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THE INTEGRATION OF THE EUROPEAN ELECTRICITY
MARKETS AT A TURNING POINT: FROM THE REGIONAL
MODEL TO THE THIRD LEGISLATIVE PACKAGE

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*The integration of the European electricity markets at a turning point:
from the regional model to the Third Legislative Package*

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AND CLARA POLETTI**

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ISSN 1028-3625

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Printed in Italy, July 2010
European University Institute
Badia Fiesolana
I – 50014 San Domenico di Fiesole (FI)
Italy
www.eui.eu/RSCAS/Publications/
www.eui.eu
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Abstract

In this paper we discuss the EU policy on electricity markets integration by reviewing the experience of the Electricity Regional Initiatives. The regional approach to market integration delivered important results in areas such as coordination among national transmission system operators, implementation of market-based mechanisms for cross-border transmission capacity allocation and transparency. Furthermore, the inclusive governance process lead by ERGEG gave voice to all relevant stakeholders. However, there are indications that the regional model reached its limit when faced with the objective of coordinating day-ahead and real-time markets. The unanimity approach at the regional level made the intra-regional decision-making process extremely slow. Further, inter-regional integration issues have not been solved yet and attempts to tackle them by prioritising projects in some Regions weakened the pluralistic attributes of the regional model.

The Third Legislative Energy Package has the potential to overcome some of these shortcomings by empowering pan-European institutions (ENTSO and ACER) and by involving Member States in the decision making process. Some weaknesses of the second-package, though, persist in the new framework. First, there are no provisions ensuring that ENTSO will have appropriate incentives to act in the interest of European consumers. Second, the Third Package perpetuates the separation between within-country congestion management – which remains a national issue – and cross-border congestion management – to be dealt with at the EU level. This two-tier approach is inconsistent with the highly meshed nature of the European network and is likely to result in inefficient market design. Further, the implementation of coordinated cross-border and national congestion management mechanisms requires considering geographically differentiated prices within countries, a politically unattractive result for most Member States.

Keywords

European electricity markets integration; cross border trading; market design

JEL classification: L4, L5, L94

1. Introduction*

European electricity markets have been historically managed on a national basis, by State-owned vertically integrated monopolists (or quasi-monopolists). In that context, cross-border transactions would take place within a framework of cooperation among national utilities, focusing more on system security and on the efficient use of generation resources than on genuinely commercial objectives.

Following the 1996 Electricity Directive¹ two streams of reform started: one at Member States level, for the implementation of national wholesale electricity markets; another one, at European level, aiming at the integration of national markets into a single European market.

The two streams progressed independently and each at a different pace. The European integration process gained momentum in recent years, mainly after the design of national markets reached a relative stability.

The lack of coordination between national-level and European-level developments may have roots in the legal framework established by the Treaty of Rome. Since energy was originally not part of the European Union remit, the Commission's intervention was cast in the single-market framework and proposals on energy regulation were confined to cross-border trade.

As a result, the European legal framework on energy developed as if cross-border transactions could be organized and managed independently of national arrangements, which is inconsistent with the technical features of electricity and the meshed nature of the European transmission system.

In this paper we discuss the European Union policy on electricity market integration by reviewing the experience of the Electricity Regional Initiatives. Our analysis covers the institutional framework governing the process towards a single European electricity market and some broad market design issues.

The regional approach to market integration delivered important results in areas such as coordination among national transmission system operators, implementation of market-based mechanisms for cross-border transmission capacity allocation and transparency. Further, arrangements integrating clusters of national spot markets have been successfully introduced, involving Benelux and France, Spain and Portugal, Ireland and Northern Ireland.

Despite those achievements, the regional approach has shown weaknesses. In particular, its governance structure is characterized by (only) very high-level binding principles set in the legislation, great reliance on voluntarism and cooperation at regional level and a two-layer integration model.

In addition, the unanimity approach at regional level made the intra-regional decision-making process extremely slow in some cases. Further, inter-regional integration issues have yet to be fully addressed and attempts to ensure inter-regional consistency by giving priority to projects in some Regions weakened the pluralistic attribute of the regional model.

* This paper was developed within a research project on Regional markets integration at IEFÉ, Bocconi University. The content of this paper is responsibility of the authors' only and does not bind the institutions they belong to. All usual disclaimers apply. The authors thank B. Moselle, P. Ranci, C. Gence-Creux, C. George, A. Sihvonen-Punkka for comments on an earlier draft. The paper was written while Giuseppina Squicciarini was Head of International Markets and Cross Border Trading at Autorità per l'Energia Elettrica e il Gas (AEEG), the Italian energy regulator. Guido Cervigni is Director at Lecg Consulting, London, and Research Director at Istituto di economia delle fonti di energia e dell'ambiente, Università Bocconi, Milan. Dmitri Perekhodtsev is Managing Consultant at Lecg Consulting, London. Clara Poletti is Director at Istituto di economia delle fonti di energia e dell'ambiente, Università Bocconi, Milan.

¹ Directive 1996/92/EC of the European Parliament and of the Council of 19 December 1996 concerning common rules for the internal market in electricity, O.J. No L 27/20.

The drawbacks of the regional institutional framework have been more evident in the attempts to integrate markets that clear close to real time, where the specific features of electricity impact more on market design and operations. Discussions focused on harmonization of products, guarantee systems and on various operational issues of the power exchanges, whilst consistency between the market coupling mechanisms and core aspects of the national market designs – like congestion management mechanism- was a not explicitly addressed issue.

Tensions between national congestion management and cross-border capacity allocation systems regularly surface the debate. Within the traditional capacity calculation framework, system operators are often alleged to make available “too-small” cross-border transmission capacity in order to avoid domestic congestion.

