

Nordic mFRR platform algorithm

Norwegian reference group meeting

09.12.21

Visit nordicbalancingmodel.net

mFRR activation process

- There will be three mFRR activation processes in the Nordic synchronous area and bidding zone DK1. Two processes occur every 15 minutes and one is incident-triggered:
 - Every 15 minutes
 - Scheduled activation process
 - Period shift process, (will only be used in Norway and Sweden)
 - Incident-triggered process
 - Direct activation
- In this presentation we will describe algorithm for the **Scheduled activation process**
- End of Q4 2021 the Nordic TSOs plan to publish a first version of a memo describing bid selection algorithm. This memo will cover bid selection for all activation processes.
- The "mFRR EAM Bid selection process" was presented in Reference group meeting June 3rd 2021. The content of that presentation will not be repeated today. [June 3rd presentation](#).

Algorithm description document (preliminary)

1) Introduction

2) mFRR activation process

- ***General info on mFRR activation processes***
 - Scheduled activation process
 - Direct activation process
 - Period shift activation process
 - Fallback processes
- ***Input***
 - Bids
 - mFRR request
 - Available Transmission Capacity (ATC)
 - Master data
- ***Pre-process (preparing the input for the AOF)***
 - General
 - TSO-specific pre-process
- ***Output***

3) mFRR EAM Bid Selection Algorithms

- ***Introduction***
- ***Algorithm in Nordic AOF***
 - Objectives (soft constraints)
 - Hard constraints
 - Other rules
- ***Rule-based bid selection***
 - Direct activation
 - Fallback solution for scheduled activation bid selection
 - Price determination
- ***Period shift***

ANNEX A - BIDS

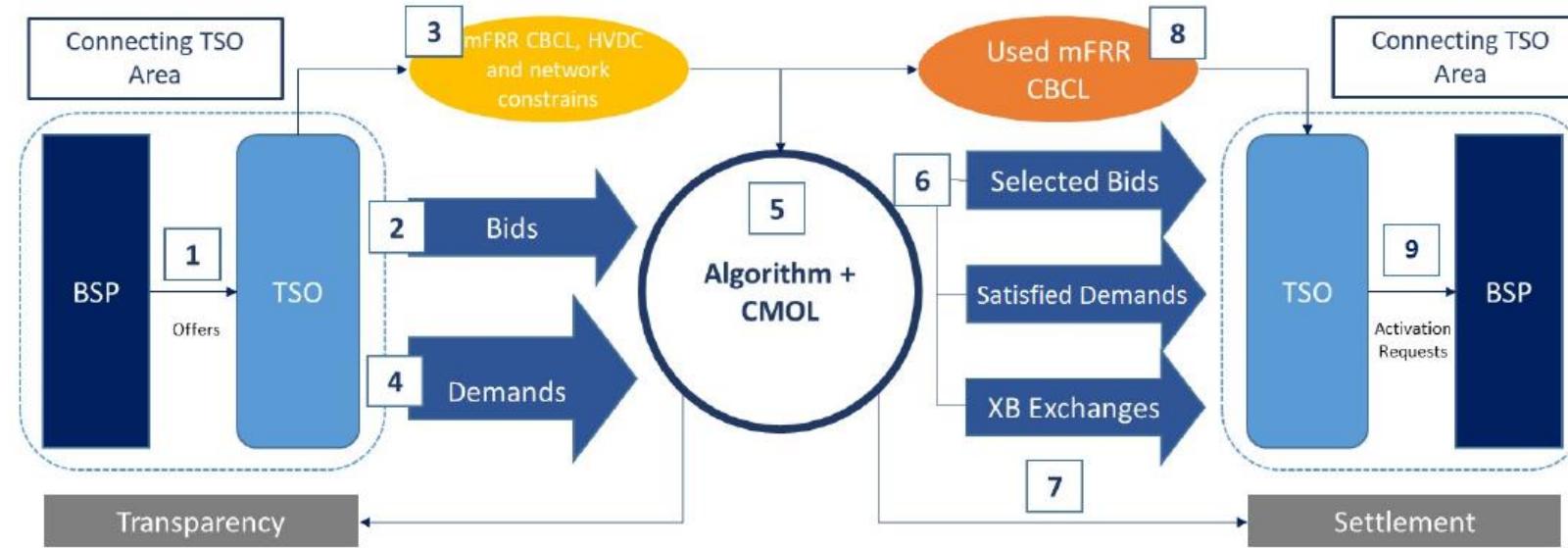
ANNEX B - GLOSSARY

Scheduled activation process



The mFRR process

General Process of mFRR Activation



1. TSOs receive bids from BSPs in their imbalance area
2. TSOs forward standard mFRR balancing energy product bids to the mFRR Platform
3. TSOs communicate the available mFRR cross border capacity limits (CBCL) and any other relevant network constraints as well HVDC constraints
4. TSOs communicate their mFRR balancing energy demands
5. Optimization of the clearing of mFRR balancing energy demands against BSPs' bids
6. Communication of the accepted bids, satisfied demands and prices to the local TSOs as well as the resulting XB exchanges
7. Calculation of the commercial flows between imbalance areas and settlement of the expenditure and revenues between TSOs
8. Remaining mFRR CBCL are sent to the TSOs
9. TSOs send activation requests to BSPs in their imbalance area

Source: MARI
stakeholder workshop.
December 18th 2020.

AOF algorithm

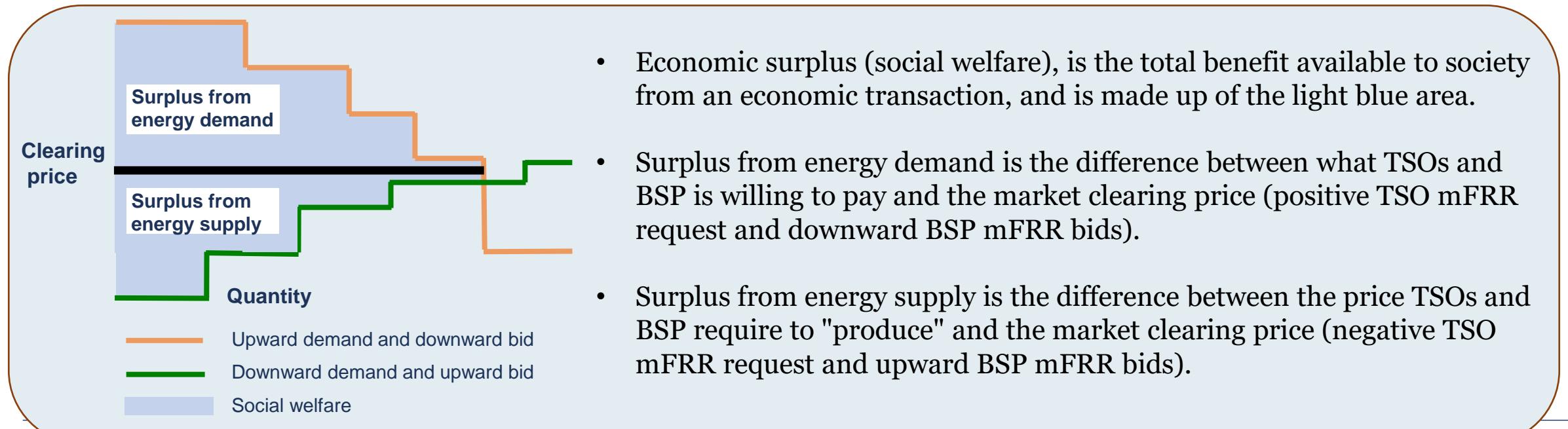
- The algorithm in AOF optimizes given objectives, subject to given constraints (objective and constraints are described later in this presentation)
 - Objectives are rules where the algorithm maximizes or minimizes "something"
 - (Hard) constraints are rules that must be fulfilled
- On a high level the algorithm seeks to satisfy mFRR request and maximize social welfare. To satisfy mFRR request has top priority.
- AOF shall perform optimization for one given MTU period only.
- Bid linking of bids in previous MTU periods can affect the availability of a bid in next MTU.
- Complexity in AOF algorithm is to a large extent due to selection of bids on the margin, and handling situation with price indeterminacy.

