



European aFRR EAM  
Aktørmøde mandag d. 11. September 2023  
*Webinar*

# DELTAGEROVERSIGT

Følgende aktører/virksomheder er repræsenteret på aFRR EAM aktørmøder:

- *Centrica Energy Trading A/S*
- *Copenhagen Energy*
- *Energi Danmark/ EDBS A/S*
- *Eviny Fornybar AS*
- *HOFOR*
- *MFT Energy A/S*
- *Nordic Power Services ApS*
- *PMN Holding ApS*
- *SCADA International A/S*
- *Sympower*
- *Ørsted A/S*
- *Clever A/S*
- *Danske Commodities*
- *Energistyrelsen*
- *Green Power Denmark*
- *Hybrid Greentech*
- *NITOR Energy A/S*
- *Norlys Energy Trading A/S*
- *S.C. Nordic A/S*
- *Sdr. Felding Varmeværk*
- *Vattenfall*

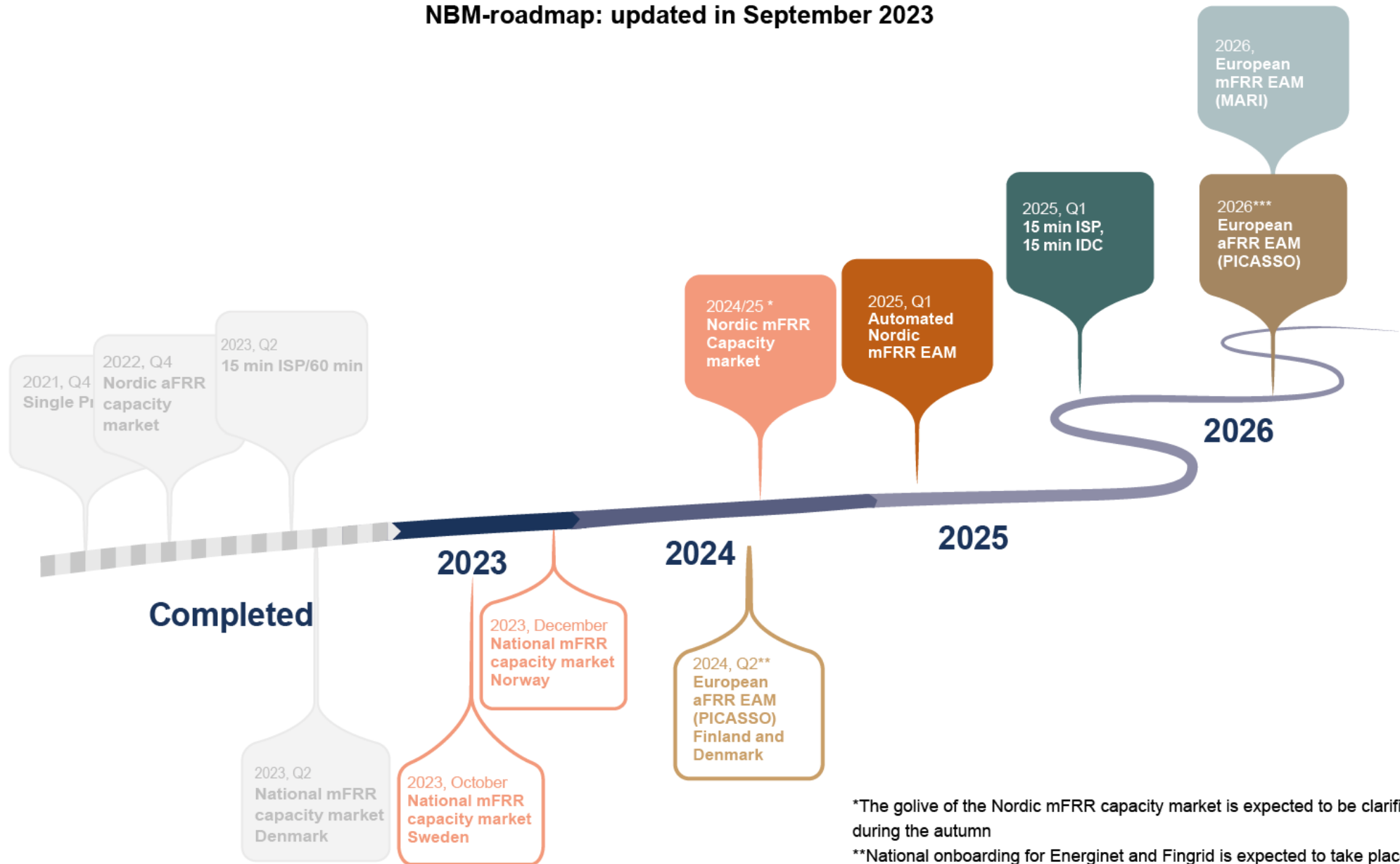
# Agenda



- Velkommen
- NBM Roadmap
- PICASSO og Energinets implementering af det Europæiske aFRR Energiaktiveringsmarked
- Gennemgang af implementeringsguide for European aFRR EAM
- Tidsplan samt test forløb
- Prækvalifikation – indhold og deadline
- Det videre forløb herunder supportbehov
- Afrunding

# NBM ROADMAP

# NBM-roadmap: updated in September 2023



\*The go-live of the Nordic mFRR capacity market is expected to be clarified during the autumn

\*\*National onboarding for Energinet and Fingrid is expected to take place Q2'24

