ACER
Agency for the Cooperation of Energy Regulators

Framework Guidelines on Electricity Balancing

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Initial Impact Assessment

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Draft

Note: In January 2012, the European Commission awarded a consortium of consulting companies to assist ACER in drafting an impact assessment for the Framework Guidelines on Electricity Balancing. The task includes:

1. **Identifying together with ACER the issues and options for European electricity balancing market based on the target model.**
2. **Analysing the feasibility and technical, economic and social impacts of the identified options.**
3. **Proposing the key design elements for a European balancing market to be included in the framework guideline.**
4. **Proposing a tentative roadmap for implementing a European balancing market.**

Inputs from this study are expected during the public consultation phase and will also support the quantification of costs and benefits of different integration models. These results will be used in final Initial Impact Assessment to further support the Framework Guidelines on Electricity Balancing.

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1 Procedural issues and consultation of interested parties

1.1 Identification

Electricity balancing covers all the actions and activities performed by a transmission system operator (TSO) to ensure that in a control area, total electricity withdrawals (including losses) equal total injections in real time operation. These activities, simultaneously performed in all control areas and between control areas, contribute to ensuring the global system balance and stability. In some countries, balancing markets can also be used to redispatch generation for congestion management purposes. Not only are the balancing mechanisms technical arrangements set out to ensure system stability; they also have implications on competition as procuring operating reserve capacities and balancing energy normally entails commercial arrangements with imbalances levied on the market through settlement mechanisms.

As national grids and electricity markets have become more interconnected, the interest in cross-border balancing has grown. When national control areas are synchronously connected, the physical characteristics of power flows require that national TSOs cooperate in order to balance the entire system.

Cross border balancing arrangements can also play a role between non-synchronous interconnected markets, as we can see from the BALIT arrangements, which have been in place on the IFA interconnector since December 2010.

1.2 Rationale behind the Initiative and ACER Mandate

At the heart of the third legislative package is the development of EU-wide Network Codes on topic areas for the integration of EU electricity and gas markets. The objective of these codes is to promote the completion and functioning of the internal market in electricity and cross-border trade and to ensure the optimal management, coordinated operation and sound technical evolution of the European electricity transmission network. The process for developing these codes is stipulated in the Third Energy Package legislation and includes the elaboration of Framework Guidelines by ACER, which set out the key principles for the development of the Network Codes by ENTSO-E.

The Framework Guidelines for Electricity Balancing aim at setting out clear and objective principles for the development of network codes pursuant to Article 6 paragraph 2 of Regulation (EC) No 714/2009 (the “Electricity Regulation”). They cover the areas pursuant to Article 8 paragraph 6 (h) and (j) of the Electricity Regulation (EC). The network code(s) adopted according to these Framework Guidelines (the “Electricity Balancing Network Code(s)”) will apply to the rules for trading related to technical and operational provision of system balancing and the balancing rules including network-related reserve power rules between the zones in the EU electricity market. The Electricity Balancing Network Code(s) shall be without prejudice to the Member States’ right to establish national Network Codes which do not affect cross-border trade[1];

These Framework Guidelines address the integration, coordination and harmonisation of the balancing regimes, in order to facilitate electricity trade within the EU in compliance with Directive 2009/72/EC (the “Electricity Directive”) and the Electricity Regulation.

[1] Article 8.7 Regulation (EC) No 714/2009

The European Regulators' Group for Electricity and Gas ("ERGEG") developed Guidelines of Good Practice for Electricity Balancing Markets Integration (GGP-EBMI) in 2009. These GGP contained ERGEG views on electricity balancing markets integration, in the sense of Articles 11.7, 14.6 and 26.2(b) of the Electricity Directive (2003/54/EC). The final GGP-EBMI (E09-ENM-14-04) was published in September 2009. To draft the GGP-EBMI, NRAs cooperated with consultants working on a study about balancing, intraday and ancillary services for the EC. The conclusions of this study also constitute relevant background information and were considered in the preparation of the framework guidelines on balancing.

The 15th Florence Forum, held November 2008, invited ERGEG to establish a Project Coordination Group of experts, with participants of relevant stakeholders, with the tasks of developing a target model for 5 key areas: capacity calculation, long-term capacity allocation, day-ahead, intraday and balancing. Although a multilateral TSO-TSO model with common merit order was seen as the long-term target model, the agreed medium-term target model for cross-border balancing exchanges was a multilateral TSO-TSO model without common merit order. In December 2009, the Florence Forum welcomed the initiative, the work done and the target model proposed. This broad agreement could facilitate the agreement on the content of the Framework Guidelines and Network Code on Balancing and on the concrete implementation of balancing markets integration projects

In mid-2011, ENTSO-E published a position paper on cross-border balancing[2] in which several issues related to implementation of the target model are highlighted, in particular, preserving high levels of security of supply enjoyed to date, consistency of target model with other areas of market development and clearly defined responsibilities of each TSO in cross-border balancing schemes.

In this context, the European Commission invited ACER to draft the Framework Guidelines on Electricity Balancing, taking into account overlapping conclusions from the Framework Guidelines on System Operation and acknowledging links with the Framework Guidelines on Capacity Allocation and Congestion Management (CACM). The invitation letter from the Commission, which was sent on 18 January 2012, acknowledged the conclusion of the scoping phase and requested the Framework Guidelines to set the framework for competitive, harmonised and effective EU-wide balancing arrangements.
Furthermore the Framework Guidelines should anticipate on further developments such as increasing intermittent generation and the more active role for consumers. In particular they should:

- set out the roles and responsibilities of both TSOs and balancing service providers;
- set out harmonised technical specifications for facilities providing balancing services;
- define compatible balancing products and timeframes for the procurement of balancing services, and prepare harmonised rules for the award and remuneration of these services;
- set out a harmonised and non-discriminatory framework for settling system imbalances with the balance groups, including pricing of imbalances, imbalance periods, settlement timeframes, clearing requirements;
- set out rules for the use of cross-border transmission capacities for the exchange of balancing services. The rules should also consider how access arrangements can efficiently accommodate both requests for balancing purposes and for firm commercial deliveries.

1.3 Consultation and expertise

2 https://www.entsoe.eu/fileadmin/user_upload/_library/position_papers/110531_AS_TOP_08_XBBalancing_Consolidated_Final.pdf

ACER has set up an "ad hoc" expert group to provide support during the development of the Framework Guidelines. The expert group consists of experts with a diverse background ranging from TSOs, generators, end users, consultants and academics. The expert group met with the drafting team in three meetings on August 28th, October 11th and November 29th 2011.

On October 24th 2011 ACER hosted a workshop on Electricity Balancing in Ljubljana. ACER presented its initial views on the main policy options available and invited stakeholders to express their opinions. The summary of the workshop can be found on the following link:

http://www.acer.europa.eu/portal/page/portal/ACER_HOME/Stakeholder_involvement/Events/ACER_Workshop_on_Electricity_Balancing_Framework_Guidelines/ACER%20Workshop%20on%20Electricity%20Balancing%20FG%20-%20Summary.pdf

2 Problem definition

2.1 What is the issue or problem that may require action?

System balancing is a complex task which requires TSOs to take actions to ensure that electricity demand and supply are equal in real-time in order to preserve the good functioning of the system. This task has been historically entrusted to national TSOs, as the single entities with sufficient information on system frequency, national generation, consumption and network topology to efficiently balance the system. As a consequence, TSOs established – after extensive market consultation and approval by NRA's – their national balancing systems. Being designed according to historical national specificities (generation portfolios, significant presence of internal congestions and level of interconnections with foreign markets) these systems can significantly differ from one country to another. The wide variety of balancing market designs existing at European level is generally believed to hamper the integration process.

Lack of competition

The European Commission's sector enquiry revealed high levels of concentration within national balancing markets[3]. This, combined with a low degree of integration, enables generators to heavily influence the market outcome. This effectively creates barriers to market entry for suppliers, who face imbalance price risk and/or high network charges (to the extent that balancing costs are included in the costs of the network)[4]. It is possible that this balancing market concentration could be decreased through a higher degree of cross-border integration, a reduction in entry barriers and an improvement in market efficiency. This could be done through the introduction of more competition between balancing service providers and increased liquidity in balancing energy trading.

With interconnection capacities not being fully used[5] and the balancing need not always being in the congestion direction, there is also room for improving competition by means of cross-border balancing exchanges.

Market distortions

At present, access to balancing resources is mostly limited to national markets. This lack of market integration has also been identified by a study commissioned by the EC[6]. The study highlighted the risk of migration of imbalances from one country to another due to cross-border trade between different market designs, as market participants are not confronted to equivalent balancing incentives in the different countries.

