ACER
Agency for the Cooperation of Energy Regulators

ACER's benchmark cross-border capacity

Rafael Muruais
MM team leader- ACER

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Outline

- Background: Agency's work on monitoring cross-border capacity
- Benchmark capacity calculation methodology
- The benchmark capacity concept Vs. the proposal included in the CEP

ACER's MMR: Background

- **Legal basis:** Legally mandated (Article 11 of Regulation 713/2009)
- **History:** First report published in 2012 on 2011. Currently in its 7th edition (on 2017)
- **Scope:** Comprises four volumes (Electricity Wholesale, Gas Wholesale, E+G Retail markets and Consumer Protection)

- **Focus of the EW volume:** cross-zonal aspects of the IEM. It aims to answer the following three questions:
  - How much cross-zonal capacity is offered to the market?
  - How efficiently the cross-zonal capacity is being used?
  - Are there any other elements that may represent a barrier to market integration: e.g. emergence of uncoordinated CMs?

The evolution of ACER's analysis on the amount of cross-border capacity:

- **2011-2012 MMRs:** Evolution of year-on year commercial capacity (NTCs) and on the amount of UFs

- **2013-2014 MMRs:**
  - NTCs compared to thermal capacity.
  - Stakeholder's feedback: Only thermal capacity not the best basis to assess commercial capacity (no N-1 criteria or RM considered)

- **2015 MMR:**
  - NTC compared to thermal capacity, subject to N-1 criteria (rudimentary assessment) and a RM considered.
  - No CGM available to ACER yet
  - Stakeholder's feedback:
    - Ignoring network topology (e.g. distribution of flows) leads to too rough results
    - Too rough assumptions for the N-1 criteria

ACER's MMR: Background

- **2016 MMR:**
  - Following the recommendation of ACER on capacity calculation, the benchmark capacity concept was defined.
  - CGMs available to the Agency
  - As opposed to previous years, ACER' calculation of benchmark capacities take account of:
    - The distribution of flows in the network based on CGM data
    - N-1 criteria assessed based on network information
  - ENTSO-E's feedback: Improvements are still advisable, in particular on:
    - The consideration of the N-1 criteria
    - How the simultaneity of the benchmark capacities (on NTC-based borders) is guaranteed.

- **2017 MMR:** Same methodology as above, plus improvements to address ENTSO-E's latest comments are currently under consideration.

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Benchmark capacity: the Agency's recommendation

Starting point: Agency's recommendation on capacity calculation

The Agency issued Recommendations on Capacity Calculation Methodologies related to cross-border capacity calculation, in order to ensure an efficient internal electricity market, leading to the following main guidelines

1. "limitations on internal network elements should not be considered in the cross-zonal capacity calculation methods"*
2. "the capacity of the cross-zonal network elements considered in the common capacity calculation methodologies should not be reduced in order to accommodate loop flow"*

How to ensure meaningful capacity calculation (in order to obtain benchmark capacities) within the scope of these assumptions ?

* Any deviation from the general principles should only be **temporarily** applied

Step 1: Selecting a representative network situation

- The winter/summer reference CGMs as delivered by ENTSOE for Continental Europe, are used (initial estimates based on the Winter GCM)
- CGMs for the Nordic area are still a prototype and can be limitedly used
- Studied with a power system simulation tool

Step 2: Calculating a flow-based domain for continental Europe

- Critical Network Elements (CNEs) = interconnectors
  - Neither internal branches nor allocation constraints taken into account
  - A RM=15% is considered, then RAM is assumed to be 85% of Fmax
- Contingencies
  - All N-1 inside the element's bidding zone and N-1 on neighbouring countries' interconnectors
  - 2016: N-1 on "parallel" interconnectors (leaving the same bidding zone) assumed to be managed through remedial actions : a curative remedial action is assumed to be much more cost-efficient for these contingencies (and no data about temporary overload capabilities is available)
  - 2017 MMR: N-1 on 'parallel interconnectors' to be considered differently
- Generation Shift Keys
  - Mostly uniform
- Flow-Based calculation
  - Provides exchange PTDF values for all CNECs and borders
  - Very low PTDFs, ignored
  - In sum, a European FB domain is obtained, where the PTDFs are derived from the reference CGM and the RAM is assumed to be 85% of Fmax.

Step 3: Ensuring simultaneous NTCs

- In 2016 MMR: The approach was to calculate the NTC as the sum of the PFs on all lines of a specific border due to exchanges across that border until the weakest line is congested. But this did not fully guarantee that a specific line could be overloaded until certain exchanges configuration.

- In 2017 MMR: the approach to simultaneity is expected to be inspired from operational TSOs work (and CCM proposals), as follows:

  - For a given CNEC, the RAM is spread equally among all borders (exchanges) with influence on its loading.
  - Derive the change in commercial exchange for one border (due to one CNEC)
  - Take minimum value over all CNECs for one border → NTC change for the border
  - Update all borders' NTCs
  - Iterate until full physical capacity used

Benchmark capacity: Methodology (FB borders)

