ENTSO-E Overview of Internal Electricity Market-related project work

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Contents

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Executive Summary

– Transmission System Operators (TSOs) and energy stakeholders **have been making significant progress towards the completion of the Internal Energy Market (IEM)**. It is however essential that policy-makers further support the creation of a fully-integrated European energy market;

– **Considerable progress has been made by the industry in delivering the network codes**: ENTSO-E has now delivered nine of the ten electricity network codes. There are however significant delays in the adoption of the codes, which is slowing down the delivery of benefits to EU consumers. It is important that the Commission and Member States commit to the timely adoption of the network codes, so that TSOs and other stakeholders may focus on the smooth implementation of the codes;

– **Significant milestones have been reached on market coupling thanks to the common work of stakeholders:** the full price coupling of the South-Western Europe (SWE) and North-Western Europe (NWE) day-ahead markets was achieved on 13 May 2014, thus creating the largest day-ahead energy market ever, as electricity can now be exchanged from Portugal to Finland or from Germany to the United Kindgom. Similar progress is on-going in Eastern Europe, where national regulators and TSOs have committed to an ambitious timetable for market coupling;

– **On 5 January, ENTSO-E will have completed work on its Central Information Transparency Platform**, thus creating a level playing field for market participants, which is indispensable for the integration of the European electricity market. Following the publication of EU Regulation 543/2013 in June 2013 on the submission and publication of data in electricity markets, ENTSO-E has been mandated to develop the platform by January 2015.

– **Grid investments are needed to complete the Internal Energy Market:** ENTSO-E released in July 2014 its draft ten-year network development plan (TYNDP) 2014, looking at the grid investments needed towards a 2030 horizon. The TYNDP foresees a total investment of 150 Billion Euros and highlights the significant reductions in power prices which will result from these investments. However, TSOs face significant delays in delivering these investments, mainly due to public acceptance or permit granting procedures – with one third of the TYNDP 2012 projects facing delays. Political support is needed to deliver these investments which are essential to achieve a truly integrated market;

– **Since 2010, ENTSO-E has been a key player in developing harmonised standards for data exchanges** between TSOs, TSOs and DSO and between TSOs and other important market players. Harmonised information exchange standards are essential in market integration and in making the market work more efficiently;

– **At this stage, efforts to complete the IEM should therefore focus on the timely implementation of the existing arrangements,** such as the Third Energy Package, cross-border infrastructure projects and the implementation of the network codes as opposed to designing completely new frameworks.

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About ENTSO-E

ENTSO-E, the European Network of Transmission System Operators in Electricity was established through the Third Legislative Energy Package for the Internal Energy Market (IEM). Regulation (EC) 714/2009 on conditions for access to the network for cross-border exchanges in electricity describes ENTSO-E's tasks and mandates it to draft non-binding ten-year network developments plans (TYNDPs) every two years and binding network codes with the aim to contribute to security of supply, a seamless pan-European electricity market, a secure integration of renewable resources and a reliable future-oriented power transmission grid. ENTSO-E represents 41 power transmission system operators (TSOs) in 34 European countries.

Completing the IEM through the implementation of the Market target Model

The target model for the European electricity market is the vision shared across all stakeholders on the future market design. The model is the blueprint with top-down guidance for regional market integration projects and is being implemented bottom-up through regional market coupling projects and top-down through the network codes that ACER, EC and ENTSO-E develop. The implementation of the target models in gas and electricity is equivalent to the completion of the IEM. In the power sector, ENTSO-E plays an important role in the completion of the European electricity market through:

- drafting of the network codes that translate the vision of the European target model into clear rules for implementation across Europe;
- regional market coupling initiatives in close co-operation with member TSOs, power exchanges and other market players. These create regional (and eventually European) markets ahead of the coming into force of network codes;
- putting in place with its members, power exchanges and other market players the platforms and IT systems that are required to operate power markets in the different time frames (in particular forward, day-ahead and intraday markets);
- harmonising information models for the exchange of market data. These harmonised standards are needed to perform essential market operations at European level, such as scheduling, settlement, capacity allocation, etc.;
- developing a new central information transparency platform and corresponding manual of procedures on the provision of fundamental electricity data;
- planning, developing and implementing, together with member TSOs, the transmission infrastructure that is needed to connect national and regional markets with each other;
- contributing proactively to the adjustment of the target model, which is needed due to evolving circumstances, like the sharp rise in power generation from intermittent renewable energy sources.

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Network Code Development

The network codes are the foundations on which Europe's internal market in electricity is being built. They are complementary to other mechanisms, in particular regional market coupling initiatives. In line with the requirements of the Third Energy Package, electricity network codes are developed by ENTSO-E, based on ACER's framework guidelines. All network codes eventually pass through the comitology process to become legally binding EU law.

ENTSO-E is presently developing ten network codes. The European Commission decides the areas where network codes are required. The priority objectives of this first set of network codes are market integration.

In this regard market network codes provide a complete set of rules for trading electricity across Europe at different points – starting from a year before real time and finishing immediately before the point when energy is delivered. Once in force, these codes will help establish harmonised cross-border markets in all timeframes and will allow market participants to trade seamlessly across all of Europe as one single electricity market.

Greater liberalisation of electricity markets and greater interconnection between national electricity transmission systems require changes to the way the power grid is operated. The network codes on grid connection and system operation specify such grid connection rules for generators and consumers and operational rules for transmission system operators.

There are two types of users who connect to and use these grids: generators, and large customers (who use electricity themselves or sell or distribute it to smaller customers). The rules setting out the requirements for these users to connect to the transmission grids are covered by the connection codes, with a view to deliver an interoperable, standardised network.

By creating a fit-for-purpose network and creating rules to mitigate risks of blackouts, connection and operational codes are also key to enhance the general quality of supply in Europe, and thus create a more competitive business environment.