Harmonisation of national arrangements, to a certain extent, is required in order to improve security of supply, avoid market distortions and refrain from discrimination among balance service providers participating in different markets. Removal of market distortions and increased competition on balancing market can reduce the overall cost of balancing the system.

Security of supply

To ensure a certain level of security through these isolated balancing markets, TSOs procure balancing reserves within their control area. The development of cross border balancing may

[3] DG Competition report on energy sector inquiry (SEC(2006)1724, 10 January 2007)
[4] Energy sector inquiry, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52006DC0851:EN:NOT
[5] See as an example the CWE report on electricity interconnection management and use in 2008: http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_ACTIVITIES/EER_INITIATIVES/ERI/Central-West/Final%20docs/Report%20on%20electricity%20interconnection%20-%20CWE%20region%20-%20200.pdf
[6] TREN /C2/84/2007; Study of the interactions and dependencies of Balancing Markets, Intraday Trade and Automatically Activated Reserves

reduce the need for reserves and increase competition on the balancing market, thereby improving reserve procurement efficiency and reducing the costs of balancing the system.

Moreover, the development of cross-border exchanges closer to real-time emphasises the importance of TSOs' task of balancing the system while it may impact the level of resources available for them. As a consequence, it is required that the on-going market integration process also prioritises the integration of balancing markets[7].

Integration of renewables

The increasing amount of intermittent generation from renewable energy sources (RES), concentrated in certain areas of the system, may increase the need for balancing products. Such developments may require a new approach in the management of interconnected electricity systems, allowing national systems to exchange balancing resources. Developing cross-border balancing can be considered essential in accommodating an increasing amount of intermittent generation without jeopardising the European system and inducing high additional costs to balance the system.

Low market integration

Despite the potential gains evoked above, few initiatives have emerged so far to develop cross-border balancing. The on-going market integration process involves timeframes prior to balancing operation, such as the day ahead and intraday timeframes. However, the extreme variety of existing balancing arrangements, as reported by ENTSO-E also[8], may hamper the process of market integration in other timeframes as well as balancing or discriminate among market participants.

The impact the development of cross-border balancing have on all market timeframes should encompass national harmonisation.

Lack of competition, risks to security of supply and high costs of balancing are amongst main concerns that are currently being raised in the discussion on balancing markets. Therefore cross-border integration of national balancing markets could be a viable solution that would assist in developing competition, increasing security of supply and reducing balancing costs.

[7] See as an example Eurelectric position paper towards market integration of reserves and balancing markets: http://www2.eurelectric.org/DocShareNoFrame/Docs/1/NHHLPMCDKOINAPGJLFKHMGLE77VD8TBOQHUHMJHNHT5D/Eurelectric/docs/DLS/IntegrationofReserveBalancingMarketsFINAL-2008-396-0004-2-.pdf

[8] https://www.entsoe.eu/fileadmin/user_upload/_library/position_papers/ENTSO_BalancingMaps_Final.pdf

3 Objectives

3.1 General policy objectives

Following legislative provisions of the EU Third Energy Package the overarching policy objective is to achieve a well-functioning, open and efficient internal electricity market within Europe. Balancing market integration has been highlighted as a necessary step to achieve this goal. Given this context, the Framework Guidelines aim to provide an adequate framework to foster integration of EU balancing markets.

3.2 Specific policy objectives

The policy options will be evaluated and considered in light of the following objectives:

3.2.1 Guarantee / enhance operational security

TSOs ensure that the real-time balance of production and consumption is maintained, which means the short-term operational security is not compromised. The development of cross-border balancing must at minimum maintain the level of operational security at the current level.

- How does the proposed option affect short-term operational security?

3.2.2 Improve competition in balancing markets

Competition issues are crucial to the proper functioning of the Internal Electricity Market. For the provision of balancing services the current lack of integration between European balancing markets may affect price formation and market liquidity. Moreover, as described in the previous paragraphs, balancing markets are generally national and – in consideration of existing limitation (internal congestions, grid topology, available generation portfolios) to the number of potential service providers - highly concentrated, which gives generators scope for exercising market power.

Reducing possible entry barriers for balancing service providers and facilitating wider participation of demand response and renewable sources of energy may improve the liquidity and competition in the balancing markets.

Increasing cross-border balancing exchanges may (as it is true for integration of European markets in general) improve the efficiency of balancing markets and reduce overall costs, allowing that only most efficient generators are used to balance the system, in consideration of all the network limitations.

- What is the impact of the proposed option/FG on competition in the balancing market, and in the EU electricity market in general?

3.2.3 Increase social welfare

Currently there is a low degree of cooperation between TSOs for balancing purposes. Increasing competition within balancing markets, improving cooperation between TSOs, developing cross-border balancing and/or giving the right incentives to market players may limit the overall amount of needed reserves and balancing energy and therefore reduce the costs of balancing, while preserving the current security standards. This could benefit the efficiency of system balancing and have impacts on the overall electricity market. However increasing competition within balancing

market and developing cross border balancing should not cause adverse effects in other electricity markets.

- What is the impact of the proposed option / FG on the overall social welfare[9]?

3.2.4 Facilitate integration of intermittent generation from renewable energy sources

With a growing share of intermittent generation from renewable energy sources in the generation mix, the system imbalances (and thus the need for *operating reserve capacity)* may increase. At present, European balancing market designs are very different, and networks arrangements were not developed to accommodate high levels of intermittent generation. Those differences may impact further integration of renewables, which can only provide accurate generation forecasts closer to real time.

- What is the impact of the proposed option on the integration of intermittent generation?
- Does the proposed option limit or induce barriers to market entry for intermittent generation?

[9] This analysis should not only take into account the reduction of balancing costs but also the side-effects on the overall market.

4 Evaluation criteria for the policy options

For each of the identified problem areas that require action, and in relation to the objectives defined in preceding chapters, we describe and assess most suitable solutions and put forward a preferred option.

From a high level perspective, options range from maintaining the status quo ("Option 0") to detailed legislative requirements for full harmonisation of balancing market aspects. Middle options leave scope for national and regional arrangements, recognising that different areas and problems may need different approaches.

The way a certain option is implemented depends on a number of aspects in the policy assessment. To achieve the desired result, different combinations of mechanisms can be considered alongside particular policy options. Impact assessment should underline where a determined mechanism would have a significant role in driving a policy option's impact.

According to the EC Impact Assessment Guidelines[10], the screening process should consider the main policy options and then eliminate the not-applicable ones immediately.

Moreover, for the policies considered (including *Option 0*), it is important to consider all the relevant positive and negative impacts alongside each other, regardless of whether they are expressed in qualitative, quantitative or monetary terms.

A screening process should consider the main policy options to meet the policy objectives and then eliminate the non-applicable ones. This process may be based on the following criteria:

- Effectiveness: to what extent the options can be expected to achieve the abovementioned objectives?
- Time of implementation: how long could the option take to be implemented?
- Efficiency: what are the expected benefits of the option compared to the costs of implementation?
- Coherency: are the options coherent with other overarching EU objectives (e.g. energy sector or environmental policies and targets)?

Policy options scoring high in screening process may be subject to a cost-benefit analysis for diverse parties affected. Although a quantitative approach is not straightforward at this stage, a differentiated view on all influencing and influenced factors is provided.