Tighter integration mechanisms will not necessarily solve those issues. For example, the implementation of the so called “flow-based” capacity allocation system in the Central-West² Region has highlighted the drawbacks of a locational-price model applied with reference to a simplified network representation. Fine tuning of the model’s parameters is proving to be a difficult exercise and the algorithm therefore still runs on the basis of the traditional capacity calculation methodology.

We submit that the highly decentralized and voluntary regional approach is not suitable for building consensus around mechanisms whose adoption might entail material distributional impact (also within each country), such as national congestion management systems based on geographically differentiated prices. A recent Commission’s procedure against the Swedish transmission operator - targeting curtailments of cross-border capacity³ - is informative about the weaknesses of the institutional framework governing the integration process so far. In that case, a market design issue – that should be a core topic of the integration process – has been dealt with by a European Commission investigation within the European competition policy framework.

The recently approved Third Legislative Energy Package⁴ provides new regulatory tools and a new governance structure, which could address some of the shortcomings of the previous arrangements. In particular, the new European legislation foresees the development of Framework Guidelines and the adoption of network codes through Comitology, which, on the one hand, will allow greater commitment by Member States, and, on the other hand, will establish a binding framework with limited scope for regional differentiation.

The governance of the process is centered on the interplay of European institutions: the Agency for the Cooperation of Energy Regulators (ACER)⁵, the European Networks of Transmission System Operators (ENTSOs) and the Commission. The 3rd Package places responsibility on specific bodies in respect of the measures envisaged, for example: the Agency to prepare Framework Guidelines and provide an opinion on draft network codes; the ENTSOs to prepare network codes; the Commission to submit proposals to the Comitology process.

These measures, when implemented, will transform the governance of the market integration process from an essentially voluntary one, to one with binding and enforceable rules. Effective decision making overcoming the hurdles of unanimity and voluntary implementation does not have to come at the price of lower pluralism. In fact, the advantages of the current regional “bottom-up” approach in terms of facilitating participation can be more apparent than real, while a properly

² The Central West Region includes: France, Germany, Belgium, Luxembourg, Netherlands.

³ Commission’s notice published pursuant to Article 27(4) of Council Regulation (EC) No1/2003 in Case COMP/B1/39.351 – Swedisjh interconnectors (O.J. C 239/9).

⁴ http://ec.europa.eu/energy/gas_electricity/third_legislative_package_en.htm

⁵ Regulation 713/2009 (EC) No 713/2009 of the European Parliament and the Council establishing an Agency for the Cooperation of Energy Regulators.

structured “top-down” approach may increase transparency and it may also lead to higher quality decisions.

Some weaknesses of second-package, though, appear to carry-over to the new framework. First, no provision in the new legislation ensures that ENTSO will have appropriate incentives to act in the interest of European consumers. Second, the third package perpetuates the separation between within-country congestion management – remaining a national-level issue – and cross-border congestion management – to be dealt with at the Union level. Because of its inconsistency with the highly meshed nature of the European network, this two-tier approach is likely to result in inefficient market design. Further, the implementation of coordinated cross-border and national congestion management mechanisms requires considering geographically differentiated prices within countries. However, questioning national geographical electricity-price uniformity is politically unattractive for most Member States.

The paper is organized as follows: in Section 2 we review the milestones of process aimed at the integration of the European electricity markets. In Section 3 we discuss achievements and limits of the regional approach. Section 4 sketches some concluding remarks.

2. Setting the framework for European market integration

2.1 The first Directive and the creation of the Florence Forum

The 1996 Electricity Directive⁶ started the liberalization process of the European electricity market. The directive set out the general framework and principles for the introduction of competition in the industry, but did not prescribe a specific market design to be implemented across Europe.

The Commission’s 1999 “Second Report to the Council and the European Parliament on Harmonization requirements” acknowledged that limited cross border interconnection capacity, discriminatory access to networks, inefficient and transaction based congestion management methods, long term contracts and tariff pancaking were serious obstacles to the establishment of the internal electricity market. Those impediments became the focus of the Florence Electricity Regulation Forum, launched by the Commission and the Council Presidency in 1998 as a neutral and informal EU level framework for discussion, encompassing national authorities, representatives of the electricity industry and of major consumers.

The Forum is meant to guide the discussion on implementation and has been leading the way for main policy developments on issues having cross border relevance. As the Forum lacks any direct enforcing powers, its findings and guidelines are adopted on a voluntary basis. However its authority has increased over time and discussions on energy policy taking place within the Forum have informed further Commission proposals for binding legislation.

Early agreements reached within the Florence Forum in 2000 concerned principles for cross-border tariffication, inter-TSO compensation (ITC) and congestion management. However, these early agreements were not followed by prompt implementation.

The first cross-border tariffication scheme was introduced only in 2002, and reflected only to a partial extent the principles agreed upon at the Florence Forum. That system, that was meant as a transitory solution to replace transaction-based cross-border tariffs and overcome tariff pancaking, has not been updated yet, even though in 2003 Regulation 1228 made the broad set of principles elaborated at the Forum binding. Lack of concrete progress has recently prompted action from the

⁶ Directive 1996/92/EC of the European Parliament and of the Council of 19 December 1996 concerning common rules for the internal market in electricity, O.J. No L 27/20

Commission. In December 2009, the Commission submitted its draft Comitology guidelines on ITC and transmission tariff harmonization to the Electricity Cross-Border Committee⁷.

On congestion management, although the 2000 Florence Forum guidelines supported market based mechanisms for congestion management, only a limited number of interconnectors had implemented market based methods by 2002⁸.

Whereas reaching consensus on broad principles proved to be relatively straightforward, the early experience showed that the voluntary framework adopted through the Florence Forum had limited ability to drive and coordinate implementation of those principles.