Objectives and constraints

- **Objectives (soft constraints)**
 - Satisfy demand
 - Maximize social welfare
 - Minimize unforeseeable rejected bids (URBs)
 - Minimize cross border flows
 - Maximize traded volumes
- **Hard constraints – must be fulfilled**
 - Prevent unforeseeable accepted bids (UABs)
 - Prevent adverse flows
 - Enforce price convergence between uncongested bidding zones
- **Other rules** – what to do if multiple equivalent (in terms of fulfilment of objectives) solutions exist
 - Price indeterminacy - Minimize distance to price target
 - Several bid with bid price equal to clearing price - Prioritize fully divisible bids

AOF algorithm rules – objectives (1 of 3)

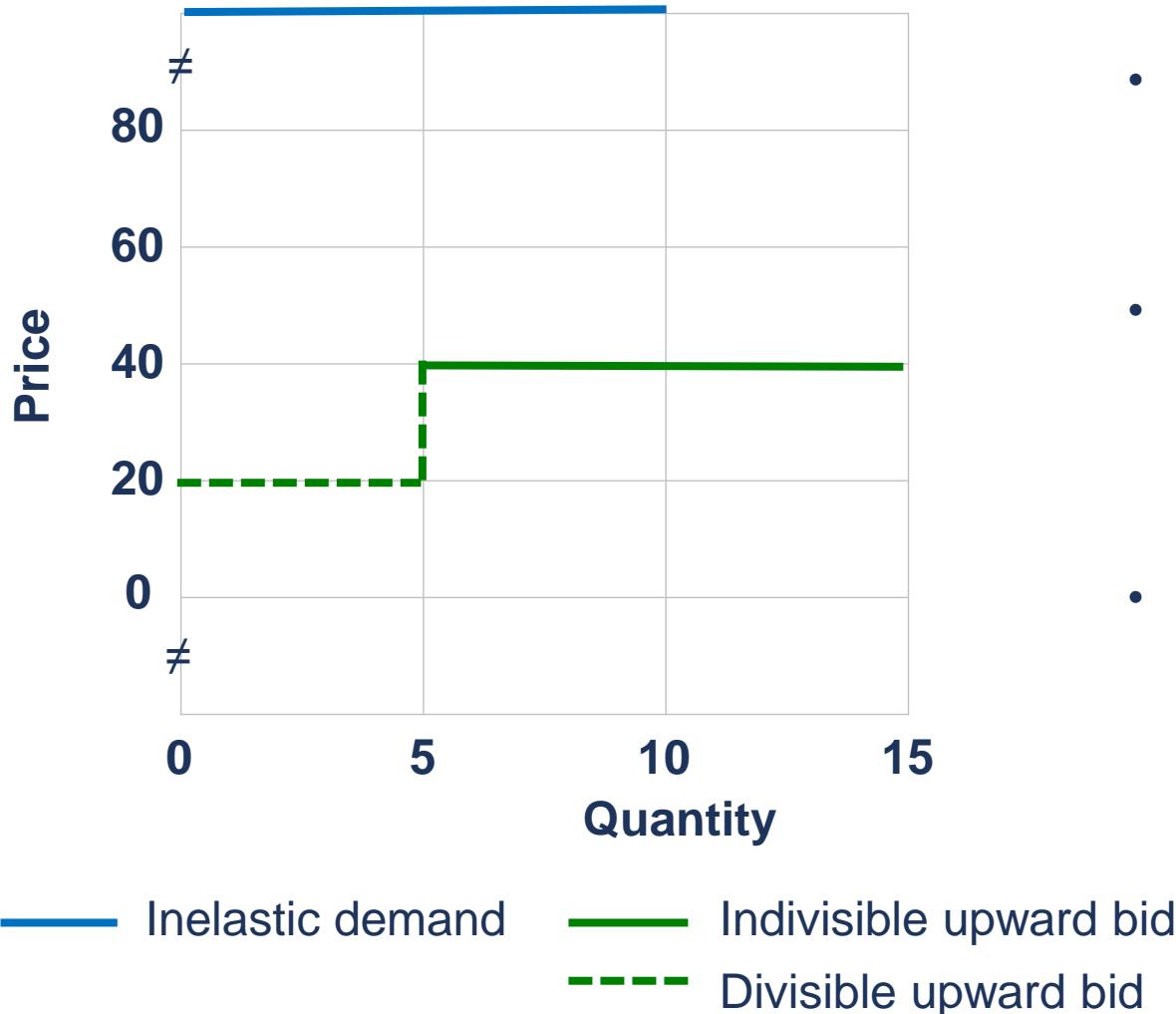
- **Satisfy demand**
 - If there are available bids (given transmission capacity) demand will always be covered. If all optimization objectives cannot be fulfilled, there is an extra penalty if demand is not covered.
- **Maximize social welfare**
 - One of the main objectives of the optimization. The "satisfy demand" rule has the highest priority, then maximize social welfare.



AOF algorithm rules – objectives (2 of 3)

- **Minimize unforeseeable rejected bids (URBs)**
 - Minimize the rejection of bids that are in-the-money, i.e., unforeseeable rejected bids (URB). Unforeseeable rejected bids are bids that are not selected even though the clearing price is higher than the URB bid price (for upward bid).
- **Minimize cross border flows**
 - The bid selection will prioritize demand satisfaction by bids in the same area as demand. If two potential solutions to the optimization give the same result for the optimization objective, the result with least cross border flow will be used.

Minimize unforeseeable rejected bids (URBs)



- If avoiding unforeseeable rejected bids had been a hard constraint, then the inelastic demand in the figure would not have been satisfied.
- Since the rule is to minimize URBs, the solution in the example will be that the indivisible upward bid of 10 MW and price 40, will be selected to satisfy inelastic demand of 10 MW.
- The divisible bid of 5 MW and price 20 will be unforeseeable rejected.

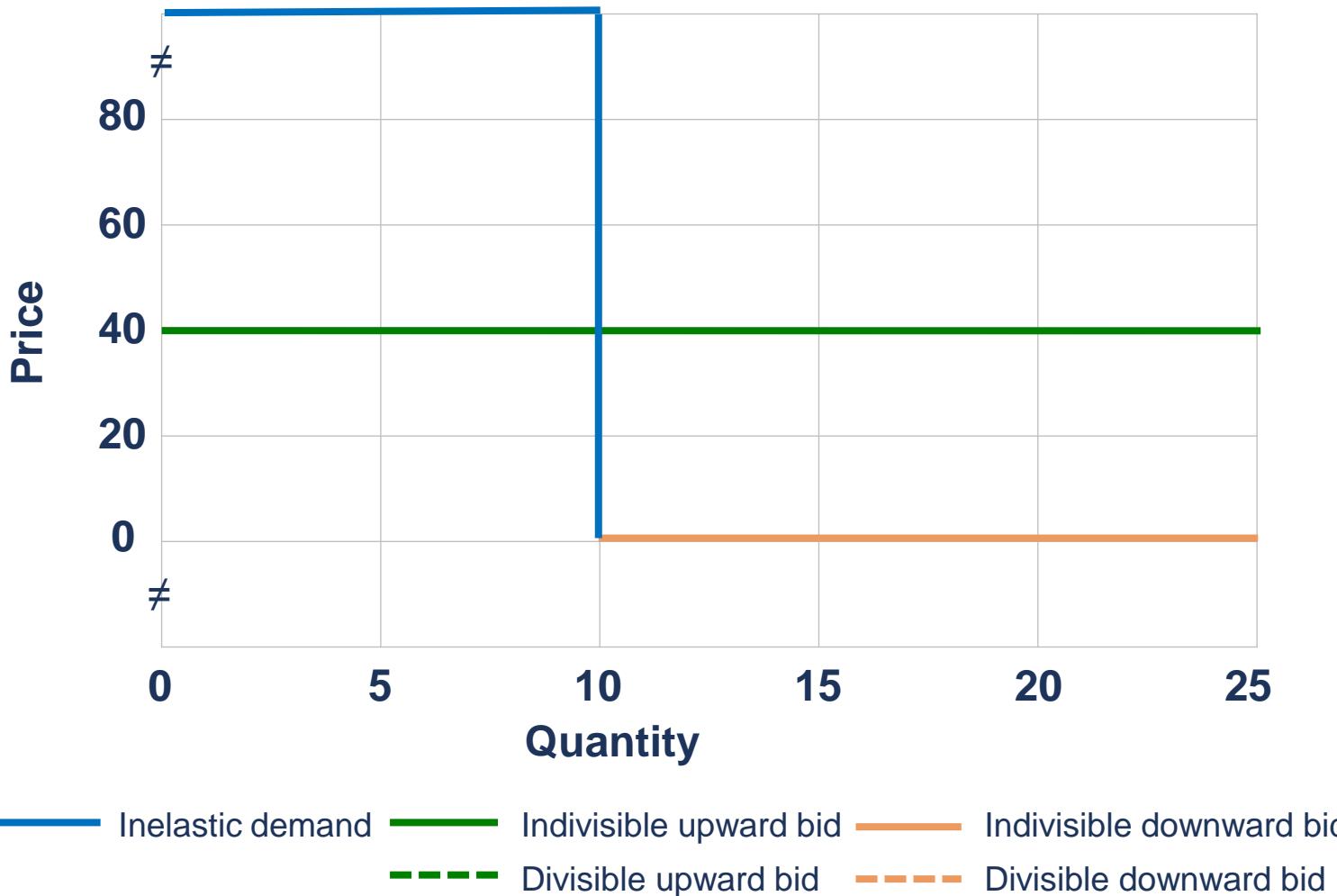
AOF algorithm rules – objectives (3 of 3)

- **Maximize traded volumes**
 - If different volumes can be accepted, the selection will prioritize highest traded volume.
 - If there are upward bid and downward bid with bid price equal to the clearing price, and there are both upward and downward bids that are not used to cover demand, there is several solutions with the same social welfare.
 - Given this rule upward and downward bids with bid price equal to clearing price will be selected, as long as no other rule is violated.