[10] http://ec.europa.eu/governance/impact/commission_guidelines/commission_guidelines_en.htm

5 Description of the identified options

5.1 Interaction between integration and harmonisation issues

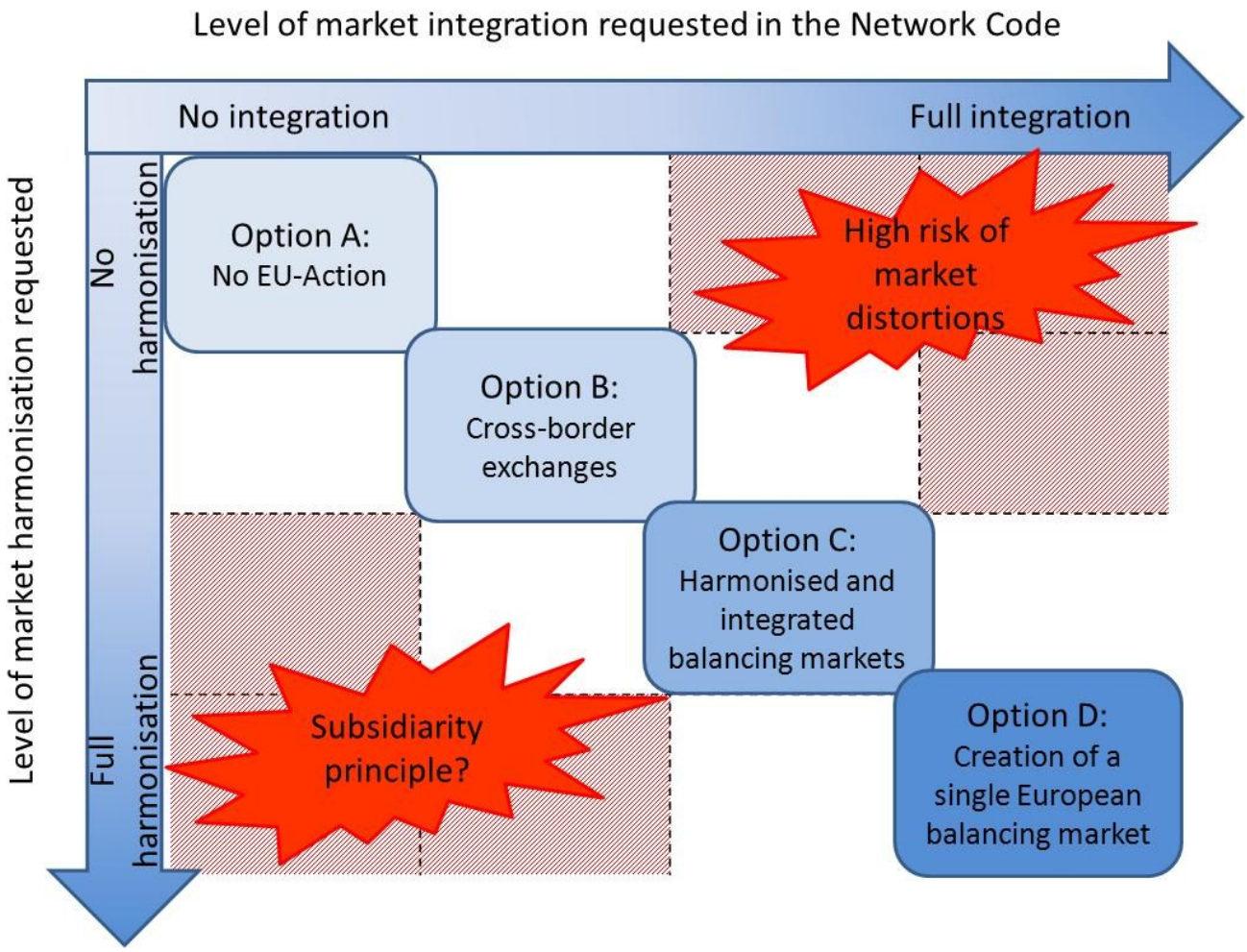
The improved functioning of balancing markets could be achieved by using two parameters: by enhancing and harmonising national market design and/or by integrating balancing markets across Europe.

It could be envisaged that a stronger harmonisation is foreseen in the first place, in order to facilitate further integration of balancing markets and to create a level-playing field for the wholesale markets (long-term, day-ahead, intraday).

On the other hand, it could also be envisaged to focus on integration of balancing markets, expecting that necessary harmonisation will come along in the implementation phase.

Nonetheless, in accordance with the principle of subsidiarity, Member states shall keep the rights to establish national network codes that do not affect cross-border trade, in accordance with Article 8(7) of the Electricity Regulation.

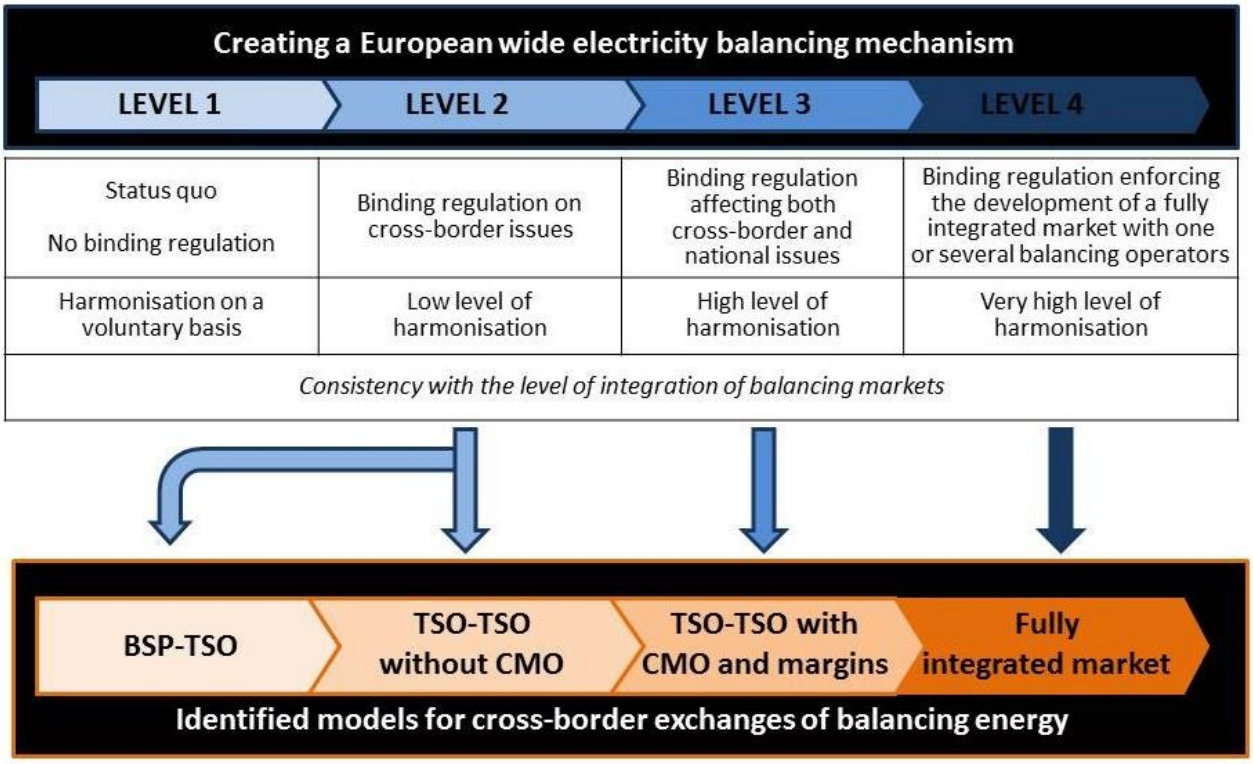
However it is important to note that the existence of fragmented local balancing market arrangements could result in distortions that may create substantial implementation challenges for wider integration of balancing markets.



Interaction between the harmonisation and the integration of balancing markets considering the different options

Therefore, there is a need to ensure consistency between requirements in terms of harmonisation and requirements in terms of integration of balancing markets.

The following chapter therefore takes this issue into account by describing identified models to exchange balancing energy consistent with the options to create a European-wide balancing mechanism. Such links are illustrated in the following graph:



5.2 Option A: status-quo

This option consists in letting the current voluntary approach evolve without a binding European regulation in place. In this way the existing on-going experiences will be free to develop, if so decided by the participating systems.

For instance, projects such as the Balancing Inter TSOs (BALIT) and the international Grid Control Cooperation (GCC) have grown in importance during the years, gathering new participating systems: this suggests that a pure voluntary approach may deliver some level of integration over time.

However, with this option, some countries may decide not to share their internal resources or to take part to the integrated balancing market. This would results in a situation where expensive resources are often activated in some countries, while in other countries cheap resources are being kept locally for security reasons, but are rarely activated. This option may also suggest that a fully integrated European balancing market may never be achieved as we could expect an evolution of the decentralized regional or bilateral experiences, without any proper harmonisation requirements.

5.3 Option B: creating a European exchange of balancing services through a legally binding regulation defining minimum harmonisation requirements necessary to develop cross-border exchanges

Scope of the EU regulation

This option consists of developing a binding European regulation that focuses on cross-border (or cross control area) exchanges of balancing services. Such regulatory framework will then be designed to be compatible with national regulations.

A limited set of balancing products – "cross-border" balancing products – will be identified and each participating TSO may or will be required to share these products with other European control areas. The rules governing the national markets will however not be subject to any binding European regulation and will remain in the scope of the national regulations.

The European binding regulation may only request the harmonisation of the characteristics of national balancing markets, which is necessary to enable cross-border exchanges. However, this option may allow for national-only balancing products to co-exist in parallel with products for cross-border exchange.