2.2 The second Directive and the Electricity Cross-Border Regulation

Further requirements were introduced in the European legislation in 2003 by the second Electricity Directive⁹ and the Electricity Cross-Border Regulation¹⁰. The Directive narrowed, to a certain extent, Member States' discretion, for example by imposing legal unbundling of transmission networks and regulated third party access to networks, whereas those provisions were optional in the first Directive. Furthermore, the second Directive imposed shorter deadlines and fewer options in implementation, aiming at greater convergence of market opening.

The Regulation complemented the Directive; setting binding principles aimed at harmonising access conditions to the European electricity network. Market based mechanisms were to be the norm for congestion management in Europe, marking a clear turning point with previous pro-rata or first-come-first-served methods. In addition, the scope for reservations of interconnection capacity for long term contracts was reduced.

Despite the more prescriptive stance of the Regulation, the compromise reached in the negotiations among Members States was still evident on some important issues. Transaction based methods remained possible, even though not preferred. Exemptions to third-party access were also still possible, even if limited to new interconnectors and subject to specific conditions (pro-competitive, risky investments that would have not been carried out otherwise).

Notably, nothing was said in either the Directive or the Regulation on the congestion management systems to be implemented within each Member State, thus neglecting the need for coordination of intra-State and inter-State congestion management systems.

As a result of the wide range of issues left to subsidiarity, market designs¹¹ developed in the EU Countries displayed widely differing features, also in areas that are crucial to the development of efficient cross-border spot trading arrangements. Models range from pools, allocating cross border

⁷ "Draft Commission Regulation laying down guidelines establishing a mechanism for the compensation of transmission system operators for the costs of hosting cross border flows of electricity and a common regulatory approach to transmission charging", Cross Border Committee 17 December 2009, Brussels.

⁸ "Discussion paper on congestion management guidelines", 8th Florence Forum, February 2002.

⁹ Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC, O.J. L 176/37

¹⁰ Regulation (EC) No 1228/2003 of the European Parliament and of the Council of 26 June 2003 on conditions for access to the network for cross-border exchanges in electricity, O.J. L 176/1

¹¹ We take here a broad definition of market design, encompassing both the definition of the product exchanged and the way the exchange takes place. On the first aspect (product definition), for example, issues following in the market design domain include the length of the time-interval during which the value of electricity is conventionally considered constant for the purpose of settling the transactions, or the set of networks nodes at which electricity is conventionally held as having the same value. Issues relating to the way transactions are carried-out include, for example, the use of auctions or decentralised (bilateral) negotiation to match demand and supply of electricity, the mechanisms to allocate transmission rights in the different time-frames, etc.

(Nordic market) or national (Italy) transmission capacity, to systems heavily relying on bilateral negotiations and self-scheduling with congestion management performed via redispatch (UK and most of the Central European markets). The same diversity features on ancillary service procurement arrangements, ranging from highly transparent balancing and ancillary services markets to more or less openly regulated agreements between the transmission system operators and the main generators. This situation should be compared with the US approach, where the Federal regulator (the FERC) issued binding guidelines suitable to implement the same market design – the so-called “Standard Market Design” – across the entire country (Hogan, 2008).

2.3 The regional model

The Commission set out its strategy on the electricity market integration process in its “Medium term vision for the internal electricity market”, issued in March 2004 (EC 2004a). From this point on, the regional approach becomes a core element of European electricity market integration strategy.

The regional approach is presented, in the Commission’s paper, as a necessary interim stage towards pan-European integration, motivated by the higher level of interconnection among certain groups of Member States and by the fact that certain groups of Countries have already adopted common harmonized rules. Regionalisation is seen by the Commission as a means to faster moving integration of groups of Countries (like the Nordic Countries). The Commission proposed this approach under the assumption that eventually “most rules will be standardized at EU level in any event and any artificial partitioning of the EU market will be avoided.”

The Commission envisages a two stage approach. The goal of the first stage is set in terms of a co-ordinated market-based mechanism integrating day ahead (and possibly intraday) markets within each Region. In particular, for the day-ahead timeframe, each Region should pursue integration through implicit auctions of cross border capacity. The second stage would be characterised by tighter integration within each Region, to be possibly achieved through a single power exchange, setting geographically differentiated prices in the case of congestion.

In the Commission’s strategy, regional market should eventually converge into a pan-European single market. However, neither the objectives nor the means for inter-region integration are defined. Further, no blueprint for European market design is suggested, although the paper touches on the potential flaws of models treating internal and cross border congestions differently.

Consistently with the new regional energy policy, a series of regional "Mini-Fora" were set up during the winter 2004/2005. These regional Fora were convened jointly by the Commission and the Council of European Energy Regulators (CEER)¹² and included representatives of the transmission system operators, the power exchanges and, where appropriate, all other relevant stakeholders, including in particular the governments of the Member States of the region.

In September 2004, when the Mini Fora were set-up, 12 out of the 25 most congested interconnectors were managed with market based methods (implicit auctions in the Nordic market, explicit auctions elsewhere). On the remaining 13 interconnectors, capacity was allocated by pro-rata, priority list or other not market based methods. In addition, the procedure to allocate transmission rights on 11 of the 25 most congested interconnectors was not run jointly by the TSOs sitting at both ends of the interconnector; separate applications had to be filed with both TSOs and the allocation at both ends was not coordinated, so that some applicants could end up with non-matching rights (EC 2004b).

¹² Later the CEER’s role was taken up by the European Regulators' Group for Electricity and Gas.

The ambition of the Mini Fora was to develop a plan and detailed timetable for the introduction of coordinated market based mechanisms for the allocation of cross-border transmission capacity¹³ at least day-ahead. Results were mixed. Coordination of day-ahead capacity allocation in the whole EU was not achieved. However, plans were set for all interconnectors with non-market based capacity allocation methods to move to market based methods by 2006. In addition, the introduction of implicit auctions involving France, Belgium and Netherlands (the so-called Trilateral market Coupling) was planned. Further, a pilot project based on implicit auctions was planned between the Nordic countries and Germany.