Each of these codes represents an indispensable building block of the integrated electricity market.

Network codes implementation and amendment

The drafting and approval of network codes, however, is merely the beginning of the process. The network codes have been developed to help realise Europe's energy policy goals. For these goals to be achieved, the network codes need to be implemented and complied with across Europe.

This represents an important challenge for the European electricity sector. Each network code requires a series of steps to be taken before they can be considered as fully implemented. This might include national decisions, the conclusion of regional agreements or the creation of more detailed methodologies. All market participants, distribution system operators (DSOs), transmission system operators (TSOs) and regulators will be involved and the required development work and consultation will be extensive.

ENTSO-E is working with ACER, the European Commission and stakeholders to finalise the work on all codes till their adoption. Early-stage implementation work has begun in two key areas related to the European energy market: the definition of bidding zones and the definition of capacity calculation regions. Network codes are among the most important and most effective instruments to drive market integration of the IEM. Several other initiatives complement this process and also deserve mentioning.

The network codes will become binding technical regulations. As new technologies are developed, business models emerge, practices are adopted, or new policies are implemented, **these network codes will also need to evolve and be revised**.

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In the long-term, the network codes will continue contributing to a competitive, secure and efficient European energy business environment if they are revised through a well-designed process, with the necessary pace of change.

In several European countries, the national grid code revision process involves a stakeholder's committee, usually facilitated by regulators and/or network operators. ENTSO-E believes that such a structure could also play a role in the network code revision process. In this context, ENTSO-E welcomes the recent ACER proposal to review the process for modification and enforcement of network codes.

ENTSO-E and its member TSOs, as the authors of the network codes, can play a significant role in maintaining efficiency of the future amendment process. ENTSO-E believes that this approach is the only way to provide an efficient delivery of the IEM.

Relevant milestones & achievements so far

The European Commission suggests that the Capacity Allocation and Congestion Management (CACM) Guideline, which is the first of the ten electricity network codes, will pass through comitology before the end of 2014 and be adopted into law by the European Parliament and Council in early 2015.

To reflect its innovative character, this first network code, formally referred to as CACM Network Code, was relabelled to a Guideline, which however, does not change the legally binding value of the text.

This relabeling resulted from a review by the European Commission's legal service, which recommended labelling CACM a 'Guideline' instead of 'Network Code'. ENTSO-E welcomes this discussion, which reflects the particular structure of the text. CACM includes numerous methodologies and processes to be defined during the implementation period. CACM indeed addresses the innovative topics of cross-continental intra-day and day-ahead electricity market coupling, which has never been attempted before within, or outside of Europe.

	Network Codes	Guidelines
	Complete set of rules ready to be applied at national level	Include **topics requiring further implementation procedures**
Legal value	**Binding.** Directly applicable in all Member States	**Binding, identical to network codes**
Development	Defined in the Third Energy Package	In practice, **identical to network codes** (could in principle be less formal)
Adoption	Comitology procedure	**Identical to network codes**
Amendment process	Defined in the Third Energy Package and ACER Guidelines	Absence of any specific rules. Should follow the **same process as network codes**

Capacity Allocation and Congestion Management[1] (CACM) Guideline

Most relevant in this regard is probably the CACM Guideline. This piece of legislation will help achieve a fully integrated electricity market for Europe by setting out the rules that will introduce a harmonised approach to cross-border electricity trading in Europe. By doing so, the code will help create the largest and most competitive electricity market in the world. The CACM Guideline also sets out the rules for congestion management, the management of scarce transmission capacity among different parties.

Historically, countries generated their own electricity to supply the needs of their populations and operated their systems based only on their own requirements. However, to create a single cross-border market, a single set of rules is needed to allow market participants to trade seamlessly across all of Europe, as one single electricity market. The proposals set out the rules that will enable a transition from the current system, in which there are different rules for electricity market participants in different countries or regions, to a single set of electricity market rules applied across Europe in the intra-day and day-ahead timeframe.

The electricity market design, as set out in the CACM Guideline is based on four elements:

– A day-ahead market – the wholesale market in which generators, traders, and end users can submit bids and offers to buy or sell energy for delivery on the following day); and in which transmission capacity and electricity are auctioned together, with prices only differing if there is congestion on transmission networks.
– Intraday markets, which allow market players to trade closer to real time, letting them manage risks and respond to changing conditions (such as varying wind forecasts). Intraday markets take place during the day of operation, as opposed to day-ahead markets where trades are concluded the day before the physical delivery.
– A coordinated approach to capacity calculation – including implementing the innovative "flow-based" method – with the objective of making the best use of the electricity transmission lines which interconnect Europe.
– The definition of a series of bidding zones (the largest geographical areas within which market participants can offer and buy energy – in the day-ahead, intraday and longer-term market timeframe – without having to acquire transmission capacity to conclude their trades) on the basis of transparent criteria reflecting both system security and the need to promote competition.

The rules in the CACM Guideline will drive forward closer cooperation and promote the convergence of the existing rules, which are similar in objective but different in detail. Once the CACM Guideline is in force, countries will need to adjust their rules for electricity trading and market participation to meet the rules set out in the Guideline on CACM.

CACM is closely related to two other network codes – Electricity Balancing and Forward Capacity Allocation – which, when combined with the CACM Guideline, will provide the complete set of market rules. In particular, the provisions of the CACM Guideline on calculating cross-border capacities and specifying bidding zones are closely linked to these codes.