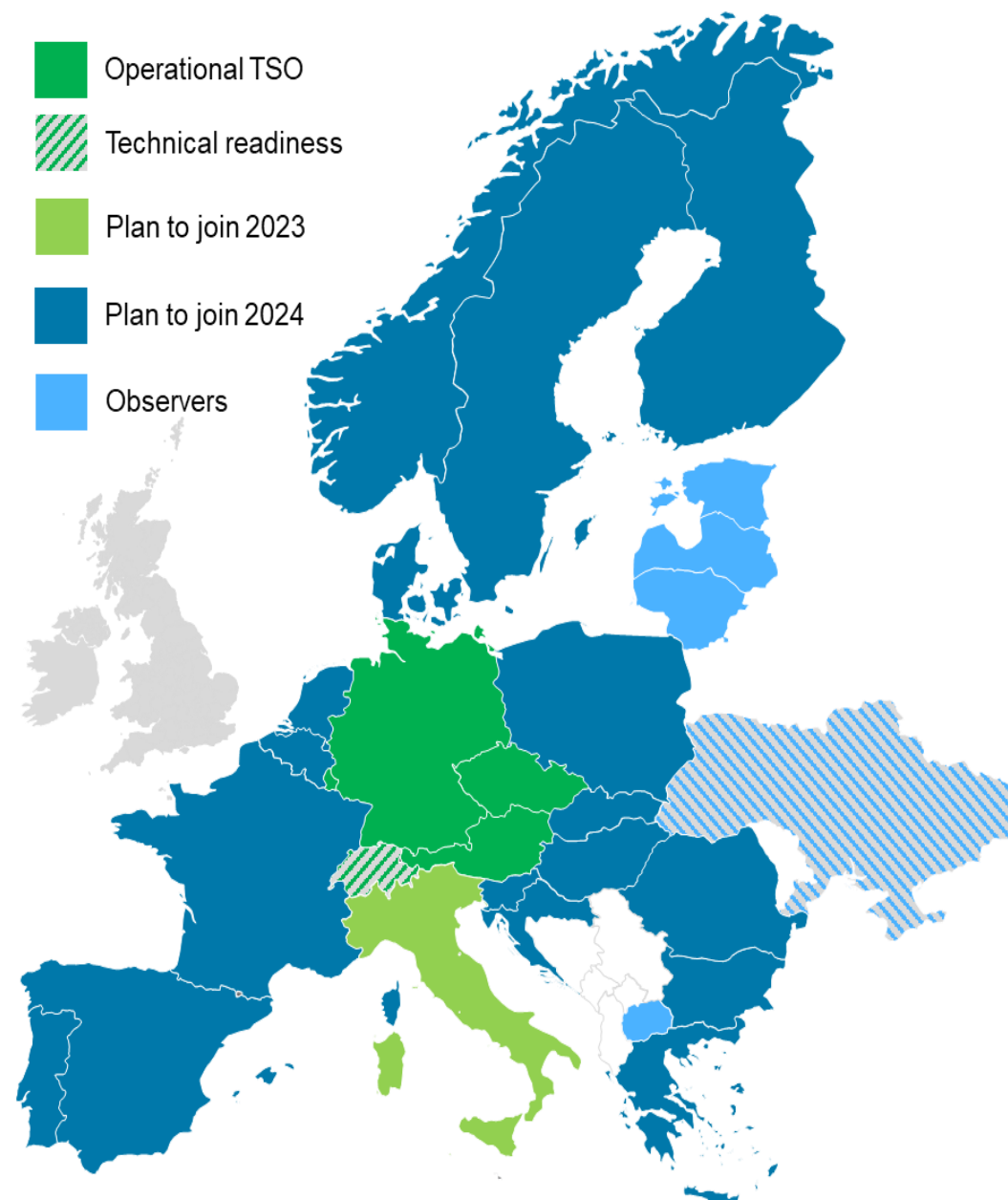
\*\*\*Joint Nordic PICASSO-accession.

# PICASSO OG ENERGINETS IMPLEMENTERING AF DET EUROPÆISKE AFRR ENERGIAKTIVERINGSMARKED

# HVAD ER PICASSO

The PICASSO Activation Optimization Function (AOF) optimizes the aFRR activation by maximizing the social welfare at European level taking into account the network topology and aFRR balancing energy bids.

Læs meget mere om PICASSO og hvordan det virker [her](#)



# PRIORITERING | OPTIMERING

Priority	Objective
1	Maximize satisfaction of the aFRR demand of individual LFC areas
2	Maximise the economic surplus
3	Minimize the deviation from the proportional distribution of relative deviation from the target values for unsatisfied demand
4	Minimize the amount of cross-zonal capacity usage
5	Equal distribution of flows over parallel trading paths
6	Minimize approximated physical flows
7	Minimize the deviation of cross-zonal-flows from their target value
8	Minimize the deviation of physical flows from their target value