Under this option more harmonisation of national market designs could emerge, but there is no guarantee that a full harmonisation will ever be reached.

Exchanges of surpluses of balancing energy

With this option the development of cross-border exchanges would be based on the concept of surpluses of balancing energy. Such exchanges involve surpluses that are not needed locally to meet the security criteria and/or balancing expectations, to be exchanged after the gate closure time of the cross-border intraday market and on the basis of the availability of sufficient transmission capacity.

As balancing market designs may differ among control areas because of the technical characteristics of balancing resources being available locally as well as balancing needs (generation mix, consumption pattern, etc.), several independent approaches derived from this concept may be considered to better suit the regional specificities.

To foster the exchanges of balancing energy from replacement reserves (and possibly manually-activated frequency restoration reserves), a *BSP-TSO* and a *TSO-TSO without common merit order* can be considered.

To foster the exchanges of balancing energy from automatically-activated frequency restoration reserves, an *imbalance netting* mechanism can be considered.

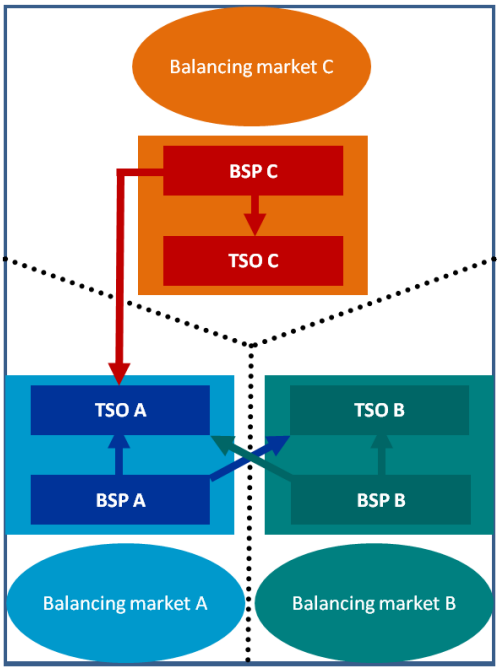
Regardless of the sub-model considered below, harmonisation of key elements of national balancing markets (e.g. balancing energy and reserve products, gate closure times, pricing, imbalance settlement etc.) is not a prerequisite to develop cross-border exchanges of surpluses.

- BSP to TSO model

Key features

A BSP to TSO model enables a BSP to provide balancing services directly to a TSO situated in another control area. Thus, BSPs need to identify themselves what is the best possible allocation of their resources among control areas, based on the information they have.

The providing BSP is responsible for building the balancing product, as well as notifying the change in generation and/or consumption schedules (and possibly interconnection capacity acquisition) to the requesting and



local TSO, with respect to the rules for scheduling generation, consumption and cross-border exchanges.

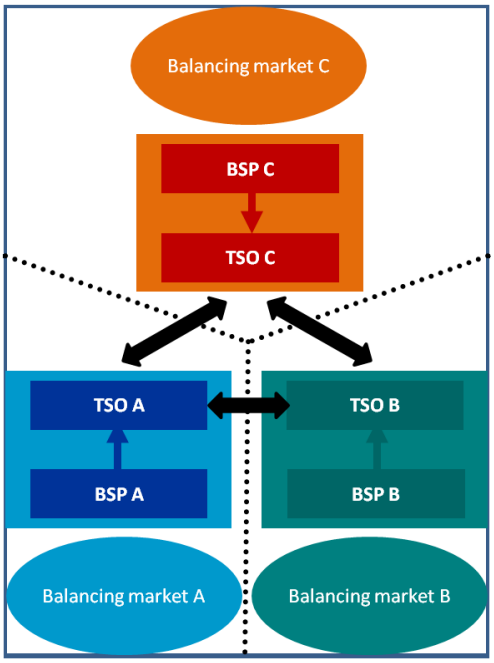
Implications in terms of system operation

The involved TSOs have agreed procedures for the event of acceptance of a bid/offer. The decision process is based on transparent rules for scheduling generation, consumption and cross-border exchanges. Especially for security reasons, the local TSO, where the BSP is located may have the possibility to veto the change in the BSP's program and inform the requesting TSO that the offer is not available.

- TSO to TSO without common merit order

Key features

The bids in the balancing markets become available for activation for other TSOs by decision of the providing TSO after defining the amount of balancing energy that can be exchanged based on security criteria and/or balancing expectations as well as available transfer capacity. The providing TSO is responsible for compiling the products to be exchanged (including price) on a program time unit basis. The ability to activate bids and offers across the border will depend on the availability of cross border capacity.



TSOs identify available surpluses of balancing energy and aggregate them into standard cross-border products to be traded on a specific common pool that gathers offers and bids from the providing TSOs. This common pool represents a specific merit order list. The requesting TSOs can thus decide to activate the most economically advantageous bid or offer from local merit order list of from the specific merit order list. The corresponding energy is delivered and settled at a given price, depending on the retained rules.

One concrete example is the BALIT mechanism implemented between France and GB, which facilitates the exchange of balancing energy delivered by *replacement reserves.*

Implications in terms of system operation

- Defining standard products to be exchanged by TSOs;
- Developing a common platform and necessary IT tools to be used by participating TSOs;;
- Building the products based on local bids from providing BSPs (volumes & prices);
- Handling the cross border exchanges in price formation and imbalance settlement;
- Management of transmission capacity close to or in real time and coordination with intraday time frame.

- Imbalance netting

Key features

The model consists of an exchange of information of control zone imbalances and automatic netting of opposing (long and short) energy imbalances of these control zones in real time, subject to available transmission capacity. Such netting is effectually a cross-border exchange of balancing energy in an implicit way and leads to a reduction of needs to activate the balancing energy from frequency restoration reserves that is needed in real time.

The participating TSOs use an automatic system in order to signal the direction and the size of the energy imbalances, which are settled at a price derived from a settlement scheme between TSOs.

In order to satisfy system security requirements, TSOs can optionally define an upper boundary to the amount of imbalances that can be netted..

Implications in terms of system operation

- Developing an automatic control system that performs the netting of imbalances with strong coordination to TSO control systems;
- Developing an financial settlement mechanism to settle the balancing energy exchanged in this way
- Developing of a system to assess and operate financial transfers between TSOs coming with the design of an imbalance settlement;

Implications in terms of harmonisation of balancing markets

An *imbalance netting* mechanism is likely to be implemented without any harmonization requirements and very short lead time for implementation. Such system is already in place today within Germany and between some of its neighboring countries.

Exchanges of surpluses of balancing reserves

For efficiency reasons, TSO contracted reserves should be limited to their needs, and they should be in a position to share surpluses of balancing reserves. The option may allow for the development of exchanges of balancing *reserves* through a bilateral reserve trading model between two adjacent areas in which reserve procurement processes have not been integrated nor harmonised. Exchanges of balancing reserves might be subject to reservation of cross-border capacity. Therefore, impacts on overall social welfare should be analysed on a case by case basis.

5.4 Option C: creating a European exchange of balancing services through a legally binding regulation imposing a defined level of harmonisation of the balancing mechanisms adopted by each Member State to facilitate cross-border exchanges

Scope of the EU regulation

This option foresees the setup of a European binding framework in which the harmonisation of key elements of the current national balancing markets is addressed with the aim to facilitate the development of cross-border exchanges of *balancing energy and, to some extent, of balancing reserves*.

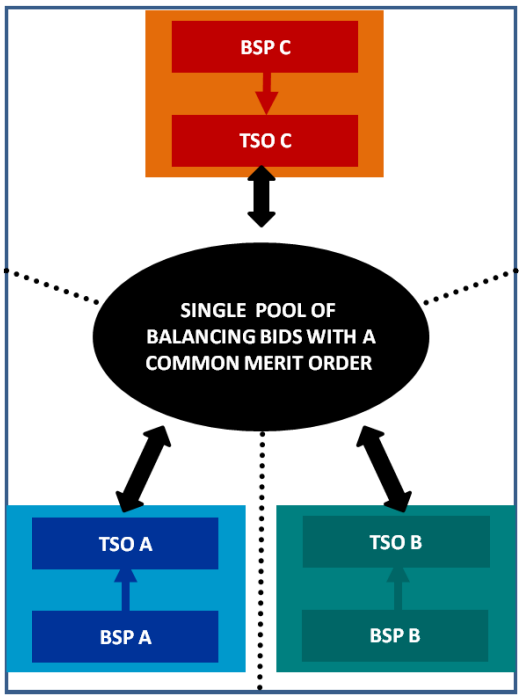
A progressive approach on balancing energy may be considered to ensure a proper level of integration:

- First, TSOs coordinate in order to perform an imbalance netting when economically efficient;
- Then, TSOs coordinate and optimise the activation of *balancing energy* from resources that are used as *replacement reserves*;
- Finally, TSOs coordinate and optimise the activation of *balancing energy* from resources that are used as *frequency restoration reserves*.

