
Annex 4: Justification of configurations of the Bidding zone review region “Central Southern Italy” which are to be considered in the bidding zone review process

Bidding Zone Review Region "CSI"

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2. Regulatory Framework

The European target model for the Internal Electricity Market (IEM) foresees energy markets (day-ahead and intraday) based on a zonal representation of the European Power System.

Bidding zones are then essential elements of today’s and tomorrow’s market design and they “*should be defined in a manner to ensure efficient congestion management and overall market efficiency*”, as stated in the EU Regulation 1222 / 2015 (CACM).

The definition of bidding zone borders is therefore a question of major relevance for the IEM and requires dedicated analysis.

This topic has been tackled in the Italian Power System since the beginning of the Electricity Markets: the Italian Control Area has been subdivided in several Bidding Zones in order to cope with internal structural congestions.

Prior to the entry into force of the CACM, the Italian bidding zones review process was based on the regulatory framework set by the Resolution 111/06. According to this process, the efficiency of the existing Bidding Zones configuration was assessed every three years performing a full review aimed at identifying the optimal configuration for the successive three years.

In 2018 the first Italian Bidding Zones Review pursuant to CACM Regulation (in application of article 32.1.b), **has been formally launched by the Italian National Authority (ARERA) with the Resolution 22/2018/R/eel**. The formal launch (which sets a strict deadline for a very complex task) has been anticipated by an informal stage where Terna and ARERA worked on methodologies and assumptions in order to find a trade-off between model complexity and results quality (started with ARERA Decision 461/2016/R/eel).

The main differences between the old process and the new one (CACM) can be summarized as follow:

- According to Resolution 111/06, a Bidding Zones review had to be performed every three years (without a triggering event) while, under the CACM Regulation, a review shall be formally launched after a triggering event (this launch is mainly linked to the results of a dedicated monitoring process¹).
- The list of criteria to be evaluated has been significantly enlarged, according to CACM article 33.1.
- The time horizon under assessment has been enlarged: from 3 years up to 10 years, according to CACM article 33.2.

¹ A technical report (prepared by All TSOs) and a market report (prepared by All NRAs) shall be published every three years at European Level. In addition, Italian NRA requested to Terna an annual report (starting from 2019) for monitoring the Italian Bidding Zones efficiency.

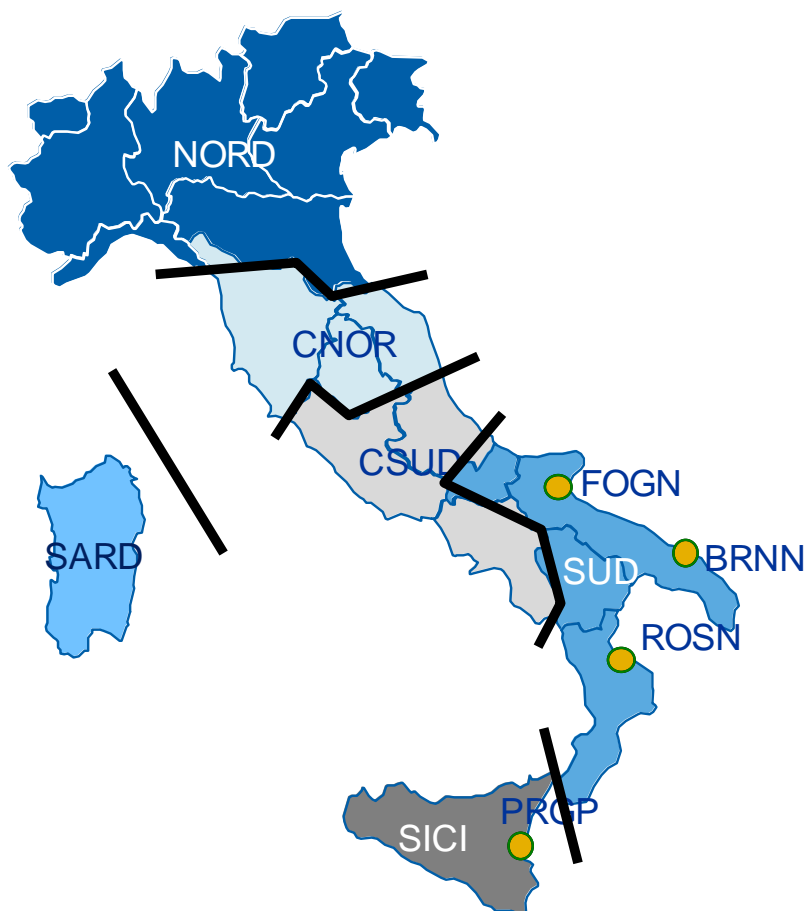
On the 15th of May 2018, after one month of public consultation (including a public workshop), the final version of the study has been submitted to ARERA, which:

- **Approved the study and decided to implement a first change to the previous Bidding Zone configuration starting from the 1st of January 2019** (deleting 3 out of the 4 national virtual Bidding Zones, namely “Brindisi”, “Foggia” and “Priolo”). (ARERA Decision 386/2018/R/EEL, 12th of July 2018)
- **Approved Terna’s proposal for a new Bidding Zone Configuration (“Alternativa Base” described in the following chapter) and asked for implement it in 2021.** (ARERA Decision 103/2019/R/EEL, 19th of March 2019).

3. Starting Bidding Zones configuration and alternatives considered in the recent Bidding Zone study in Italy

The Italian Bidding Zones configuration, which was in place until the end of 2018, entered into force in 2009² and it contained:

- 6 geographical³ Bidding Zones
- 4 virtual⁴ Bidding Zones



Alternative Bidding Zone configurations can be identified according to two different approaches:

- “Expert-based”: different Bidding Zone configurations are defined by TSO’s experts according to statistical analysis, their knowledge of the Power System as well as taking into account the outcomes of other studies (eg. Ten Year Network Development Plan, Mid Term adequacy Forecast, National development plan, other studies carried out by Terna). This approach is well established and proved to be effective for the Italian case.

² In 2012 the virtual Bidding Zones “Monfalcone” has been merged to the geographical Bidding Zones “Nord”.

³ A geographical Bidding Zone is a zone with a direct link with a geographical area.

⁴ A virtual Bidding Zone is a zone composed by some power plants having a direct infeed on some preselected 380kV nodes.

- “Model-based”: different Bidding Zone configurations are defined according to dedicated algorithms and clustering techniques. This kind of approaches can produce more efficient delimitations, but they are still in a “research and development” stage.

