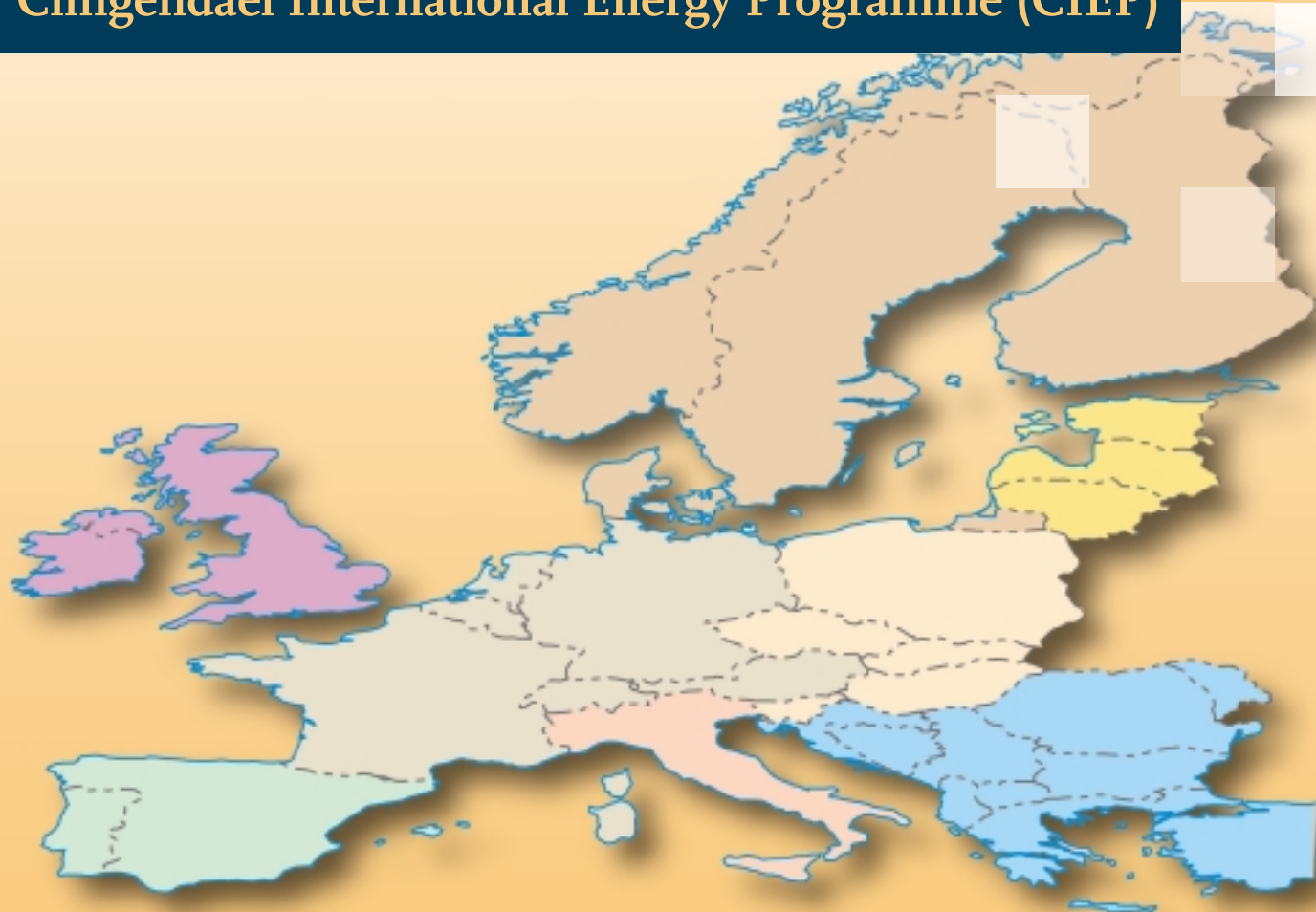


The 'Regional Approach' in Establishing the Internal EU Electricity Market

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The ‘Regional Approach’ in Establishing the Internal EU Electricity Market

A contribution to regulatory debates in the EU and the US on Standardised Market Designs and Regional Markets