Exchanges of balancing energy using a common merit order

Key features

In this model, TSOs share their balancing resources and optimise their activation in order to minimise the cost of balancing by gathering in a common list balancing bids and offers that are available in their control areas, and activate them according to the merit order subject to technical constraints including the availability of transmission capacities.



This exchange of harmonised balancing energy products between TSOs is based on the activation of the cheapest bids provided by the BSPs on a common program time unit basis.

TSOs are still responsible for ensuring that the security criteria are met in their control area. The model would allow a certain level of margins (energy bids) to be kept at national level to fulfil these security criteria. In this case, the providing TSOs would still display on the common platform the back-up balancing energy products (i.e. margins) to be kept to ensure system security in their control area, in order to increase transparency of TSO actions.

These balancing energy margins need to be based on the most expensive bids, to achieve that the cheapest bids are activated at a European level (subject to technical constraints) and global social welfare is enhanced.

Implications in terms of system operation

- Definition of a limited set of standard products to be used by TSOs;
- Development of a common platform and necessary IT tools to be used by participating TSOs to exchange balancing energy;
- Management of transmission capacity close to / in real time and coordination with intraday;
- Setup of a settlement mechanism between TSOs.

Implications in terms of harmonisation of balancing markets

A limited set of standard balancing products will be identified, to be used both locally and across the border. To enable participation of specific balancing resources and new technologies, specific

balancing energy products may still be defined, and the TSOs make them available for exchanges together with the standard products.

Key elements of the national market design will be harmonised such as the program time unit and the gate closure time, as well as the roles and responsibilities of BSPs. Some elements may remain outside the scope of harmonisation requirements, where it is considered that they do not impede the development of the cross border exchanges.

Exchanges of balancing reserves

Key features

A progressive approach on balancing reserves may be promoted to ensure a proper level of integration:

- to exchange surpluses of reserves through a bilateral reserve trading model between two adjacent areas in which reserve procurement processes have not been integrated nor harmonised;
- to implement a multilateral reserve trading model involving *TSOs* and *BSPs* of two or more control areas, in which reserve procurement processes have been harmonised and integrated into a common procurement process.

Reservation of cross-border capacity

Cross-border exchanges of reserves are possible only in situations where reservation of cross-border capacity is not necessary or it is specifically allowed. TSOs do not reserve transmission capacity for the purpose of balancing, except for cases where it can be demonstrated that such reservation can result in increased overall social welfare, and the modalities for the assessment of cross-border capacity reservation needs to be defined so that there is no undue discrimination between TSOs and market participants using the cross-border capacity.

Implications in terms of harmonisation of balancing markets

The option may foresee a certain level of harmonisation of balancing reserve markets to foster their integration. This may include the definition of standardised reserve products used to balance the system, with the possibility for TSOs to define specific products as long as this does not create significant inefficiencies or distortions with adjacent markets. It may also consider the definition of common principles for the procurement of reserves.

Imbalance settlement

To ensure an efficient integration of the balancing markets, the implementation of a common merit order to exchange balancing energy may come with the harmonisation of imbalance settlement. In particular, the European binding regulation may:

- ensure that all imbalances are subject to compensation via the imbalance pricing;
- define harmonised principles to calculate these imbalances;
- define harmonised principles for imbalance pricing.

5.5 Option D: creating a European exchange of balancing services through a legally binding regulation defining a single European balancing mechanism, including creating one or several regulated entities to perform the tasks of supranational balancing operators

Scope of the EU regulation

This option would result in a significant evolution of the current way in which European electricity systems are operated. In order to fully exploit the benefits of the exchange of balancing resources, and to ensure that when balancing energy is required the most efficient balancing service provider is selected at continental level, taking in due consideration the network constraints, only a supranational approach may be considered.

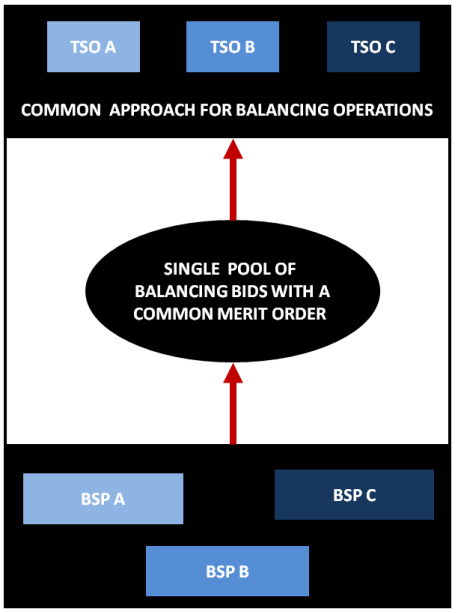
Under this option a legally binding European regulation will be developed to ensure that a single balancing market design is adopted all over Europe, or at least in synchronous areas.

The European regulation will foresee the harmonisation and common rules on all main balancing arrangements: roles of BSPs and BRPs, definition and procurement of balancing services, as well as balance responsibility and imbalance settlement rules.

Moreover, this regulation will create one of several supranational entities that will be responsible for operating the balancing markets in selected regions, covering wide areas (e.g. synchronous areas). These supranational balancing market operators will balance the system in close cooperation, on the basis of the full information that is necessary for balancing (regional network situation, system imbalance forecasts, availability of bids, etc.). This will have a major impact on the procedures and responsibilities of system operation,

Fully integrated balancing market

In a fully integrated cross-border balancing market, one single entity (or very few) is responsible for coordinating with TSOs to balance the whole system. While option C also foresee the exchange of all balancing energy on the basis of a common merit order list (i.e. margins set to zero), in this option the balancing energy bids are activated based on common system needs. Such coordination ensures the use of the most efficient balancing resources that are offered in a common balancing platform, taking into account the availability of transmission capacities.



The model requires an extensive harmonisation of the roles of BSPs and BRPs, the definition and common procurement of balancing services – both reserves and energy activation –, as well as balance responsibility and imbalance settlement rules.

While the benefits of a centralised activation of most efficient balancing energy bids would bring additional benefits compared to option C, a significant increase of benefits in option D are expected to arise from joint operational processes that come with a common approach with respect to security criteria (centralised sizing, sourcing and procurement of reserves, common management of critical situations, etc.).

6 Analysis of the identified options

6.1 Option A

- Effectiveness to guarantee or enhance the level of security of supply

A voluntary approach with no European wide regulation may come with setting up some regional projects aiming at developing cross-border exchanges of balancing energy. Depending on the nature of these projects, a certain level of integration may be reached and security of supply may be enhanced. Unfortunately such approach does not ensure that such integration of balancing markets will ever be fostered, whereas new balancing needs are anticipated by TSOs to be able to enjoy a satisfactory level of system security in the coming years. Thus option A is likely not to provide sufficient and guaranteed level of security of supply.

- Effectiveness to improve competition and economic efficiency

For the same reasons, some voluntary initiatives may create an interesting level-playing field in balancing markets and allows for reducing balancing costs. But without any binding regulation, such effectiveness remains hypothetical and high levels of competition and economic efficiency will probably never be reached.

- Effectiveness to facilitate the integration of variable generation from renewable energy sources

The need to accommodate massive penetration of generation units delivering variable generation comes with the necessity to define a consistent European framework to guarantee that sufficient products will be available for TSOs to meet the growing demand in balancing energy. Cross-border may be essential to achieve this. As a consequence, option A may be irrelevant.

- Time of implementation

As no regulation will impose any implementation roadmap, the feasibility of such option is secured.

- Efficiency

On the one hand, voluntary approaches are likely to be considered only if it is foreseen that few implementing costs would be involved, while expecting interesting benefits in terms of social welfare. On the other hand, there is few chance that strong integration of balancing markets will occur, and the potential gains resulting from the projects are likely to be economically suboptimal.

- Coherency

For the reasons listed above, following this option may not lead to an efficient integration of balancing markets in Europe. Balancing operators may not have sufficient incentives to benefit from wider sourcing areas to perform new challenging tasks that are expected in the coming years, notably to accommodate the renewable sources. Therefore option A may not be consistent with the main objective of fostering balancing market integration.