AOF algorithm rules - hard constraints

- **Prevent unforeseeable accepted bids (UABs)**
 - The optimization algorithm shall not select unforeseeable accepted bids (UAB).
Unforeseeable accepted bids are bids that are accepted even though the clearing price is less than the bid price (for upward bid).
- **Prevent adverse flows**
 - Avoid activating bid in a bidding zone where the marginal price is higher than the marginal price in the bidding zone with the demand.
- **Enforce price convergence**
 - The market clearing price of the two connected bidding zones shall be equal when there is no congestion.

Prevent unforeseeable accepted bids (UABs)

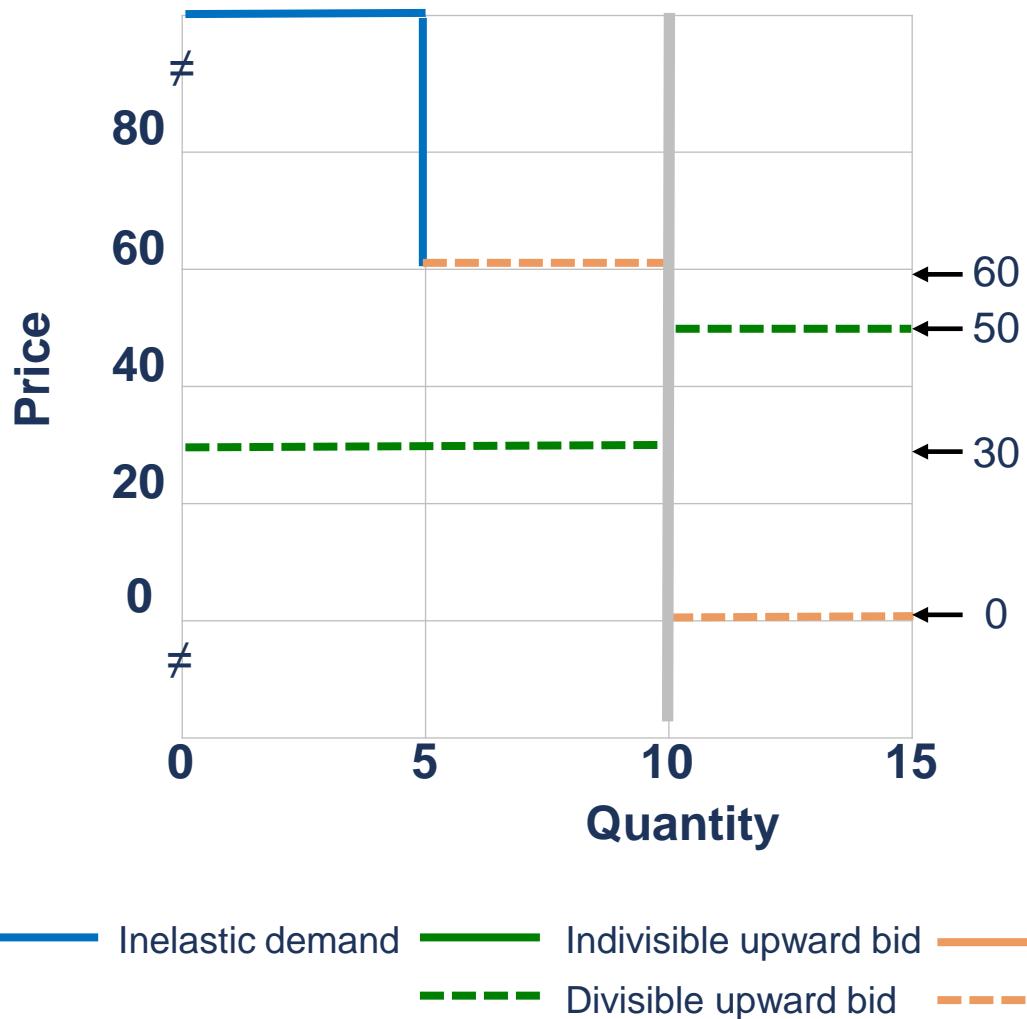


- If there is an inelastic demand of 10 MW, and indivisible downward bid of 15 MW and price 0, and an upward indivisible bid of 25 MW and price 40.
- The solution here will be that no bid is activated, and the inelastic demand is not satisfied.
- The reason is that if the indivisible upward bid had been accepted also the indivisible downward bid need to be activated to have energy balance.
- Then one of the activated bids would be out-of-the-money. Since prevent unforeseeable accepted bids is a hard constraint, no bid is activated, and the demand is not satisfied.
- .

AOF algorithm rules – other rules

- **Minimize distance to price target**
 - In case of price indeterminacy (there are multiple price solutions) the clearing engine needs rules to determine prices.
 - The clearing engine defines price targets and minimizes the sum of squared distance between the clearing price and the associated price target over all scheduling areas.
- **Prioritize fully divisible bids**
 - If multiple equivalent solutions exist in terms of volumes the clearing engine needs rules to select solution.
 1. Fully divisible bids have priority over other bids.
 2. Among fully divisible bids, the acceptance ratio should be the same for all such bids.

Minimize distance to price target



- The bid selection has satisfied inelastic demand of 5 MW and matched downward bid of 5 MW with price 60, with an upward bid of 10 MW and price 30.
- To determine the price in this case the following limits to the price is determined:
 - The price must be **less than 60**, or else the selected downward bid would be out-of-the-money.
 - The price should be **less than 50**, or else the rejected upward bid would be in-the-money and we try to minimize URBs.
 - The price must be **higher than 30**, or else the selected upward bid would be out-of-the-money.
 - The price should be **higher than 0**, or else the rejected downward bid would be in-the-money and we try to minimize URBs.
- This give us a potential price range between 30 and 50. The price target is set to the middle point and the clearing price will be 40.

Prioritize bids

For all cases:

- There is a positive demand of 100 MW to be satisfied
- All bids have the same bid price

	Case 1		Case 2	
	Offered MW	Selected MW	Offered MW	Selected MW
Divisible bid 1	100	50	0	
Divisible bid 2	80	40	40	24
Divisible bid 3	20	10	10	6
Indivisible bid 1	70	0	70	70
Indivisible bid 1	30	0	30	0

Case 3 Priority rule for indivisible bids:

Given the following available bids, all indivisible bids and in same bidding zone as mFRR request:

- Bid 1 volume: 90 MW
- Bid 2 volume: 90 MW
- Bid 3 volume: 90 MW
- Then 90 MW of the mFRR request will be covered by one of the bids. AOF will select bid randomly.
- Bid is randomly selected when there are multiple available indivisible bids with same price and volume.

Thank you!

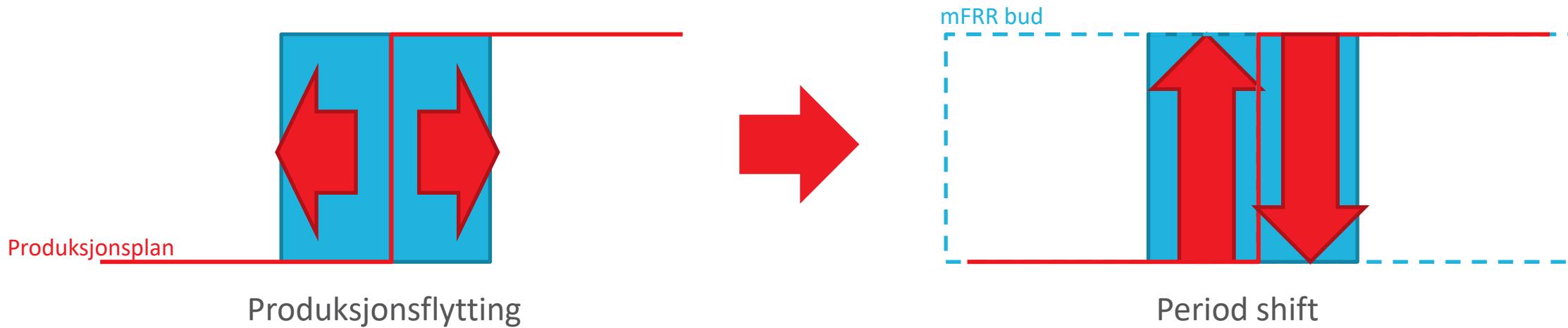
Endring i retningslinjer knyttet til produksjonsflytting som erstattes av periodeskift

Foreslått løsning reflektert i forslag til nye retningslinjer for praktisering av systemansvaret

- Vi ønsker å foreslå en løsning for praktisering av FoS §8b basert på periodeskift i stedet for produksjonsflytting. Det mener vi er mer fremtidsrettet, og samspiller bedre med automatiseringen av balanseringen. Forslaget innebærer at justering av produksjonsplan gjøres vha. periodeskift. Den nye løsning er planlagt gjeldende f.o.m. Q4 2022, når mFRR EAM settes på drift.
- Stasjonsgrupper med samlet produksjonsendring ved kvarterskift over en viss terskelverdi (forslag: 25 MW) vil pålegges å levere periodeskiftbud tilsvarende produksjonsendringen.
- Det vil være både permanente og midlertidige unntak som tar hensyn til tekniske og konsesjonsmessige forhold ved stasjonsgruppa samt inngåtte forpliktelser i kapasitetsmarkedene.
- Aktørene vil enten kunne levere periodeskift knyttet til et mFRR bud eller kun tilby periodeskift.
- Periodeskift klareres etter planlagt aktivering med 1) gjenværende mFRR bud med periodeskift og 2) rene periodeskiftbud. Sistnevnte vil ikke ha en budpris, men kompenseres med mFRR pris.
- mFRR bud med periodeskift vil kompenseres med det beste av mFRR pris og egen budpris pluss €3/MWh.

