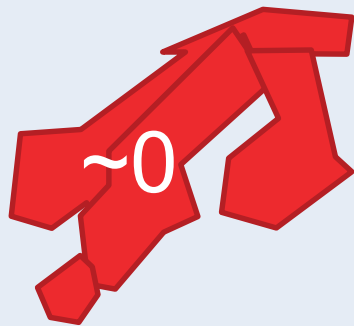


# To ensure fast-paced development towards a future-proof model, we will move from frequency control to Modernized ACE (MACE) control

## Today – balancing of frequency on a Nordic level

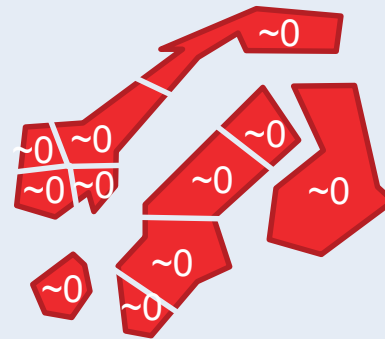


- Today we are balancing ACE on a Nordic level, called frequency control

### Several challenges with today's model:

- More challenging to control Nordic frequency
- Hard to identify real costs per country in balancing activities, and low accountability for own imbalances

## Target – balancing of ACE with modern IT solutions

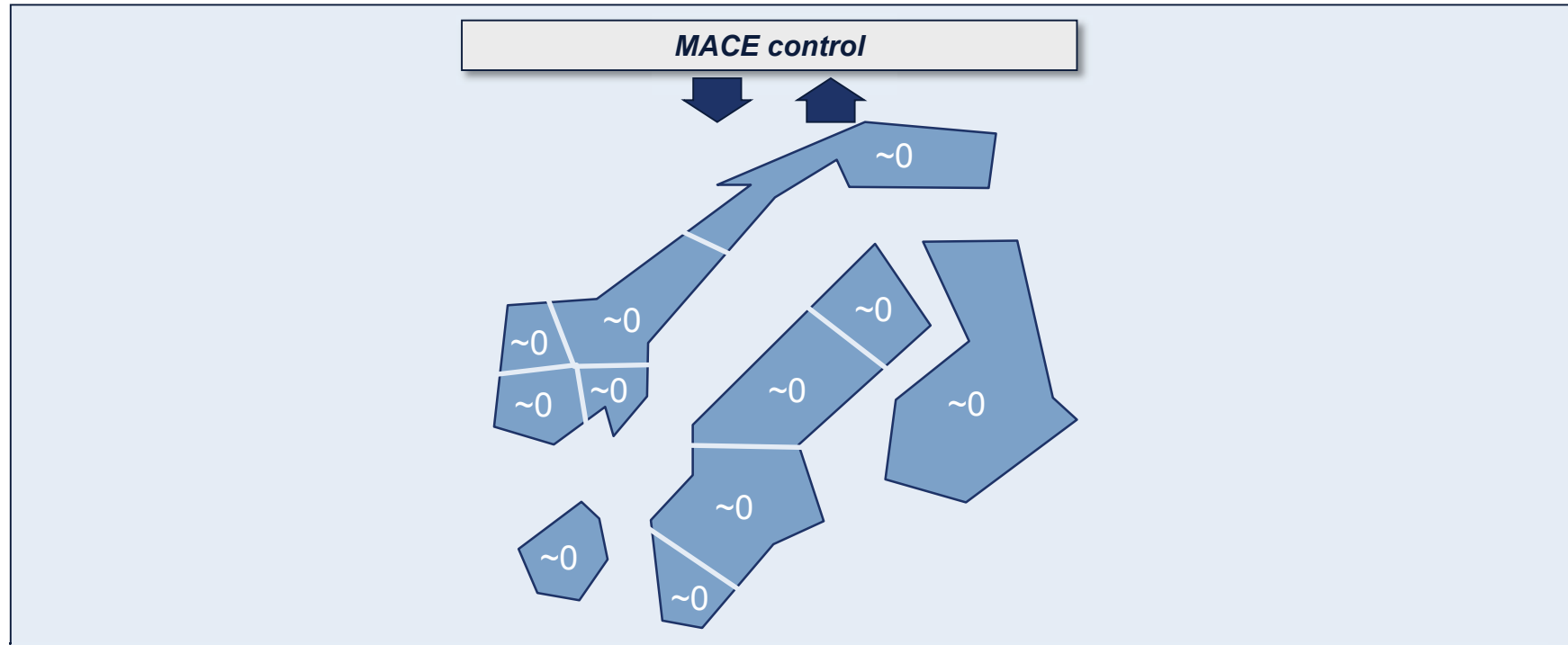


- Each bid area is balanced according to their individual ACE
- Modern IT solutions enables **easy and effective** netting and trade

### Great advantages with MACE regulation:

- Better control of imbalances per bid area
- Increased accountability per bid area
- Harmonization with the rest of Europe

## The MACE controller will leverage modern IT technology to ensure safe and efficient balancing



- Ensure exploitation of netting possibilities and facilitate an efficient balancing market
- Optimal and coordinated combination of balancing needs, available transmission capacity, and balancing resources
- The MACE Controller calculates and decides on the desired reserve activation per bidding zone in each of the 11 bidding zones, using a central optimization function

***The transition to MACE will involve significant IT development -  
but high IT costs will be required regardless of how we choose to solve our common challenges***

# The move from frequency to MACE will affect all phases of the balancing process, and has been formulated as a new Nordic Balancing Concept

The Nordic Balancing Concept covers all phases of the balancing process

## Dimensioning

- TSOs must ensure that the right reserves are available at the right place and at the right time

## Balancing capacity

- Capacity procurement based on the dimensioning of reserves per bidding zones
- Capacity trade between areas require ensured grid capacity

## Activation

- All activation of reserves are based on the balancing need in each area
- This will also control the flow on all major bottlenecks in the system

## Settlement

- All cross-border activation of reserves will be settled as a trade between the two areas
- This will give a TSO-TSO settlement with more correct incentives for all parties

# The Nordic Balancing Concept will continue pursuing market based solutions, and will promote market participant *flexibility*

The Nordic Balancing Concept will take the following steps...

Allow for integration with European market platforms for balancing products - and allow market solutions to be offered also outside our synchronous area (e.g. to Jylland)

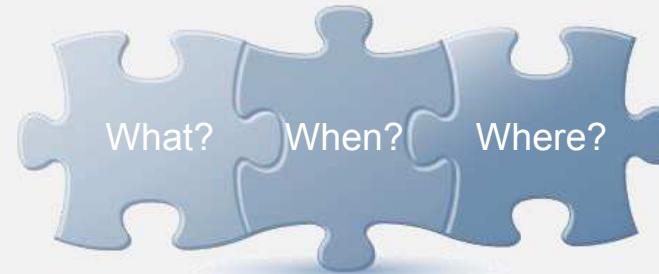
Strive for joint balancing markets with joint platforms for procurement and activation of balancing services

Pursue adequate price signals for balancing services and imbalance settlement in all relevant channels\*

...while ensuring development and maintenance of market participant flexibility across 3 key dimensions

## Flexibility

The ability to adjust consumption or production of energy when required across 3 dimensions



What	When	Where
What type and amount of balancing service	When in time the balancing service is offered	Where the balancing service should be located

\* I.e. per TSO, BSP and BRP, 15 minute time period and per Bidding Zone