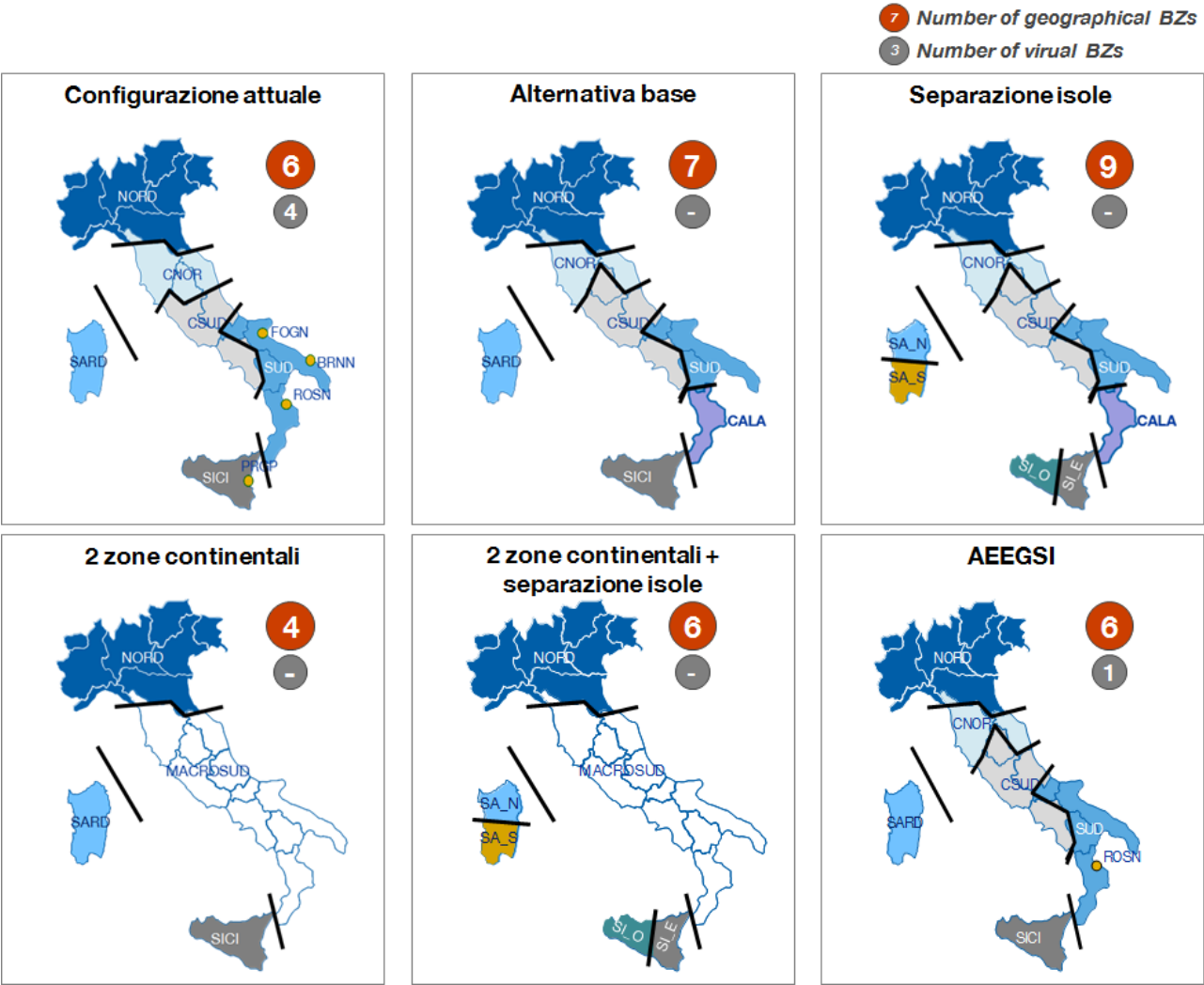
Terna applied an “expert-based” approach for the purposes of Bidding Zone review, designing in parallel a step-by-step process for developing and fine-tuning **“model-based” techniques to be applied in the future** to the Italian case⁵.

In total, **six Bidding Zone configurations have been assessed** in the review:

- “Configurazione attuale”: configuration in place
- “Alternativa base”:
 - Umbria region moved from “Centro-Sud” to “Centro-Nord” Bidding Zone;
 - All the virtual Bidding Zones merged to the connecting geographical Bidding Zone;
 - New geographical Bidding Zone “Calabria”.
- “Separazione Isole”: in addition to “Alternativa base” changes, Sardinia and Sicily Bidding Zones are splitted.
- “2 zone continentali”: all the continental bidding zones under assessment⁶ are merged.
- “2 zone continentali con separazione delle isole”: in addition to “2 zone continentali” changes, Sardinia and Sicily Bidding Zones are splitted.
- “AEEGSI”:
 - Umbria region moved from “Centro-Sud” to “Centro-Nord” Bidding Zone;
 - “Foggia”, “Brindisi” and “Priolo” virtual Bidding Zones are merged to the connecting geographical Bidding Zone.

⁵ In accordance to ARERA’s Resolutions 496/2017/R/eel and 22/2018/R/eel, Terna sent a first proposal to the Italian NRA on the 28th of February 2018. A dedicated R&D project is ongoing in collaboration with relevant Italian Universities.

⁶ Bidding Zone “Nord” is not in the scope of this study since it is covered by the “FIRST EDITION OF THE BIDDING ZONE REVIEW” launched by ACER on the 21st of December 2016.