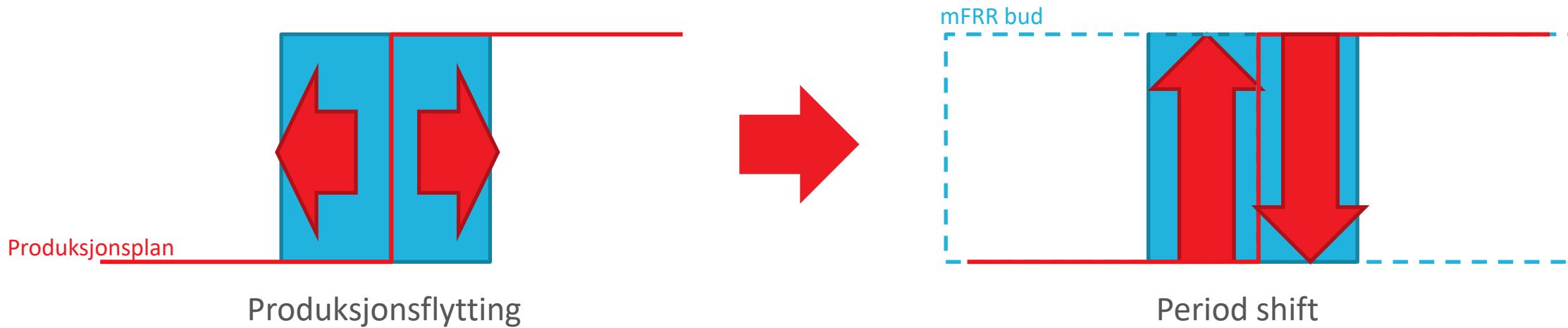
Periodeskift

- Periodeskift vil erstatte produksjonsflytting for håndtering av strukturelle ubalanser
- Kobles tydelig til mFRR-budene for å unngå "kollisjoner"
- Aktørene melder selv inn når de kan brukes til periodeskift, ved hjelp av noen budegenskaper



Periodeskift

- Eksempel:
 - mFRR bud OPP med Period shift end før kvarterskiftet og mFRR bud NED med Period shift start etter kvarterskiftet
 - Dette vil gi TSOen nøyaktig samme mulighet til å regulere som produksjonsflyttingen i dag



Skal produksjonsflytting finnes fremdeles?

- Periodeskift er i utgangspunktet tenkt som et frivillig produkt som aktørene velger å delta i eller ikke
- Produksjonsflytting var ikke frivillig men et systemkritisk vedtak i tråd med FoS §8b
- Muligheten til å pålegge justering av produksjonsplan består (FoS §8b)
 - I implementasjonsguiden er det foreslått at det skal gjøres ved å beholde dagens produksjonsflytting, og benytte denne dersom de frivillige mekanismene ikke virker
 - Tilbakemeldinger fra aktører på at det er vanskelig for dem å beholde både gammel produksjonsflyttingsløsning og den nye periodeskift-løsningen
 - **Vi ser derfor på muligheten for å bruke samme, nye tekniske løsning (periodeskift) for både frivillig deltagelse i periodeskift og når det er pålagt justering av produksjonsplan.**
 - Hvordan dette skal innrettes har vi ikke konkludert på ennå.
 - Vil bli mulig å sende inn bud som kun kan brukes til periodeskift
- Viktig at periodeskift støttes av alle som deltar i mFRR-markedet!

Presentert for aktørene i ISB-møte 28. oktober 2021

Marked for driftsforstyrrelsesreserver



Bakgrunn

- Vi trenger tilgang til alle reserver som tilbys i markedet i dag, også fra industrien, etter overgang til automatisert balansering.
- Nytt automatisert mFRR-energiaktiveringsmarked har strenge krav om rampingtid, responstid, avstilling osv. Mange av industriaktørene klarer ikke å levere på nye krav.
- Det er en kobling mellom tilslag i RKOM (og framtidig mFRR kapasitetsmarked) og aktiveringsmarked for mFRR. Med innføring av standardprodukt for mFRR (nye krav) og automatisert budvalg må vi være mer presise på hvilke krav som gjelder hvor.
- Behov for en løsning for å sikre reserver som ikke tilfredsstiller krav til standardproduktet i mFRR og/eller passer bedre som en driftsforstyrrelsesreserve (holdes utenom AOF).
- Vi foreslår å etablere et nytt reserveprodukt – driftsforstyrrelsesreserve
 - Sende ut konsept på høring for å få innspill før vi skriver selve vilkårteksten

Konsept for driftsforstyrrelsесreserve

- Reserven aktiveres fortrinnsvis ved driftsforstyrrelser, herunder når det nødvendige reguleringsvolumet er større enn dimensjonert FRR for normale ubalanser
 - Stort behov for denne typen reserver i tiden fremover
 - Disse budene blir ikke med i AOF-optimeringen, og aktiveres og deaktiveres manuelt
 - Ikke lov til å utveksle over landegrenser (på sikt)
- Om og gjøre å kunne gjenbruke mest mulig av dagens IT-infrastruktur for aktørenes og vår egen del
- Aktører får krav om eBestill og 15 min aktiveringstid
- Som i RKOM vil aktører med tilslag forplikte seg til å levere aktiveringsbud
 - Forutsetning at budgivere er tilgjengelig for aktivering

Markedsdesign

1. Innkjøp på ukesbasis eller oftere – åpen for innspill
 - Bare ett innkjøp – ikke flere tidshorisonter
 - Trade-off mellom effektivitet og lengde på markedet
2. Beholde dagens segmenter - dag/natt, helg/hverdag
 - Jo lengre tidsperiode jo flere segmenter
3. Mulighet for opp/ned reserver
 - Behov opp og ned for hvert sitt segment
 - Ukesanalyser på hva vi trenger
4. Behov per budområde/land – mulighet for utveksling innad i landet
 - Indikasjon per budområde og offisiell etterspørsel på landnivå
 - Dimensjonering varierer per budområde og tid. Etterspørsel fordeles rundt statistisk etter hvor det kan leveres fra
5. Marginalpris for landet som helhet
 - Prissetting per time
 - Mulighet for overhopp