Based on the mini-Fora experience, the amended 2004 Guidelines¹⁴, adopted at the end of 2006, provided the legal basis to the regional approach, marking a significant change in the organization of the work on market integration. The new Guidelines established seven groups of EU Member States (the Regions) within which a common coordinated congestion management method and procedure for the allocation of transmission capacity to the market had to be developed. Regions overlapped and countries (and interconnections) at the seam between Regions belonged to more than one Region¹⁵. The following figure shows the Regions defined in the Guidelines.

Tab. 1: Electricity Regional Initiatives – Regions

Region	Countries	Lead Regulator
Central-West	Belgium, France, Germany, Luxembourg, Netherlands	CREG (Belgium)
Northern	Denmark, Finland, Germany, Norway, Poland, Sweden	DERA (Denmark)
UK & Ireland	France, Republic of Ireland, GB, Northern Ireland	Ofgem (GB)
Central-South	Austria, France, Germany, Greece, Italy, Slovenia	AEEG (Italy)
South-West	France, Portugal, Spain	CNE (Spain)
Central-East	Austria, Czech R, Germany, Hungary, Poland, Slovakia, Slovenia	E-Control (Austria)
Baltic	Estonia, Latvia, Lithuania	PUC (Latvia)

Source: ERGEG

¹³ The relevant background for this exercise was the ETSO/Europex joint proposal for congestion management based on the so-called “flow-based market coupling”. However, the flow based market coupling approach was not necessarily intended as a target model to be adopted throughout Europe. It was the Mini-Fora task to consider for each relevant area the best congestion management mechanism, in line with the Regulation, that was most suitable to the particular circumstances in the Region.

¹⁴ Commission Decision of 9 November 2006 amending the Annex to Regulation (EC) No 1228/2003 on conditions for access to the network for cross-border exchanges in electricity.

¹⁵ The overlapping countries are: Germany, France, Poland, Slovenia and Austria.



Source: ERGEG

The Guidelines set the regional coordination objective in very general terms: *“the use of a common transmission model dealing efficiently with interdependent physical loop flows and having regard to the discrepancies between physical and commercial flows”* and coordinated *“allocation and nomination of capacity to deal efficiently with interdependent physical loop-flows”*¹⁶.

The Guidelines place great emphasis on coordination among the transmission system operators on issues like allocation procedures (*“identical timeframes and closing times”*, *“accounting and settlement of congestion management actions”*), contractual arrangements (*“consistent contractual framework with market participants”*), and security checks (*“verification of flows to comply with the network security requirements for operational planning and for real-time operation”*)¹⁷.

On the design of the allocation system, though, the Guidelines do not pin down a target model. Wide flexibility is left to develop regional tailor-made arrangements, both from the institutional and technical perspectives.

From the institutional point of view, very different solutions are compatible with the Guidelines. Coordination of system management can be reached either through coordination of independent transmission system operators or by the creation of a regional system operator. Transmission rights allocations may be implemented either through the creation of a single auction office or of a single power exchange, or via coordination of independent entities.

Also, in terms of design choices, the range of options compatible with the Guidelines remains wide. Explicit or implicit systems are both possible for the day-ahead time frame. Longer term hedging can be provided through either financial transmission rights or long term physical rights. For intraday cross border allocations, besides explicit and implicit allocations, continuous trading with first-come-first-served transmission capacity allocation is also possible.

¹⁶ Paragraph 3.5 of the Congestion Management Guidelines, points a) and b); Commission Decision of 9 November 2006 amending the Annex to Regulation (EC) No 1228/2003.

¹⁷ Paragraph 3.5 of the Congestion Management Guidelines, points from d) to h); Commission Decision of 9 November 2006 amending the Annex to Regulation (EC) No 1228/2003.

The only constraint to regional level discretion is set by another objective at paragraph 3.4 of the Guidelines: “*Compatible congestion management procedures shall be defined in all these seven regions with a view to forming a truly integrated Internal European Electricity Market. Market parties shall not be confronted with incompatible regional systems.*” However, what makes congestion management procedures devised in different Regions compatible or not is not addressed in the Guidelines.

The involvement of the European regulators in the process increased in parallel with the development of the legal framework. In 2006 the European Regulators' Group for Electricity and Gas (ERGEG) launched its Electricity Regional Initiatives (ERI) (ERGEG 2006), with the objective to speed up the implementation of the Guidelines.

ERGEG set out the institutional framework for the regional markets. The work is steered by the regulators in Regional Coordination Committees (RCCs). The RCCs have no formal legal power to enforce regional decisions. The Commission and the national Regulators retain enforcing powers at the European and at national level respectively. As a consequence, regional decision-making requires unanimity.

The Implementation Groups (IGs), comprising the representatives of regulators, transmission system operators (TSOs) and power exchanges, were responsible for carrying out the work. Involvement of Member State governments was foreseen, at regional level, in the mini-Fora (or Stakeholder Group meetings), and at the Florence Forum, which remained the place for discussing European developments, reporting regional progress and ensuring pan-European consistency.

The importance of the “regional level” in the process towards European electricity market integration appears to have grown in time. Before ERI, local integration initiatives were considered as pilot projects within the pan European umbrella provided by the Fora. The ERI program decentralised the decision making process and allowed for objectives and priorities to be defined at regional level.

