TSO reflections on flowbased in operation

Nordic CCM Stakeholder Meeting

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DA market outcome comparison: NTC vs. FB data after go-live

- Price changes per bidding zone after flowbased
- Unusually high reservoir level in the northern regions after FB go-live

Average prices per bidding zone

Bidding zone	01.nov 23 - 14.aug 24	1. nov 24 - 14.aug 25	Difference*
DK1	66.59	83.68	17.09
DK2	66.52	83.78	17.26
SE1	38.58	12.94	-25.63
SE2	38.59	12.47	-26.12
SE3	45.10	43.95	-1.15
SE4	56.75	58.53	1.78
NO1	54.69	54.27	-0.42
NO2	58.14	62.57	4.43
NO3	42.31	15.45	-26.86
NO4	37.03	5.58	-31.45
NO5	55.51	40.69	-14.82
FI	53.74	37.60	-16.14

*Positive value means higher prices after FB go-live

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UPDATED on 15/09/2025

Changes in flow

Flow-based enabled more DA flow through the Nordic system during the investigated periods.

North Cut:
Average flow is increased by 4%
Maximum flow decreased by 6% 4320 → 4074 MWh

Central Cut:
Average flow is increased by 29%
Maximum flow increased by 9% 8023 → 8711 MWh

South Cut:
Average flow is increased by 14%
Maximum flow increased by 9% 5336 → 5790 MWh

South Norway:
Average flow is increased by 155%
Maximum flow increased by 23% 2564 → 3156 MWh

Note: data comparison in slide 3 – 6: First eight months post go-live (Nov 2024 – June 2025) vs. same periods (Nov-June) of the two years prior to go-live (2022-2023 and 2023-2024) in NTC. (Net positions applied to the FB domain)

