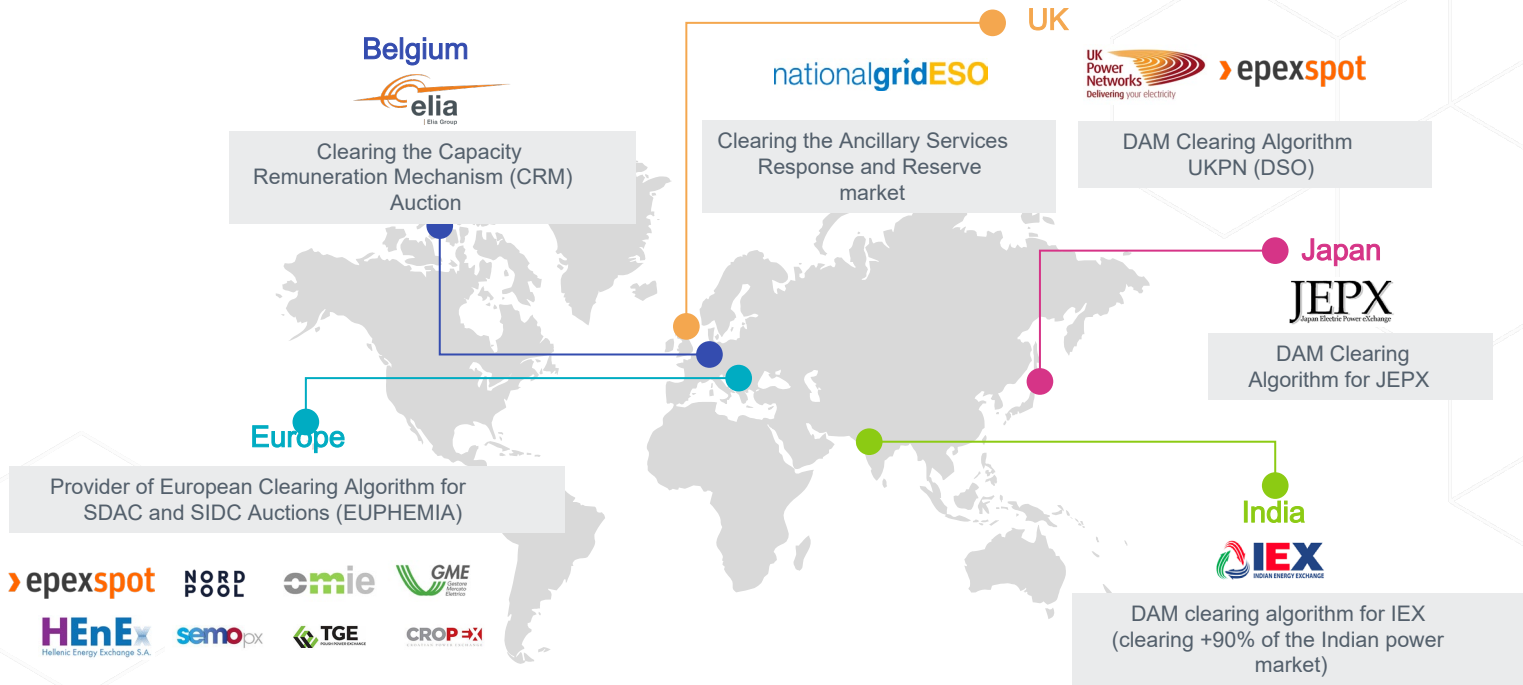
*ESIG Forecasting & Markets Workshop  
Nashville, June 24th 2025*

**Public data**

# Agenda

- 01 Introduction
- 02 About N-SIDE
- 03 Balancing in Europe
- 04 Sizing Reserves
- 05 Takeaways

At N -SIDE, we design and build power markets, maximizing social welfare for more than 2 billion people