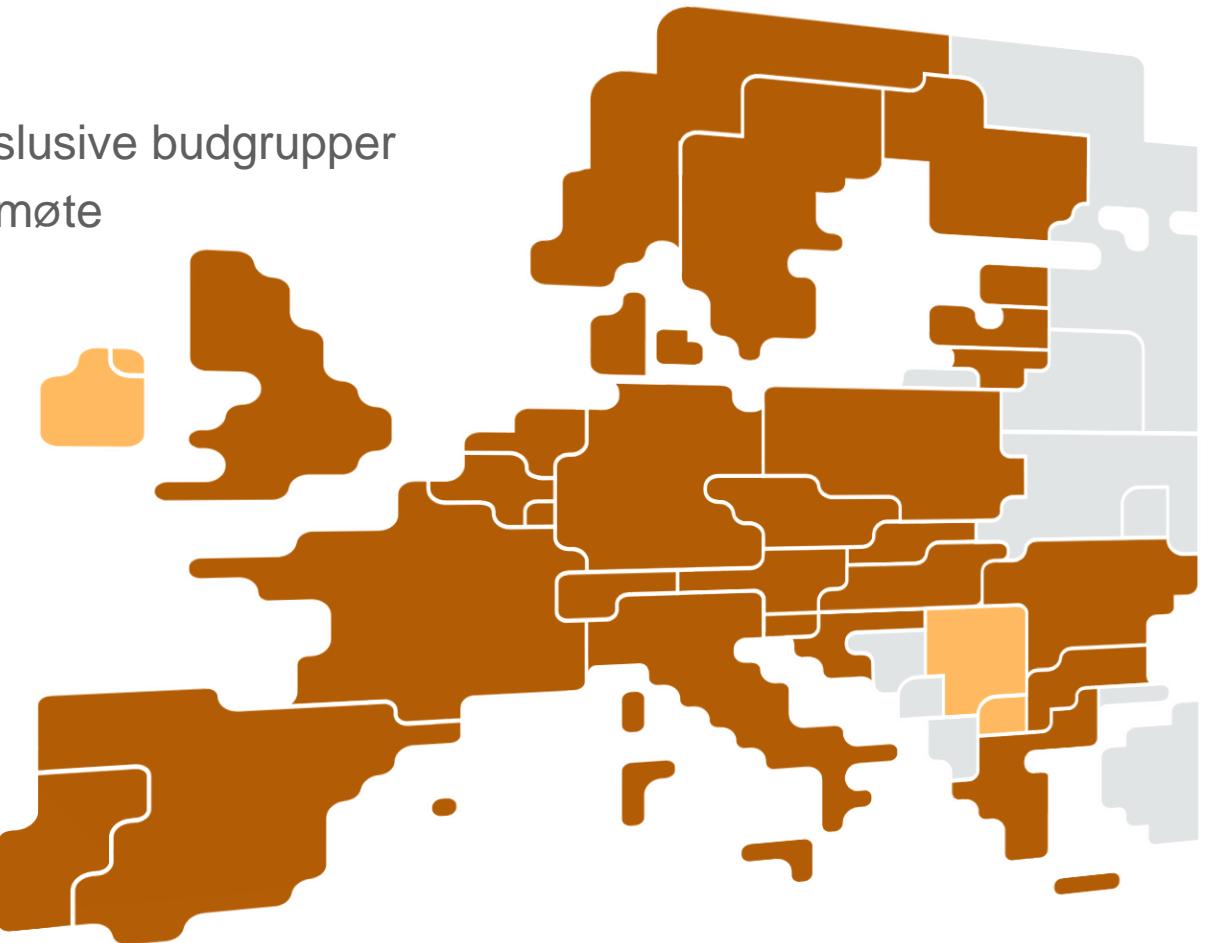
Videre prosess

- Høringen finner dere [her](#) og [her](#)
- Det er mange dokumenter for samme marked nå og vi forstår at dette er forvirrende
- [Høringsmøte](#) i morgen fredag kl.9 skal kunne gi en oversikt
- Tre måneders høring på Fos-relaterte endringer i vilkår og retningslinjer
- En måneds høring for vilkår i EB GL-format



