Italy North Curtailments

Insights

11th March 2021

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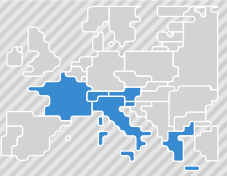

NTC reductions are determined by the **specific system operating condition** that are evaluated day by day.

- **Grid operation is a complex exercise influenced by many factors**: a simple comparison between consumption drops and capacity reductions across Europe could be misleading. Many elements must be considered all together:
  - **structural elements**: due to its location, the Italian power system is **lowly meshed**, resulting to be a sort of antenna connected to the highly meshed European network;
  - Terna applies a **central-dispatch model** procuring most of the ancillary service resources through an integrated scheduling process after the day-ahead market;
  - Italy has a **very high renewables/distributed generation** share in generation
- The purpose of such operational constraints is to **cope with phenomena** (voltage control, system inertia, dynamic stability**) which cannot be** transformed efficiently into maximum flows on critical network elements. As it might be expected, such constraints become more compelling when significant reductions of consumption are in place.

- The **application of such measures is foreseen by the Capacity Calculation Methodology pursuant to CACM Regulation**, as approved by the Regulatory Authorities of the Italy North CCR in order to maintain the transmission system within operational security limits.

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Details about the reductions occurred in 2020:

- exceptional **drop of consumption** caused by the **Covid-19 situation** occurred during the spring period in which the Italian power system is usually characterized by very low level of consumption, especially during weekends and public holidays, and **high renewables infeed**.
- in addition, presence of particular **mild weather conditions** that led to the persistence of the critical situation till the beginning of June.

Terna has made **every effort to ensure the balance of supply and demand** and, as facilitator of electricity markets, to **minimize the effects of the COVID-19 crisis on the power system**. The exceptional circumstances of the COVID-19 crisis led to the need to **adapt the operational security constraints**, so as to ensure a proper control of voltage profiles and dynamic stability of the power system, and to maintain the transmission grid within operational security limits.

Differences between Italy North borders and Italian internal bidding zones

Direct comparison between the approach adopted for the Northern Italian Border and the one adopted for the border between North and the other internal bidding zones **is not technically correct.**

- **Different operational** and **market frameworks are in place**, affecting the availability and reliability of remedial actions that could be activated after the day-ahead market.
- **Italy** is provided with central dispatch model and a well-structured ancillary services market; **in his control area**, **Terna** is therefore **able to fully control all the dispatchable generators**, altering the cross-zonal schedules on internal borders in order to secure the system. In other words, **Terna can forecast more precisely the availability of remedial actions** and can activate them autonomously.
- For the **Northern Italian Border**, the availability of remedial actions is subject to **bilateral countertrading contracts** between TSOs allowing, when feasible for the counterparty, **only small changes** to the commercial schedules in case unplanned events materialize in real-time; this means there's **no guarantee that the other TSOs will provide to Terna enough resources** for reducing the commercial schedules after the day ahead market (especially during critical hours/days and simultaneous stressful situations).

Differences between Italy North borders and Italian internal bidding zones

- When sizing the capacity curtailments at Italy North borders, **Terna does already consider all the internal remedial actions** available for the other borders and **translate into allocation constraints** only the **residual security violations** that cannot be solved adjusting internal flows;
- **Introducing allocation constraints** even on the border between NORD and CNOR, would not limit the amount of capacity to be reduced at the Northern Italian Border.
- Allocation constraints are not applied in case small reductions are detected (most likely manageable by the existing countertrading schemes).