6.2 Option B

- Effectiveness to guarantee or enhance the level of security of supply

Option B comes with minimum balancing market integration requirements to be addressed by the European regulation, as described in chapter 5.3. When it comes to assessing the several relevant models to exchange balancing energy across borders, the notion of surplus is fundamental.

Regarding the schemes to exchange balancing energy from replacement reserves:

- a *BSP to TSO* model allows for an exchange of an offer that is strictly not necessary for the providing TSO to ensure security of supply in its control area. Therefore the level of security of supply may not be jeopardized. However, if the TSO situated in the control area of the providing BSP decides to veto the exchange, the requesting TSO cannot rely on the bid, which may complicate the short-term operational process and put the requesting system at risk;

- with a *TSO to TSO model without common merit orde*r, TSOs are still responsible for the operations that are necessary to ensure security of supply in their control areas, regardless of the issues faced by requesting TSOs. Thus the level of security of supply remains at least unchanged. It may even be increased in case there is sufficient liquidity within the specific common pool of bids since system security in the control area of the requesting TSO may benefit from the added value coming with the energy bid built by the providing TSO.

With respect to the scheme to exchange balancing energy from frequency restoration reserves:

Netting of imbalances may significantly reduce the need for activation of frequency restoration reserves, thus leading to a better availability of these reserves and moving towards an enhancement of security of supply. However, as imbalance netting affects system flows in real time, ad-hoc rules may be needed to guarantee system stability and avoided undesired risks.

- Effectiveness to improve competition and economic efficiency

With option B, a consistent framework designing the prerequisites to foster cross-border exchanges is likely to emerge. However, national-only and tradable cross-border balancing may still co-exist, and prevailing national rules for procuring reserves and setting imbalances might hamper a fair competition among BSPs or distort the behaviour of participants.

Regarding the schemes to exchange balancing energy from *replacement reserves*:

- with a *BSP to TSO* model, the level of competition is increased since more BSPs are likely to participate in the balancing market of the receiving control area. Economic efficiency may be increased as the offer from a BSP will be activated only if selected in the merit order established by the requesting TSO. Nevertheless, it does not ensure that the best available offer will actually be used from an overall perspective, which may lead to socio-economic distortions. Differences in balancing markets (e.g. gate closure times, national rules) may lead to asymmetry in market opportunities on each side of the border;

- the *TSO to TSO model without common merit orde*r may have a good effect on cross-border competition and economic efficiency, depending on how the balancing markets differ in prices and volumes. A providing BSP may benefit from the activation of the bid compared to the case where systems are isolated and the bid may not be economically advantageous for the local TSO. The development of a specific merit order list may strengthen the transparency of balancing services and be a strong driver towards more exchange and more similar prices for balancing services between control areas.

Moreover, selling the balancing services is a rather simple task to achieve. The BSPs only contract with their TSO and then comply with the rules of their local balancing market. However, the BSPs are not free to choose which TSO they contract with. As providing TSOs are responsible for building the offers, the BSPs are not able to check the consistency between their offer and the energy that is activated by the requesting TSO, thus preventing them from tracking and tailoring the service. In case an insufficient level of harmonisation is achieved, there may be a need to define specific products which only partially satisfy the needs from TSOs. This would increase complexity and reduce economic efficiency. The products, which are built on the basis of the most expensive bids from providing control areas, may barely be used by the requesting TSO, depending on the real-time characteristic of the requesting balancing market. The lack of optimisation in exchanges may lead to a low level of integration of balancing markets and a limited enhancement of economic efficiency.

With respect to *imbalance netting* related to balancing energy from *frequency restoration reserves*:

The experience gained by participating TSOs is positive and already lead to significant efficiency savings. The international Grid Control Cooperation project in Germany and with some of its neighboring countries has substantially reduced the costs for balancing energy from frequency restoration reserves, and the extension of the project to neighboring control areas is likely to confirm such gains in economic efficiency.

- Effectiveness to facilitate the integration of variable generation from renewable energy sources

Designing a limited set of cross-border balancing products and requiring TSOs to share their surpluses may be a consistent approach to tackle the coming challenges related to the penetration of renewables.

Schemes to exchange balancing energy from *replacement reserves*:

- a *BSP to TSO* model does not allow for the best allocation of resources and does not maximise exchanges of balancing energy, thus making difficult for the TSOs to fully benefit from the complementary of renewable sources across Europe. Moreover, without any prerequisite on gate closure times, the model may not encourage harmonization of timing processes that could allow generators to modify their output close to real time and increase the effectiveness;

- a *TSO to TSO* model may increase competition and make a positive - but limited - contribution to facilitate the integration of renewables, in the whole continental area where the integration of variable generation is expected to increase the balancing needs closer to real time.

Regarding the scheme to exchange balancing energy from *frequency restoration reserves*, the implementation of an *imbalance netting* mechanism may significantly reduce the need for activation of automatically-activated energy, and may provide to participating TSOs a better availability of reserves in order to better accommodate the integration of renewable generation.

- Time of implementation

In option B, the rules governing national balancing markets will not be subject to any binding European regulation and will remain in the scope of the national regulations. Harmonisation processes will be limited to the strict necessary to perform cross-border exchanges of surpluses. Feasibility of the option may depend on whether the binding regulation asks for a European-wide

or regional implementation, as well as the type of models considered to exchange balancing energy.

Schemes to exchange balancing energy from *replacement reserves*:

- The *BSP to TSO* approach is already used between some control areas. Common gate closure timeframes, technical characteristics of balancing products and imbalance settlement are not prerequisites for such a scheme to apply. Even though some differences in bidding rules between balancing markets may reduce the amount of exchanges or lead to a lack of reciprocity, the *BSP to TSO* model can be implemented quickly without any major changes in current balancing markets;

- The *TSO to TSO model* is already implemented as the BALIT mechanism. Some differences in balancing markets may not allow to best benefit from the model: common gate closure timeframes, technical characteristics of balancing products and imbalance settlement are important to maximize exchange possibilities, but they are not prerequisites. The model calls for the development of ad-hoc rules and a common platform to exchanges surplus or balancing energy. It requires TSOs to be able to handle cross-border exchanges in the price formation and imbalance settlement processes within local markets, to update available transmission capacity close to real time, and ensure coherency between possible liquid intraday markets and balancing markets taking into account the cross-border exchanges. Therefore, it may need a certain amount of time to be implemented. Regional implementation projects may help to achieve its development faster.

Schemes to exchange balancing energy from *frequency restoration reserves*:

The iGCC project within Germany was implemented relatively quickly due to the existing similarities in the different German control areas (balancing management, common processes and tools, etc.). Current experience of extending the iGCC to neighboring countries of Germany show that the time needed for the technical implementation is quite low after an agreement for financial settlement of the transferred energy has been found between the participating TSOs.

- Efficiency

Option B may be considered as a first interesting step towards the integration of balancing markets. Depending on the scheme that is chosen to implement exchanges of balancing energy, significant benefits may arise. Costs related to the implementation of models to exchange surpluses may be relatively low; but as a consequence, bounding the integration of balancing markets with this concept of surplus may lead to a suboptimal increase of social welfare, while more integrated models may provide a substantially higher level of efficiency.

Schemes to exchange balancing energy from *replacement reserves*:

- The *BSP to TSO* approach has been running on some interconnections for several years – for instance between France and Germany and Switzerland. It's a proven concept which has already led to a significant reduction of balancing activation costs. In particular, it doesn't imply significant implementation costs. However, selling of the balancing services remains complex, contracting arrangements are multiplied and monitoring is a rather complex task to achieve for the NRAs. The main consequence of implementing a BSP to TSO model is a suboptimal use of balancing services as well as transmission capacity, leading to an insufficient increase of social welfare;

- The *TSO to TSO* model may have a good level of efficiency, as it allows for locally-unused volumes to be exchanged, thus reducing balancing costs within the requesting control area with few implementation costs. However, since only surpluses of balancing energy are shared between

TSOs, there is no guarantee that the best available offer is used, even with a regional process for activation. A suboptimal use of balancing services may occur, leading to an insufficient increase of social welfare.

With respect to balancing energy from *frequency restoration reserves*, the netting of imbalances may have a good level of efficiency, as it allows for the avoidance of counteracting activations of balancing energy, thus reducing overall balancing costs with relatively few implementation costs.

The implementation of imbalance netting in the German iGCC led to a saving of approximately 2 TWh, about 300 Million €/year. Estimations of TSOs suggest that expanding the iGCC to neighboring countries and control areas can lead to additional savings of 10 Million €/year/border or even more depending on the size of the country that joins the iGCC. Current experiences with the expansion to neighboring countries show that this estimation proves to be correct.

