The Nordic Capacity Calculation Methodology (CCM) project

TSO-view on the 70%-implementation

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Rules to avoid undue discrimination between internal and cross zonal exchanges

REGULATION (EC) No 714/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 13 July 2009

on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003

ANNEX I

1.7. When defining appropriate network areas in and between which congestion management is to apply, TSOs shall be guided by the principles of cost-effectiveness and minimisation of negative impacts on the internal market in electricity. Specifically, TSOs shall not limit interconnection capacity in order to solve congestion inside their own control area, save for the abovementioned reasons and reasons of operational security (1). If such a situation occurs, this shall be described and transparently presented by the TSOs to all the system users. Such a situation shall be tolerated only until a long-term solution is found. The methodology and projects for achieving the long-term solution shall be described and transparently presented by the TSOs to all the system users.

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Official Journal of the European Union

COMMISSION REGULATION (EU) 2015/1222

of 24 July 2015

establishing a guideline on capacity allocation and congestion management

(Text with EEA relevance)

Capacity calculation methodology

1. The proposal for a common capacity calculation methodology for a capacity calculation region determined in accordance with Article 20(2) shall include at least the following items for each capacity calculation time-frame:

(b) a detailed description of the capacity calculation approach which shall include the following:

(ii) rules for avoiding undue discrimination between internal and cross-zonal exchanges to ensure compliance with point 1.7 of Annex I to Regulation (EC) No 714/2009;

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L 158/54 EN Official Journal of the European Union 14.6.2019

REGULATION (EU) 2019/943 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 5 June 2019

on the internal market for electricity

(recast)

8. Transmission system operators shall not limit the volume of interconnection capacity to be made available to market participants as a means of solving congestion inside their own bidding zone or as a means of managing flows resulting from transactions internal to bidding zones. Without prejudice to the application of the derogations under paragraphs 3 and 9 of this Article and to the application of Article 15(2), this paragraph shall be considered to be complied with where the following minimum levels of available capacity for cross-zonal trade are reached:

(a) for borders using a coordinated net transmission capacity approach, the minimum capacity shall be 70 % of the transmission capacity respecting operational security limits after deduction of contingencies, as determined in accordance with the capacity allocation and congestion management guideline adopted on the basis of Article 18(5) of Regulation (EC) No 714/2009;

(b) for borders using a flow-based approach, the minimum capacity shall be a margin set in the capacity calculation process as available for flows induced by cross-zonal exchange. The margin shall be 70 % of the capacity respecting operational security limits of internal and cross-zonal critical network elements, taking into account contingencies, as determined in accordance with the capacity allocation and congestion management guideline adopted on the basis of Article 18(5) of Regulation (EC) No 714/2009.

The total amount of 30 % can be used for the reliability margins, loop flows and internal flows on each critical network element.

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Visualizing the 70%-margin of CEP