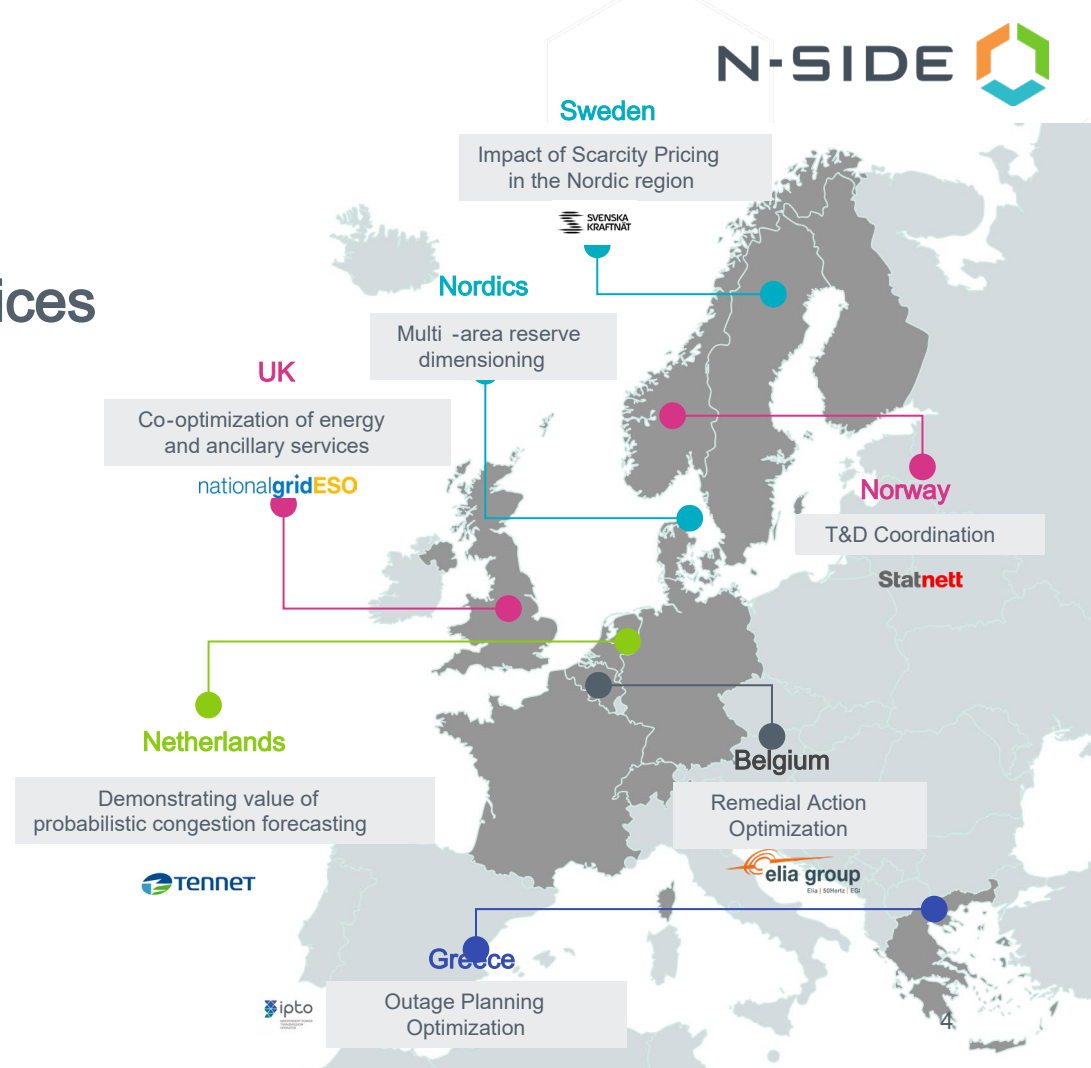


# N-SIDE supports system operators with advanced analytics and advisory services

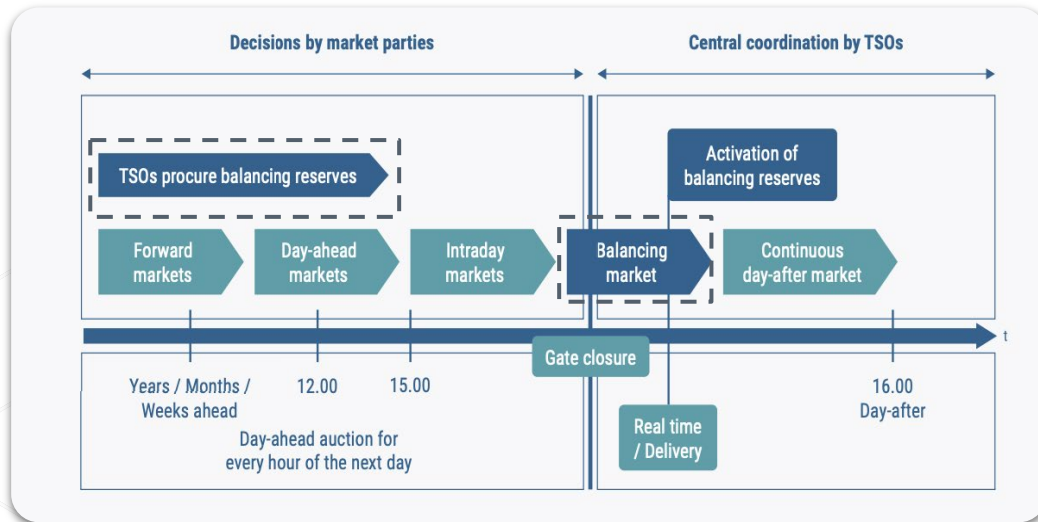
Providing state-of-the-art optimization & AI solutions as well as advisory services to system and market operators seeking to address key energy challenges.

Improving informed decision making across balancing, congestion management, adequacy.

Delivering consulting and software projects with high reliability.



## Balancing markets ensure the physical availability and economic dispatch of assets capable of delivering balancing services to TSOs



### Balancing Capacity Markets

Secure the minimum amount of assets' capacity