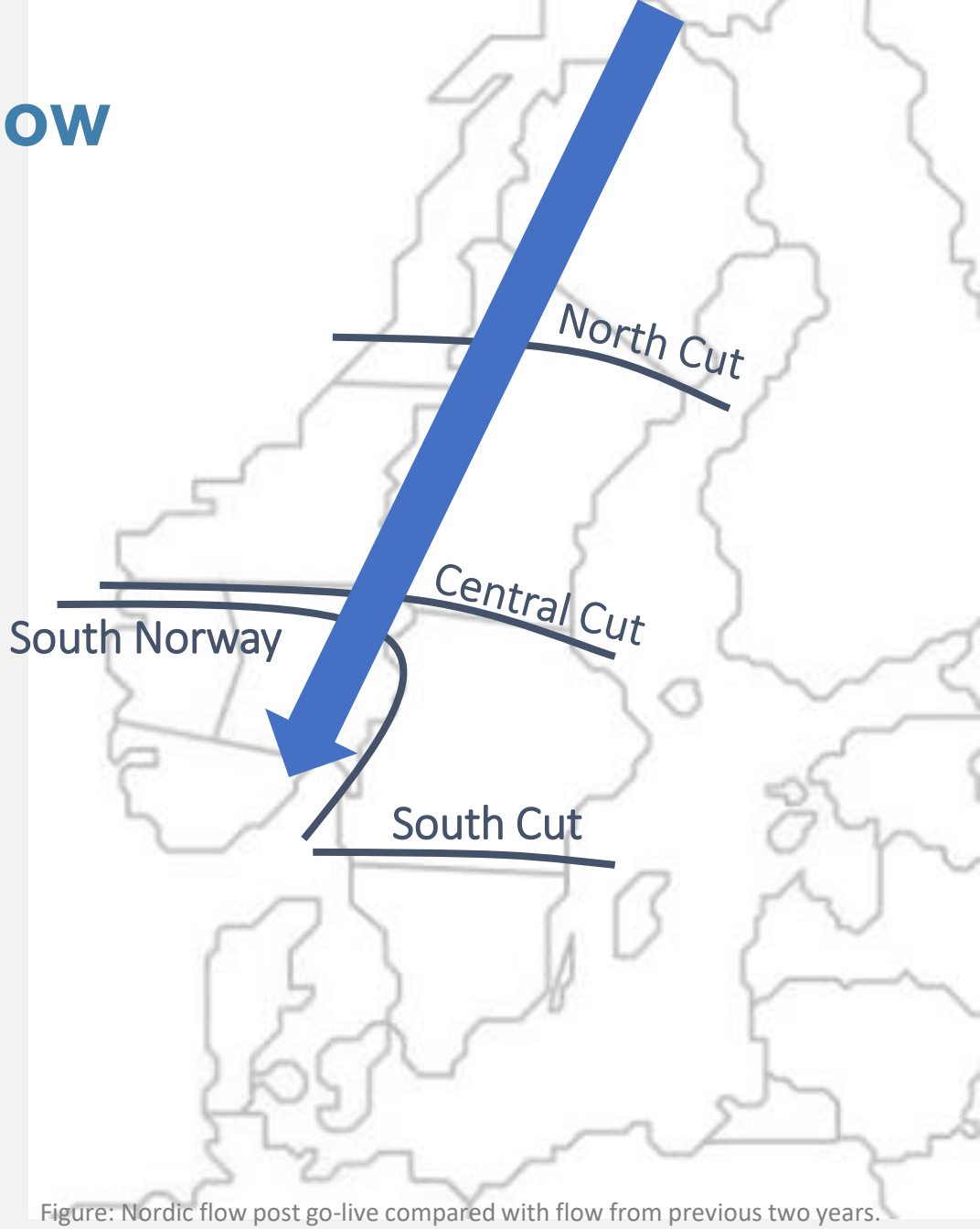

Figure: Nordic flow post go-live compared with flow from previous two years.

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Non-intuitive flows

Non-intuitive flows occur from the market coupling and are flows that go from higher-priced to lower-price bidding zones.

- Allows more flow on another border, thereby leading to increased socioeconomic welfare
- Integrated part of the flow-based capacity calculation method and maximizing market benefits

Post flow-based go-live, the non-intuitive flows in the Nordics match the expected results, similar to those seen in EPR