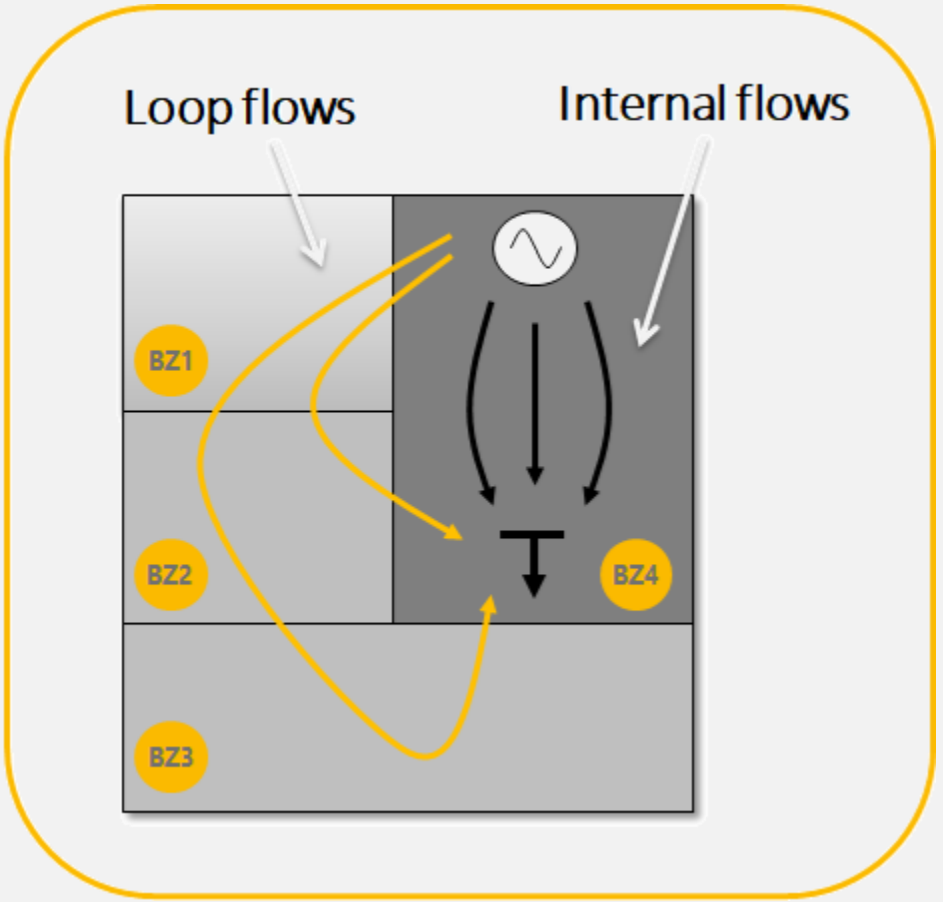
Total Capacity on a critical network element

Capacity available to cross border flows
C2

Loop flows, internal flows and reliability margin
C1

Min. 70%

Max. 30%



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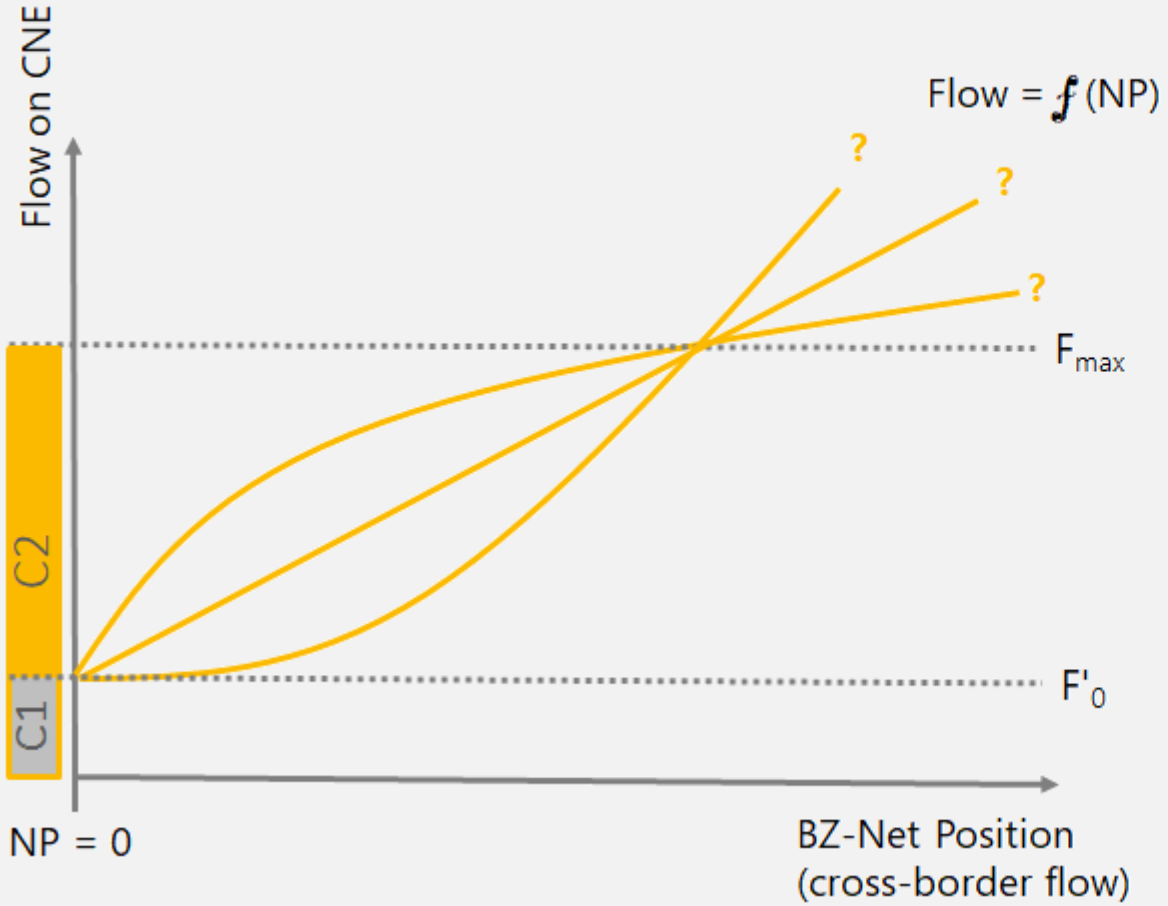
Net Position and physical flow