that must be ready to provide balancing services to ensure sufficient bids in the balancing energy markets.

All awarded assets receive remuneration for their capacity and it is typically financed by the system tariff/grid charges.

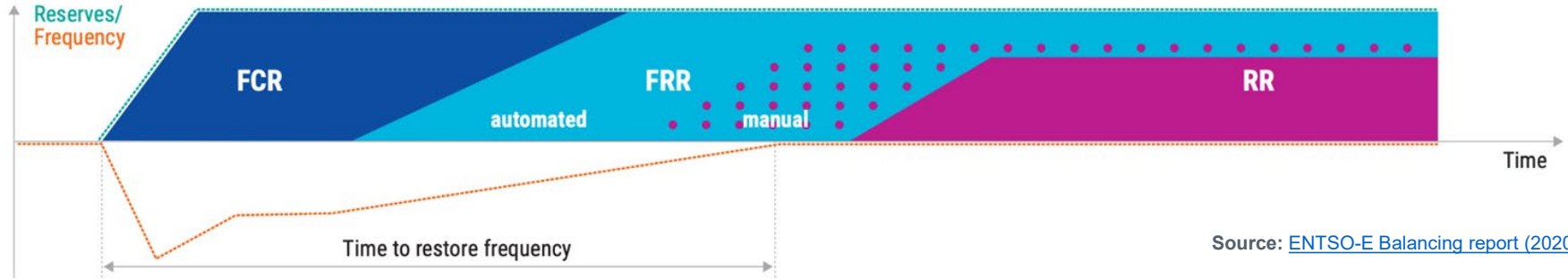
Currently, balancing capacity markets are operated by the national TSOs.

### Balancing Energy Markets

Ensures optimal use of available reserves (i.e. merit order based activation), following pay clear principles. -as-

These markets correct the imbalance caused by participants' deviations from their market positions (system imbalance) by activating balancing energy from parties which are remunerated for their energy.