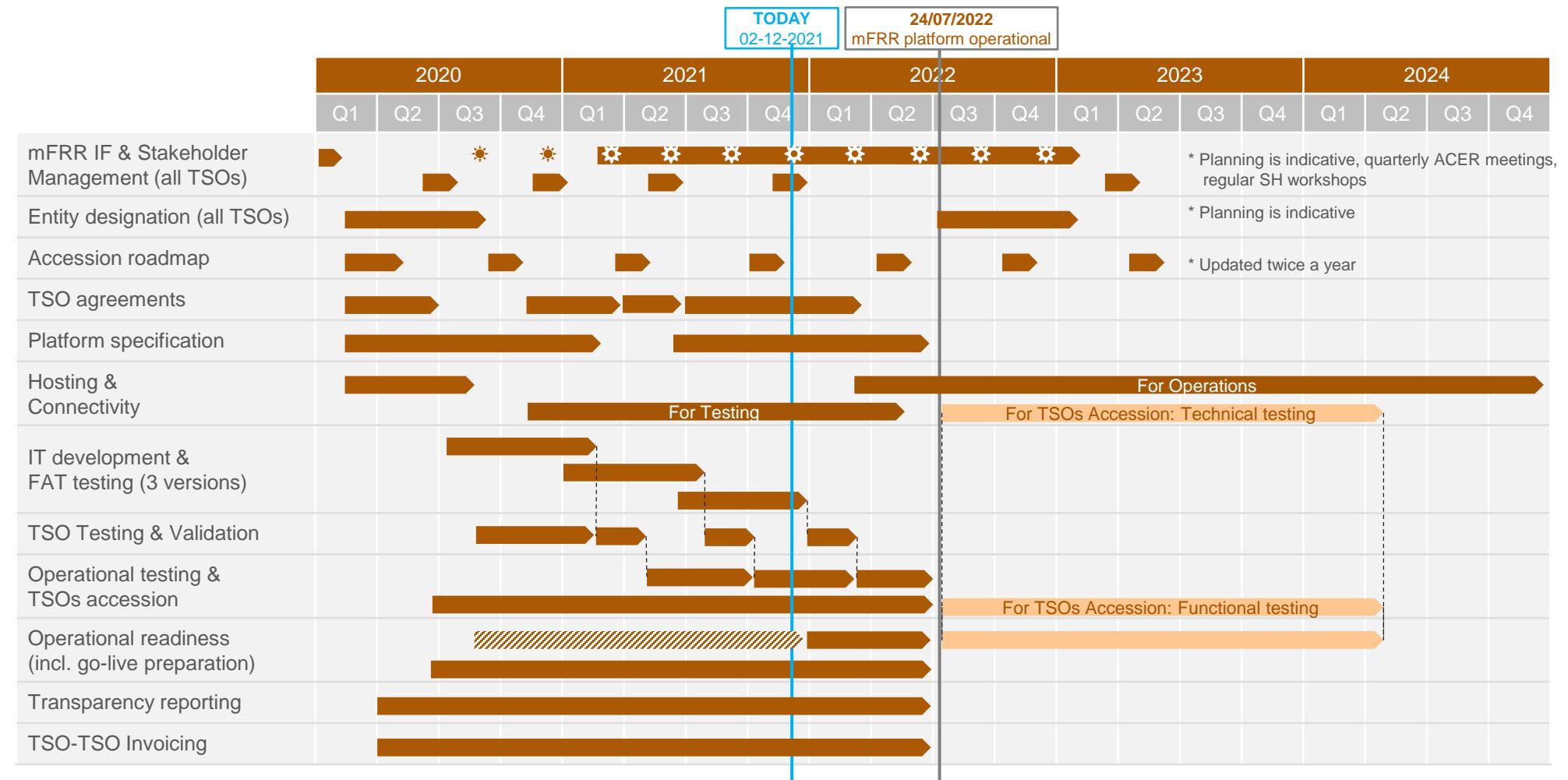
MARI

Status og begrensning av eksclusive budgrupper
Norsk NBM referansegruppemøte





Project planning

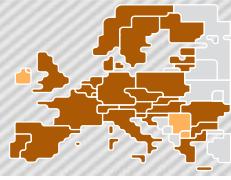


MARI Accession Roadmap

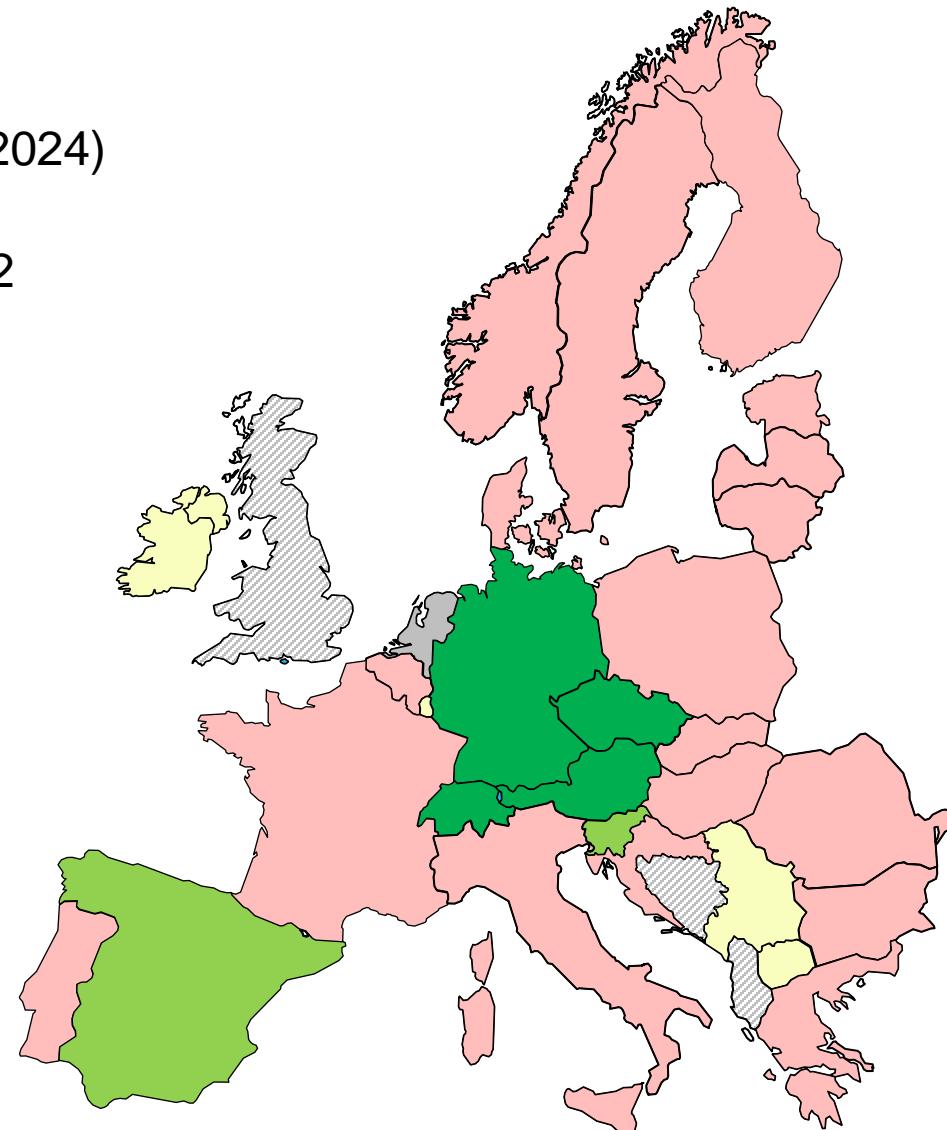
Full overview



mFRR-Platform Accession Roadmap												Last updated on October 2021 based on latest information available.													
	mFRRIF	5.4.(b)(ii)	AOF	2021						2022						2023				2024					
				7	8	9	10	11	12	1	2	3	4	5	6	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
mFRR-Platform	5.4.(b)(iii)	TSOs Interoperability tests																							
	5.4.(b)(iv)	Operational tests (parallel run)																							
	5.4.(b)(v)	TSOs Connection / Go-live																							
	5.4.(b)(vi)	mFRR-Platform Go-live																							
Country Go-Live TSO																									
2021 2022 2023 2024																									
Germany		50Hz/Ampriion/ TenneT GmbH/ TransnetBW																							
Greece	Q2 2024	ADMIE ⁵																							
Austria		APG																							
Latvia	Q4 2023 - Q3 2024	AST ¹																							
Czech republic		CEPS																							
Estonia	Q4 2023 - Q3 2024	ELERING ¹																							
Slovenia	Q4 2022 - Q1 2023	ELES																							
Belgium	Q1 2023 - Q2 2023	Elia ⁷																							
Denmark	Q4 2023 - Q2 2024	Energinet ²																							
Bulgaria	Q4 2024	ESO																							
Finland	Q4 2023 - Q2 2024	Fingrid ³																							
Croatia	Q3 2023 - Q3 2024	HOPS ¹⁰																							
Lithuania	Q4 2023 - Q3 2024	LITGRID ¹																							
Hungary	Q3 2024	MAVIR ³																							
Poland	H1 2024	PSE																							
Spain	Q4 2022	REE																							
Portugal	Q4 2023	REN																							
France	Q3 2024	RTE																							
Slovakia	Q3 2024	SEPS ⁴																							
Sweden	Q4 2023 - Q2 2024	SVK ²																							
Netherlands		TenneT BV ¹¹																							
Italy	Q2 2024 - Q3 2024	Terna																							
Romania	Q1 2023	Transelectrica ⁸																							
EEA																									
Norway	Q4 2023 - Q2 2024	Statnett ²																							
Non-EU Member State																									
United Kingdom		NGESO ⁶																							
Switzerland		Swissgrid ⁹																							
	5.4.(b)(i)	National terms and conditions development																							
	5.4.(b)(ii)	National terms and conditions entry into force																							
	5.4.(b)(iii)	Interoperability tests between TSO and mFRR-Platform																							
	5.4.(b)(v)	TSO connection to mFRR-platform / Go-live																							
	5.4.(b)(vii)	EBGL Article 62 Derogation considered / requested / granted																							



- █ Q2 2022
- █ Derogation (in 2022)
- █ Derogation (2023 – 2024)
- █ Observers
- █ Known end Jan 2022





Introduction

- Each optimization software has certain limits
- There is no risk that no solution will be found by AOF, but when certain limits are reached, the solution may not be optimal
- Early performance study indicated that potentially a technical limit of AOF is reached due to exclusive bids

Exclusive bids

- Exclusive bids are mutually exclusive according to the principle “exactly one or none”.
- They may have different prices, directions and volumes.
- They must have the same activation type and availability status.
- Exclusive bids always refer to the same MTU period.

Way forward

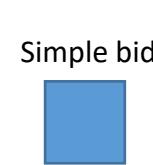
- Design of limitations rules including Action plan (see next slide)
- Target limitation solution
- Design of monitoring solution
- Detailed performance study to assess maximum algorithm can process (during V3 phase)
- Technical study to assess how the algorithm can be optimized to improve the performance



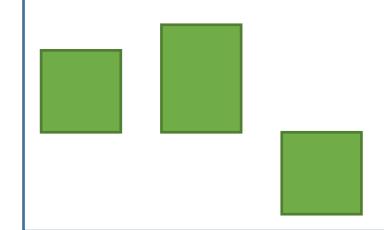
Exclusive Bids - Possible guidance and limitation due to exclusive bids

Note: It does not matter the number of exclusive groups but the number of bids included in the exclusive groups, i.e "Exclusive bid" (see example below)

Example 1

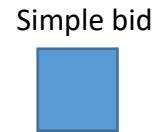


Exclusive group

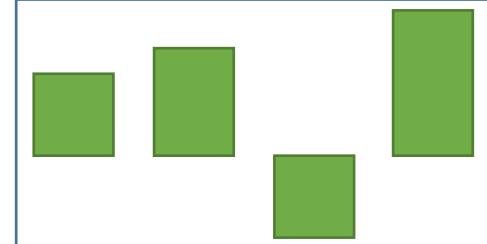


Number of exclusive bids = 3

Example 2

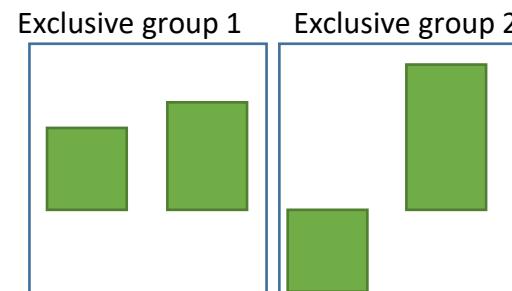
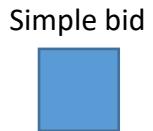


Exclusive group



Number of exclusive bids = 4

Example 3



Number of exclusive bids = 4



Exclusive groups – status and steps

- Design the overall process for evaluation of applying exclusive groups bid limitations
- Comprehensive document (Exclusive bids limits)
- Design of monitoring solution
- Detailed performance study to assess maximum algorithm can process (during V3 phase) → Technical study assesses how the algorithm can be optimized to improve the performance
 - Volumetric for performance study tests: **15s for DA (30k bids) and 60s for SA (80k bids)**
 - Limitations: tests generated do not have all of the MARI complex aspects represented
 - Conclusions:
 - Exclusive bids have negative impacts on performances
 - Exclusive bid increase combinatorial aspects of the problem to optimize with additional binary variables
 - The more exclusive bids we have, **the higher will be the chance that solution returned is of low quality**
 - There shall be **no more than 50 % of exclusive bids** (10 % threshold seems to be a safe limitation, 30 % threshold comes with moderate risks)



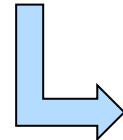
Process for evaluation of applying limitations:

1. Improvement of AOF

(continuously improve the performance of the AOF regarding acceptable volumetric of exclusive bids)

2. Monitoring & Guidance

(starting from MARI platform go-live, avoid having non optimal results from the AOF)



3. Applying of hard limitations

(when total limit exclusive bids is reached or if optimality gap is >10%)

1. Improvement of AOF

- Technical study to assess how the algorithm can be optimized to improve the performance indicated following possible improvements of AOF:
 - Optimization parameters of AOF - optimized based on the performance and production test cases.
 - New developments of AOF:
 - Improve data process
 - Improve numerical stability

If improvements are insufficient or no further AOF improvement is possible in due time, then limits on the number of exclusive bids shall be applied on platform level & TSO level.



2. Monitoring & Guidance



- Monitoring: starting from go-live based on KPIs (usage and optimality indicators) on platform level
- Principle: the amount of restriction is known beforehand so that the BSPs may adapt their bidding strategy to prevent the occurrence of non optimal solution and so the application of a hard limitation
- Goal: Avoid having too often a non optimal solution from the AOF due to an excessive number of exclusive bids
- Solution: to apply **soft cap** on exclusive bids (i.e. each TSO has an assigned limit on the number of exclusive bids, sharing key under discussion), which will be communicated to the local BSPs as guidance

3. Applying of hard limitations



- In case that the guidance (i.e. soft cap) is not successful (i.e. BSPs will submit a larger number of exclusive bids than the technical limit on the platform), which will result in reaching the overall limit of exclusive bids, a **hard cap** will be applied, (i.e. recommended limits will be strictly applied and validated in local systems and also on platform level, therefore exclusive bids would be rejected if for one MTU the cap is reached)
- How to set limits per TSO:
 - Exclusive bids sharing key
- How to split each TSO limit within local BSPs
 - It is up to each TSO how to split limits within local BSPs
- When to start with applying limits:
 - How often to monitor
 - Decision body for applying mitigations
 - Timeline for applying mitigations
 - Each TSO to provide guidance on possible limitation to local BSPs



Summary

- At the Go-Live, no Hard restriction regarding exclusive bids will be imposed to any BSPs (only guidance)
- For the purposes of triggering the application of limits (hard cap), three of the following conditions must be fulfilled.
 1. No further AOF improvement is possible in due time.
 2. Gap from optimal solution due to the high number of exclusive bids is above 10 %
 3. Occurrence of above-mentioned gap is more than 4 times per day during period of 7 consecutive days.