Jacques de Jong

December 2004

Clingendael International Energy Programme

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Table of Contents

Acronyms	5
Executive Summary	7
1. Introduction	9
2. Some General Comments on US Electricity Restructuring and on EU Energy Market	
Liberalisation	11
2.1. Introduction	11
2.2. Some noteworthy differences	11
2.3. EU developments	12
2.4. Developments in the US	14
3. Strategic Views on Electricity Market Integration	19
3.1. Introduction	19
3.2. The EU strategy paper and its discussion	19
3.3. FERC actions	21
3.4. Some concluding observations	23
4. Key Issues Concerning EU and US Wholesale Markets	25
4.1. Introduction	25
4.2. Managing congestion	27
4.2.1. Introduction	27
4.2.2. The EU	28
4.2.3. The US	29
4.2.4. Concluding observations	30
4.3. Tariff structures	30
4.3.1. Introduction	30
4.3.2. The EU	30
4.3.3. The US	31
4.3.4. Concluding observations	32
4.4. Independent TSO governance	32
4.4.1. Introduction	32
4.4.2. The EU	33
4.4.3. The US	34
4.4.4. Concluding observations	34
4.5. Resource planning and adequacy	34
4.5.1. Introduction	34
4.5.2. The EU	35
4.5.3. The US	36
4.5.4. Concluding observations	37
4.6. Market monitoring and mitigation	37
4.6.1. Introduction	37
4.6.2. The EU	37
4.6.3. The US	38
4.6.4. Concluding observations	38
4.7. Jurisdiction and subsidiarity	38
4.7.1. Introduction	38
4.7.2. The EU	39

4.7.3. The US	40
4.7.4. Concluding observations	41
4.8. System failures	41
4.8.1. Introduction	41
4.8.2. The US situation	41
4.8.3. EU reactions and the EU events	42
4.8.4. Concluding observations	43
4.9. Gas and electricity, electricity and gas	44
4.9.1. Introduction	44
4.9.2. General trends	44
4.9.3. Supply security and market rules	45
4.10. Emission trading and renewable energies	46
4.10.1. Introduction	46
4.10.2. The EU	46
4.10.3. The US	47
4.10.4. Concluding observations	48
5. Lessons Learned and To Be Learned	49
5.1.1. Introduction	49
5.1.2. US-EU lessons	49
5.1.3. EU-US lessons	49
5.1.4. Agenda for further discussion with the US-side	50
5.1.5. Agenda for further discussion within the EU	50
6. Conclusions	53
References	55

Acronyms

AEEG	Autorita per l'energia elettrica e il gas (Italy)
ATC	available transmission capacity
BETTA	British Electricity Trading and Transmission Arrangements
BPA	Bonneville Power Administration (US)
CAEM	Center for the Advancement of Energy Markets (US)
CEC	Commission of the European Communities
CEER	Council of European Energy Regulators
CENTREL	TSOs of the Continental countries of Western and Central Europe
CHP	combined heat and power systems
CIEP	Clingendael International Energy Program (Netherlands)
CNE	Comisión Nacional de Energía (Spain)
CRE	Commission de régulation de l'énergie (France)
CRR	congestion revenue right
DG TREN	Directorate-General for Energy and Transport (EC)
DOE	US Department of Energy
DSO	distribution system operator
DTe	Dutch Office for Energy Regulation
EC	European Communities
EET	entry / exit tariff
EFET	European Federation of Energy Traders
EIA	Energy Information Administration (US)
EPACT03	Energy Policy Act, 2003 (US)
ERGEG	European Regulators Group for Electricity and Gas
ERSE	Entidade Reguladora dos Serviços Energéticos (Portugal)
ETSO	European Transmission System Operators
EU	European Union
EU-15	the first 15 member states of the European Union: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom
EU-25	EU-15 plus member states which joined the EU in 2004: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia
Eurelectric	Union of the Electricity Industry (EU)
FERC	Federal Energy Regulatory Commission (US)
FTR	firm transmission right
GAO	General Accounting Office (US)
GW	gigawatt
IEM	Internal Electricity Market (EU)
ISO	independent system operator
ITP	independent transmission provider
kV	kilovolt
kWh	kilowatt-hour
LMP	locational marginal pricing
LNG	liquefied natural gas
MIBEL	Mercado Ibérico de la Electricidad (Iberia)
MTOE	million tonnes of oil equivalent (in natural gas)
MWh	mega watt hours
NERC	North American Electric Reliability Council
NOPR	notice of proposed rulemaking