## Types of Reserve Products



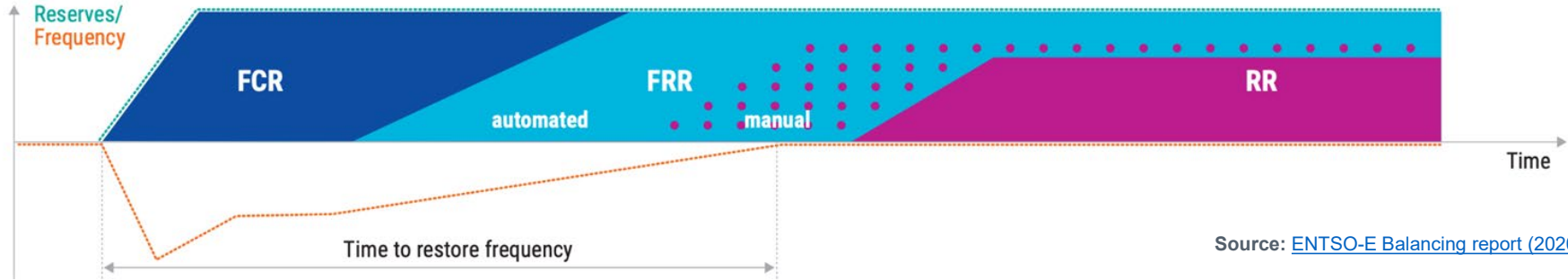
Source: [ENTSO-E Balancing report \(2020\)](#)

FCR (Frequency Containment Reserves)

FRR (Frequency Restoration Reserves) → **automatic** (aFRR), **manual** (m FRR)

RR (Replacement Reserves)

# Types of Reserve Products



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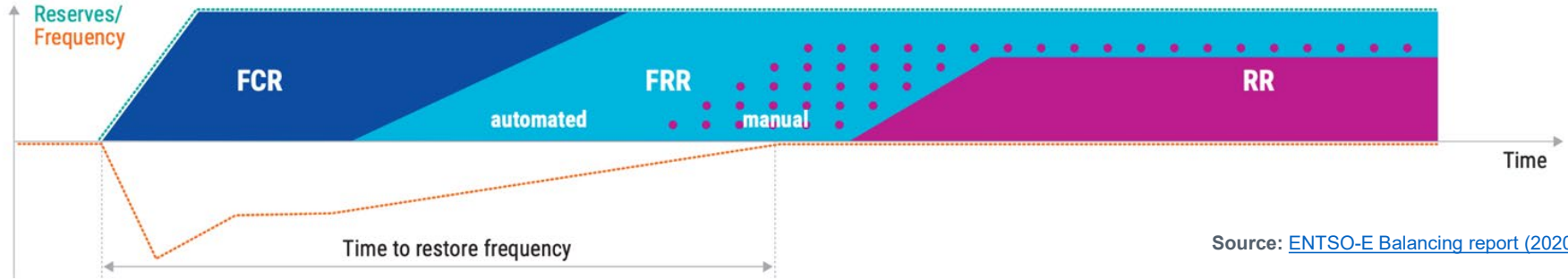
Sized at EU level, proportional to peak load