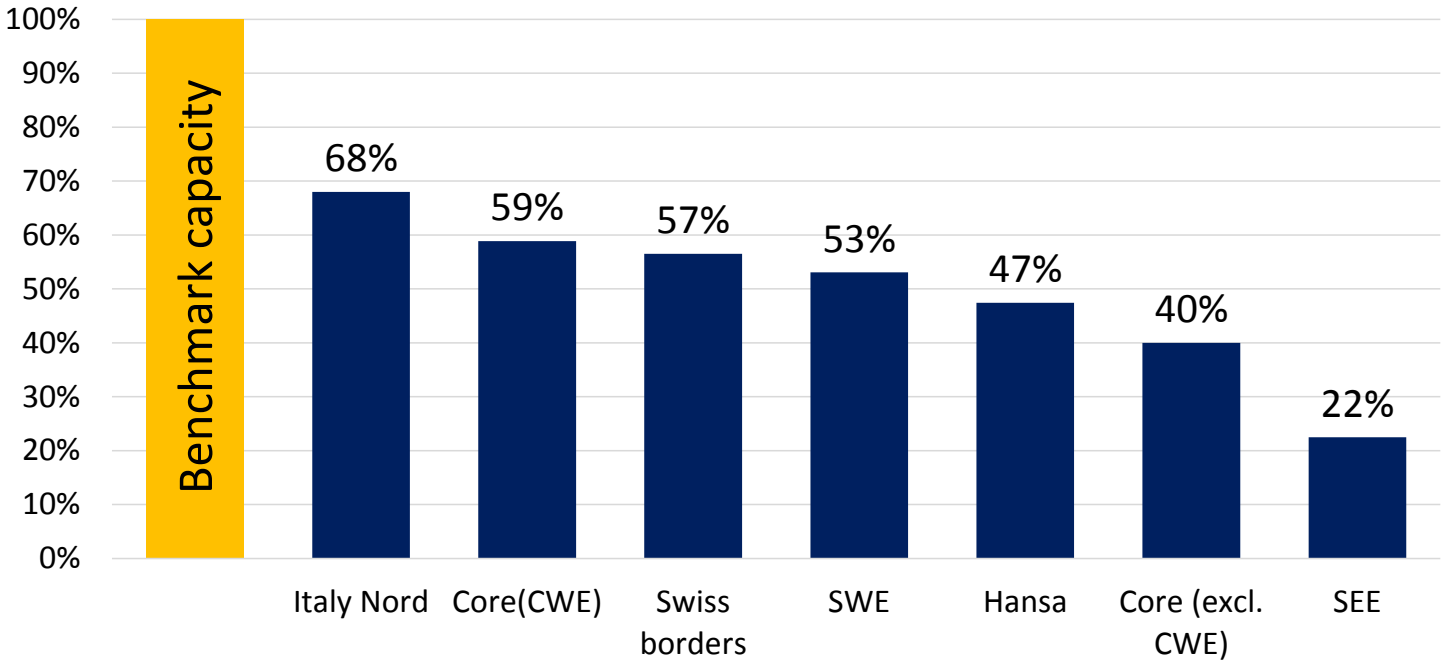
CWE Flow-Based domain calculation

- Based on the actual hourly FB domains, i.e. the CNECs information provided by CWE TSOs
- Removing internal lines and allocation constraints
- RAM on interconnectors = 85% Fmax
- The FB domain is rebuilt, based on these assumptions. Redundant constraints are removed.
- As opposed to the NTC case where individual ratios between actual and benchmark NTCs are considered, in the FB case a single ratio based on FB volumes (actual vs benchmark) for the whole region is calculated.

Outcome of the benchmark analysis

Last year results indicated that roughly 50% of the benchmark capacity is offered to the market. Similar results are expected for this year's MMR

Ratio between available cross-border capacity and the benchmark capacity* of HVAC interconnectors per region – 2016 (%)



Borders with the lowest ratio between tradable capacity (NTC) and benchmark capacity (ranked) – 2016 (%, MW)

Border-Direction	ratio NTC/benchmark
DE/LU->PL	0%
CZ->PL	1%
SK->PL	2%
DE/LU->CZ	10%
RO->BG	10%
DK1->DE/LU	12%
PL->SE-4	16%
AT->CZ	28%
AT->CH	29%
DE->CH	29%
PL->LT	30%

Note: *The benchmark capacity is calculated by ACER as the capacity which could be made available while preserving operational security.

Source: ACER calculations based on ENTSO-E and NRAs (2017)

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Benchmark concept vs CEP proposal

Benchmark capacity *"85% of Fmax on individual interconnectors is given to the market, internal lines are not considered"*	**Latest CEP proposal** *"75% of thermal capacity should be given to the market"*
Input-based approach. The focus is on removing discrimination in the capacity calculation process. The output depends on the network configuration.	**Unclear:** • it is interpreted as input-based approach by some (75% of Fmax is an input to CC) and • it is interpreted as an output-based as others (CB capacity on a given border is 75% of the sum of the thermal capacity of all interconnectors)
No room for interpretation: • Except a RM of 15% the remaining is to be given to the market, subject to N-1 criteria • Reductions due to congestion in internal lines not allowed or only temporarily • Same principles apply to NTC and FB	**Ambiguous:** • Does the 25% include the RM and LFs or not? If it does not, what is the reason for the 25% reduction? • Unclear whether reducing cross-border capacity due to internal lines is allowed and to which extent • Are FB and NTC CC affected equally by the latest CEP text?
Ambitious: It implies an increase of CB capacity in a majority of borders, except few which are very close to the ACER's benchmark.	Depending on the interpretation, **possibly a step back compared to the actual cross-border capacity!** For example on the ES-FR or on the DE-DKW border, depending on the interpretation, the resulting 'target' may be below the 2017 values (ES-FR) or the bilateral DE-DKW agreement. Does this make sense???

Thank you for your attention

www.acer.europa.eu
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MMR link
http://www.acer.europa.eu/en/Electricity/Market%20monitoring/Pages/Current-edition.aspx