- Coherency

The concept of surplus is the cornerstone of option B. There is no doubt that the development of new arrangements to materialise this concept is an important step towards the integration of balancing markets which comes with substantial implementation challenges. However, as the corresponding regulatory framework will be designed only to be compatible with national regulations, with limited requests on harmonisation of balancing features, it is likely that the option will provide limited results in terms of balancing market integration, and may not be sufficient to properly deal with some coming challenges in the electricity sector.

Schemes to exchange balancing energy from *replacement reserves*:

- Compared to the development in other markets, the *BSP to TSO* model does not foresee a common European balancing market. It will provide experience in common balancing and thus increase the level of cooperation, but if a common European balancing market is the long term target, the model will present an interim step where the fundamental characteristics will have to be again changed to reach the target.

- The *TSO to TSO* model could be also considered as an initial step to avoid inefficient use of balancing energy, and with a progressive implementation the market confidence may be enhanced. However, it may not be considered as a sufficient option to achieve the goal of integrating the balancing markets in Europe.

With respect to balancing energy from *frequency restoration reserves*, imbalance netting is consistent with the idea of optimising the activation of balancing energy arising from a coordination between TSOs. It may be considered as a very initial step to be implemented European-wide so that the overall need to automatically-activate balancing energy is reduced, and the binding regulation will mainly focus on models that ensure higher levels of balancing market integration.

6.3 Option C

Contrary to the options A and B, this approach foresees a consequent harmonisation of key issues with respect to the national balancing markets to foster a step-by-step integration of balancing energy markets and, to a lesser extent, balancing reserve markets.

- Effectiveness to guarantee or enhance the level of security of supply

As described in chapter 5.4, a progressive approach to integrate balancing energy markets may be used. Once ad-hoc rules are properly defined to guarantee system stability, the implementation of *imbalance netting* mechanism to minimise counteracting activations between adjacent control areas may be beneficial with respect to security of supply point of view. Then, TSOs will coordinate and optimise the activation of *balancing energy* from, first, resources that are used as *replacement reserves* and, secondly, resources from *frequency restoration reserves*. On the basis of a common merit order, security criteria will still defined at national level and TSOs will benefit from higher market liquidity issued from the definition of standard products, therefore enjoying enough available resources for local security reasons. Since this model will imply that national and cross-border bids and decisions are further integrated it is necessary to strengthen the TSOs cooperation on real time operation. If the necessary time is granted to make changes to the current system of cooperation, the level of security of supply enjoyed to date will be enhanced or, at least, not be altered.

Moreover, option C may allow the development of well supervised cross-border of reserves to the extent of implementing a multilateral reserve trading model. Requiring a high level of harmonisation of procurement processes in order to tend to a common system may boost such integration, therefore enhancing significantly the level of security of supply within participating control areas.

- Effectiveness to improve competition and economic efficiency

Regarding the activation of balancing energy, the harmonisation of main issues that is foreseen if option C prevails may be highly beneficial in terms of competition and economic efficiency. In the same vein, the possible development of a common process to procure balancing reserves will emphasize such expected gains.

Competition will be deeply increased as the most competitive bids from every control areas are compared using a common platform, and activated according to the common merit order list. Defining standard products will foster balancing market liquidity, and specific products provided by some BSPs will still be considered by TSOs on a marginal basis.

Selling of the balancing services will be simpler. There will be a complete consistency between offers from BSPs and the energy that is actually activated, thus allowing them to track and tailor the service. The allocation process will be easily managed and transparent exchange information easily displayed.

The economic efficiency of the model depends on the level of harmonization of the balancing services and intraday market in the area it is implemented. It is expected that the design of common pricing method based on marginal pricing, as well as common timing processes, will help the integration and therefore deliver a very satisfactory level of economic efficiency. In addition, the alignment of imbalance netting is likely to provide the BRPs with a proper level playing field.

- Effectiveness to facilitate the integration of variable generation from renewable energy sources

Integration of variable generation from renewables will increase as the model maximises the liquidity of the common market, thus allowing them to better benefit from the complementarity of energy sources across Europe.

- Time of implementation

For both cross-border exchanges of balancing energy from *replacement and frequency restoration reserves*, TSOs keep enough energy margins to secure their own system, therefore the model doesn't imply a complete revision of roles and responsibilities in terms of security of supply. As it requires at least, in addition to the development of a single IT platform, harmonised balancing products in order to create a trustful liquid balancing market, as well as a proper sharing out of costs and benefits among control areas, such harmonisation may take a long time to set up and may face reluctance from TSOs as it actually affects national balancing markets.

Experience from the Nordic system and current initiatives may be a good basis to implement a highly-integrated model to exchange energy from manually-activated reserves. Depending on the fact that the implementation is whether foreseen European-wide or on a regional basis, a certain amount if time - typically a minimum of 3 years - may thus be needed to ensure such integration. More time may be necessary for TSOs to adapt their operational processes on a step-by-step basis in order to optimise the use of energy from automatically-activated resources at pan-European level.

The time needed for consequent cross-border exchanges of reserves to emerge will depend on the dynamics coming with voluntary initiatives, and the relevance of the projects submitted to the approval of NRAs. In any case, designing a common reserve procurement to implement a multilateral reserve trading model will be quite challenging and request a huge time of implementation as it will call for a careful step-by-step process allowing for learning effects.

- Efficiency

With a strongly binding European regulation enforcing the harmonisation of key balancing features, the implementation of a common merit order to exchange balancing energy will be boosted. The costs arising from implementation and operations may be significant. However, a well-functioning common balancing market may demonstrate huge benefits coming from the activation of the most competitive bids, allowing for a better allocation of resources and an increase of social welfare. Such benefits may be emphasized in case ambitious projects are carried out to foster the exchange of balancing reserves across Europe.

A cost-benefit analysis will have to be monitored carefully before envisaging both:

- a fully integrated balancing energy market where no energy margins are withdrawn for the common merit order;
- a multilateral reserve trading model with a common procurement process.

- Coherency

In general, option C is consistent with the objective of building a single European energy market. As it permits to better welcome variable generation on the grid, it is also coherent with EU targets on renewables.

With respect to the model to exchange balancing energy, a common merit order may consist in the best option to be considered for all the reasons listed above, provided that a consistent implementation roadmap is defined to carefully move towards a well-functioning single balancing market. Therefore it may be worth enforcing a high level of both integration and harmonisation by means of a tight European binding regulation.

With respect to the models to exchange balancing reserves, a looser regulation may be more relevant at this stage to allow for a well-supervised development of projects and leave room for potential future considerations based on learning-by-doing approach.

6.4 Option D

- Effectiveness to guarantee or enhance the level of security of supply

With such option, as a common approach is chosen for security criteria and responsibilities with respect to electricity balancing, a theoretically optimal level of security of supply is reached within the region.

However, this would imply a complete change of the way balancing is done today introducing a centralised entity with some powers that today are held by the TSOs. Separating some of the powers from the TSOs that would still be responsible for other system operation decisions might impose a threat to system security if imposed without adequate care.

- Effectiveness to improve competition and economic efficiency

The BSPs are subject to common rules and are able to participate in a common balancing energy market. Maximum competition arises from a fully integrated model. Allocation of resources is optimal and the cheapest bids are selected first to satisfy balancing needs. The process is transparent and easy to monitor for stakeholders and NRAs in different areas. Benefits in terms of economic efficiency and cross-border competition at European level are therefore larger than in all other options.

- Effectiveness to facilitate the integration of variable generation from renewable energy sources

A global system overview allows for a better identification of balancing resources to accommodate intermittent generation. Maximising exchanges of balancing energy also permits to benefit from the complementarity of energy sources across Europe.

- Time of implementation

A common platform to exchange balancing services may take a long time to be implemented. Centralised governance may be very difficult to achieve in practice, as the model comes with a significant re -definition of roles and responsibilities with respect to system operational security. Therefore, the corresponding time of implementation depends on many factors and is likely to be extremely high compared to other options.

- Efficiency

A cost benefit analysis may theoretically demonstrate huge benefits arising from a common consideration of system security management, as well as the activation of the most competitive bids. This long term scheme allows for a better allocation of resources and enables to reach an optimal level of global social welfare. Nevertheless, the huge implementation challenges with respect to responsibilities and operational security may be prohibitive and substantially affect efficiency. It might be worth enjoying a lower but satisfactory level of integration without enforcing such “revolutionary” scheme, as suggested by option C.