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# Types of Reserve Products



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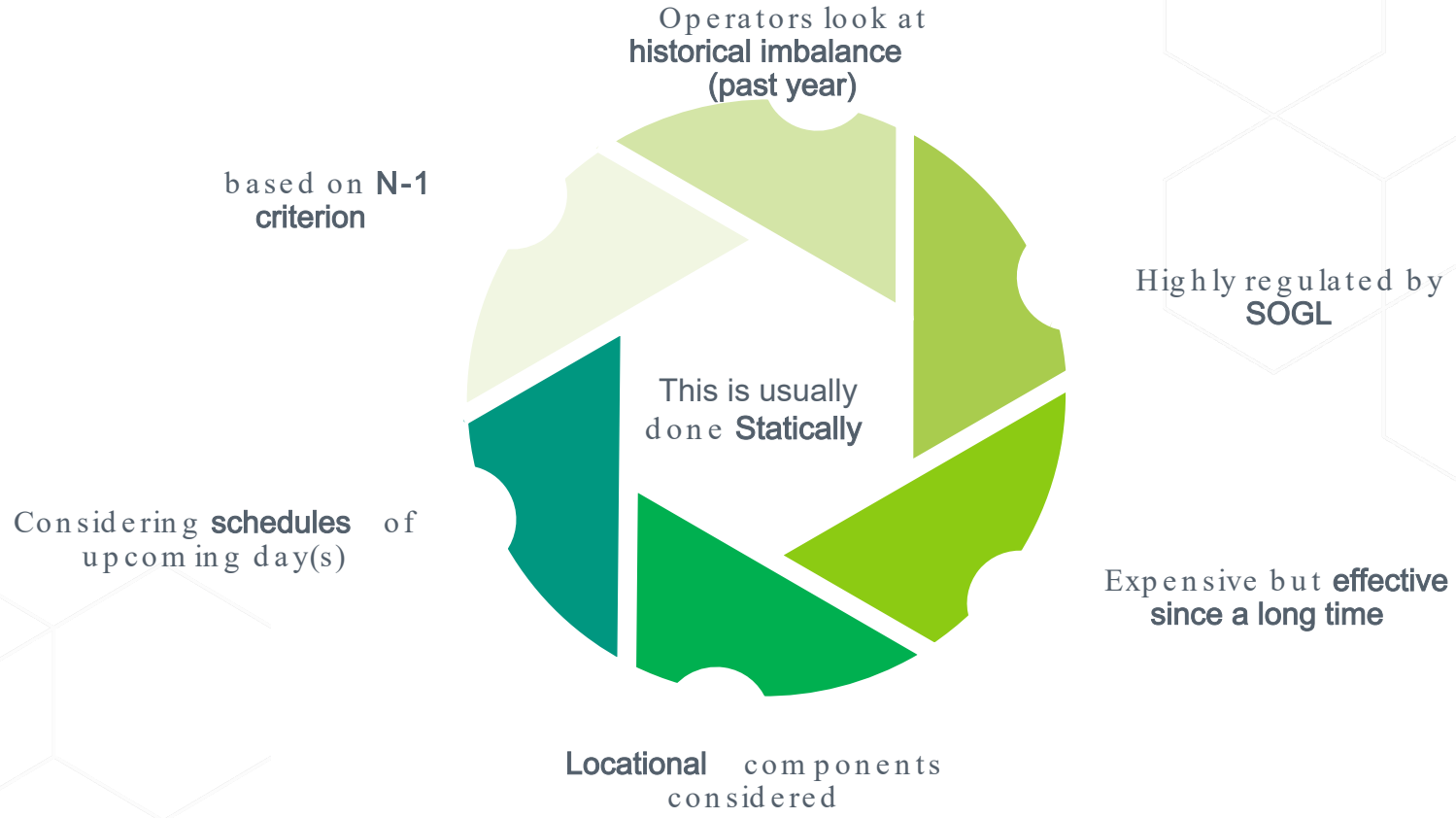
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# However, the world is significantly changing!