- The relation between NP and the flow on a particular CNE is defined by a complex function f(NP) embedded in the grid model (CGM)
- A non-zero Net Position (NP) for the Bidding Zone (BZ) will by definition result in a cross-border flow
- All flows above F'_0 is by definition a result of a cross border flow, and thus, C2 is by definition available for cross-border flows

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ACER
Agency for the Cooperation of Energy Regulators

PUBLIC

RECOMMENDATION No 01/2019
OF THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY REGULATORS
of 08 August 2019
on the implementation of the minimum margin available for cross-zonal trade pursuant to Article 16(8) of Regulation (EU) 2019/943

As the requirements of Article 16(8) of Regulation (EU) 2019/943 are general, additional clarity is needed for TSOs and regulatory authorities on how to implement them. Such clarity could be provided by amending the CACM Regulation, which is considered as an implementing act for Regulation (EC) No 714/2009 and for Regulation (EU) 2019/943. However, until such amendments are adopted, TSOs and regulatory authorities may need detailed guidance on how to implement in a harmonised and consistent way the requirements of Article 16(8) of Regulation (EU) 2019/943.

Introduces guidance to TSOs and Regulatory Authorities on how to understand and implement the CEP-requirement of a 70%-margin for cross-border trade in capacity calculation

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ACER's interpretation

- ACER introduces the notion of MACZT (margin available for cross-zonal trade)
- For a synchronous area, like the Nordics, using a FB capacity calculation, ACER defines this as:
  - $MACZT = RAM_{DA} + F_{AAC}$
    - RAM_{DA} is the Remaining Available Margin from the DA FB system
    - F_{AAC} is the margin for already-allocated and nominated capacities

Flaws

1. A linearized approach is proposed by ACER to assess the level of loop flows and internal flows in the system – this is a proxy at best
2. ACER focuses on RAM only, while it is both PTDF and RAM that determine the FB capacity domain and define the capacity for cross-border trade