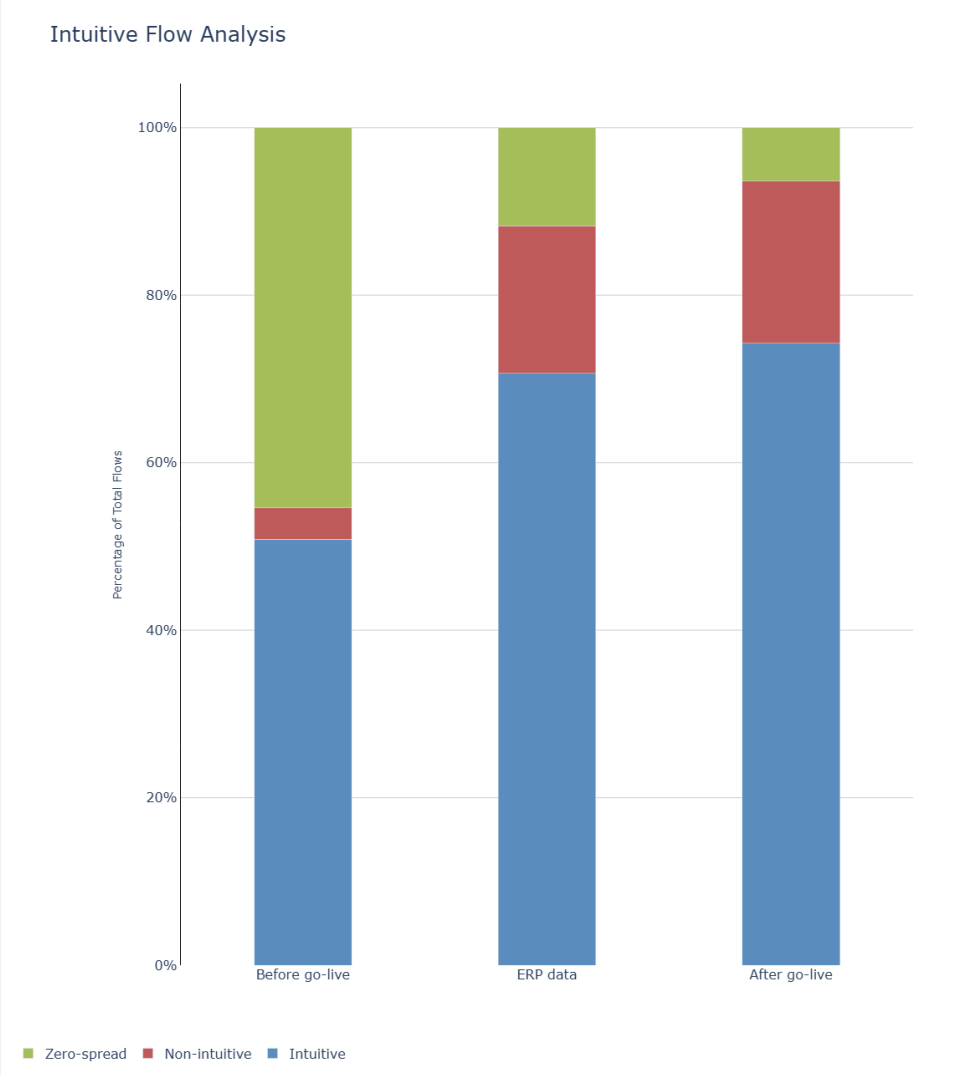

Figure: Average type of flow in the nordics before and after go-live

Note: data comparison in slide 3 – 6: First eight months post go-live (Nov 2024 – June 2025) vs. same periods (Nov-June) of the two years prior to go-live (2022-2023 and 2023-2024).

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Line Set vs. Flow-based

Before Flow-based a so-called Line Set between SE3 and NO1+DK1 limited the flow to maintain grid security. After Flow-based went live, this Line Set was removed, and flow-based capacity calculation took over the responsibility of maintaining grid security.