Assume you have a system with a considerable wind penetration

Suddenly, there is a lack of wind in an area and this causes a significant **Forecast Error!**

The existing approaches would not prepare the system to have enough reserves for this scenario



## That's where the need for Dynamic Dimensioning emerges

### System Imbalance

System imbalance depends on various factors such as:

- RES
- Interconnector **flows** and neighbouring regions
- Forced **outages** and system needs
- **weather** , seasons, externalities

### Procurement Philosophy

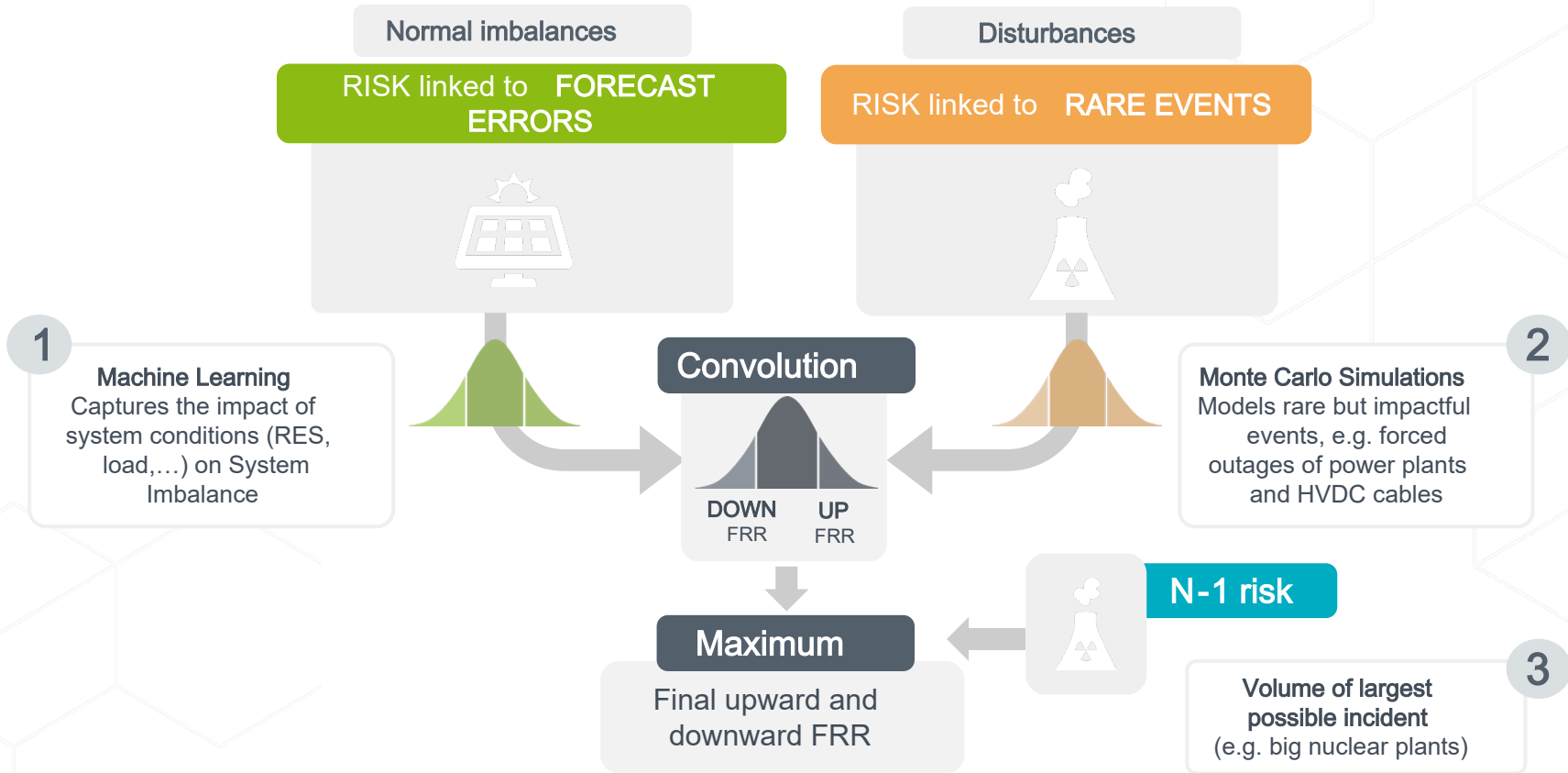
Hence, it makes sense to **procure more** when there is higher uncertainty!