Table 1: Objectives of the CMO optimisation problem



# PI SLØJFE OG IMPORT/EKSPORT AF UBALANCE

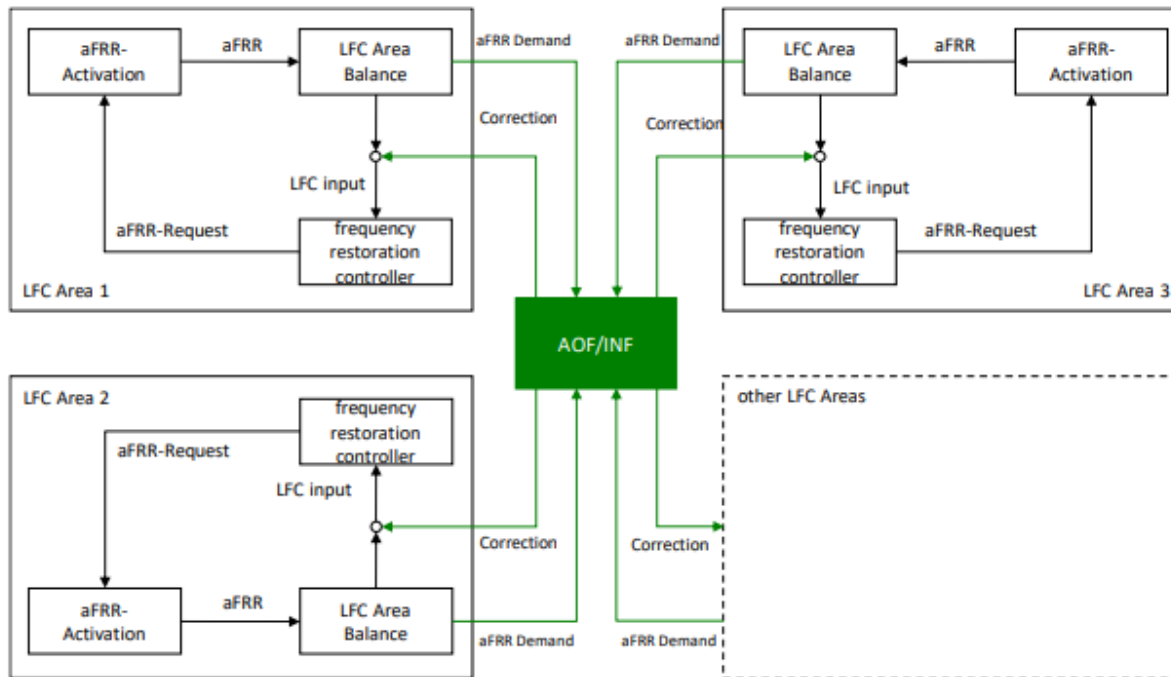
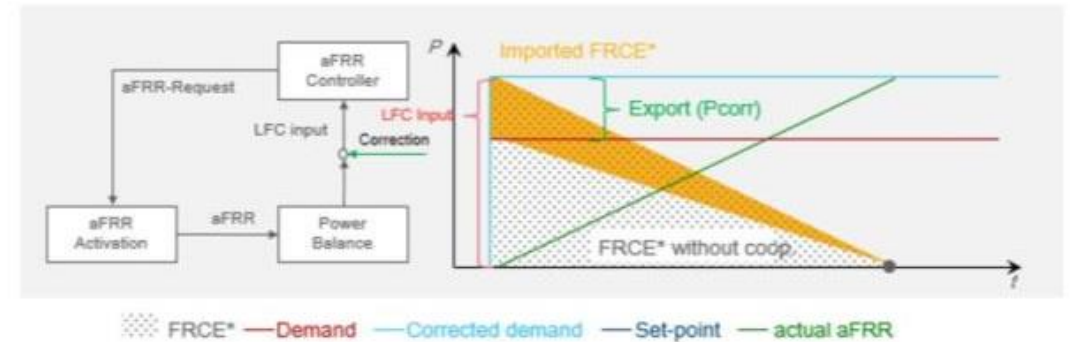
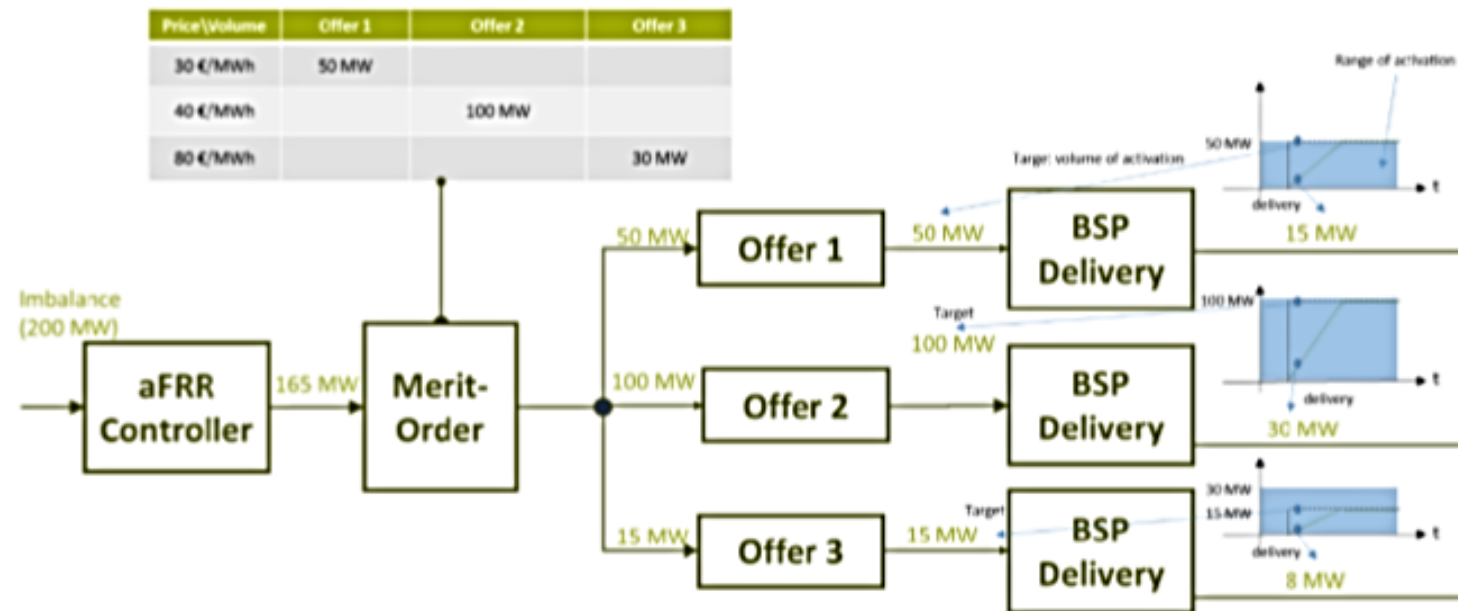


Figure 1 - High level design of interaction between AOF and LFC areas



# MERIT ORDER AKTIVERING



# PRISSÆTNING & BUDAKTIVERING

- Prissætningen foregår ved marginalpris
- Der aktiveres i prISRækkefølge
- I DK vil aktiveringen blive fordelt ligeligt såfremt der er flere bud med samme pris
- aFRR prisen er gældende for alle LFC områder/Budzoner som er uncongested også selvom man ikke leverer aFRR respons