- Coherency

This option will introduce a true common European balancing market. However, the challenges coming with its implementation may be very complex and not perfectly understood while drafting these lines. Therefore, the model may merit further careful consideration to well identify the related implications, in order to understand if designing one single market is even feasible across the whole continental Europe and, if so, to demonstrate with a cost benefit analysis that such fully integrated model deserves to be implemented.

7 Preferred policy options

7.1 Synthesis of evaluation of policy options

The analysis of the options shows that the potential gains from strongly harmonising and integrating balancing markets across Europe (options C and D) are substantial as it would increase competition, generate higher social welfare and facilitate the integration of renewables and intermittent generation into the network.

Criteria		Option A	Option B	Option C	Option D
Effectiveness	Security of supply	-	+	+	++
	Competition	-	+	++	+++
	Social welfare	-	+	++	++
	Renewables	- -	+	++	++
Time of implementation		+ +	-	--	---
Efficiency		-	+	++	+
Coherency		-	+	++	+

7.2 Long-term preferred policy option

In the long-term, option D appears to be the best solution as its implementation would allow for the creation of a single European balancing market, in line with the targets for wholesale markets (long-term, day-ahead, intraday). In addition to substantial gains in terms social welfare, option D would induce a harmonisation of balancing rules and incentives, which would create a level-playing field for all market participants, not only in the balancing markets, but also in the wholesale markets. Consequently, competition will be fostered in all markets.

In addition, it would force TSOs into a strong cooperation, which would end up with a reinforced security of supply in Europe and would exploit synergies between systems. By using jointly the balancing resources across Europe, TSOs would be able to size the balancing reserves in a centralised and more efficient way and therefore to limit these reserves and the associated costs.

Therefore, option D is wished to be implemented in the long-term and should serve as a visionary goal when drafting the Electricity Balancing Network Code(s).

Nonetheless, a strong integration of balancing markets, especially through the complete sharing of balancing resources, requires significant changes in the current system operation rules. Some of these changes will be considered in the Network Code(s) on operational security, on operational planning and scheduling and on load-frequency control and reserves. Others changes appear to be much more challenging and would necessitate more time to be implemented.

7.3 Medium-term preferred policy option

As a result of the difficulties of implementing option D, the preferred option for the Electricity Balancing Network Code(s) is option C.

In this option, building on towards the long-term model, all balancing energy bids and offers are gathered centrally through the TSO-TSO model with common merit order list. As responsibility to balance the system is still with the TSOs, the activation of bids and the corresponding decision process remains decentralized. TSOs are allowed to keep some balancing energy bids ("margins") at national level to be able to meet the security criteria. To maximise the efficiency of the balancing energy exchanges, the margins should include only the most expensive bids, so that the cheapest resources are available at the common merit order list which enables that the cheapest resources are activated globally. The definition of these margins and the methodology to calculate them should be such that it may avoid any free-riding behaviour and incentivise TSOs to share as much as possible in the common merit order list.

The first economic estimation – to be confirmed by the consultant study of the European Commission – tends to show that the gains in the balancing energy markets would be mostly obtained thanks to option C insofar as the margins are defined in an efficient way and are kept to a minimum. These margins and the related efficiency loss should be carefully monitored, and they should gradually converge to zero, which is foreseen in the draft Framework Guidelines on Electricity Balancing.

Moreover, taking into account the benefits of having access to a wide European energy balancing market, TSOs will be able to reduce the balancing reserves they contract in advance and to coordinate the amount of reserves they contract and the way they procure them.

Standardisation of balancing products is required to increase competition among BSPs and liquidity of these products as well as to simplify the TSOs decision process to balance the system in a most efficient way.. Nonetheless, in the light of the differences in terms of network constraints, generation mix, balancing markets' structures etc., it is important to conserve products adapted to these local or national specificities, in order not to lose specific balancing resources. To avoid any retention by a TSO, these specific products should also be shared on a common merit order list (if not included in the margins).

An efficient functioning of this common balancing energy market necessitates harmonising some features. In this respect, the pricing methodology of balancing energy has to be harmonised. The most adapted method for pricing activated balancing energy seems to be the marginal pricing method (pay-as-cleared). In such a case, a uniform price for balancing energy is applied in areas without congestion.

Incentives for market participants' behaviour should also be harmonised to a certain extent to avoid having TSOs coping with completely different situations. In particular, imbalance settlement has to evolve towards a more harmonised mechanism.

As regards cross-border capacity reservation, this issue should be addressed in a cautious way since the negative impacts on commercial cross-border exchanges in the traded markets (long-term, day-ahead and intraday) may exceed the gains from reserving cross-border capacity for balancing services' exchanges. Thus, a detailed cost-benefit analysis must be carried out, and cross-border capacity reservation should only be allowed if the overall gain is demonstrated.

In consequence, exchanges of balancing reserves are not foreseen to be pursued to a great extent, as ENTSO-E considers that cross-border capacity reservation is a prerequisite. The Framework Guideline on Electricity Balancing is therefore less prescriptive on the model for balancing reserves' exchanges. Nonetheless, if balancing reserves' exchanges are frequent, procurement mechanisms should be harmonised and integrated.

Lastly, balancing reserves' exchanges should also be envisaged without reserving cross-border capacity by coordinating the procurement and the sizing of the balancing reserves, possibly through stochastic forecasts and analysis.

8 Annexes

8.1 Definitions

The following definitions are intended to clarify the provisions of this Initial Impact Assessment.

- **ACER** – Agency for the Cooperation of Energy Regulators, as established by Regulation (EC) No 713/2009.
- **Balancing** – all actions and processes through which *TSOs* ensure that the total electricity withdrawals are equalled by the total injections in a continuous way, in order to maintain the system frequency within a predefined stability range.
- **Balancing Energy** – energy (MWh) activated by TSOs to maintain the balance between injections and withdrawals.
- **(Balancing) Reserves** – power capacities (MW) available for *TSOs* to balance the system in real time. These capacities can be contracted by the *TSO* with an associated payment for their availability and/or be made available without payment. Technically, *Reserves* can be either automatically or manually activated.
- **Balancing Services** – *balancing reserves* or *balancing energy*.
- **Balance Responsible Party (BRP)** – a market participant or its chosen representative responsible for its *imbalances*.
- **Balance Service Provider (BSP)** – a market participant providing *balancing services* to one or several *TSOs* within one or several *control area(s)*.
- **Control Area** – a coherent part of the interconnected system, operated by a single *TSO* responsible for *load-frequency-control* for physical loads and generation units connected.
- **Cross-border balancing** – exchanges of *balancing energy* and/or *reserves* between *control areas* and/or between *bidding zones*.
- **Cross-border (Transmission) Capacity** – a capacity to transfer the energy from one congestion management bidding zone to another one. Reservation of *cross-border transmission capacity* indicates (a portion of) available *cross-border capacity*, which is reserved for cross-border exchange of *balancing reserves* and thus is not accessible to market participants for cross-border energy trade.
- **Day-Ahead** – market timeframes occurring in D-1.
- **Frequency containment reserves** – operating *reserves* necessary for constant containment of frequency deviations (fluctuations) from nominal value in order to constantly maintain the power balance in the whole synchronously interconnected system. Activation of these *reserves* results in a restored power balance at a frequency deviating from nominal value. This category typically includes operating *reserves* with the activation time up to 30 seconds. Operating *reserves* of this category are usually activated automatically and locally.
- **Frequency restoration reserves** – operating *reserves* used to restore frequency to the nominal value and power balance to the scheduled value after sudden system imbalance occurrence. This category includes operating *reserves* with an activation time typically up to 15 minutes (depending on the specific requirements of the synchronous area). Operating *reserves* of this category are typically activated centrally and can be activated automatically or manually.

- **Gate Closure Time** – deadline for the participation to a given market or mechanism.
- **Imbalances** – deviations between generation, consumption and market deals (in all timeframes – market deals include sales and purchases on organised markets or between *BRPs*) of a *BRP* within a given *imbalance settlement period*.
- **Imbalance Settlement** – a financial settlement mechanism aiming at recovering the costs of *balancing* applicable to *imbalances* of *BRPs*.
- **Imbalance Settlement Period** – time units used for computing *BRPs*' *imbalances*.
- **Intraday** – market timeframe beginning after the *day-ahead gate closure time* and ending at the *intraday gate closure time*.
- **Merit Order List** – in the *balancing* market a *merit order list* is a list of all valid *balancing* bids submitted by *BSPs* and sorted in order of their bid prices.
- **Program Time Unit** – time units used for scheduling and programs.
- **Replacement Reserves** – operating *reserves* used to restore the required level of operating *reserves* to be prepared for a further system imbalance. This category includes operating *reserves* with activation time from 15 minutes up to hours.