NORDEL	Nordic TSOs
Nordpool	Nordic Power Exchange
OMOI	Office for Market Oversight and Investigations (US)
PPA	power purchase agreement
PSO	public service obligation
PUC	public utility commission (US)
PUHCA	Public Utilities Holding Company Act (US)
PURPA	Public Utilities Regulatory Power Act (US)
RES	renewable energy sources
RTO	regional transmission organization
RTPA	regulated third party access
SEEREM	Southeast Europe Regional Energy Market
SMD	standardised market design
tcf	trillion cubic feet (natural gas measure)
TO	transmission owners
TPA	third party access
TSO	transmission system operator
TSOI	Association of TSOs in Ireland
TVA	Tennessee Valley Authority (US)
TWh	terawatt-hour
UCPTE	Union for the Coordination of Production and Transmission of Energy (EU)
UCTE	Union for the Coordination of Transmission of Electricity (formerly UCPTE, EU)
UK	United Kingdom
UKTSOA	UK TSO Association
US	United States of America
USD	US dollar

Executive Summary

The new Electricity Directive and the Regulation on cross-border trade have finalised the legal setting of the EU internal electricity market (IEM). A number of technical implementation details and relevant policy issues however still prevail or are yet to be settled, including industry structure and market power, supply security, and the further enhancement of cross-border trade and integrating cross-border markets. Discussion continues on many levels, such as regarding the strategic view that the European Commission has developed towards accomplishing the single EU electricity market. Issues are numerous and complicated, but not only on this side of the Atlantic. The US is also subject to ongoing discussion and policy-making regarding ‘US Electric Restructuring’, regional market organisation and regulatory design.

Although there are many differences between US and European developments, it is useful for the regulatory debate in the EU to be informed by the debate in the US, and vice versa. Relevant EU and US developments are therefore compared, not only in a more general descriptive way, but also in terms of particular issues with a focus on market integration, wholesale markets and cross-border, and interstate issues. On the EU side, analysis largely draws upon the Florence Forum, whereas for the US, the ongoing debate on Federal Energy Regulatory Commission (FERC) initiatives on (regional) wholesale markets is used as a point of departure. Issues are discussed concerning congestion management, tariff structures, independent transmission system operator (TSO) governance, resource planning and adequacy, market monitoring and mitigation, and jurisdiction and subsidiarity. Relevant new issues such as system failures, gas and electricity integration, and emission trading and renewables are also explored.

The paper concludes with an agenda for action, which proposes steps for future EU discussions as well as exchanges between the regulatory authorities on the two sides of the Atlantic. For the EU, actions are suggested to develop a legal framework for regional electricity markets with a set of minimum requirements. These requirements should include a physically and commercially strong interconnected system, a common view from the regulatory authorities on the prospects of the regional market, a clear and effective cooperative scheme between national TSOs and national regulators, a comparable level of TSO unbundling together with a set of mutually consistent rules for third party access (TPA) together with the intention of achieving integrated regional balancing markets and power exchanges. In addition to these requirements, a set of more detailed market conditions should be developed including conditions for congestion management, transmission tariff structures, TSO governance structures, resource planning and adequacy, system reliability, and market monitoring and mitigation procedures. Jurisdictional issues between the EU Commission and national regulators will have to be clarified, with a procedure for EU compliance assessment. And finally, the appropriate EU legal framework should be provided to establish the regional market procedures in a new EU regulation on regional electricity markets.

For the cross-Atlantic dialogue, technical and economic issues such as the management of congestion and locational marginal pricing (LMP) models, transmission tariff designs and procedures for market monitoring and mitigation will be important. Legal and jurisdictional issues will also need to be covered, including governance models for TSOs and regional transmission organisations (RTOs), regulatory involvement in market oversight, and federal versus national roles. Ongoing round table discussions between EU and US regulators might be an appropriate framework for this dialogue.

1

Introduction

The new Electricity Directive adopted in June 2003 (EC 2003a) finalises the legal setting for the internal electricity market (IEM). Member states must have implemented this Directive by 1 July 2004. The Directive establishes an overall legal level playing field for the EU electricity market. Under the new Regulation on Cross Border Trade (EC 2003c) the European Commission has the role of setting binding guidelines for the further integration of cross-border electricity markets. Although a number of details have yet to be settled, the basic rules are in place and the further play-of-game by market parties, regulators, national and EU authorities can and should begin. The market parties should embrace the challenge and begin to deliver the anticipated consumer benefits.