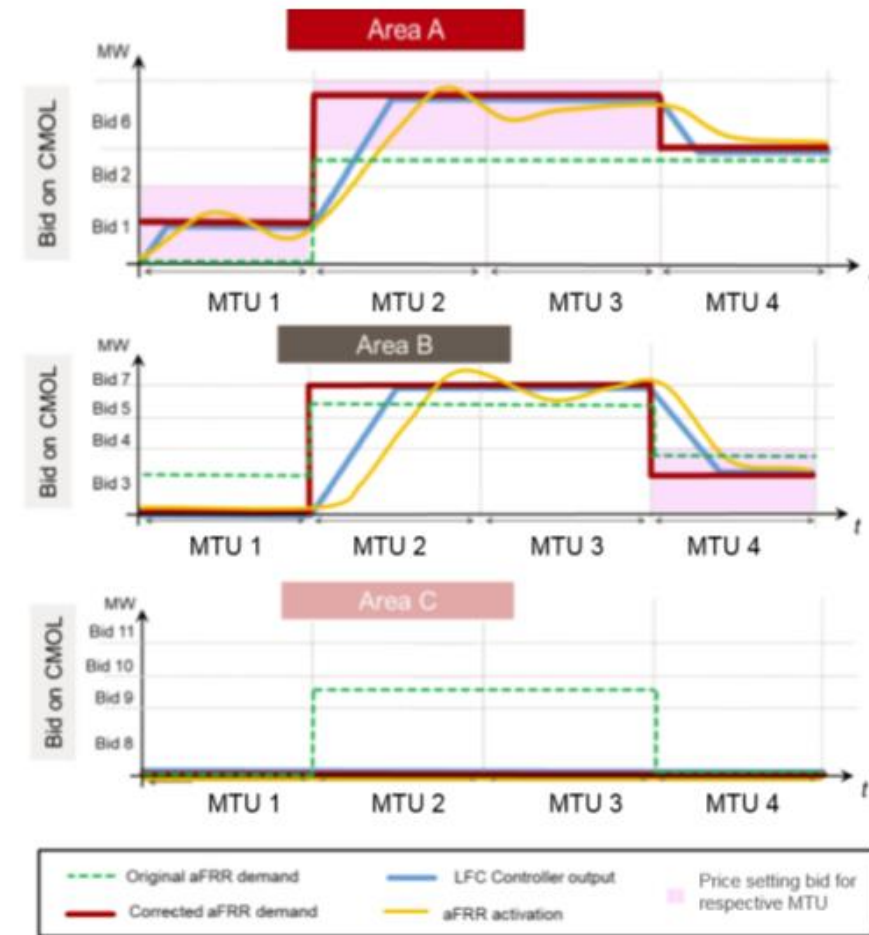
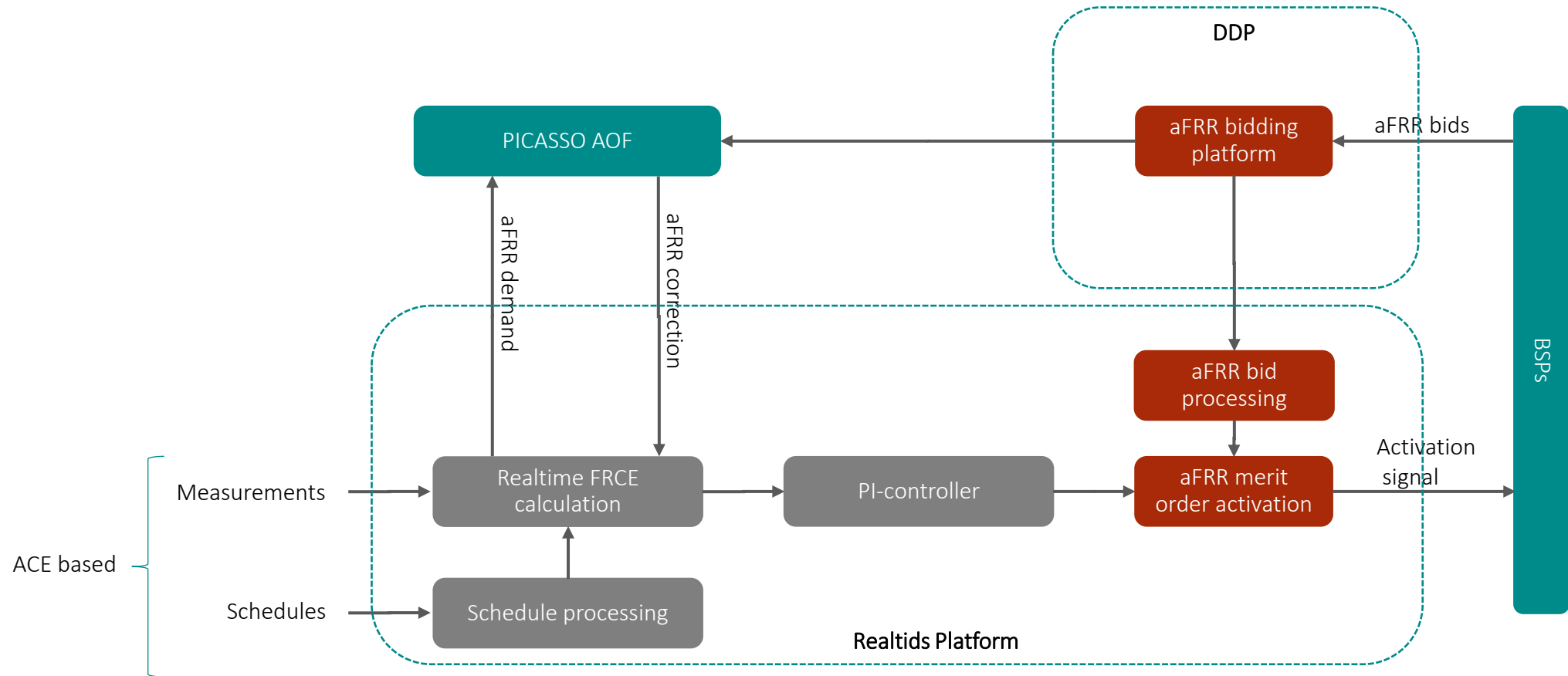


Figure 5. Schematic representation of determination of marginal prices based on AOF.

# TIDSOPLØSNING

- Der indsendes bud i 15 minutters opløsning – dvs. et aFRR EAM bud er gyldigt i 15 minutter og forventningen er at aktøren kan levere den indbudte respons i de 15 minutter.
- Optimeringscyklussen er sekundopløst (4 sek.) – der bestemmes et aFRR behov for hver optimeringscyklus, og der aktiveres og findes dermed en marginalpris tilsvarende.