We should not just base ourselves on the past or on the worst case scenario.

### Dynamic sizing

Reducing procurement cost, and better utilizing the system, by **leveraging data** effectively.

# How do we do it at N -SIDE?



And several Operators trusted us



## Why N -SIDE?

SOGL requires **N-1 security**

Reducing **procurement cost**

Finer granularity, higher **efficiency**

Considering **uncertainty** from RES  
& interconnectors

Leverages reserve **sharing**  
**agreements**

# Larger imbalances are leading to higher costs

## Static

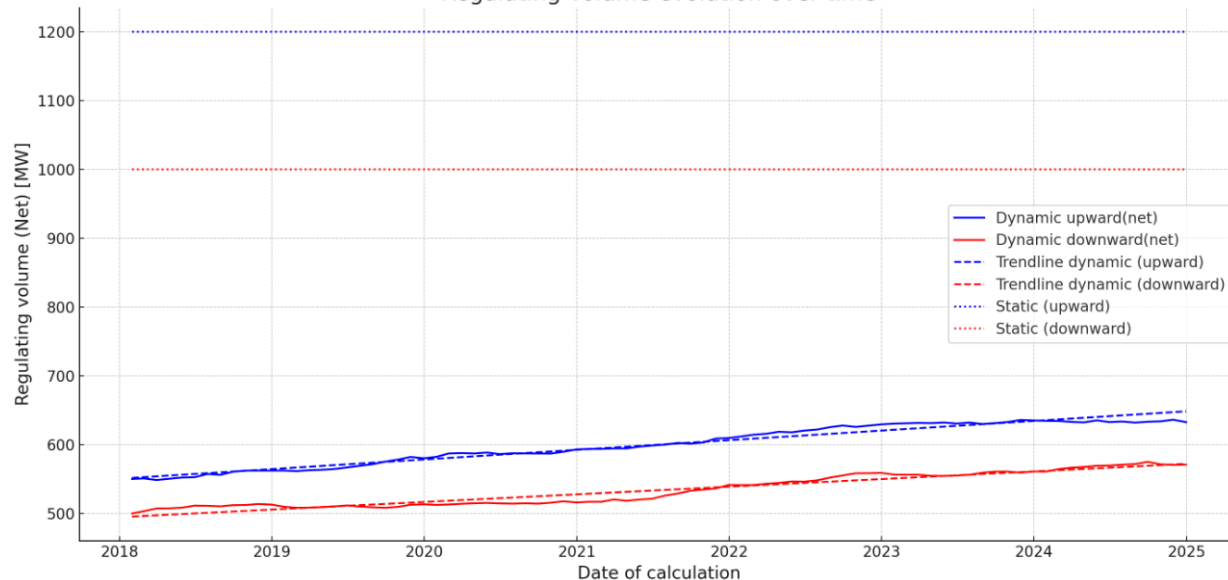
Look at largest possible outage (  $P_{max}$  )

## Dynamic

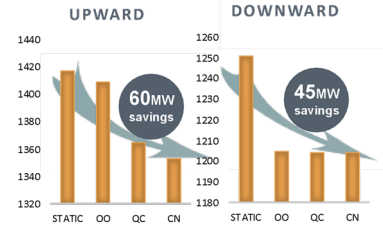
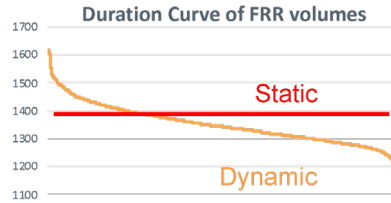
More granular timeframe

99% coverage of imbalances in the forecasted upcoming period

Regulating Volume evolution over time



# Using a dynamic approach towards dimensioning provides significant benefits to the operator



Look at the future, not at the past



Understand the drivers of uncertainty



More granularity for more efficiency



Lower costs and better utilization

# Thank you!



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