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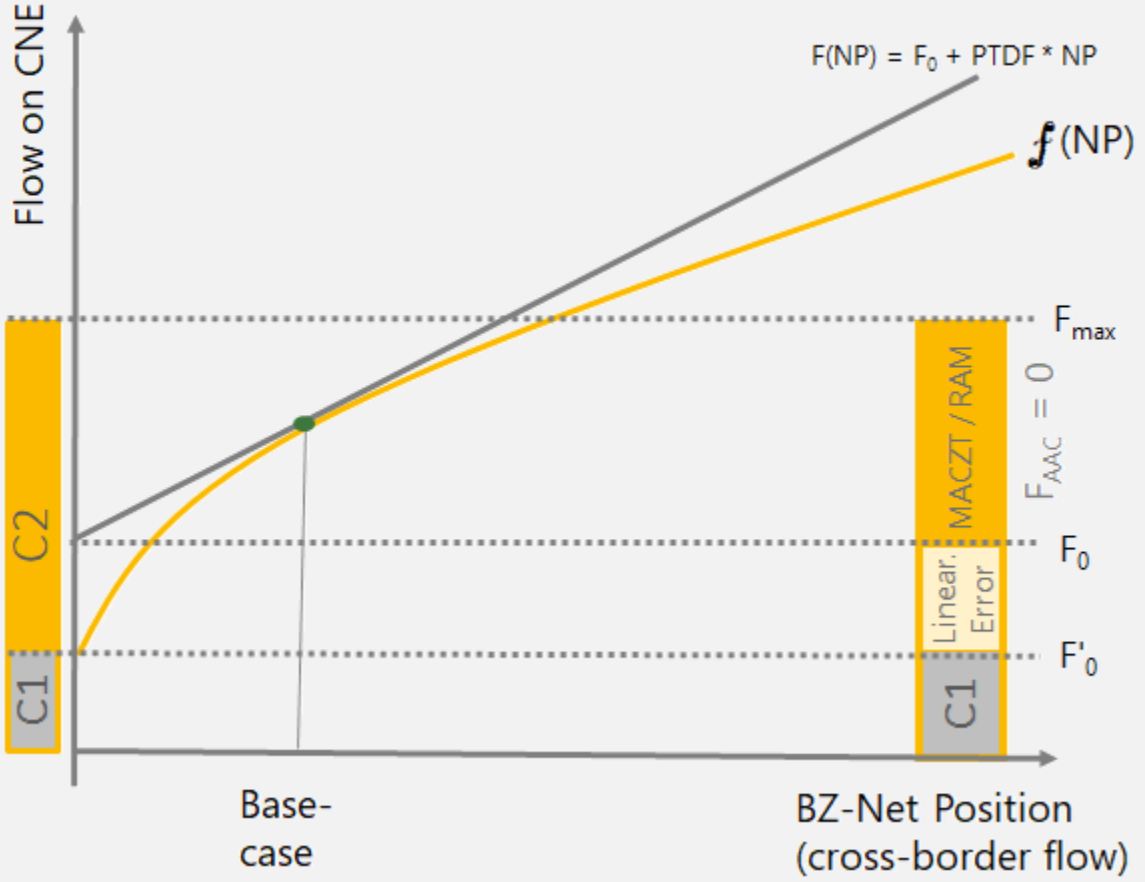
Flaw 1: linearized approach to assess loop flows and internal flows

- The European market optimization engine (Euphemia) requires a linear description of the relation between NP and flow:
  - $F(NP) = F_0 + PTDF * NP$
- A linearization point (base-case) is chosen in order to obtain a linear gradient (PTDF) as close as possible to the physical non-linear gradient in the area around the expected market point
- Applying the linearized function (FB approach) to assess the internal flows and loop flows is a crude proxy at best
- Thus in reality, the 30% of the capacity covers internal flows, loop flows, reliability margins and linearization error (LE)