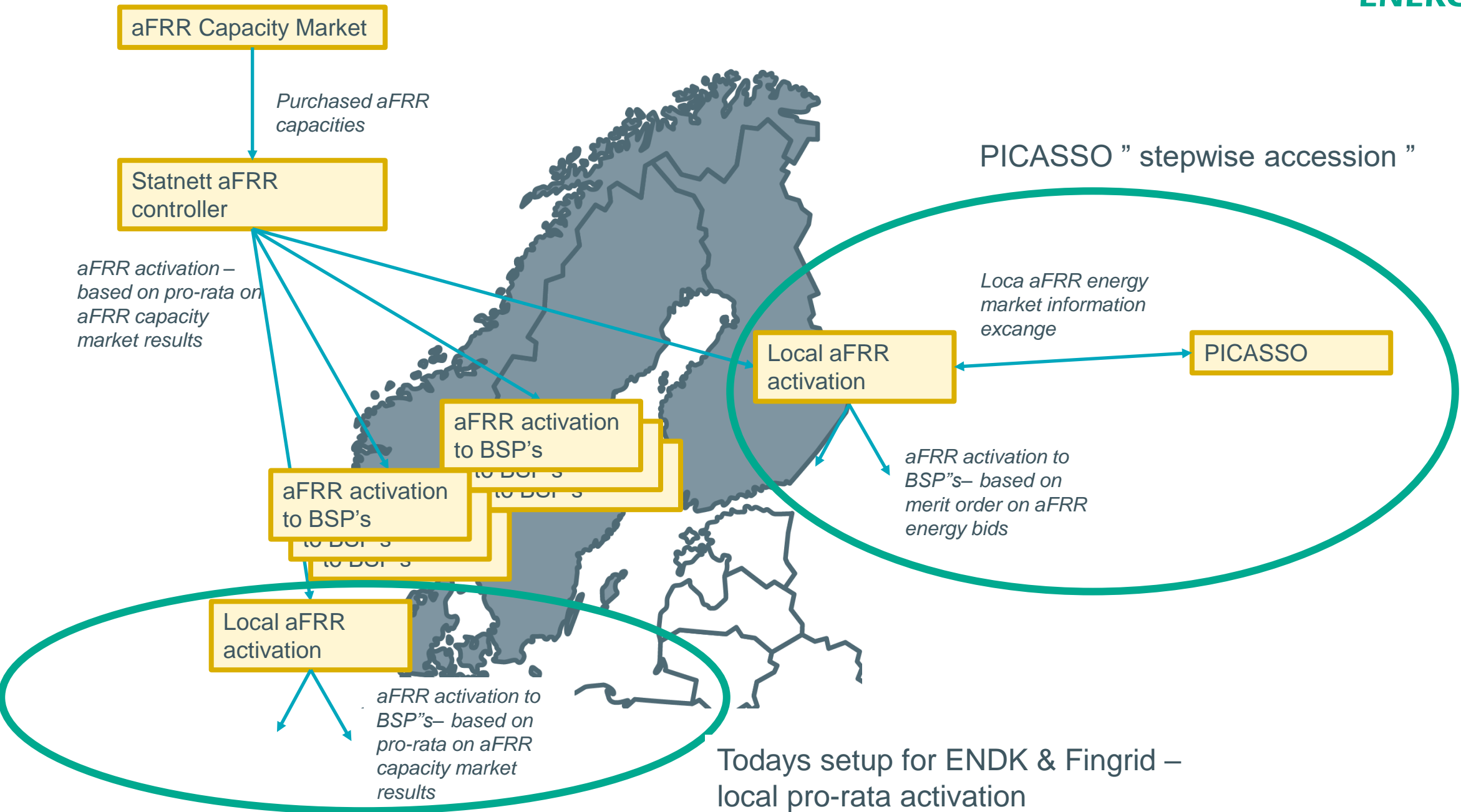
# DK1 – FULD PICASSO TILSLUTNING



# HVORFOR STEPWISE ACCESSION

Og hvad kræver det?

- SN & SvK er forsinket på PICASSO leverancen - pga. nordisk overgang er der brug for en ny plan
- Der er nordisk udviklet en løsning (stepwise accession) til at én eller flere TSOer kan tilslutte sig PICASSO uden at ødelægge/forstyrre den nuværende nordiske aFRR løsning
- Kræver at vi koordinerer vores aFRR behov til PICASSO med den nordiske pro-rata fordelte aFRR
- Betyder at stepwise accession planen kun er nødvendig for DK2, og ikke DK1 som kan tilsluttes "normalt"

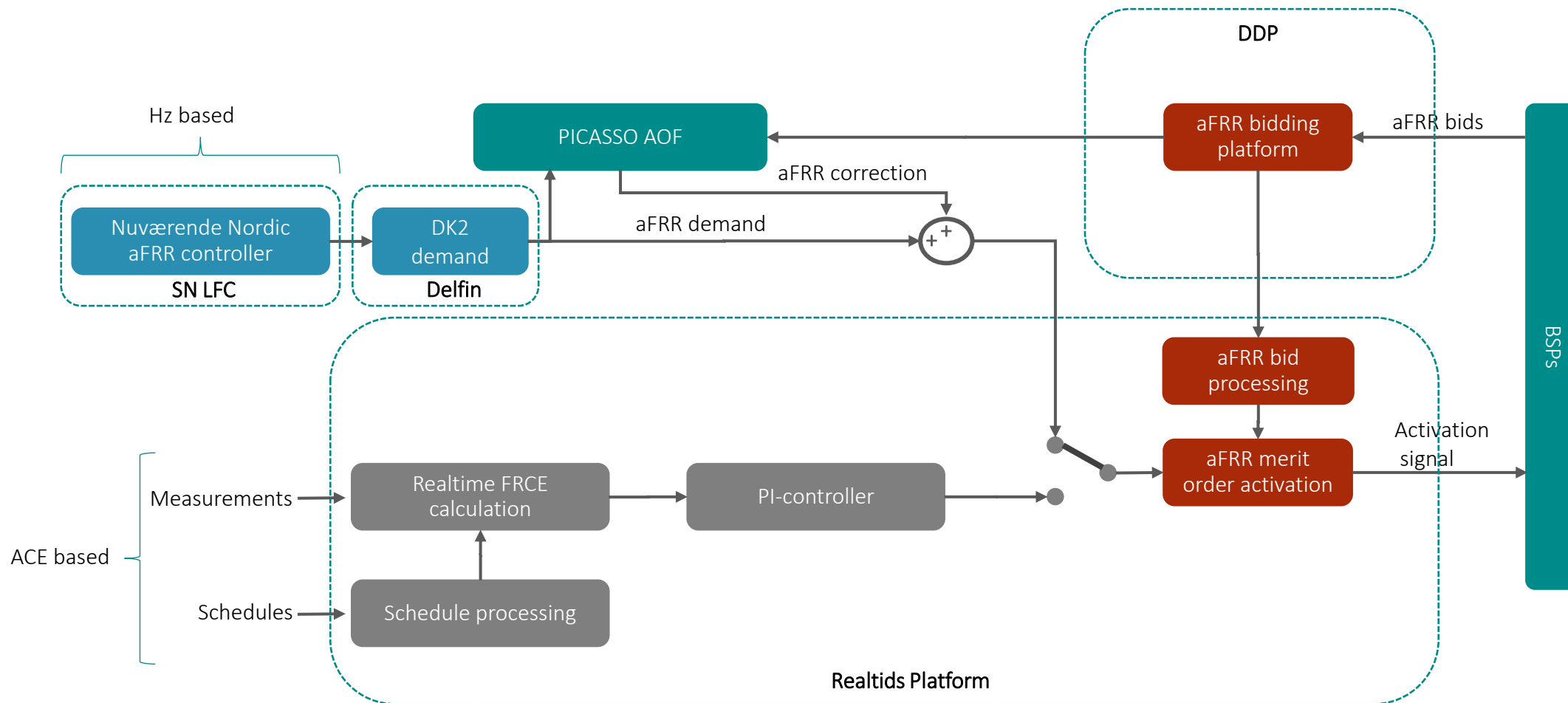


# BETYDER STEPWISE ACCESSION NOGET FOR MIG SOM DANSK AKTØR?

- Ja ved tilslutning til PICASSO opdeles aFRR markedet i to (CM & EAM) som vi kender det fra mFRR. Dermed bliver det muligt at byde i mindre tidsopløsning og frivilligt tæt på driftstidspunktet
- De danske aktører får ved dansk tilslutning til PICASSO fuld adgang til PICASSO og vil indgå på CMOL'en i det omfang der er grænsekapacitet til rådighed
- Dvs. at danske aktører kan blive udkonkurreret af billigere europæiske bud ligesom de selv kan udkonkurrere og levere til genoprettelser af ubalancer i andre PICASSO lande