3. Achievements and limits of the regional approach

3.1 Did the regional approach deliver?

Compared to the picture sketched by the European Commission in September 2004 (EC 2004b), when the regional approach was proposed, significant progress has been made:

- market based allocation mechanisms are now in place on all European congested interconnections;
- the central European Regions (Central West, Central East and Central South) introduced explicit auctions on all interconnections to allocate medium and long term (yearly) capacity products to hedge against short term volatility in price differentials. These Regions managed to greatly harmonise allocation rules applied within Regions;
- TSOs’ coordination on capacity calculation and allocation, barely existing in 2004, has been a key area of work delivering some important results. At least bilaterally coordinated procedures are in place on congested interconnections. Regional common procedures have been adopted in the Central West and Central East Regions;
- the Trilateral Market Coupling project encompassing Benelux and France, committed in the framework of the 2004/2005 Mini Fora, has been successfully implemented and is currently evolving to include Germany. The second pilot project agreed within that process, the Germany-

Denmark coupling, was re-launched in November 2009¹⁸. New commitments have been undertaken at sub-regional or regional level for the implementation of implicit auctions at the day-ahead time frame;

- mechanisms for TSO to TSO balancing have successfully been introduced in the France-UK-Ireland Region on the France-UK interconnector.

The regional approach delivered, therefore, some important results.

Nevertheless, the ERI suffered from a decision making process heavily relying on voluntarism and highly decentralised.

Reaching consensus on even relatively non-technical issues has proved very time consuming in some cases because of the complex interplay of national-level and stakeholder-level interests, reflecting, in some countries, the ties between the government and the incumbent and between the incumbent and the transmission system operator.

The governance structure of the ERI process is such that each of the TSOs and of the Regulators has de-facto veto power on any decision. A good example of this is the Single Auction Office project in the Central South Region. Whilst similar to best practice examples successfully implemented in the Central East and Central West Regions to set up common allocation procedures, the Central South Region project was blocked by lack of alignment of interest among TSOs. Lengthy discussions have been fruitless so far due to lack of consensus on the governance structure of the coordinating entity¹⁹.

Progress to date has therefore been successful where there has been close alignment of interests among the local stakeholders and/or where political willingness spun the process. A key factor of success for some projects was indeed the support offered by the Governments concerned, which, in some instances, developed to a large extent outside the ERI framework. For example, the Spain-Portugal integration into the MIBEL market was supported by the Wholesale International Agreement (2004), which progressively developed by national legislation. Similarly, in the case of the creation of a single wholesale market in the Island of Ireland (SEM project), the national legislation on electricity in both markets was identically amended in 2007, ex-ante, to provide a compatible legal framework to integration. Further, governments' commitment was a key success factor in the Trilateral Market Coupling project.

Moreover, as Regions were responsible for building internal consensus on priorities and on timing for their implementation, local achievements have been reached largely independently within each Region or even sub region. Each Region has tended to adopt partly unique technical and governance approaches with little Europe wide coordination or direction. Coherence of developments and convergence of solutions has therefore been a major concern of ERGEG and the Commission in deploying the regional model²⁰.

The 2008 Florence Forum acknowledged the need for more coordination and established the Project Coordination Group (PCG)²¹, which was assigned the task to develop a practical and achievable model to harmonise interregional congestion management and to propose a roadmap with

¹⁸ Market coupling was introduced on the Kontek DC link between Germany and Eastern Denmark and on the AC link between Germany and Western Denmark in September 2008. However operations were stopped after few weeks because of inconsistent market outcomes resulting from the coupling algorithm.

¹⁹ Information on developments and minutes of RCC and IG meetings are published on the ERGEG website: http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_INITIATIVES/ERI/Central-South

²⁰ "Forum participants welcomed the EREG 2nd Electricity Regional Initiative Coherence and Convergence Report, which reaffirmed that the seven electricity Regions are working in ways which foster regional market integration....However, the report noted the risk that progress in Regions could be disjointed as Regions have different priority levels and timings for the priority issues", minutes of the XV Florence Forum, November 2008

²¹ In the PCG the European Commission, Regulators, ETSO, Europex, Eurelectric and EFET are represented.

concrete measures and a detailed timetable. The PCG presented its proposal for a target model for capacity allocation and congestion management and a tentative roadmap for the implementation by 2015 in December 2009 (PCG 2009). The PCG proposal marks a significant departure from the regional model and towards a top-down approach. Integration is to be obtained by the extension to neighbouring countries of the mechanisms developed in one Region, whereas in the original two-layer approach integration would have resulted from the coordination of heterogeneous regional models. It remains to be seen how and to what extent the PCG proposal will be channelled into the Third Package legal framework.

In the next section we survey the developments of different Regions. In the subsequent ones we outline the main issues that do not appear to have been adequately addressed within the regional framework.

3.2 Similar priority topics, different models: will the Regions converge into a single market?

All Regions identified and pursued similar priority topics (ERGEG 2007). Six out of seven Regions set up dedicated work-streams on improving congestion management methods, covering transmission capacity calculation, as well as capacity allocation mechanisms for the different time-frames (yearly to intra-day). However, the Regions assigned differing priority levels to different work-streams and/or launched parallel projects on similar issues with little inter-regional coordination.

Transmission capacity calculation has been under intense discussion especially in Central European Regions – Central West and Central East Regions - where the network is highly meshed and loop-flows more relevant. Currently TSOs set ex-ante the maximum feasible level of cross-border transactions – the so-called “commercial capacity”. The commercial capacity allocated at each cross-border interface is set as independent from the capacity allocated at every other border. Available capacity levels are set via load flow calculations based on expected physical flows, at which stage expected loop flows are taken into account. Calculations are generally based on a limited set of information. In order to cope with the differences between actual and expected flows part of the transmission capacity is not allocated to market participants (the so-called Transmission Reliability Margin). We will later refer to this approach as the “Net Transfer Capacity (NTC) model”.

In both Regions the current implementation of the NTC approach was considered unsatisfactory and an evolution to the so-called “Flow-Based” system was envisaged²². In the Flow-Based model the use of cross-border lines is jointly determined with (market-based) optimal injections and withdrawal schedules. However the chosen timeframes and allocation methods have been different in the two Regions. Whilst Central East focused mainly on long term allocations, Central West is pursuing a flow based short-term allocation system.