Next milestones: adoption and implementation of the CACM Guideline

CACM was the first network code to have entered the Comitology process (in December 2013). Discussions between the EC and Member States were scheduled to last a maximum of six months. However, it is now expected that the EC's Electricity Cross Border Committee vote could take place around the end of 2014. Delays were caused by the legal discussion on the label of the regulation, as

[1] Further information: http://networkcodes.entsoe.eu/market-codes/capacity-alloc-congestion-management/

described earlier in this document. The text will only come into force once it has also passed through the scrutiny process by the European Parliament and the Council, which may take several more months.

Network Code on Forward Capacity Allocation (NC FCA)[2]

The Network Code on Forward Capacity Allocation covers the design and operation of the markets in which the right to use cross-border capacity is sold in advance – be it weeks, months or even years before it will actually be used. Market players are able to buy long-term transmission rights (which come in either physical or financial forms) which allow them to hedge price fluctuations within day ahead markets. Long-term transmission rights facilitate cross-border trading, competition and provide efficient and reliable long-term price indication.

The NC FCA sets out rules regarding the type and quantity of transmission rights which can be allocated, the way in which they are allocated and the way in which holders of transmission rights are compensated in case their right is curtailed. The overarching goal is to promote the development of liquid and competitive forward markets in a coordinated way across Europe.

The implementation of the code will ensure that a range of risk hedging products, which do not exist in all parts of Europe today, are available to market participants. This will reduce the risk of trading in the European market and create incentives to trade in larger volumes. The code is therefore an important element in implementing the electricity market target model and thus in completing the IEM.

In rare cases it may be necessary for allocated long-term transmission rights to be partially curtailed in order to preserve system security (for example because a transmission line fails). The NC FCA defines the different compensation mechanisms (which can vary based on the time when the curtailment is announced) that will be applied by a TSO in these cases.

The NC FCA is closely related to the CACM Guideline. The CACM Guideline covers the design of the day ahead and intraday markets as well as outlining the approach to calculating cross-border capacity and defining bidding zones. These two latter issues are closely related to the NC FCA.

Next milestones: adoption and implementation of the NC FCA
On 1 October 2013, ENTSO-E delivered the Network Code on Forward Capacity Allocation and supporting documents with a letter to ACER. ACER published an opinion on the code in December 2013. In its opinion, the Agency outlined a number of issues on which it considered adjustments were required.

In April, ENTSO-E resubmitted the NC FCA to ACER, accompanied by a supporting document on firmness, which highlights the considerably improved firmness regime that ENTSO-E has included in this version of the code. ACER later recommended the code for adoption to the EC. The code is set to be discussed in Comitology in 2015.

Network Code on Electricity Balancing (NC EB)[3]

The objective of any balancing market – be it national or pan-European – is to ensure that demand and supply remain in continuous balance at the lowest possible cost to customers. The development and integration of the European electricity market follows clear target models in all areas except balancing.

The NC EB aims to move Europe from the current situation in which most balancing is carried out on a national level, to a situation in which larger markets allow the different resources available in Europe to be

[2] Further information: http://networkcodes.entsoe.eu/market-codes/forward-capacity-allocation/
[3] Further information: http://networkcodes.entsoe.eu/market-codes/electricity-balancing/

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used in a more effective way. For this reason, the NC EB sets out a clear series of steps, which over the course of six years will see balancing markets grow from their current relatively underdeveloped state, to a set of regional markets and later a pan-European market.

The NC EB will promote greater integration, coordination and harmonisation of electricity balancing rules in order to make it easier to trade resources. This will allow TSOs to use the resources available more effectively, bring down costs and enhance security of supply.

This sequential approach allows TSOs and market participants to gain and share experience and, when clear milestones are reached to assess the appropriate next steps based on what is best for overall market and system security. This will make for more robust and effective long-term electricity balancing solutions.

A key part of the NC EB is that it creates a level playing field for all potential providers of balancing services, including demand side response and intermittent sources (like wind and solar power) by introducing standardised rules. Anyone will be able to offer balancing services with the most cost effective offers selected by the TSOs. The NC EB will encourage a greater number of parties to offer balancing services, which will create larger and more competitive balancing markets.

Once the code is adopted and in force, TSOs and market players will need to work closely as markets evolve and existing arrangements, national codes or contractual frameworks may need to be updated. The development of a truly European balancing market will take over five years to complete and will require more changes to existing rules than in any other timeframe in which electricity is traded.

Next milestones: adoption and implementation of the NC FCA

On 23 December 2013, ENTSO-E delivered the Network Code on Electricity Balancing (NC EB) and supporting document to (ACER). ACER provided its reasoned opinion on the code on 23 March 2014.

ENTSO-E has studied the reasoned opinion in detail. Several changes to the code were implemented to improve the code. ENTSO-E resubmitted a new version of the code to ACER in the first week of September 2014.

Network Code on Requirements for Generators (NC RfG)[4]

Greater liberalisation of electricity markets and greater interconnection between national electricity transmission systems means that generators are now supplying ever-increasing amounts of electricity across borders. In addition, the nature of how electricity is generated is changing. Renewable generation such as wind and solar is becoming a much more prominent part of the energy mix and electricity is being generated at ever-smaller scales. The electricity system cannot operate reliably without the support of the generators (and the consumers) of electricity. The Network Code on Requirements for Generators sets out the rules that new generators must adhere to in order to connect to the transmission system.

Intermittent RES technologies (wind, solar) have different technical characteristics to conventional generation and are often smaller in size. If they are to contribute to system security in a similar way to traditional plants (which is vital as more renewable generation is added to the energy mix and as older plants close), they need to be designed to provide these services.

The NC RfG will facilitate this process and allow more RES to be connected to the system while ensuring that electricity transmission grids remain stable. As such, the NC RfG will contribute to enhancing the security of electricity supply across Europe.