# DK2 – FULD PICASSO TILSLUTNING (HZ BASED)



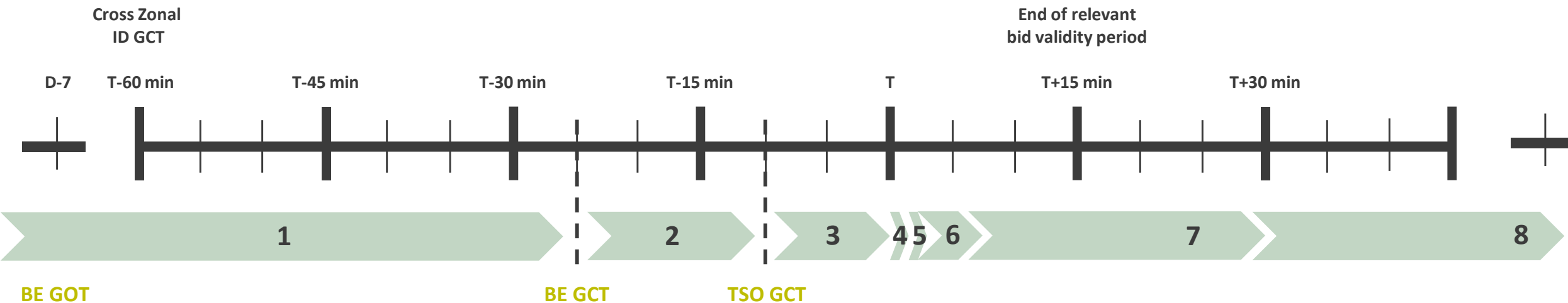
# DATA OM PRISER OG MÆNGDER I PICASSO

Data til brug i business case kan findes her:

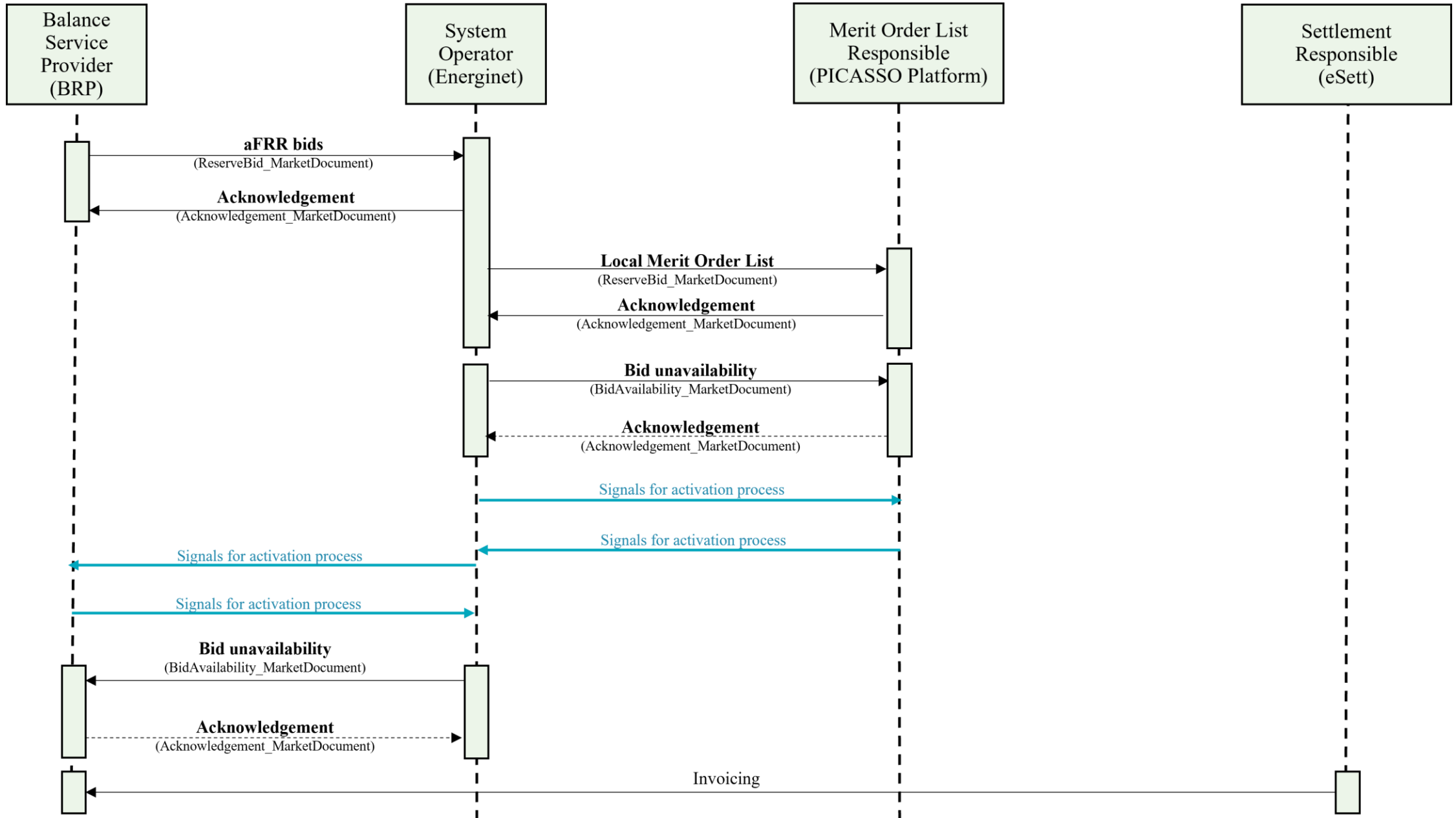
<https://www.transnetbw.de/en/energy-market/ancillary-services/picasso>

Der vil i løbet af 2024 blive stillet langt mere data til rådighed på Entsoe-Es Transparency Platform side

# GENNEMGANG AF IMPLEMENTERINGSGUIDE FOR EUROPEAN AFRR EAM



1. BSP bids to TSO
2. TSO processes
3. PICASSO Platform processes
4. PICASSO Activation optimisation function (optimisation cycle)
5. TSO activation request to BSP (control cycle)
6. aFRR activation by BSP (FAT)
7. Publication of transparency data
8. Settlement and Invoicing



# BID SUBMISSION

- Standardized document format: CIM *ReserveBid\_MarketDocument*
- All bids in a document must be valid. Otherwise the document will be rejected by an *Acknowledgement\_MarketDocument*. Bid documents are either fully accepted or fully rejected
- Submitted bids must be available for activation
- Bids must have globally unique IDs (GUIDs are required)
- One bid per timeseries. Multiple timeseries are allowed in the bid document
- Gate closure for bid submission is 25 mins before delivery (BEGCT T-25)
- Bids are always divisible

# BID CHARACTERISTICS

Bid characteristics	
Currency	EUR
Maximum price	15.000 EUR/MWh
Price granularity	0.01 EUR
Minimum bid size	1 MW
Maximum bid size	9999 MW
Bid granularity	1 MW
Bid time resolution	15 minutes
Full Activation Time, FAT	Max 5 minutes