Average flow is increased by 72% from SE3 to DK1+NO1

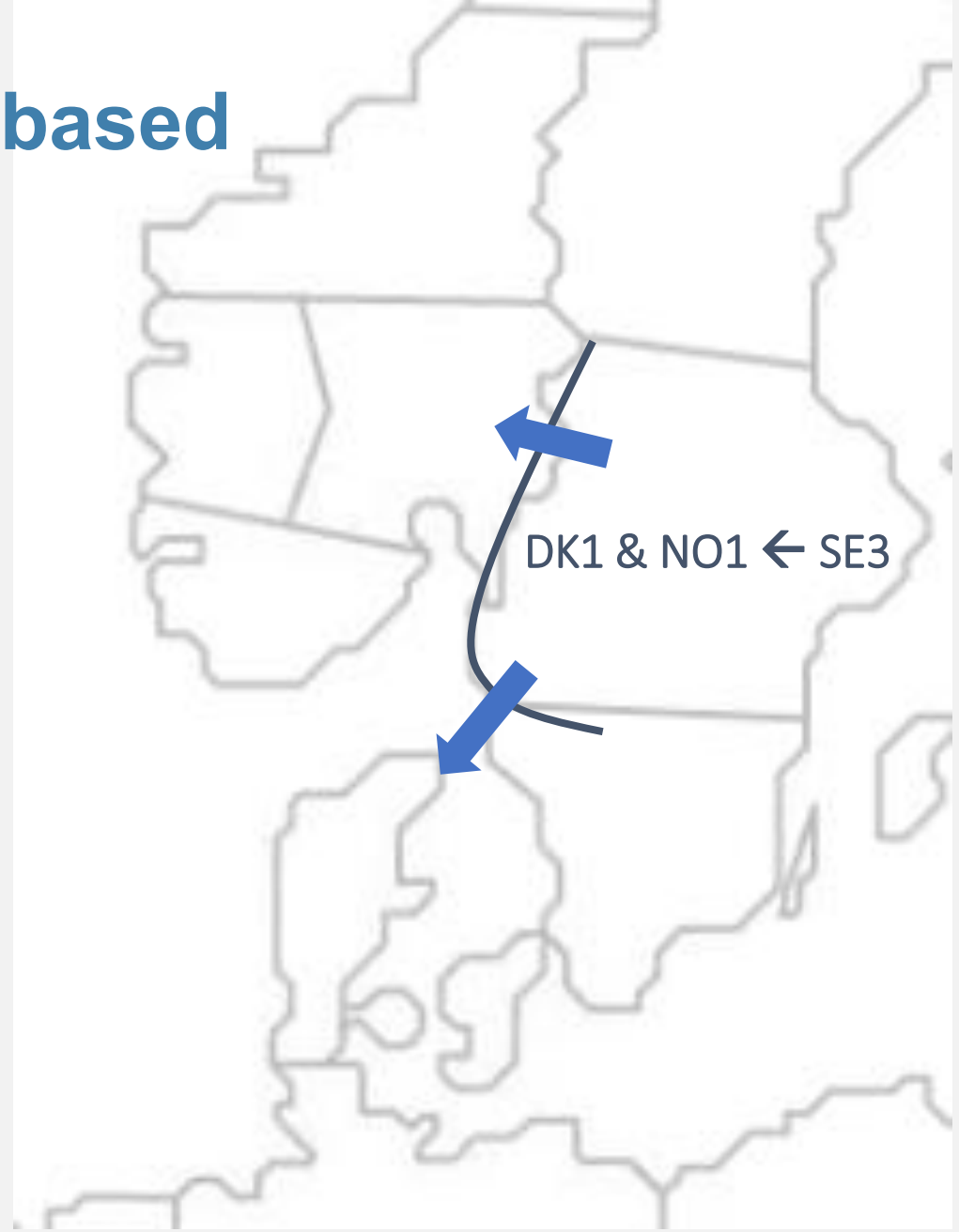

Figure: SE3 Line Set flow post go-live compared with flow from previous two winters.

Note: data comparison in slide 3 – 6: First eight months post go-live (Nov 2024 – June 2025) vs. same periods (Nov-June) of the two years prior to go-live (2022-2023 and 2023-2024) in NTC.

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Slack node change – May 28 (operational overview)

Background: Planned Outage on Hovegaard busbar de-energized at 06:30 (most meshed station in the Nordic grid, typical slack node, located in DK2)

Impact: Hovegaard unavailable as slack node after 06:00

Slack Node Selection: Dynamic; always the most meshed PV/Pθ node at highest voltage level

New Slack Node: Automatically shifted to a node in SE2 as standard procedure

Market Impact: No effect on market coupling results

Detailed elaboration in the CCM news update of 5 June 2025: https://nordic-rcc.net/wp-content/uploads/2025/06/News-update-5-June-2025.pdf

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Trial increase of ATCE relaxation for Intraday capacity calculation from May 1, 2025

- Background
  - Stakeholders requested more ID capacity
  - DA leftover remains as the starting point
- Trial action: ATCE z2zPTDF relaxation increased from 2% to 3%
- Trial period: 2 months, from May 1, 2025, i.e., Energy Delivery Day May 2, 2025
- Based on the feedback from the control centers: 3% relaxation is operationally acceptable and has become the new standard

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FRM changes at Statnett

- Background
  - Flow-based market coupling has increased Nordic grid utilization
  - Forecast errors & model uncertainties have caused frequent congestions
  - Higher FRMs (is needed) to reduce overload risk and cover more extreme cases
- FRM update from a standard 5% of Fmax from 21.12.2024 (published 24.11.2024) on
  - Selected CNECs: to 5-14% of Fmax (avg. ~7% of Fmax)
  - New CNECs: 10% of Fmax as default
- Market impact
  - No proper analysis done, but no clear observed impact from the FRM increase
- Going forward
  - FRMs will be fine-tuned over time based on operational experience
  - Ongoing improvements to tools, models, and data
  - Target: lower average FRM in future updates

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FRM changes at Svk

- Background: Similar to Statnett
- FRMs were updated for EDD 25th of February 2025 from a standard 5% of Fmax to:
  - Selected CNECs: to 3-12% of Fmax
  - New CNECs: 10% of Fmax as default
- Operational and market impact
  - Ensures adequate risk levels for operational security
  - Market impact was considered limited due to simultaneous discontinuation of daily IVA application that was performed by SVK between November 2024 until the new FRMs were introduced
- Going forward
  - FRM values updated regularly according to Nordic CCM
  - Ongoing operational monitoring, tool/model/data improvements

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GSK on NO4 change due to unplanned outages

- Background: operational security concerns due to outage of 420kV Kobbvatnet-Ofoten
  - Line in the middle of NO4, effectively splitting the bidding zone in two
  - Surplus of production south of the split, deficit of production north of the split
- Mitigation action: GSK strategy for NO4 is changed from strategy 6 to strategy 5.
  - Strategy 6: Generators and loads participate relative to their current expected power generation or load power (MW)
  - Strategy 5: Generators participate relative to their current power generation (MW)
  - The strategy was changed because Statnett's internal consumption forecast is quite good, and the grid split scales production wrongly
  - Also had to manually change some GSK values to get a better match between forecast and reality
- Remark: GSK strategy is back to normal from operating day May 15th (strategy 6)

NUCS reference: https://www.nucs.net/outage-domain/other-market-information/show?ummId=835fe53abc144b5fba4b9c07f6f76a89%7C10X1001A1001A38Y

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