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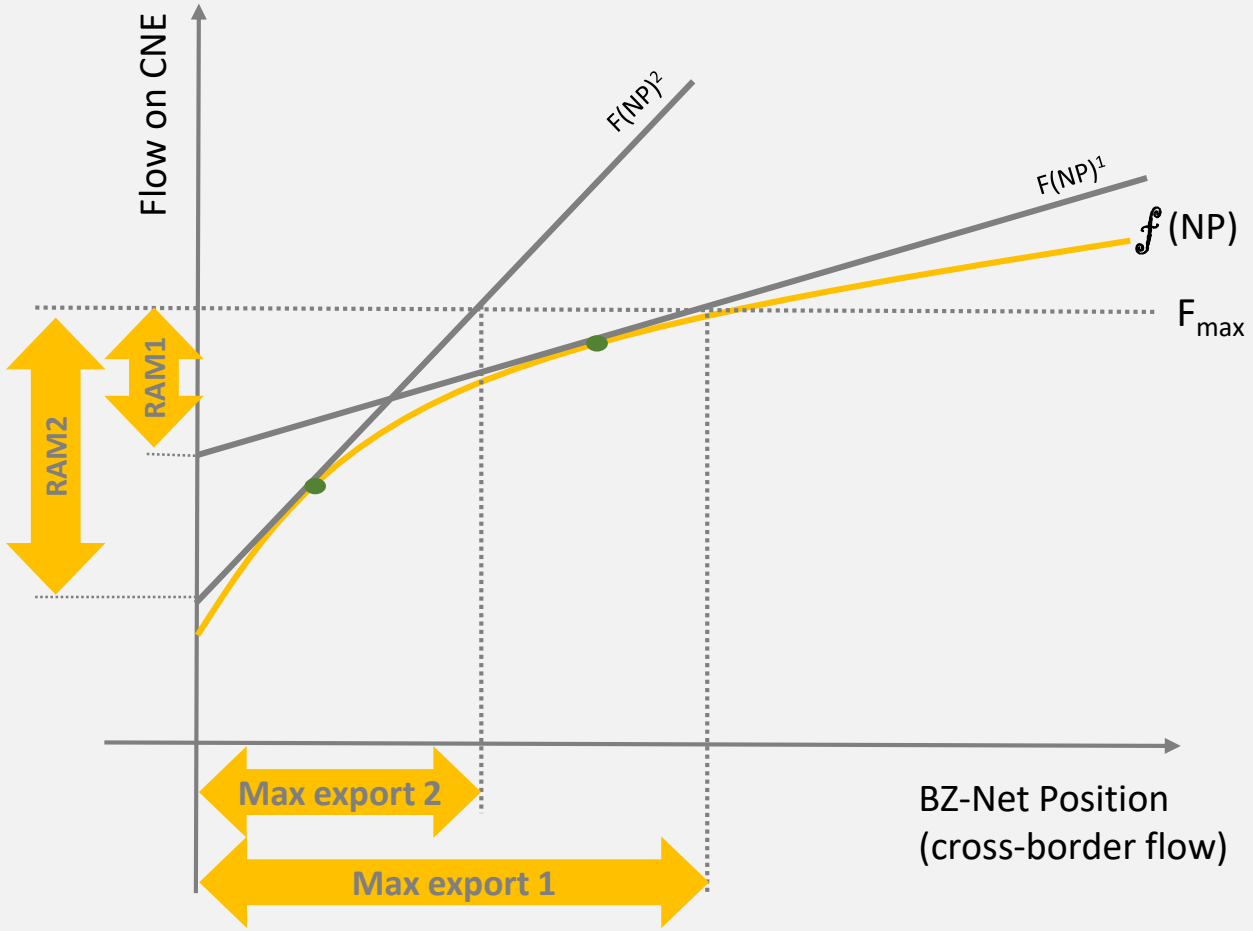
Flaw 2: Not just RAM that determines cross-zonal capacity

- Linearization 1
  - RAM 1/Fmax = 35%
  - **Does not meet** the 70% requirement
  - Lower PTDF
  - **Higher export capability**
- Linearization 2
  - RAM 2/Fmax = 70%
  - **Meets** the 70% requirement
  - Higher PTDF
  - **Lower export capability**
- **The focus of the 70%-requirement is not on the right axes**