# BID UPDATES

- Standardized document format: CIM *ReserveBid\_MarketDocument*
- Updates are possible until BEGCT, 25 mins before delivery
- Updates are done by sending the affected time series (same ID) with new data
- If a bid becomes unavailable before BEGCT the bid must be cancelled
- Cancellation of time series is done by sending value 0 for quantity
- Only updated bids should be sent in a new message. No need to resend unchanged bids
- New bids are allowed in the update message



# BID ACKNOWLEDGEMENT

- Standardized document format: CIM *Acknowledgement* *\_MarketDocument*
- Used to acknowledge the receipt of a document.
- The received document is referenced in the returned *Acknowledgement* *\_MarketDocument*
- Both TSO and BRP must return an acknowledgement when a document is received
- Implies acceptance or rejection through reason codes
- Errors can be elaborated in the Reason Text field

# BID AVAILABILITY

- Standardized document format: CIM *BidAvailability\_MarketDocument*
- *Acknowledgement\_MarketDocument* must be returned
- In the document the TSO will inform the BRP of bids that have been marked unavailable for activation
- TSO can change availability of a bid for various reasons, including but not limited to:
  - Loss of real time signal towards the BRP
  - Request from BRP (this only applies after BEGCT – before BEGCT the bid must be canceled)
  - Local congestions
- If there is no unavailabilities during a validity period the document is not sent

# MESSAGING IN GENERAL

- Messages must be sent over ECP
- Messages will undergo validation
  - Technical level (Schema, data formats)
  - Document level (compliance of attributes, timing)
  - Bid level (bid characteristics, timing)
- The beginning and ending date and time of the period covered by the document must be on the same CET/CEST day

# MANDATORY GEOTAGS

Snippet from Implementation Guide:

registeredResource.mRID	M	<p>List of geotags indicating where the bid feeds into the grid.</p> <p>Comma separated list of 400kV, 220kV, 150kV (DK1) or 132kV (DK2) substations. At least one substation must be provided, but if the bid feeds into different points in the grid (as with portfolio-based bids), all relevant substations must be provided.</p> <p>All substations in the list must be situated in the same bidding zone as the bid itself.</p>
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Dok.21/00138-3 Offentlig/Public

- Exact same model as for mFRR EAM (geotags will be mandatory in mFRR EAM from 1<sup>st</sup> of December 2023).
- If a bid feeds into a substation on a lower voltage level (60kV/50kV) the corresponding 150kV/132kV substation must be used as geotag.
- List of valid substations will be available for download.
- Example:  
**"FGD\_150,LAG\_150"**  
 (Indicates a portfolio-based bid feeding into Fraugde and Landerupgaard)

# TIDSPLAN SAMT TESTFORLØB

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11/9 2023

**Aktørmøde** om  
aFRR EAM  
processen og  
implementation  
guide\*

\*Energinet planlægger  
at afholde flere møder  
forud for go-live

Q1 - 2024

**Integrationstest**  
herunder  
signaltest

APRIL  
2024

**End-2-End test**

28/5 - 2024

**Go-live:**  
Tilslutning til  
PICASSO

1/10 - 2024

**Deadline for fuld  
indfasning af  
HVDC**

# PRÆKVALIFIKATION – INDHOLD OG DEADLINE

# PREQUALIFICATION PROCESS

**Prior testing**, the following is to be sent to [PQ.Audits@energinet.dk](mailto:PQ.Audits@energinet.dk)

- Description of the system
- Fill out Test manual
- Inform about ICCP
- Invite Energinet to test

**Post testing:**

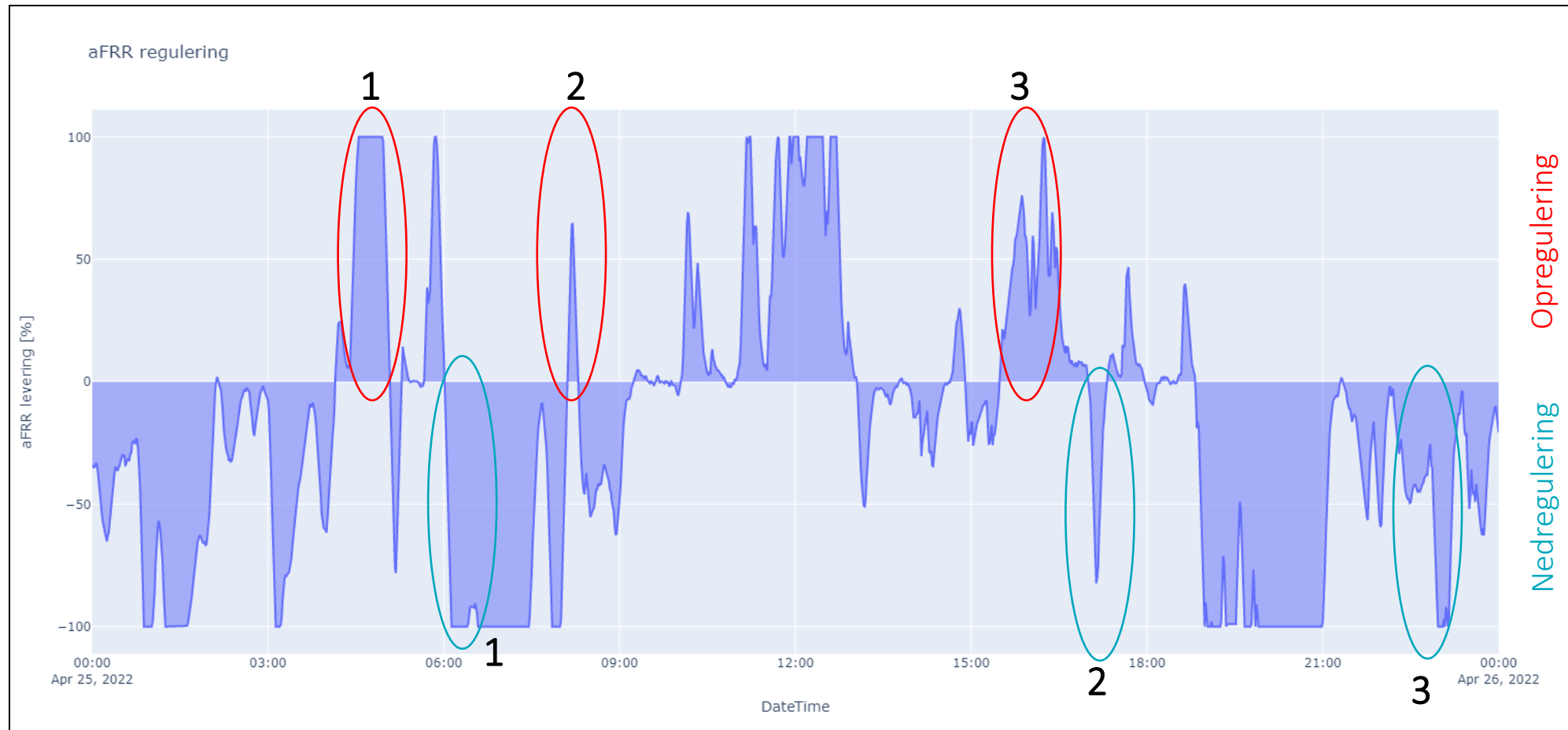
- Forward data from test to [PQ.Audits@energinet.dk](mailto:PQ.Audits@energinet.dk)
- Signal testing

Anticipated processing time is often 2-3 days.