[4] Further information : http://networkcodes.entsoe.eu/connection-codes/requirements-for-generators/

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The NC RfG will also help create an efficient pan-European (and global) market in generator technology. Manufacturers will have greater certainty about the rules that will apply and will not need to deal with a bespoke national procedures and specifications. The code clearly sets out the tasks and responsibilities for generation owners and network operators (TSO and DSOs). It determines procedures to ensure non-discriminatory treatment of generators across Europe and is based on realistic future generation/demand scenarios. It differentiates pan-European and national level in order to reflect the specificities of individual countries.

Next milestones: adoption and implementation of the NC RfG

Discussions on NC RfG between the European Commission and Members States took place in January 2014 at the Electricity Cross-Border Committee. After CACM, RfG is the second code to enter Comitology. Discussions at the Electricity Cross Border Committee are expected to resume after CACM is adopted.

Network Code on Demand Connection (DCC)[5]

As ever increasing numbers of small solar and wind-powered generators are installed, distribution networks at times are becoming suppliers of electricity. Smart grid technology (like smart meters) is enabling intelligent and active electricity usage – with customers able to participate in deciding when and how they use electricity through demand-side response. TSOs would not be able to manage the changes the system is experiencing without clear rules for everyone connecting to the grid (whether large or small, generator or customer). Without these connection rules it would be impossible to plan the system effectively or to manage it securely.

Most European countries already have basic requirements in place for connecting to transmission grids. However, a common set of rules for users across Europe has until now never been developed. The development of a pan-European electricity market, an increase in the use of energy from renewable sources, and ambitious targets for realising the potential of customers to contribute to managing the energy system using smart grids all make a consistent set of rules necessary. The DCC will ensure that all distribution networks and demand facilities (suppliers and customers) contribute effectively to the stability of the system across Europe.

The DCC will set transparent European rules on how large demand interacts with the transmission system. This code will set out the capabilities that parties connecting to the system will be required to provide and will need to take into account when planning their connection. The DCC clarifies the role that demand response will play in increasing the proportion of energy from renewable sources. The code specifies the basic functional requirements for electricity users who want to feed power back into the system from small-scale renewable generation technologies. It provides a framework for making different household appliances 'DSR ready' (able to adjust their electricity usage automatically), making it easier for consumers to provide demand side response. Given that domestic demand makes up 30-40% of electricity use, giving consumers the opportunity to reduce their consumption at certain peak periods (and save money in the process) would enable renewable energy to provide clean secure supply.

Once the DCC is adopted and in force, each Member State will need to review current standards, codes and requirements to ensure that their national rules are compatible with the cross-border rules in the DCC. The extent of change to national rules will depend on the arrangements which currently exist in a given country.

Next milestones: adoption and implementation of the DCC

[5] Further information: http://networkcodes.entsoe.eu/connection-codes/demand-connection-code/

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Discussions on DCC between the European Commission and Members States took place in March 2014 within the Electricity Cross-Border Committee. DCC was the third code to enter Comitology. However, the EC will not review network codes in parallel and DCC is now scheduled to be discussed again after the Network Code RfG is adopted.

Network Code on HVDC Connections and DC Connected Power Park Modules (NC HVDC)[6]

High-voltage direct current (HVDC) technology is increasingly used in electricity interconnections between different countries. It is of the utmost importance that these new facilities not only support power system security but also contribute to integrating the European energy market (for example by enabling balancing resources to be shared and promoting cross border trade).

The Network Code on HVDC connections sets out the rules and requirements that will cover high-voltage direct current technology. The network code covers HVDC connections between different parts of Europe, as well as specifying the connection rules applying to the generators, which are connected to the main electricity systems via HVDC lines.

Few countries currently have an HVDC grid code, with most setting connection requirements on a per project basis. Once adopted and in force, the NC HVDC will establish a European frame for rule on HVDC technology for the first time.

Next milestones: adoption and implementation of the HVDC NC

On 30 April 2014, ENTSO-E delivered the draft HVDC Network Code to ACER. After the three months review period, ACER directly recommended the code for adoption in July 2014.

The Network Code on Operational Security (NC OS)[7]

In the past, each electricity TSO had their own rules for operating their system; these rules were based mainly on national requirements. Increased interconnection between TSOs, ever increasing amounts of electricity generated from renewable sources and the creation of a single internal energy market means that TSOs now require common, binding rules to operate not only national electricity transmission systems, but also a European system.

When adopted, this code will align and harmonise operational security principles throughout Europe and will make cooperation between both network operators and the users of electricity transmission networks (electricity generators and consumers) legally binding. By doing this, the TSOs ensure that networks operate in a secure, coordinated and efficient manner at all times. Because effective coordination between TSOs is a prerequisite for the completion of the European internal electricity market, the NC OS also contributes to Europe’s energy policy objectives of decarbonising the energy sector and enhancing competition.

Once the NC OS is in force TSOs will need to update their existing systems. For example, it is essential that the information which enables the grid to be modelled and forms the basis for operational security analysis is shared in an identical format so that it can be quickly combined to give a complete picture of the European transmission network. These seemingly small changes will lead to sizable efficiency savings.

Next Milestones: adoption and implementation of the NC OS

[6] Further information: http://networkcodes.entsoe.eu/connection-codes/high-voltage-direct-current-connections/
[7] Further information : http://networkcodes.entsoe.eu/operational-codes/operational-security/

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The Network Code on Operational Security has been recommended by ACER with a small number of remarks. These remarks will be explored with the EC and ACER before they begin processing the network code into a European law. During this phase, ENTSO-E is seeking to provide appropriate support and engage in discussions with Member States, institutions and stakeholders to contribute to a smooth adoption.