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From a market perspective

- Optimal use of (scarce) resources can be obtained in a competitive market
  - Prerequisite: All real physical constraints, including grid capacity and bidding zones, are defined accurately for the market to function as an optimal physical power market
- With the prerequisite, market prices are (1) set to optimize the short-term physical dispatch, and (2) will serve as indicators for optimal long-term investments
- Without the prerequisite, shadow prices on grid constraints become distorted, causing market prices to become distorted as well:
  - Non-optimal short-term dispatch
  - Non-optimal long-term investments
  - In general a non-efficient physical power market and welfare economic losses

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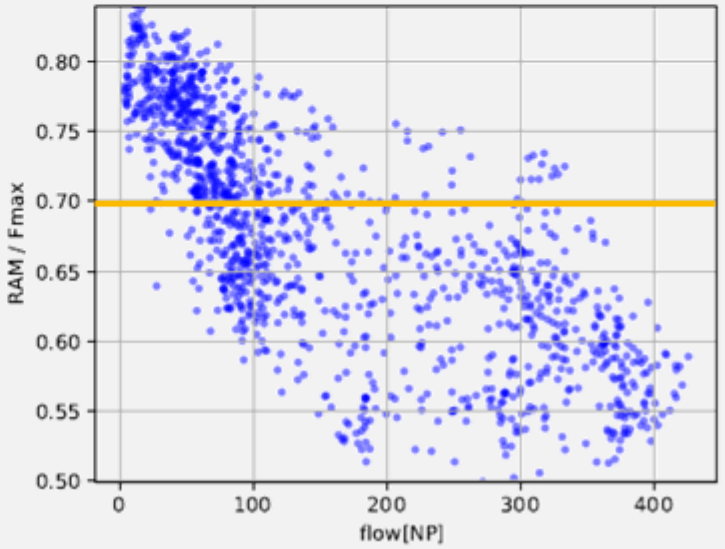
The proposed Nordic FB approach

- Tests indicates that the Nordic FB approach might not meet the 70%-requirement based on ACER recommendation, in all situations, all hours and for all CNECs

Experience from an 11-week test period (2017) for the Nordic FB-approach:

- 66 non-redundant Norwegian CNECs
- None where RAM is always below 70%
- Most where RAM is always above 70%
- 27% where RAM periodically are below 70%

- Example: Status based on ACERs proposed monitoring



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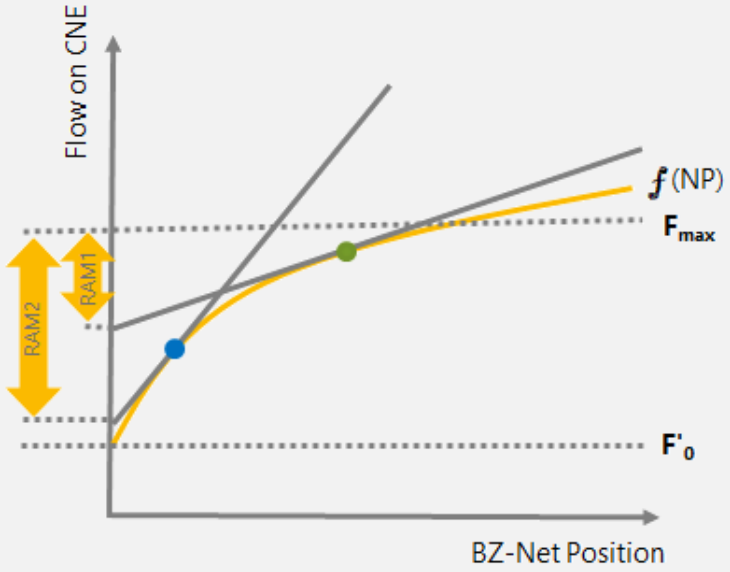
A statistical approach to the 70%-requirement of CEP

