

D2.2 Implementation Status and Market Focused Diagnosis of the Target Model

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April, 2015

Version 1.0

Dissemination level: Public

Agreement n.: IEE/13/593/SI2.674874
Duration: April 2014 – September 2016
Co-ordinator: SINTEF Energi AS
Supported by:



Co-funded by the Intelligent Energy Europe
Programme of the European Union



1 Executive summary

In the last ten years the penetration of renewable generation in power systems in Europe has increased very significantly. Power production will have to be dominated by RES generation in the coming decades in order to achieve environmental objectives set in the 2020, 2030 and 2050 time frames within the EU. The Target Model (TM) developed by the European Commission (EC) in cooperation with ENTSO-e and ACER represents an attempt to make the penetration of large amounts of renewable generation compatible with the satisfactory functioning of power systems in Europe from a techno-economic point of view.

The TM comprises a set of documents, the Network Codes (NCs), or framework guidelines, related to different aspects of the functioning of the system. Among other issues, NCs deal with the design of market required to achieve a well functioning IEM. NCs focused on the functioning of markets are the so-called Market NCs. Together with Connection and Operation Codes, they make the whole set of rules, and principles, developed to increase the efficiency in the functioning of the European interconnected system.

1.1 Description of NCs

Market NCs aim to achieve an efficient functioning of markets currently developed at European level. Three Market Codes exist:

- The Capacity Allocation and Congestion Management (CaCM)
- The Forward Capacity Allocation Code (FCA)
- The Electricity Balancing Code (EB)

The CaCM Code (or Binding Guidelines) cares about three main interrelated issues:

- The computation of available interconnection capacity to be allocated to transactions taking place between each pair of bidding zones (or zones defined for congestion management and electricity pricing reasons in the day-ahead time frame);
- The allocation of interconnection capacity and associated pricing in the day-ahead time frame;
- And the management of congestion and dispatch of energy and transmission interconnection capacity in the intra-day time frame.

The computation of available interconnection capacity can take place according to two either of two main methods: either in a coordinated way among all bidding zones (Flow-based) or predefining the amount of capacity on each likely to get congested link to be allocated to transactions between each pair of bidding zones (Coordinated Net transmission Capacity determination). The Flow-based scheme results in a more efficient allocation of capacity and therefore is preferred except in radial networks, where applying it may not be necessary.



The congestion management and pricing in the day-ahead time frame is organized in the form of centralized auctions taking place for each hour of the whole next day where energy and transmission interconnection capacity among bidding zones are allocated jointly. The mechanism implemented has been termed Price-Coupling and results in a marginal price for each bidding zone. Bidding zones have been defined within each country (in the majority of countries there is a single one) and they are expected to be updated periodically. The algorithm used for the matching of bids in the day-ahead is called Euphemia and it is very flexible, accepting almost any kind of bid. Many different types of constraints associated with bids have been accommodated in this algorithm.

Capacity allocation and congestion management in the intra-day time frame is taking place primarily, through a continuous trading scheme similar to the one in place in Stock-Exchanges. Bids for the purchase and sale of electricity are allocated interconnection capacity according to the prices offered (price in bids for purchase must be higher than in bids for sale that are matched with the former) and the amount of interconnection capacity available. This is possibly combined with intraday-auctions at times when problems of liquidity advise organizing them.

The Forward Capacity Allocation Network Code establishes common rules for the establishment of a common methodology and process for determining the Cross Zonal Capacity and its subsequent allocation in the long-term. Forward capacity allocation shall be implemented on all those bidding zone borders where competent National Regulatory Authorities (NRA) determine that market agents are in need of instruments like these to manage the risk associated with the volatility in the price to be paid to access the grid to inject power in a certain bidding zone and retrieve it in another one.

In particular, the FCA establishes common rules and guidelines around:

- Long-term transmission capacity determination
- The single allocation platform for cross-border capacity rights
- The long-term transmission capacity products and the associated firmness
- Homogenize nomination rules for physical transmission rights
- Others: financial requirements and fallback procedures, publication of information and secondary trading

Mechanisms for the determination of transmission capacity are the same as in the day-ahead time frame. There must be a single platform for the initial allocation of transmission rights. Rights can be subsequently traded in auctions or bilaterally among agents. Products that can be issued are physical transmission rights, financial rights as obligations, and financial rights as options. Curtailment of these rights is subject to compensation that shall depend on the time of curtailments (after or before the nomination deadline).

The main purpose of the EB NC is achieving a well functioning, integrated, balancing market in the IEM. The design of the market and its implementation is aimed at making smooth progress in the integration process. Then, this process is expected to go through several stages from the



integration of control areas for imbalance netting, whereby imbalances would be computed in larger areas than the current control ones, to the creation of common merit order lists, which involves having all balancing bids considered together and being dispatched according to the prices offered in them, its features, and available interconnection capacity among areas.

The NC is providing general guidelines while it leaves many issues open, from the definition of the trading time units to that of the trading period, or definition of the gate closure time; going through the definition of products and the imbalance settlement rules. Regarding this last point, both single and dual pricing are considered options, and marginal pricing is not considered the only option. The time frame of bids submitted is not defined in a harmonized way.

1.2 The process of deployment of the IEM

The European energy regulators have been working together for many years to promote regional cooperation and the integration of energy markets. The Regional Initiatives (RIs), launched by the European Regulators Group for Electricity and Gas (ERGEG) in 2006, aimed at bringing together national regulatory authorities (NRAs), transmission system operators (TSOs) and other stakeholders in a voluntary process to advance integration at the regional level as a step towards the creation of a well-functioning Internal Energy Market (IEM). The RIs represent a bottom up approach to the completion of the IEM. Seven regional initiatives have been defined, which are based in seven European regions partly overlapping: Central West European RI, North (North Western, initially) European RI, France-UK-Ireland RI, the Baltic RI, the Central South RI, the South West RI, and the Central East RI.