Network Code on Operational Planning & Scheduling (NC OPS)[8]

TSOs forecast and plan the operation of the system, exchanging the "schedules" of planned electricity flows, adjusting these forecasts where necessary due to short-term changes (e.g. wind volatility) and finally, operate the electricity transmission system in real time. The last decade has seen enormous changes in the way in which electricity is generated with much higher levels of generation from unpredictable electricity sources, such as wind, traded (100% growth of intraday trade in one year alone) and consumed.

These changes make the job of planning and scheduling the electricity transmission system much more challenging. They also require TSOs to plan on both national and European levels. Clearly, communication and coordination among all European TSOs is key to planning and scheduling the transmission system so that it operates securely at all times. The Network Code on Operational Planning and Scheduling deals with all of these aspects.

When adopted and in force, this code will help coordinate the maintenance of assets across national borders and will determine the roles and responsibilities for transmission system operators, grid users and market participants with regard to the operational scheduling procedures. The code ensures that every actor involved in system operations and electricity markets knows what is expected of them. It determines the roles and responsibilities for TSOs, DSOs, significant grid users and market players with regard to the operational scheduling procedures, and prescribes how these different parties will exchange data. This will enhance operational security, thus support the efficient functioning of the European internal electricity market and facilitate the integration of intermittent renewable generation.

Next Milestones: adoption and implementation of the NC OPS
The NC OPS was recommended for adoption by ACER in November 2013. The Regulators proposed a small number of amendments which will be considered by the European Commission before they begin processing the network code into European law.

Network Code on Load Frequency Control & Reserves (NC LFCR)[9]

TSOs have been working closely to manage system frequency on a voluntary basis for many years. The LFCR code builds on a wide range of proven requirements, policies and standards already in use, but has refined and adapted them so that they reflect the changing dynamics of the European power system.

The NC LFCR sets out the detailed rules for this close TSO cooperation in European law. Therefore, the overriding objective of the NC LFCR is to promote closer cooperation in order to ensure the safe, secure and reliable supply of electricity to customers across Europe. The NC LFCR establishes important rules for how parties providing reserves and TSOs will interact. Among others, the code will establish harmonised procedures for cross-border exchange, sharing and activation of electricity reserves, which will improve the efficiency of the European transmission system. Crucially, the NC LFCR will provide a solid foundation on which a single European electricity market, and in particular, a balancing market can develop. In this respect, the NC LFCR sets out the conditions upon which a pan-European balancing market can be

[8] Further information : http://networkcodes.entsoe.eu/operational-codes/operational-planning-scheduling/
[9] http://networkcodes.entsoe.eu/operational-codes/load-frequency-control-reserves/

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constructed and is closely related to the Network Code on Electricity Balancing. In simple terms, the NC EB sets out the way in which reserves and system services will be procured on a pan-European basis, while the NC LFCR determines the levels of reserves which TSOs need to hold.

Next Milestones: adoption and implementation of the NC LFCR

On 27 September 2013, ACER issued a positive reasoned opinion and recommendation to adopt the network code on Load Frequency Control and Reserves. The European Commission is now reviewing the network code before they begin the process of passing the code into European law.

Network Code on Emergency and Restoration (NC ER)

The Network Code on Emergency and Restoration is a key factor for ensuring security and continuity of electricity supply across Europe, as it deals with the procedures and remedial actions to be applied in the Emergency, Blackout and Restoration states. This involves preparation of system defence, system restoration and re-synchronisation plans in advance, dealing with information exchange, procedures for operating when a system enters into one of these states and ad-hoc analysis of the incidents.

On 1 April 2014, ENTSO-E was mandated by the European Commission to draft these operational rules for electricity. Following the requirements set out in ACER's framework guidelines, ENTSO-E prepared a preliminary working draft of the code – collecting information based on current best practices from TSOs across Europe regarding Emergency and Restoration.

In July 2014, a preliminary working draft was complete and ENTSO-E launched the initial formal development and consultation phases on the NC ER. In order to present and discuss this draft and gain further input into the code's development, ENTSO-E held on 9 July a first public stakeholder workshop while a second public stakeholder workshop will take place on 12 November[10]. The public consultation period started on 13 October 2014.

After the workshops and the formal stakeholder consultation are completed, the input received will be evaluated and a final draft code prepared. This final draft will be delivered to ACER for its opinion before 1 April 2015, to be followed by a submission to the European Commission.

Regional Market Development

In combination with the network codes, regional market-coupling initiatives are essential to achieving an internal energy market. Regional projects, developed in a co-ordinated way, complement the top-down approach provided by the network codes and streamline bottom-up cooperation, bringing regional and national reality to the European context.

Multi-Regional Coupling Project (MRC)

The coupling of national electricity markets on the basis of the Single Price Market Coupling for day-ahead market with implicit allocation of cross-border capacities aims to ensure a harmonised approach to the market organisation and a more efficient use of cross-border transmission capacities. It will increase competition on the markets and contribute to the stabilisation and convergence of wholesale electricity prices as well as increase in the market liquidity. In this context, the Multi-Regional Coupling Project has

[10] https://www.entsoe.eu/news-events/events/Pages/Events/Second-Public-Stakeholder-Workshop-Network-Code-on-Emergency-Restoration.aspx

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been created after the full price coupling of the South-Western Europe (SWE) and North-Western Europe (NWE) day-ahead electricity markets on 13 May 2014.

The day-ahead market is the largest and most liquid market. On 4 February an important milestone was achieved as the North-West European price-coupling project went live. The North-West European region (NWE) covers the Central-West Europe (CWE) region (Belgium, France, Germany, Luxembourg and The Netherlands), the Nordic-Baltic region (Denmark, Sweden, Finland, Norway, Latvia, Lithuania and Estonia) and Great Britain, as well as the *Swepol* link between Sweden with Poland.