Coordination about capacity reductions

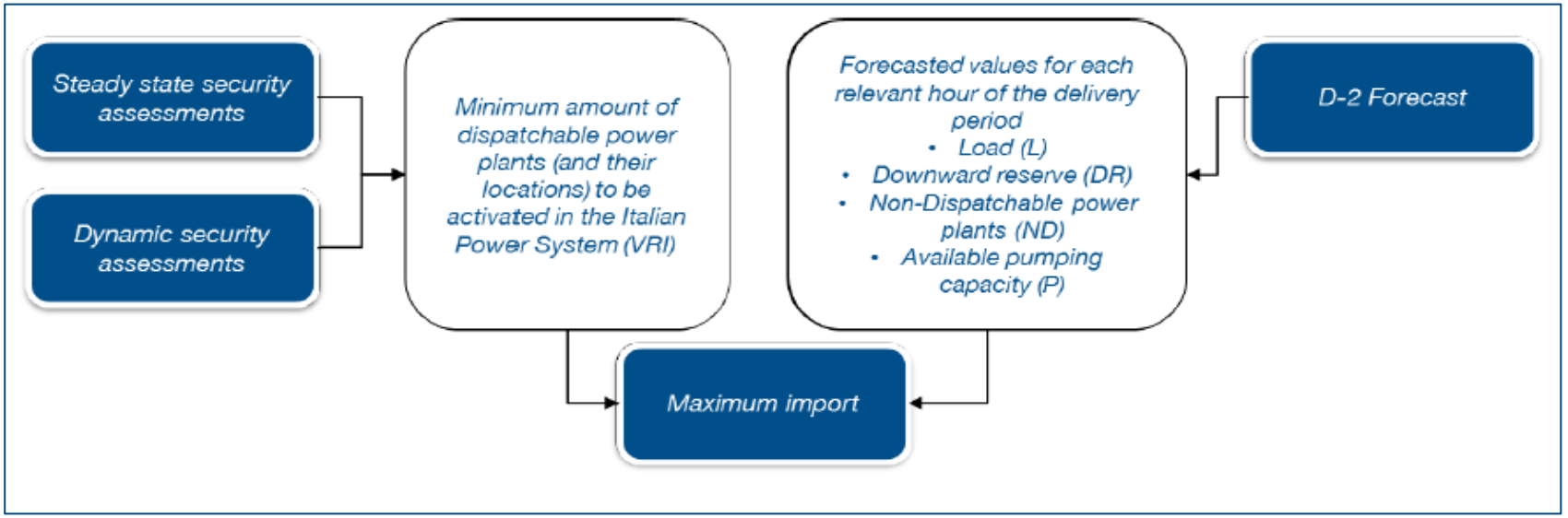
- Allocation Constraint are mostly linked to **forecasted renewable production and forecasted load**. In order to have **high degree of forecasting reliability**, AC are decided as later as possible, in D-2
- Once AC value is decided, it is immediately communicated to neighboring TSOs
- Before applying NTC reduction, Terna evaluates the possible **preliminary measures** that could minimize the reduction in NTC. Only when the preliminary measures are not enough, the reduction on the interconnection capacity was made. Preliminary measures include the **setting up of an appropriate asset of our own grid and devices**, **the optimization of pumping storage and** the **optimization of the production schedules** in order to ensure minimum standards in the correct management of voltage levels in steady state and transient.

Social welfare considerations

Cost benefit analysis is under preparation. This should evaluate social welfare dynamic compared to different alternative measures rather than curtailments. **Outcomes of the CBA is foreseen to be ready by mid 2021.**

How allocation constraints are calculated

The way in which AC are calculated can be found into the Explanatory Note of DA CCM



During low demand/high renewable infeed periods, the **Italian Power System has to be properly managed** in order to avoid:

- Voltages above the operational security limits;
- Low system inertia
- Dynamic instability.

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A minimum amount of dispatchable power plants able to provide system services according to the criteria of System Operation Guidelines (e.g. voltage regulation, primary reserve…) has to be activated. This minimum set of power plants is quantified performing:

- Weekly steady-state security assessments;
- Dynamic assessments on several scenarios considered representative of the expected system conditions.

Once this minimum set of power plants is defined, the maximum amount of import at the Northern Italian Border for each market time unit is computed considering demand and generation forecast available in D-2: the scope is to make the Italian TSO able to activate the needed set of power plants, applying redispatching actions at national level.

This maximum amount is computed according to the following formula:

$$Import_{max}^{h} = [L^h - DR^h] - [ND^h + VRI^h] + P^h$$

Where:

- **L**: *hourly load forecast*
- **DR**: *downward reserve defined according to the uncertainties related to load and RES forecasts*
- **ND**: *infeed expected from non-dispatchable power plants*
- **VRI**: *is the infeed from the minimum set of dispatchable power plants*
- **P**: available *pumping capacity*