The PCG target model for capacity calculation is very broadly defined as “Extended improved Flow based Capacity Calculation”, which shall serve as the basis for the implicit allocations. The PCG recommended the target model to be based on a common model of the European grid, which should consist in a set of coordinated processes and a common set of information. The common grid model should serve as the basis for tight cooperation and coordination of TSOs on day ahead capacity allocation, grid reliability assessment, security analysis and for curative redispatch measures. The PCG recommends therefore further than the regional grid model and TSOs coordination foreseen in the congestion management guidelines (and indeed yet to be implemented in most Regions) and advises full coordination at European level. This generic target model will be the object of an ad hoc project chaired by ENSTO-E.

²² Under a Flow-Based approach – at least in its pure form – no ex-ante interface-level transmission capacity assessment and allocation are performed. In practice, as we discuss in the following section, the Flow-Based mechanisms being currently developed in Europe retain some features of the Net Transfer Capacity approach.

Materially different arrangements were developed in different Regions to implement implicit auctions of cross-border interconnection capacity. At one extreme, the Spanish and Portuguese markets are operated as a single market by one power exchange since 2007. Bids and offers for delivery in either country are matched by the same algorithm, operated by a single exchange. In case of congestion, the Iberian market is “split” in two different price-zones²³.

An intermediate degree of integration features in the Trilateral Market Coupling mechanism, which allocates cross-border transmission capacity among France, Belgium and the Netherlands since November 2006. Each national exchange run a national market clearing algorithm, while cross-border flows are determined through an iterative process involving a central “coupling” institution. The national wholesale prices and the cross-border flows are jointly determined. A high degree of coordination among the involved exchanges, both at the operations and at the clearing algorithm design level, features in this model. The evolution of the Trilateral Market Coupling, the Central-West Flow-Based market coupling, is based – at least from the point of view of the market clearing algorithm, on a more centralised approach. The German-Denmark market coupling approach can be placed at the “low-coordination” extreme of the range of the market integration models. In that case, the national wholesale prices and the cross-border flows are not jointly determined: cross-border flows are determined first and then clearing prices implementing those flows are determined independently by the power exchanges²⁴ (EMMC 2006, EMMC 2009).

The regional approach encouraged development of competing projects. Germany, for instance, was involved in two parallel coupling projects (the Germany-Denmark coupling involving the Northern and the Central West Regions and the Central West internal regional coupling project). The French regulator, CRE, expressed concern on the compatibility of the two projects and raised the issue of prioritisation of coupling projects (CRE 2007). In the following year’s report, CRE proposed setting the sequence of coupling projects to implement based on qualitative and quantitative criteria, in order to ensure “*inter-regional coherence*”. The European regulators included a similar recommendation in their 2nd ERGEG Coherence and Convergence Report (ERGEG 2008). The ERI approach, though, provided no framework – either in terms of technical criteria or institutional processes – to build consensus on (let alone impose) a decision on the priority of the different projects. All the more so given those projects implemented earlier would de-facto set most of the design choices.

The ETSO-Europex Report (ETSO and Europex 2009) was the first attempt to define a road to market integration for the day-ahead timeframe. The Report proposes two options for integration of the regional markets.

The first option is inter-regional “volume coupling” (called “dome-coupling”)²⁵. This approach is consistent with the two-layer (regional/inter-regional) model as the underlying assumption is that the inter-regional mechanism would require a lower degree of coordination/harmonisation, compared to intra-region coupling systems. A cursory look at the topology of the highly meshed European transmission network does not appear to provide support for that assumption. We recall in this context that implementation of a volume-coupling system at the German-Danish border has proved to be all but easy. The trend of convergence of marginal generation costs throughout Europe and the increasing

²³ This approach (known as *market splitting*), similar in essence to the ones adopted in Nordpool and in the Italian internal market, implies the higher level of technical and institutional coordination (one market design, one clearing algorithm, one power exchange).

²⁴ This approach to market coupling is referred to as “volume coupling”. The initial mechanism delivered incoherent results (flows in the opposite direction from the price differential) and inefficiently unused capacity in a high number of hours. As a consequence, the coupling was suspended in October 2008 after ten days of operations. The project has been successfully relunched since November 9 2009 (with delivery on November 10).

²⁵ Volume coupling is a potentially imperfect form of integration: in a first stage cross-border flows are determined based on limited information about the electricity prices in each market; at a later moment each national market is cleared by considering imports and export – determined in the first stage – as given.

reliance on imperfectly predictable renewable generators adds to the problem, by making (efficient) flows across Regions increasingly difficult to anticipate and, therefore, to embed in an NTC-based capacity calculation systems.

The second option consists in a pan-European “price-coupling”²⁶ mechanism, to be achieved by extending one of the coupling mechanisms applied within one Region. This model has recently been endorsed by the PCG, which foresees a sequential path to integration by progressive extension of the CWE model to neighbouring Regions. Notably this solution marks a radical departure from the decentralized approach on which the regional model was based.

Harmonization and improvement of long and medium term explicit auction rules and the setting up of a common coordinated procedure for allocations have been central topics in all Regions, with the exception of the Nordic Region, where contracts for difference are deemed to provide adequate hedging possibilities. In this context two companies (CASC²⁷ and SAO²⁸), owned by TSOs, were set up in Europe with the task of performing coordinated auction procedures in the Central East and Central West Regions, respectively. Both of them plan to operate harmonised auction rules on all interconnections within Regions in 2010.

The PCG target model for the forward transmission market is very broadly defined to the point that it does seem to simply acknowledge the existing variety of arrangements across Europe. The PCG recommends transmission rights to be either physical or financial rights. The choice between the two models is left to the Regions. The issue of compatibility of products between Regions is not addressed.