With the NWE price-coupling project a fully coupled day-ahead market using the same coupling approach in all involved countries has been established. A significant further step towards the European Internal Electricity Market was reached on 13 May 2014 with the successful go-live of the full price-coupling of the South-Western Europe (SWE) and North-Western Europe (NWE) day-ahead electricity markets, thus emerging in the Multi-Regional Coupling Project.

The extension to the SWE region allows implicit capacity allocation on the French-Spanish and Spanish-Portuguese borders through the Price Coupling of Regions (PCR) solution. Electricity can thus be exchanged from Portugal to Finland or Great Britain to Germany, under a common day-ahead power price calculation.

The coupled area is covering seventeen (17) European countries which represents more than 75% of the European power market.

In parallel to the MRC project, the **'4M' market coupling project** aims to extend the day-ahead market coupling of the Czech Republic, Slovak Republic and Hungary to Romania and Poland.

As a result, representatives of national regulatory authorities (ERÚ, ÚRSO, HEA, URE and ANRE), transmission system operators (ČEPS, SEPS, MAVIR, PSE and Transelectrica) and market operators (OTE, OKTE, HUPX, TGE and OPCOM) of the Czech Republic, Slovakia, Hungary, Poland and Romania signed on 11 July 2013 a memorandum of understanding on cooperation with respect to Romania and Poland joining the integrated day-ahead electricity markets of the Czech Republic, Slovakia and Hungary. **The expected day of the go live of this extension is 11 November 2014**.

Coupling of the Polish market will take place later on within the CEE FBMC project (Central East Europe Flow-Based Market Coupling). Until then, the five power exchanges will continue cooperating with the implementation of the PCR (Price Coupling of Regions), closely aligned with the integration of the Multi-Regional Coupling project.

The next step towards the target model will be the implementation of the flow-based capacity methodology for capacity calculation with the go-live of the Central-West Europe flow-based project before the end of 2014. Italian Borders and Swiss northern Borders will follow joining the MRC project.

Afterwards, the inclusion of the regions Central-South Europe (comprising Italy, France, Switzerland, Austria, Slovenia and Greece) and Central-Eastern Europe (comprising Poland, Czech Republic, Slovakia, Hungary, Romania and Slovenia) will be driven forward.

Intra-day Market coupling

Coupling national intraday (ID) markets increases intraday liquidity for the benefit of all market players and supports a better integration of renewable energy sources. This will therefore make the network more secure. The CACM Network Code (see above) defines the rules for a continuous intraday market allowing market participants to trade close to real time (roughly one hour ahead of real time).

The most important project in the intra-day area is the Cross-border Intra-Day Project, (now involving France, Belgium, Luxembourg, Netherlands, Germany, Switzerland, Austria, GB, Denmark, Sweden, Finland, and Norway). The project is presently working on the implementation of a pan-European intra-day market coupling solution, which allows for continuous implicit trading; i.e. a more liquid and better integrated market. A precise timing for the implementation of the platform cannot yet be given.

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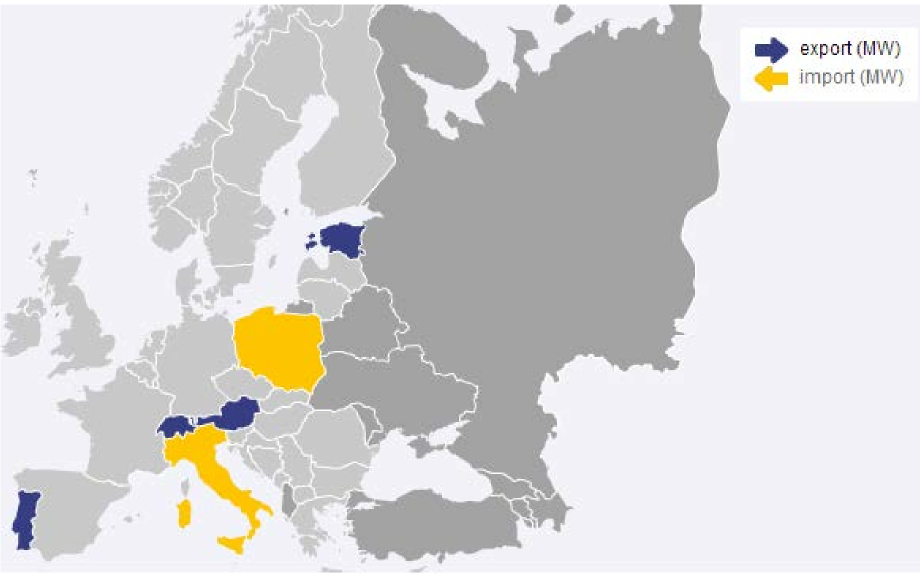
Market Transparency

The transparency of fundamental electricity market data is instrumental to creating a level playing field for market participants and thus indispensable for the integration of the European electricity market. Following the publication of EU Regulation 543/2013 in June 2013 on the submission and publication of data in electricity markets, ENTSO-E has been mandated to develop and operate a new central information transparency platform as well as a manual of procedures, providing the necessary technical information for primary data owners, data providers, TSOs and end users.

This significant redesign and major upgrade of ENTSO-E's existing transparency platform (www.entsoe.net) will provide information free of charge to all market participants and will thus help to create a level playing field between market participants, reducing the scope for any abuse of market power and ultimately benefiting the implementation of the Internal Energy Market.



Screenshot from ENTSO-E's present transparency platform www.entsoe.net

Throughout 2013, a special ENTSO-E stakeholder advisory group, consisting of generators, power exchanges, information providers and major wholesale consumers, has engaged with stakeholders to make progress on the development of the new information platform.

ENTSO-E will begin the testing of the new transparency platform in co-operation with data providers from September 2014 with the aim of launching the platform before 5 January 2015.