15 min MTU i Energimarkedene

Tore Granli KDM

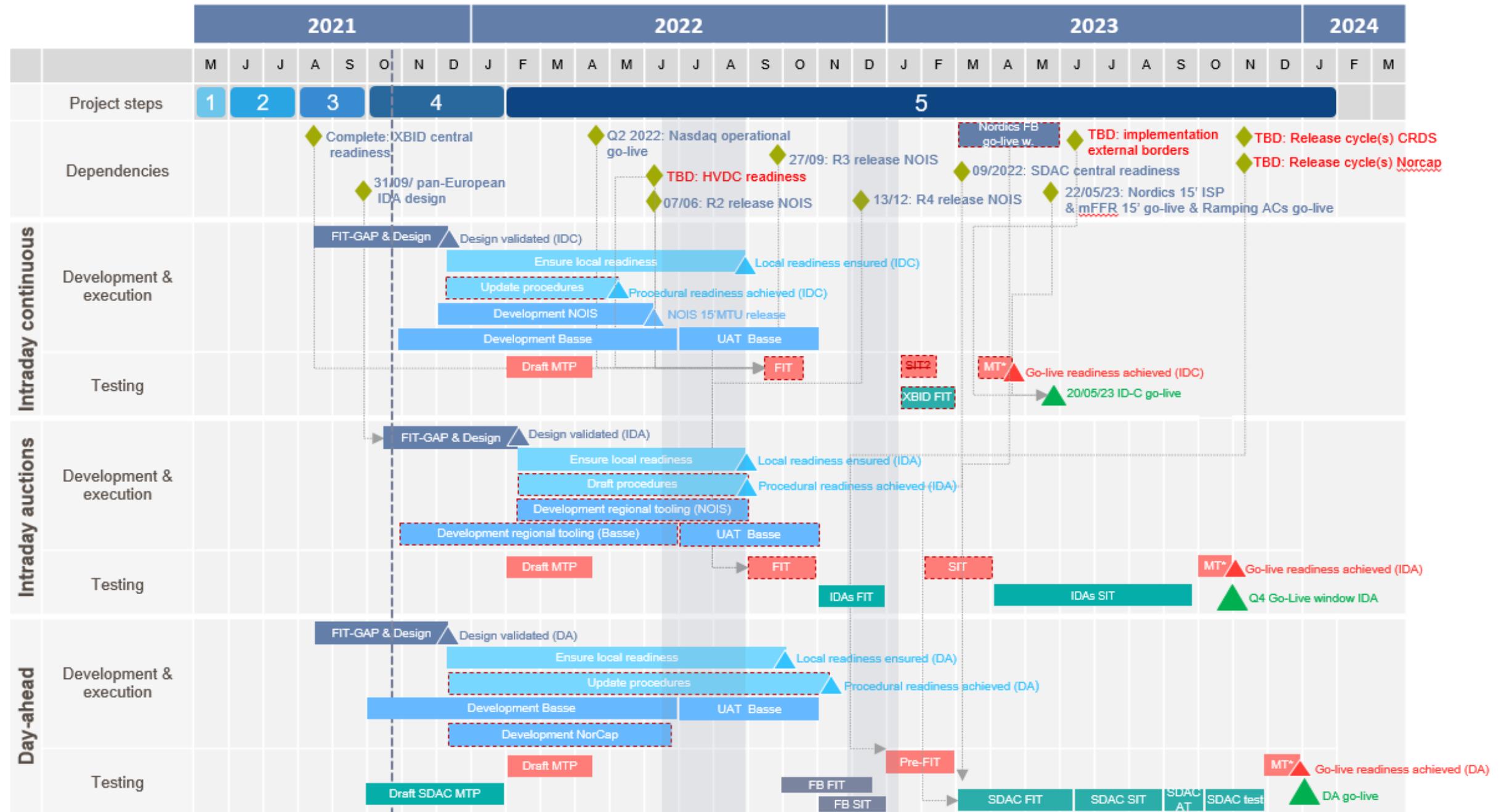
17. November 2021

Statnett

15 min Market Time Unit (MTU)

- I dag er all handel i spot- og intradagmarkedet med en oppløsning på en time
- EUs reguleringer slår fast at det skal være mulig å handle 15 minutters produkter i:
 - Intradag kontinuerlig
 - Intradag auksjoner
 - Day ahead markedet
- Men det er gitt en del utsettelser på når det må implementeres

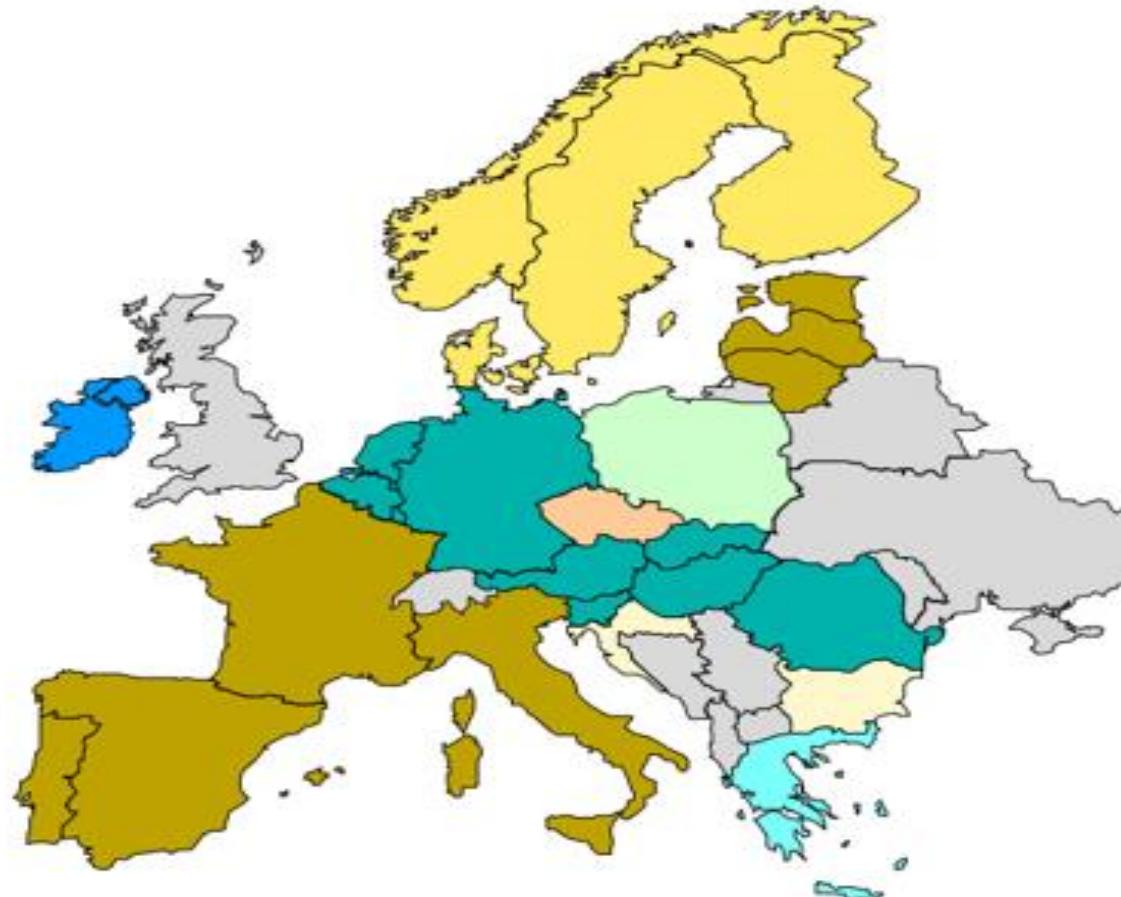
Planning for implementation of 15' MTU in the Nordics, see a more detailed version on Project Place, [PP LINK]



Derogation map for 15' ISP implementation (below: status from end of March 2021)

Since: derogation now granted in Ireland

Tentative dates to be considered for implementation in ES and PT



Not part of SDAC coupling

Status 29/03/2021*

Already implemented

31/03/2021 (still under evaluation; preliminary NRA conclusion: no need for a derogation)

Q2 2023 (part of Polish Balancing Market Reform)

01/01/2023

Bulgaria: derogation till 31/12/2022 - technical readiness for 15' ISP in place

23/05/2023

Nordics will implement 15 min ISP 23 May

30/06/2024

01/01/2025

Baltics: derogation granted until 31/12/2024;
Spain: derogation granted for 31/12/2024.
Portugal: derogation granted for 31/12/2024.
Note: derogations for Spain and Portugal encourages for a best effort to set the ISP in 15 min for 01/10/2023

Exemption (30 min ISP in long term granted for GB; under discussion for Ireland/Northern Ireland)

Not part of SDAC

*Mentioned dates are trading dates (and not delivery dates)

Intradag kontinuerlig handel

- XBID fra 2018 og har siden hatt to utvidelser (waves)
- Budene matches fortløpende gjennom driftsdøgnet
- Algoritmen opereres av Deutsche Börse
- 15 min MTU for kontinuerlig handel er implementert på flere grenser på Kontinentet

SIDC Geographical Scope and Future Go-Live Waves

SIDC will expand in several phases, also referred to as "waves". The map below shows the geographic spread of the first, second and third waves which have been implemented. Further waves are planned and the scope may expand beyond that shown.