Intraday, and even more balancing, timeframes have received less attention. The Nordic countries, (including Norway from 2009) have a common continuous trading market, Elbas, which allocates capacity during the day on a first-come-first-served basis. The Elbas model has also been introduced between Germany and Denmark East. Despite the wide agreement on the superiority of market based allocation methods, a continuous trading allocation method has been proposed as the Target Model for the intraday timeframe²⁹ in the XVIIth Florence Forum in December 2009 (PCG 2009).

With the exception of the Northern Region (and more specifically, the four Nordic Countries), where reciprocal access to foreign balancing markets already existed prior to the ERI, the France-UK interconnection is the only one where there are concrete plans for balancing integration.

Finally, market transparency is perhaps the area in which converge of Regions proved to be more effective. Virtually identical transparency requirements are now applied or are about to be in all Regions.

3.3 Crucial design issues still to be addressed

The European energy policy on market integration has to a large extent neglected the relationship between the cross-border market-coupling mechanism and the congestion-management mechanism

²⁶ Price coupling amounts to full integration of the markets; clearing prices in every country and cross-border flows are simultaneously determined.

²⁷ CASC-CWE S.A. (Capacity Allocation Service Company – Central West Europe) has been designated as Joint Auction Office to operate the activities linked to the long-term explicit auctions. See: www.casc-cwe.eu.

²⁸ CAO Central Allocation Office GmbH” is currently implementing a load-flow based explicit allocation process to allocate physical transmission rights for cross-border electricity transmission in the CEE Region on behalf of the eight involved TSOs. As soon as the implementation will be finished and tested with TSOs and market participants, CAO will take over the daily operation of the allocation process. See: www.central-ao.com

²⁹ The PCG acknowledges that its proposed allocation method is non market based and suggest that the proposed “continuous implicit allocation may be complemented, where appropriate, with market based methods (e.g: some implicit auctions during the intraday timeframe) if significant transmission capacity becomes available”.

implemented inside each State. Both mechanisms allocate scarce transmission resources, although they operate on a different geographic scale.

The separation of the “national” and the “cross-border” level is artificial and untenable, since it is inconsistent with the technical features of electricity and the meshed nature of the European transmission network. Without entering into technicalities, we recall that international and intra-national congestions could be efficiently solved as independent problems only under some “separability” conditions, which are clearly not satisfied by the highly meshed European transmission network. When those conditions do not hold, the outcome of the inter-national scheme – the coupling mechanism – is not independent from the national congestion management scheme. Therefore a separate congestion management schemes will generally result in inefficient dispatch of generators, need for costly redispatch and, ultimately, higher total supply costs for electricity customers.

The more heterogeneous the inter-national and national congestion management schemes are, the more important the issues originating from their interdependence are likely to be.

Even though a quantitative assessment is impossible at this time, tensions between the national congestion management methods and the cross-border capacity allocation system regularly surface the debate. Within the traditional NTC capacity calculation framework, system operators are often alleged (by market participants) to set “too-high” transmission reliability margins – thus reducing interconnection capacity available for transactions – to avoid domestic congestions that would need relief via (expensive) redispatch. Such behaviour has recently triggered the European Commission intervention, within the standard competition policy framework, against the Swedish TSO.³⁰ Relieving internal constraints by reducing interconnection capacity was interpreted by the Commission as an abuse of dominance, in the form of discrimination of national against cross-border transactions. In response to the Commission’s allegations, the Swedish TSO has offered to harmonise the cross-border and the national congestion management systems, by creating price-zones within the country.

This is perhaps the area of the European electricity market design where *a)* the arrangements implemented at the national level are most different from the one envisaged at cross-border level, and *b)* higher reluctance to harmonise is to be expected by the States. In the rest of this section we discuss those issues in turn.

In most European countries internal congestions are dealt with via some form of re-dispatch. When market participants commit to transactions causing flows that the network cannot accommodate, some parties are paid by the system operator to change their injection/withdrawal schedules at certain locations, until the resulting flows are consistent with the network capacity. In other words, re-dispatch based systems allow market participants to negotiate transactions “as-if” unlimited transmission network capacity were available – irrespective of the real network capacity. At a later stage, the system operator “buys-back” the rights in excess of those that can be supported by the existing network resources. A single electricity price therefore prevails across the entire transmission network, since the cost of meeting the incremental demand is perceived by market participants as the same at any location.³¹

A comprehensive discussion of the drawbacks of this approach goes beyond the scope of this paper. We limit ourselves to recalling that an extensive literature has highlighted that managing congestions through re-dispatching mechanisms may result in short and long run inefficiencies. In the short run, re-dispatching mechanisms might result in higher cost to customers due to the sub-optimal bidding incentives provided to generators. In the long run, it may induce inefficient localisation of new

³⁰ Notice 2009/C 239/04.

³¹ Locationally differentiated prices will actually emerge in the re-dispatch phase.

generation capacity.³² In particular, this last undesirable outcome is a consequence of decentralised generation investment decisions, which is a key feature of a liberalised energy markets³³. For a decentralised decision making process to produce the overall cost minimising outcome (by factoring in the investment decision the impact of location of new generation on system operation costs), the pricing mechanism has to provide locational incentives.

Contrary to a re-dispatching type of model, implicit auctions - the model of choice for regional market integration – limit market transactions to those compatible with actual network capacity. This is achieved by differentiated electricity prices according to the location where power is injected or withdrawn. Therefore different electricity prices at different locations, in case of transmission scarcity, are a structural feature of this congestion management mechanism. Under this arrangement, only injections and withdrawals in the same price area will be regarded as balanced by the System Operator in case of congestion.

The shift from a re-dispatching model to an implicit auction model providing locational prices has significant political and economic implications.