The information to be published by ENTSO-E is collected from data providers such as TSOs, power exchanges or other qualified third parties. The information on generation, load, transmission and balancing will be available to view online or to download. ACER will have special access to the information for part of the obligations under REMIT and the EC will continue to use the information as part of their Electricity Market Observation.

Infrastructure Development for a pan-European integrated electricity market

Making the internal market a "reliable reality" depends on building the necessary network infrastructure on time to create adequate transmission capacity inside and across the borders of Members States, as well as in many neighbouring countries. Interconnectors contribute to increasing social economic welfare, they facilitate the integration of more renewable energy sources, help reduce CO_2 emissions and are essential in contributing to system security.

ENTSO-E's tool for pan-European infrastructure investment planning is the ten-year network development plan (TYNDP). The Third Energy Package defines the framework of the development process, which ENTSO-E has been continuously improving from its release of the pilot project in 2010, through the release of the first official TYNDP in 2012 and the preparations for the next TYNDP, released for consultation on 10 July, until 20 September.

ENTSO-E prepares its TYNDP in order to identify gaps in infrastructure from a European perspective and inform individual Member States and other stakeholders about projects that have a European network-wide impact.

The TYNDP package, together with ENTSO-E's Scenario Outlook and Adequacy Forecast (SOAF) and Regional Investment Plans (RIPs), gives the most comprehensive view of pan-European and regional system development. The SOAF forecasts and assesses long-term generation adequacy and provides the base scenarios for market and network studies within the TYNDP framework.

Latest TYNDP developments

After the consultation comments are assessed, the TYNDP will be submitted to ACER in October and the final document will be released in December 2014.

The 2014 TYNDP contains a number of improvements over the previous 2012 publication. The time horizon for the TYNDP has been extended to **cover the 2030 time horizon**. The process has also been widened to fully take into account third party projects. Third party project promoters may be TSOs of non-ENTSO-E countries whose infrastructure connects to an ENTSO-E member TSO or private promoters building transmission or storage infrastructure in the ENTSO-E area. Further improvements have been made to enhance the cost-benefit analysis methodology and assess projects against a wide range of scenarios for 2030. The involvement of relevant stakeholders into the process has been further enhanced (especially during the process of building the 2030 scenarios) and a Long Term Network Development Stakeholder Group was created.

Main findings of the TYNDP 2014

The TYNDP 2012 had analysed the first steps towards an energy transition by 2020 characterised by large increases in RES development. The TYNDP 2014 confirms and completes these trends identified in 2012 through to 2030.

The €150 billion grid expansion proposed by the TYNDP 2014 brings significant positive economic and environmental impact. The enhanced market integration will reduce bulk power prices by 2 to 5 €/MWh, enable the mitigation of 20% of power sector CO_2 emissions by 2030 and enable the expected major shift in the generation pattern due to increase in RES generation. This will be achieved with only a limited percentage of the proposed projects (<8%) crossing protected and urbanised areas.

The four 'electric peninsulas' in Europe

The vast majority of the proposed investments address RES integration issues, either where direct connection of RES is required, or because the network section or corridor is a key-hole between RES and load centres. Projects of pan-European significance help avoid 30 to 100 TWh of RES spillage globally, reducing it to less than 1% of the total supply. Liquidity in power markets will thus be enhanced, thereby limiting the volatility of prices.

The TYNDP 2014 pinpoints about 100 spots on the European grid where bottlenecks exist or may develop in the future if reinforcement solutions are not implemented. The most critical area of concern is the stronger market integration to mainland Europe of the four main "electric peninsulas" in Europe. The Baltic States have a specific security of supply issue, requiring a stronger interconnection with other EU countries.

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Spain with Portugal, Ireland with Great Britain, and Italy show a similar pattern. These are all large systems (50-70 GW peak load) supplying densely populated areas with high RES development prospects, and as such, they require increasing interconnection capacity to enable the development of wind and solar generation.

The TYNDP in the context of the trans-European Energy Infrastructure Regulation (EU) 347/2013

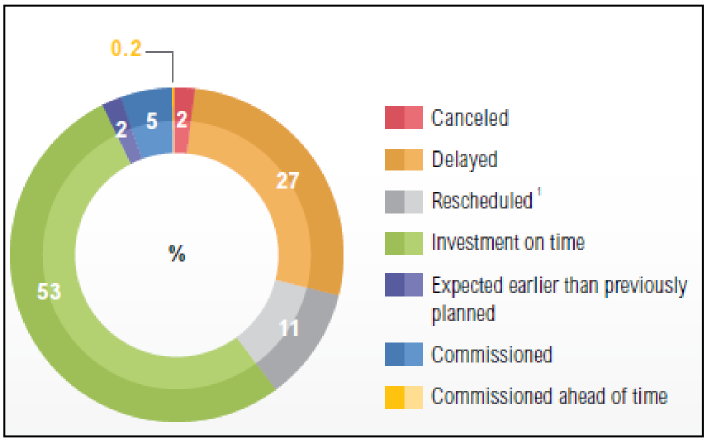
The EU's trans-European Energy Infrastructure Regulation (EU) 347/2013 entered into force in May 2013 and mandates the ENTSO-E TYNDP to provide greater transparency into the entire European transmission network. The Regulation defines European *Projects of Common Interest* (PCIs), which are electricity projects that have significant benefits for at least two Member States. They contribute to market integration and better competition, enhance security of supply and reduce CO2 emissions. Their definition is thus consistent with the definition of TYNDP projects. PCI projects can potentially be eligible for faster permitting, special regulatory treatment and EC financial support from the Connecting Europe Facility under which a €5.85 billion budget has been allocated to trans-European energy infrastructure for the period 2014-20.