The EU Energy Work Plan for 2011-2014 in Electricity is constituted from four cross-regional roadmaps focusing on the implementation of the target models for CaCM across Europe and seven regional roadmaps complementing and detailing the cross-regional roadmaps and focusing on other important dimensions for the completion of the Internal Electricity Market. Each cross-regional roadmap is dedicated to one particular timeframe or topic:

- Implementation of a single European price market coupling model;
- Implementation of a cross-border continuous intraday trading system across Europe;
- Implementation of a single European set of rules and a single European allocation platform for long and medium-term transmission rights;
- Implementation of fully coordinated capacity calculation methodologies and particularly the flow-based allocation method in highly meshed networks.
- Integration of Electricity Balancing markets

Each of the RIs defined is aiming to make progress jointly, in a coordinated way, in the deployment of Binding Guidelines. There are several reports issued by ACER and CEER providing information on the progress made in the implementation of the IEM:

- ERI Quarterly Reports: Published every quarter of a year.
- Regional Initiatives Status Review Reports: These are published annually.
- Market Monitoring Reports: these are also published annually.



The level of implementation of NCs and the associated regulation making the TM in the several RIs and countries in Europe is being quite heterogeneous, with the most advanced region in the deployment of the TM and the IEM being the North-Western and South-Western RIs.

1.3 Assessment of the TM

As mentioned above, the TM being developed by the EC in cooperation with regulators and TSOs in Europe represents a first attempt to adapt markets to the new system needs. Relevant stakeholders have managed to develop short-term energy markets that are gradually evolving towards a fully-integrated, efficient pan-European one through the joint implicit auctioning of energy and transmission capacity in the day-ahead time frame. There are still aspects of short-term markets that need to be worked out in order for their functioning to be fully satisfactory, but the general design of these markets seems to be sound. Large progress has already been made in the implementation of day-ahead market coupling, which has allowed the coordinated dispatch of energy and interconnection capacity among systems in most of Western and Central Europe.

Aspects in short term markets that still need to be refined include the definition of an appropriate level of granularity of the network model considered in the dispatch (currently, in the majority of Europe, each national system is considered a single node in the dispatch algorithm), and the update of this network model; and the timing of energy markets, which relates, among other things, with the definition of the appropriate sequence of centralized auctions and continuous markets matching the needs of market agents.

In the long term, traditionally, transmission capacity products have been sold and subsequently traded to allow agents to manage the risk associated with the volatility in the price of access to the transmission grid. This, of course, is needed and is being already considered within the TM in FCA NCs. However, together with long term transmission capacity markets, other long term markets may need to develop. These potentially include long term capacity, clean energy and even balancing markets. These may be needed for the appropriate amount of the corresponding products to be deployed. Otherwise, investment incentives may not be strong enough to trigger the installation of generation, demand and network assets required for the supply of these products.

A large number of national systems in Europe are already implementing capacity remuneration mechanisms, also called adequacy systems. However, the deployment of firm capacity in Europe should take place at a reasonable cost and not increase substantially the cost of operation of the system as well. This requires that solutions to contract capacity, if implemented, are applied in a coordinated way, thus allowing competition to take place among potential firm capacity providers all over Europe. Besides, remuneration schemes applied in long term capacity markets should not interfere with efficient signals in the short term. This should be a first priority of the Commission.

As far as the supply of clean energy is concerned, this should be guaranteed in order to comply with environmental objectives. The ability of currently existing energy markets to provide strong enough incentives to RES operators to install large enough amounts of this type of generation is



dubious. Energy contracted in current markets does not need to be clean and the value of it at times when RES energy is available for its sale may not suffice to pay back investments in RES generation capacity. Thus, specific mechanisms may need to be implemented to contract the supply of clean energy. Long term supply schemes may be able to cover the increase in the costs of market agents associated with the provision of clean energy while allowing these agents to stabilize their revenues already in the long term. However, the supply of clean energy should in any case be arranged in a way that results in the lowest cost possible for the system. It should be the most efficient generators able to supply the required amount of clean energy both in the short and in the long term the ones that this product should be contracted with. And again, signals resulting from these markets should not interfere with efficient short term, operation, signals.

Even the contracting of some balancing products in the long term may be considered, though the need for these remains to be seen.

Lastly, in the very short term, a perfect match between power supply and demand must be ensured at any time and it must take place in the most efficient way possible. Balancing markets have long existed in Europe, but their functioning could be improved in several ways. Some of the changes to be made to balancing markets have to do with the need to achieve the integration of national ones. Others have to do with the need to integrate other resources than traditional, conventional, generation in them, like energy consumers, and RES generation, both on the supply and on the demand side.

In order to achieve the integration of national balancing markets, issues to address include the harmonization of methods, or algorithms, used to trade balancing products and the harmonization of the features of balancing products themselves. This should increase the level of liquidity in the market and would avoid losses of efficiency from lacks of coordination among the contracting of balancing products in the several areas of the system. Besides, access to interconnection capacity among systems in balancing markets should also be carefully thought in order to allow for international trade to take place while not interfering badly with other markets.

The participation of RES generation and demand in balancing markets should be achieved by abolishing unnecessary barriers to this (like minimum size ones, or prohibitions for them to aggregate into large entities like VPPs). Besides, authorities should promote the implementation of an efficient market scheme whereby prices earned for the provision of balancing services corresponds to their value, while payments reflect the responsibility of agents (BRPs) in balancing costs.