Member States are likely to be reluctant to implement implicit auctions for domestic congestion management. Nation-wide electricity price uniformity has for a long time been one of the basic features of the regulatory models implemented in all European countries. Price-uniformity was interpreted as one of features of the tariff system reflecting the “social good” nature of electricity. For that reason, moving to a system in which electricity prices can be materially different in different areas of the same country would potentially come at a high political cost. Further, profitability of some generators can be materially affected if locational prices are introduced.

In conclusion, although the some of the consequences of moving from redispatch to locational prices could be mitigated by appropriate measures³⁴, changes in the national market arrangements would still be major.

The market design advocated by the PCG as the reference model for cross-border integration does not address intra-state congestion management. The CWE market coupling project, inspiring the PCG reference model, is designed under the “one country – one price” assumption. This feature is implemented in the “flow-based” market clearing algorithm through a “simplified” network representation. Fine tuning of the model’s parameters has proved to be a difficult exercise and the algorithm still runs on the basis of NTC-style capacity calculations.

4. Conclusions

The regional approach to the creation of a single European electricity market has achieved important results and, thanks to the inclusive decision making process lead by ERGEG, has been able to give voice to all the relevant stakeholders.

Despite those successes, the regional approach has shown weaknesses causing intra-regional decision-making process to be extremely slow in some cases. Further, the issue of inter-regional market integration was largely not addressed within the regional framework.

³² An extensive literature discusses the distortions of market outcomes and the distributive effects of this congestion management method. See for example Hogan 1999, Stoft 1998, Green, 2007, Oggioni G., Smeers Y. 2010.

³³ Geographic price-uniformity may not have caused inefficient investment decisions under the former vertically integrated monopoly regimes, which planned generation investments by minimising overall costs.

³⁴ For example, Italy has implemented a locational-price system for injections, while a nation-wide uniform price is assessed to withdrawals. Similar mechanisms are implemented, at a smaller geographic scale in some US markets.

There are indications that the regional approach reached its limit when faced with the objective of coordinating day-ahead and real-time markets. Integration at that level may require major changes in the design and operations of the national markets, and the burden placed on each Member State may depend on the chosen “coupling” design. Therefore, national institutions are reluctant to commit to such changes through a voluntary process, all the more absent a clear understanding of the final European-wide target.

The coordination issue can not be solved simply by assigning higher priorities to projects in some Regions. On the one hand, prioritisation would not guarantee the selection of the best solution; on the other hand it would not be consistent with the fundamentally bottom-up spirit of the regional model.

The two-tier approach, based on intra-regional markets and inter-regional coordination, appears to require much higher coordination of the regional projects than the regional process was designed to deliver. Further, the European transmission network is so highly meshed that relying on two (somehow) independent “coupling” systems for intra-region and inter-region coordination may lead to material inefficiencies.

New regulatory tools and more effective governance for decision making are therefore necessary. The Third Energy Package, recently approved by the Parliament and the Council, introduces new measures and procedures.

Network codes – developed by pan-European institutions (ENTSO and ACER) – will apply across all Member States. This will mark, potentially, a radical departure from the bottom-up approach of the regional process.

The new model appears to be more consistent with the technical issues surrounding the creation of the single electricity market in two areas: the Europe-wide approach, that could overcome some coordination issues featuring in the regional model, and the top-down approach – that could improve effectiveness of the process compared to the past voluntaristic model. On the geographic-scale, while it is expected that the role of the Regions in the decision-making phase will reduce, Regions might take on increasing responsibilities in the implementation phase.³⁵

Some weaknesses of second-package, though, appear to carry-over to the new framework. First, no provision in the new legislation ensures that ENTSO will have appropriate incentives to act in the interest of European consumers. On the governance side, the Third Package lacks provisions to ensure that ENTSO - an association of profit maximising companies subject to heterogeneous regulations, presumably pursuing national agendas and with differing degrees of independence from the former monopolists - will have appropriate incentives to act in the interest of all European consumers. In particular, the legislation contains no provisions on the structure of ENTSO. The new institution can self determine its governance structure, the duties of the participating TSOs and the decision-making process³⁶. In this respect it is not clear whether the unanimity issues affecting the regional process in the past will disappear or will be just moved into the ENTSO. Also, the ACER will have limited regulatory oversight on ENTSO: the legislation empowers ACER only with the option to reject ENTSO’s proposals in case of inconsistency with non-binding framework guidelines. While that could be an effective system to prevent the implementation of unsatisfactory solutions, it does not place any incentives on ENTSO to actively seek the single market objective.

³⁵ Commission’s presentation “3rd Package and the Regional Initiatives – where national, regional and EU objectives meet”, RI-conference, Brussels, 17 November 2009; ERGEG “Draft Strategy for delivering a more integrated European energy market: The role of the Regional Initiatives”, 9 November 2009. On the role for the Regions in the Third package see also: Reforming TSO’s: Using the Third Package Legislation to Promote Efficiency and Accelerate Regional Integration in EU Wholesale Power Markets, the Electricity Journal, Vol. 21, Iss. 8, 2008.

³⁶ The Commission’s role in this respect is limited to delivering an opinion on ENTSO’s statutes and rules of procedures (art. 5 Regulation 714/2009).

Second, the Third Package perpetuates the separation between within-country congestion management – remaining a national-level issue – and cross-border congestion management – to be dealt with at the Union level. Because of its inconsistency with the highly meshed nature of the European network, this two-tier approach is likely to result in inefficient market designs. Implementation of coordinated of cross-border and intra-state congestion management schemes might not be attractive to some States, since it might require giving up geographical electricity-price uniformity within the States, a politically unpalatable features in some countries.

Meanwhile the Commission, in the Swedish interconnectors case, has shown its ability and willingness to address topical issues in electricity market design – like congestion management schemes – within the standard competition policy framework. That introduces, potentially, an additional stream of policy actions affecting the European market integration process and adds to the need for a unified approach.

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