Regulation (EU) 347/2013 requires for the TYNDP to be the sole basis for the selection of PCIs. The Regulation states that for an electricity transmission or storage project to be recognised as a *Project of Common Interest*, it must be included in the preceding TYNDP. This also applies to third party projects. However, the assessment process by which transmission infrastructure projects obtain PCI status is separate from the TYNDP process. Although PCI projects must be listed in the preceding TYNDP, the establishment of the PCI lists is the responsibility of the European Commission with the support of regional groups. Consistent with the TYNDP process, the PCI process does not distinguish between TSO and third party projects.

The first EU-wide PCI list was adopted by the EC on 14 October 2013 and included projects from the TYNDP 2012. As of 2013 the EC publishes a biennial list of EU-wide transmission and storage PCIs.

Progress on infrastructure investments to 2014

In the run-up to the 2014 TYNDP, ENTSO-E published in June 2013 an updated monitoring report of the 100 projects identified by the TYNDP 2012. Accordingly, **one third of the projects foreseen by the TYNDP 2012 are delayed by one or two years**. These delays put at stake the important European energy policy objectives that depend on timely infrastructure implementation, including market integration, renewables integration, carbon reduction targets and system reliability.



The major reasons for these delays are due to difficulties in gaining permits and seeking public consent necessary for building new infrastructure. Regulation (EU) 347/2013 sets a new framework to speed up the permitting procedures for infrastructure, which is a key step forward in this process. But, after having granted permits, project promoters still face very often severe opposition due to lack of public acceptance. **A clear political willingness and commitment to build the required infrastructure, at EU and national level and with more consistent regulatory frameworks, will be needed to support the process**.

The financing challenge is a very significant one

Other common causes for delays include securing financing. The €150 billion investment needs identified by the TYNDP 2014 only represent a subset of the entire investment challenge for TSOs. This amounts to unprecedented capital requirements for TSOs, while regulatory frameworks in most European countries tend to focus on lowering tariffs. As a result, TSOs' credit ratings and financial ratios deteriorate and, regulatory risk, as perceived by investors, significantly impacts TSOs' ability to attract funds on global capital markets. To maintain TSOs' credit ratings and financial ratios in a period of increased investment need, it is of the utmost importance that regulatory frameworks are stable to attract investors and improve TSOs' ability to raise funds on international markets. In this context a priority premium could represent a suitable solution. A premium constitutes a supplement linked to important projects, on top of the typical TSOs rate of return. Such a mechanism would contribute to fostering the timely delivery of transmission investments.

Establishing and developing harmonised information exchange standards

In the context of a European Internal Energy Market, the integration of RES is facilitated by balancing the fluctuations brought to the grid due to their intermittent nature. This can be tackled by electricity grids operating smartly and cost-efficiently. To do this, a seamless and efficient information exchange is necessary at various stages, between an increasing number of companies – TSOs, DSOs, generators etc. ENTSO-E is playing a driving role in establishing, maintaining and further developing such standards, ensuring that these standards are developed in line with TSO requirements and are compatible with third parties and service providers.

In particular with regards to developing standards for the exchange of data required by deregulated energy markets, ENTSO-E is closely cooperating with the International Electrotechnical Commission.

Since July 2010, ENTSO-E has been conducting various interoperability tests to validate the developed standards. The latest of these tests took place in July 2014, validating exchange standards for the Common Grid Model, which is indispensable for pan-European system development (TYNDP), the implementation of ENTSO-E's network codes, for market information and transparency and capacity allocation and congestion management, just to mention the most relevant. The interoperability of the applications used by TSOs for operational and system development exchanges is crucial and ENTSO-E has the objective to ensure the interoperability via compliance of those applications with the Common Grid Model Exchange Standard (CGMES) requirements. Thus ENTSO-E approved the CGMES Conformity Assessment Framework.

The European style market profile (ESMP), as defined in IEC 62325-351, provides the core components for use in the IEC 62325-451-'X' standards, which target specific core business processes within Europe's internal electricity market, such as scheduling, settlement, capacity allocation and nomination, acknowledgement, etc.

Developing further the European target Model

The electric system is in all its dimensions deeply impacted by fundamental changes in the electricity generation portfolio. The evolution of the internal electricity market is central to resolve these challenges. ENTSO-E and its member TSOs have an important role in ensuring that this market evolves, facilitating the increased renewable penetration but respecting the technical resilience of the pan-European power system that society relies on. In this area, TSOs have identified some significant challenges which will have to be addressed through adjustments to the overall market design. Most of the challenges the European electricity system faces towards 2030 can be grouped in two main categories:

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1. **Effectiveness of price signals to stimulate appropriate investments and performances:** Today's electricity markets shortcomings do not lead to correct price signals for investments and performances for a number of reasons. Externalities (adequacy, resilience, location, etc.) are not properly included in prices; society/politicians do not accept shortages and scarcity prices, and end consumers prices are not yet dynamic enough to reflect price changes in wholesale markets.
2. **Operational issues**. Electricity markets should deliver efficient outcomes in line with system needs. To correct deviations between market outcomes and system needs, TSOs require appropriate tools. As such deviations are today increasing in magnitude and complexity, TSOs will need more tools and more control, unless the market can find means and incentives to limit such deviations. Many of these are accentuated due to the sharp rise in RES.

Direct enhancements of today's electricity markets will contribute to solving the above challenges, albeit not being sufficient by themselves to completely meet them all.

Long-term solutions to address the key challenges require an 'augmentation' of the market design: complementing the Target Model with additional features, while preserving it. This enhanced Target Model must therefore be consistent with the respective responsibilities of market participants and TSOs.

Future market design will need to address capacity adequacy and flexibility needs. Without such adjustments to the current market design, the Internal Electricity Market will not function properly. ENTSO-E and its members are actively developing solutions within their remit of responsibilities and competences to address these challenges.