# OPERATIONAL EXAMPLES



# TECHNICAL TEST

*Purpose: To assess the units technical performance*

## Part 1: Fuld activation

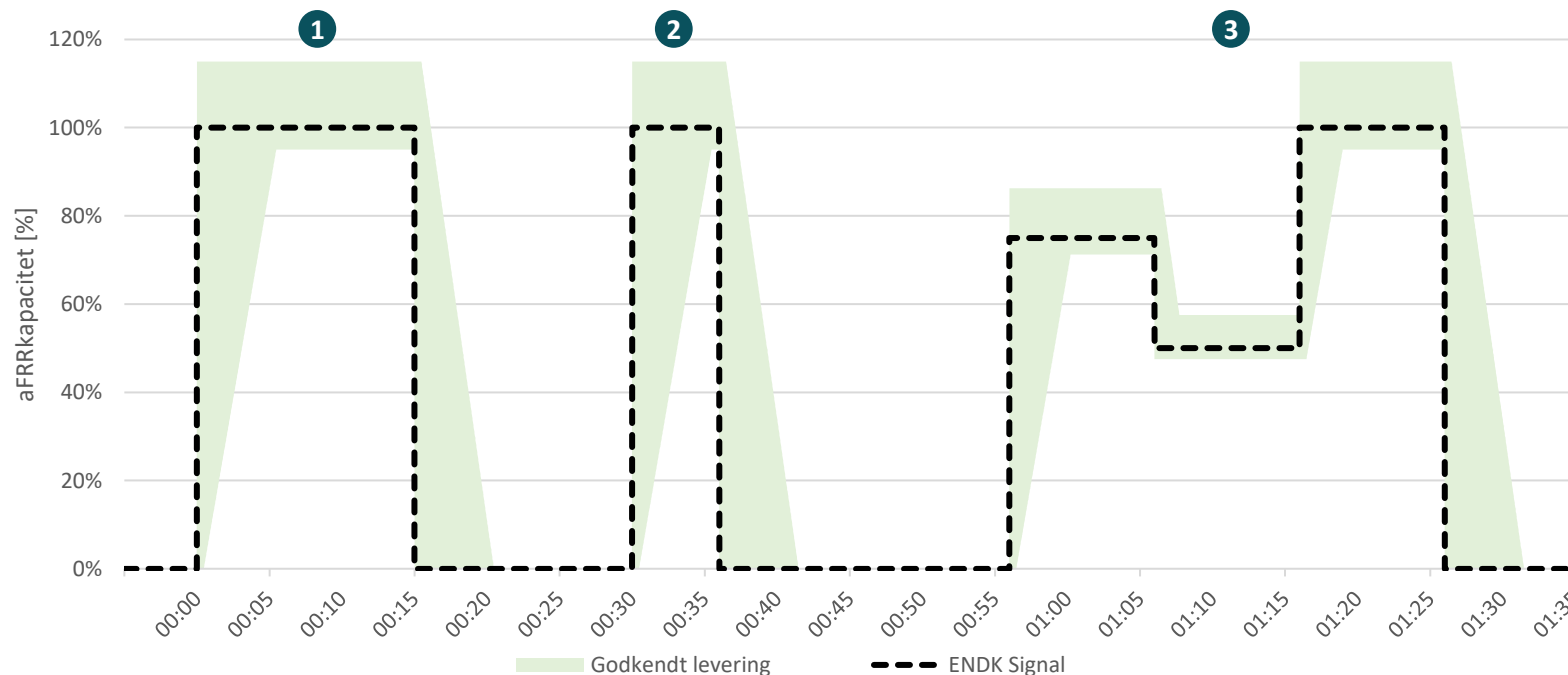
*Purpose: Tests the assets Full activation Time (FAT) performance*

## Part 2: Spike activations

*Purpose: Tests how the asset behaves when shortly activated*

## Part 3: Part activation

*Purpose: Tests a more dynamic behavior.*



- Activation signal is stepped bases
- The three parts may be tested separately.
- 30 sec maximum delay
- +15% delivery accepted
- -5% under delivery accepted
- The steady state response is the accepted capacity

<b>T1</b>	00:00	00:05	00:15	00:20	00:30	00:36	00:41	00:55	01:00	01:05	01:10	01:15	01:20	01:25
<b>T2</b>	00:05	00:15	00:20	00:30	00:36	00:41	00:55	01:00	01:05	01:10	01:15	01:20	01:25	01:30
<b>ΔT</b>	00:05	00:10	00:05	00:10	00:06	00:05	00:14	00:05	00:05	00:05	00:05	00:05	00:05	00:05
<b>Signal</b>	100%	100%	0%	0%	100%	0%	0%	75%	75%	50%	50%	100%	100%	0%

# DET VIDERE FORLØB HERUNDER SUPPORTBEHOV

# REALTIDSINTEGRATION MED AKTØRERNE

Protokoller:

- IEC 104
- IEC 61850
- Tase2/ICCP

Energinet laver et MPLS netværk som aktøren bestiller og tilslutter sig.

Derefter opsætter vi protokollen og etablerer følgende signaler:

Navn	Beskrivelse	Retning	Enhed	Opløsning	Frekvens
<b>Set-point</b>	Ønsket aktivering	LFC-> Aktør	MW	0.001	Ved ændring
<b>Aktivering</b>	Faktisk aktivering	Aktør -> LFC	MW	0.001	<1.2 s
<b>Hearbeat</b>	Periodic, binary alternating signal	BRP->LFC	0/1	N/A	<1.2 s

Signallisten laver SCADA og sender til aktør når de har valgt protokol.

# IMPLEMENTERINGSMØDER

Fællesmøder hvor implementering er i fokus

# ONLINE SUPPORTMØDER

Fast opsatte tidspunkter hver uge f.eks. onsdag fra kl. 10-10:30, hvor aktørerne, eller deres service providere, kan logge ind via Teams og få hjælp eller afklaring på spørgsmål. (Forventet opstart er 1. november 2023)

# Q&A

Hvor aktører eller deres service providere kan finde svar på ofte stillede spørgsmål

# FAST TRACK RESPONS

I implementeringsperioden etableres der en aktørsupport mailadresse, med henblik på hurtig respons og svar på spørgsmål

SPØRGSMÅL?

TAK FOR I DAG