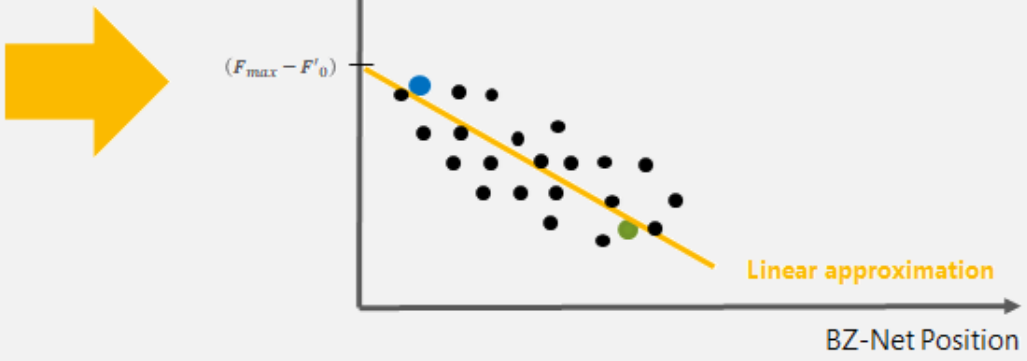
Replace:

RAM/F_{max}

With:

$(F_{max}-F'_0)/F_{max}$





- Estimate the F_0' instead of the F_0 by means of linear regression
- Will not completely solve the market issue as the focus is yet not on the right axes, but a proposal to minimize the impact on economic efficiency

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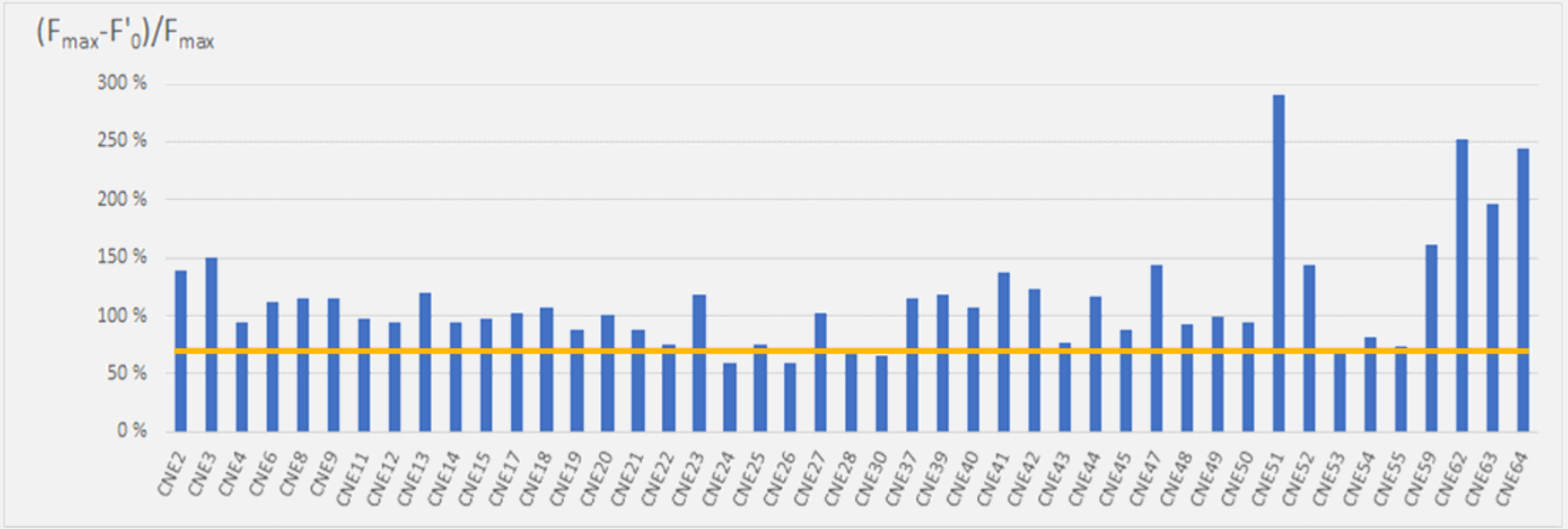
Results for 11 weeks (2017) in the Norwegian grid

- Results are shown only for CNECs with a sufficient number of observations



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