Countries coupled Intraday with 4th SIDC Go-Live

Orange
Countries coupled in
1st, 2nd and 3rd
go-live

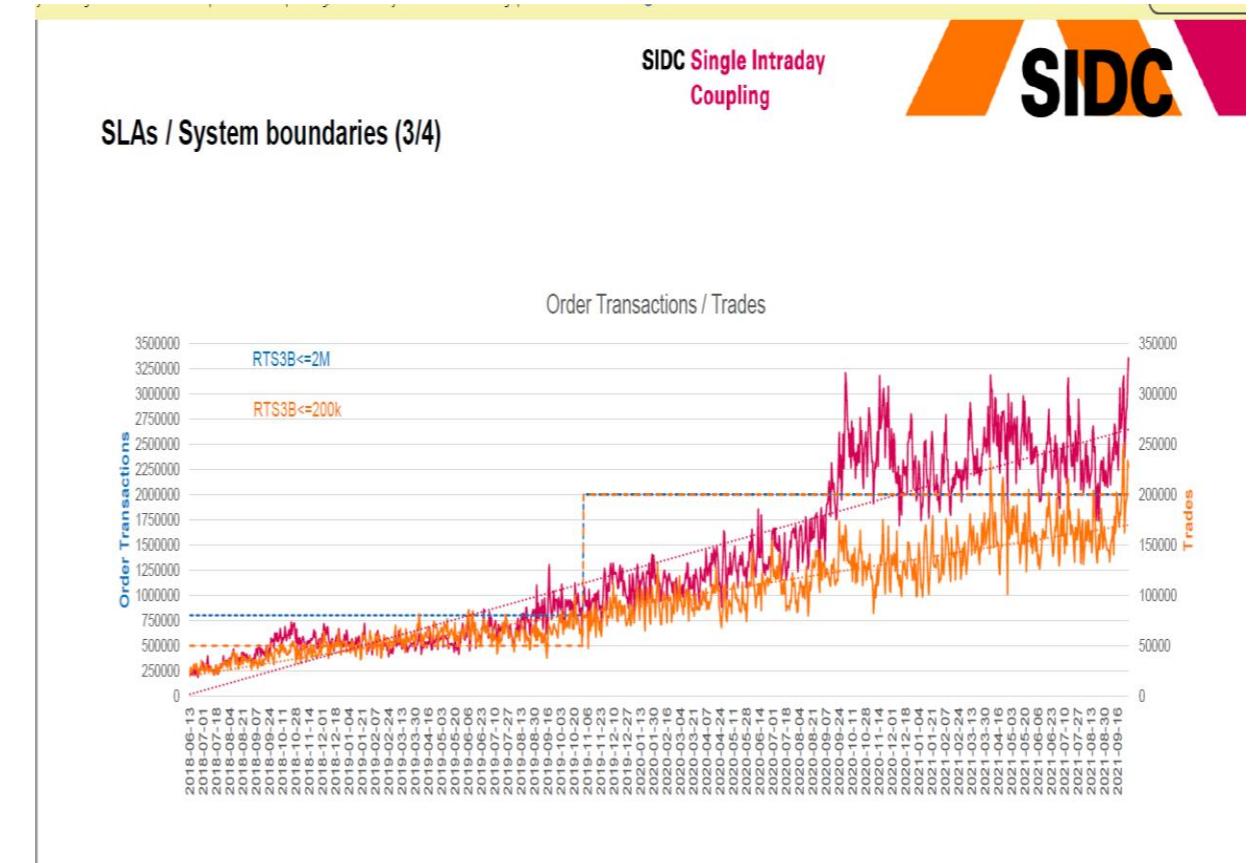
Green
Countries to be coupled
in 4th go-live
(end 2022)

Note: Luxembourg is part of the Amprion Delivery Area. Market participants in Luxembourg [have access to SIDC through the Amprion Delivery Area](#).



Intradag kontinuerlig handel (2)

- Implementering av 15 min MTU i Norden vil bli fra samme tidspunkt ISP 15 settes i drift
- Det vil bli 96 lukketider per driftsdøgn med lukketid på en time
- Kapasitetene vil fortsatt beregnes per time, men splittes opp i fire like stor enheter



Intradag auksjoner

- ACERs vedtak vedrørende algoritmemetode slår fast at intradag auksjoner skal innføres fra 1. januar 2023 og flytbasert fra 1. august 2023. Disse fristene vil ikke kunne holdes.
- Gjeldende plan indikerer idriftsettelse mot slutten av 2023.
- Det blir tre intradag auksjoner per døgn med følgende lukketid
 - D-1 kl 15, D-1 kl 22 og D kl 10
- Auksjonen vil foregå fra 20min før lukketid til 20 min etter lukketid. I denne perioden vil det ikke være mulig å foreta kontinuerlig handel.
- Auksjonen kjøres ved hjelp av Euphemia (day ahead algoritmen)

Utfordringer knyttet til intradag auksjoner

- Det er to ulike algoritmer som kjører algoritmene i intradag
 - Euphemia for IDA
 - Deutsche Börse for IDC
- Hele IDA prosessen skal kun ta 40 minutter
 - Oppdatering av kapasiteter
 - Legge inn ordrer
 - Kjøre auksjon
 - Validere resultat
 - Oppdatere kapasiteter
 - Åpne kontinuerlig marked
- Det vil ikke være noen reserveløsning for IDA. Ved feil vil auksjonen bli kansellert
- IDA vil ha samme kapasitetsallokering som IDC

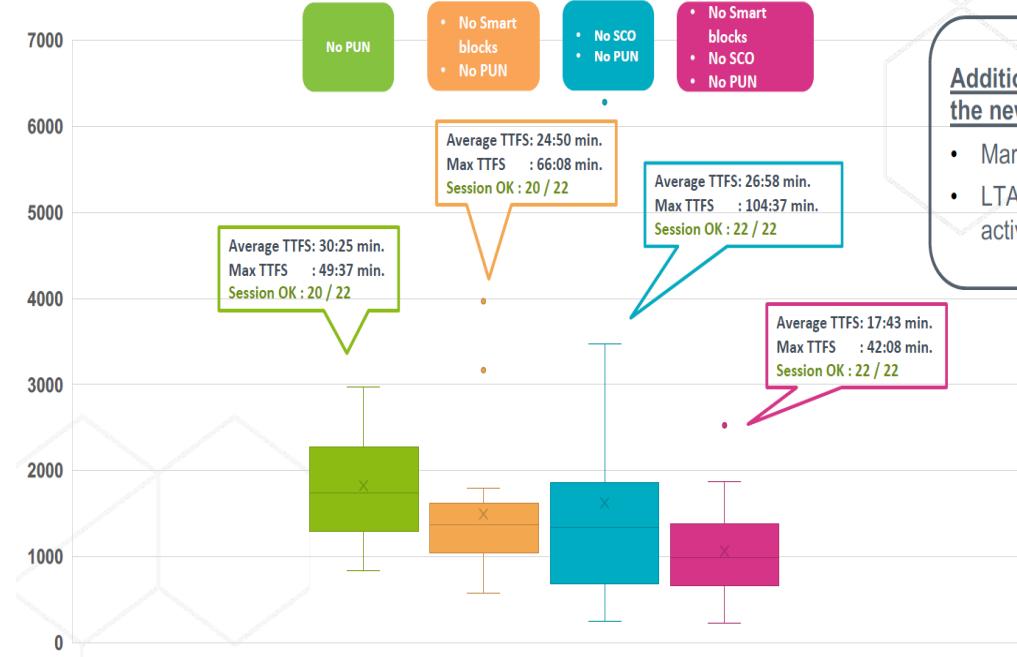
Tiden er knapp, men
fullt håndterbar

Spotmarkedet

- Algoritmen "Euphemia" har i dag 17 minutter på å regne ut priser og kraftflyt i hele Europa. Det går fint.
- Det er kraftbørsene som eier og drifter algoritmen.
- Men det kommer stadig nye funksjonaliteter
 - Flytbasert i Norden og på Kontinentet i 2002/23 og 15 min MTU i 2024
- Da blir regnestykket vesentlig mer krevende
- Det er særlig 15 min MTU som trekker opp beregningstiden

New 15'MTU batches are more challenging

Time until "PRMIC reinsertion" included → before volume problems as "post processing" of the solution
Batches Y20EP4 "stepwise" (SW) without PUN orders, shared by PCR in July 2021



N-SIDE
OPTIMIZING YOUR DECISIONS

Additional challenges with the new batches:

- Market growth factors
- LTA inclusion ("option 1") activated in CORE FB

Tiltak for å øke ytelsen

- Inneføre ikke lineær prising (non uniform pricing)
 - Vil kunne innebære at paradoksale forkastede (PRB) bud blir akseptert, men vil i neste omgang kreve at man håndterer omfordelinger
- Endre produkter som tilbys
 - PUN (prosess på dette i Italia)
 - Komplekse blokkbud
 - Andre produkter
- NEMOene og TSOene er pliktet til å vudere avbøtende tiltak som kan tas i bruk for en periode

Implementering i Statnett

- I Statnett etableres det et eget prosjekt for å sikre at nødvendige endringer blir gjort i egne systemer og mot eksterne systemer
- Det tas sikte på å implementere det i Norden og eksterne forbindelser samtidig
- Prosjektet koordinerer med NBM programmet og særlig implementering av 15 min balanseavregning (15 min ISP)
- **Viktigste mål:** 15 min handel i intradag kontinuerlig settes i drift samme dag som 15 min balanseavregning starter