4. Scenarios considered in the assessment

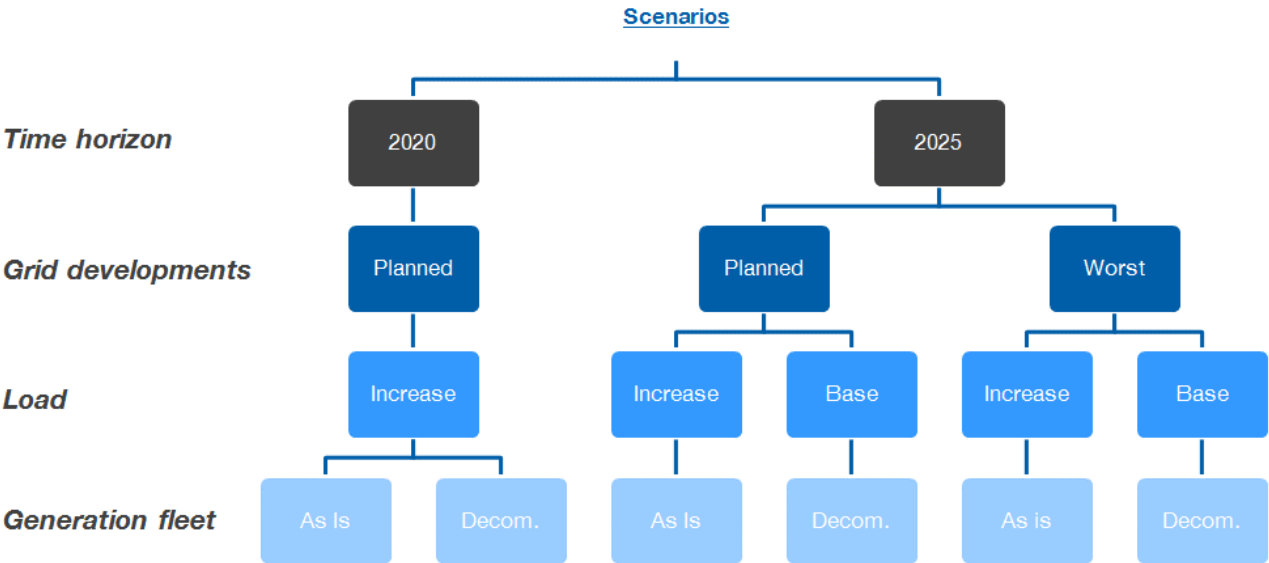
In order to cover a time horizon of ten years and to cope with the uncertainties of the future changes, Terna considered important to assess the impact of the identified Bidding Zone configurations on different scenarios.

Four drivers have been considered in the scenario definition:

- **Time horizon:** 2020 and 2025 have been identified as relevant years to cover the whole period (covering efficiently also the 3 years time horizon required in the Clean Energy Package);
- **Grid developments:** several grid reinforcements are expected to be commissioned by 2025, anyhow some of them are still in a preliminary phase and their commissioning can be delayed due to authorization or external issues. For this reason, a “planned” and a “worst” grid scenario have been considered.
- **Load:** due to the long-term prospective, for the 2025 scenario, 2 different levels of demand have been considered;
- **Generation fleet:** due to the decommissioning trend registered in the last years in the Italian Power System, a base case and a decommissioning scenario⁷ have been considered both for 2020 and 2025.

In total, **six scenarios have been considered in this study:**

⁷ RES installed capacity is expected to grow in both cases, but thermoelectric capacity is expected to decrease in the second one.



5. Evaluation of Bidding Zones Configuration

CACM Regulation (article 33.1) requires to assess the performances of the different configurations in terms of network security, overall market efficiency and stability and robustness. These high level criteria are also detailed providing a list of aspects to be considered.

In order to cope with these requirements, **Terna developed a system of quantitative indicators which enable a direct comparison between different configurations.**

The indexes can be linked to the CACM criteria as follow:

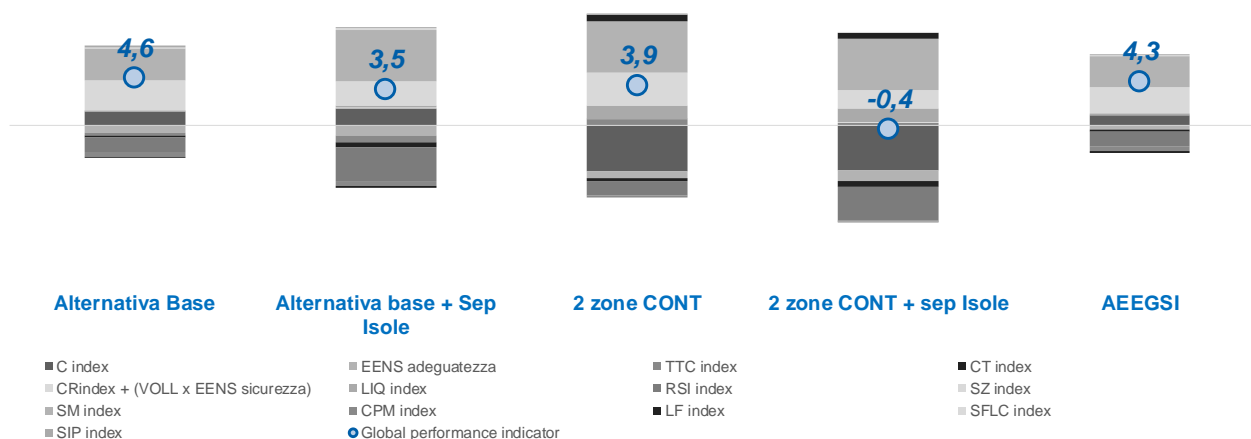
- Network security:
 - Operational Security: *Cindex*
 - Security Of Supply: *EENSadeguatezza*
 - Uncertainties in the capacity calculation: *TTCindex*
- Overall Market Efficiency:
 - Economic efficiency/surplus: *CTindex*
 - Firmness costs, feasible market outcomes: *CRindex + (VOLL x EENSsicurezza)*
 - Market liquidity: *LIQindex*
 - Market concentration and power, effective competition: *RSI index*
 - Price signals for building infrastructure: *SZ index, SM index*
 - Accuracy of price signals: *CPMindex*
 - Robustness of price signals: *SIPindex*
 - Unscheduled flows: *LFindex*
- Stability and robustness:
 - Location and frequency of congestions: *SFLCindex*

Please note that, instead, the following CACM criteria are implicitly satisfied by:

- the examined configurations:
 - “the need for bidding zones to be consistent for all capacity calculation time-frames”
 - “the need for each generation and load unit to belong to only one bidding zone for each market time unit”
- the scenarios considered in the study:
 - “the need for bidding zones to be sufficiently stable and robust over time”
 - “the cost of building new infrastructure which may relieve existing congestion”

The “transition and transaction costs” criterion has been assessed submitting a dedicated survey to the relevant Stakeholders during the public consultation process.

Final normalized values of the quantitative indexes are reported in the figure below (positive values mean a benefit compared to current configuration).



Please note that in order to obtain a final global indicator:

- Scenarios are weighted in order to attribute more relevance to the short-medium term timeframe, assuming that a new review can be anyhow relaunched in case big issues will appear by 2025.

6. Conclusions

On the basis of the analysis carried out, **Terna recommended to amend the Bidding Zone configuration that was in place in 2018, adopting the “Alternativa Base” option.**

The outcomes of this study also suggest **assessing again the Bidding Zone configuration close to the 2025, when it is expected that structural congestions in the Continental Italy will be relieved by planned grid investments.** In the new review, also model-based configurations will be considered.

According to relevant ARERA Decisions the **proposed Bidding Zone configuration changes are going to be applied in 2021** (Bidding Zone Configuration 2021 described in the CSI Annex to the Bidding Zone Review Methodology), **after a first light improvement adopted starting from the 1st of January 2019** (Bidding Zone Configuration 2019/2020 further described in the CSI Annex to the Bidding Zone Review Methodology). The Italian Control Area is (and it will continue to be) separated in several internal Bidding Zones allowing to correctly and efficiently reflect structural congestions in the energy markets (as shown even in the EntsoE Technical Report⁸).

Hence, **Terna considers the above mentioned CACM Bidding Zone Review and the related ongoing implementation process as fulfilling the Clean Energy Package requirements for the GRIT Bidding Zone Review Region**, considering also that the assessed time horizons match with the CEP requirements and no relevant changes occurred in the meantime.

Starting a new Bidding Zone Review in this moment would threaten the improvements linked to the ongoing Bidding Zone Configuration changes approved by the Italian NRA and expected to be completed in 2021. This would lower market efficiency in the near future and prevent to perform a new study when it will be more effective since, according to relevant Stakeholder opinions and CACM Regulation, Bidding Zones Configurations should be “stable over the time”.

⁸ https://docstore.entsoe.eu/Documents/Events/2018/BZ_report/20181015_BZ_TR_FINAL.pdf