At both the European and national levels, many issues still remain unresolved – some of these are critical others are mere argumentation and positioning. Areas undergoing negotiation and debate include industry structure and market power, network unbundling in an ownership-unbundled-environment; supply security (including for generation, networks or perceived import dependency); system reliability; and the relevance of national markets versus the European market. Additional discussions address the technically complicated development of cross-border trade and market integration. Interestingly, policymakers, governments, regulators and industry are increasingly exploring these issues at a regional level, reflecting physical and commercial realities. Also the strategic vision that the European Commission has developed for the single EU electricity market recognises the regional model (DG TREN 2004a). The proposals from the European Commission on infrastructure and supply security in electricity in late 2003 (CEC 2003a) can also be viewed in this context.

These issues are not limited to discussion and reflection on the eastern side of the Atlantic. In the US, discussion and policymaking on the wider concept of ‘US Electric Restructuring’ is ongoing as well. The Federal Energy Regulatory Commission (FERC) undertook initiatives for a regional market organisation partly as the result of a number of serious black-outs. Some successful and interesting regional markets have occurred in the US with the debate on restructuring continuing at federal, regional and state levels. It is relevant for European discussions on regulatory approaches and practices to be informed by the simultaneous debate in the US. Although there are many differences between US and European developments, the issues that policymakers and regulators are facing are comparable and solutions could be found along similar paths. This is not only true for the electricity sector per se, with its networks, cross-border, interstate wholesale and retail markets, and policy and regulatory choices and concepts, but is also true for the institutional dilemmas in which (in general terms) the federal and European levels are competing with respective state and national levels. In this instance, European regulators still have to define their own precise roles, whereas in the US they are already established institutions.

In this analysis, relevant EU and US developments are discussed and compared. Following a general description of the two market sectors, we focus on market integration, wholesale markets and cross-border, interstate issues. For the EU, analysis largely draws upon the Florence Forum; for the US, we examine the ongoing debate on FERC initiatives for (regional) wholesale markets. Motivated by the need to understand the August and September 2003 events in the US Northeast and in Italy, a separate section addresses system failures. We also give attention to some relatively new issues, such as the integration between gas and electricity markets, and obligatory versus voluntary emission trading schemes together

with the role of renewable energies. Both developments will have impacts on electricity markets and further exploration is worthwhile. The conclusions to the paper include a possible dialogue between EU and US regulators, and speculate on further development of the regional model within the EU itself.

Regional market development analysis usually begins with market definition and market delineation. A substantive body of economic literature has been published on these issues (e.g. Shrieves 1978; Horowitz 1981; Stigler and Sherwin 1985), using price tests as the primary instrument for relevant market definitions. Since electricity markets are largely regulated, theoretical concepts of regulatory models should also be included. Over the last few decades, a wealth of theory, dedicated to providing frameworks for understanding regulatory policies, has been developed (e.g. Newbery 1999; Kahn 1988). A recent annotated reading list compiled by the World Bank encompasses thematic areas such as market structure and competition, price regulation, tariff design, non-price aspects, information issues, regulatory processes, etc. The issue of EU electricity market regionalisation has not yet received much theoretical attention and has been to-date approached more on practical and institutional grounds. Interesting concepts can be found in some recent journal publications, providing an initial analysis of the IEM (Boisseleau 2004; Boisseleau and Hakvoort 2002; Boucher and Smeers 2001; Perez Arriaga and Olmos 2004).

Regional market models are not the only solution for establishing an internal EU electricity market. An alternative might be an EU-wide policy framework for fuel input for power generation together with rules for siting. Such a policy could, in principle, also lead to more harmonised and globally competitive electricity systems without the otherwise necessary integration of trade and networks. Some interest groups have promoted similar approaches of national self-sufficiency in power generation that do not favour cross-border extension of trade and market integration. It should be noted, however, that any coordinated fuel input policy for power generation runs the risk of a centralised planning scheme which would be contrary to the general trends limiting decision-making powers at the EU-level, of subsidiarity and the use of market forces.

This paper does not intend to provide a detailed analysis of regional electricity market concepts and their theoretical backgrounds and implications. We instead focus on the current regulatory debate, and the issues that are on the agenda of regulatory authorities in the EU and the US. The paper provides comparative observations, drawing initial lessons and conclusions for further work and discussion. William Massey (FERC Commissioner) offers a useful comment to conclude these introductory remarks:

“The bulk of the assets in transmission are in retail rates under state control, yet the markets are regional. The entire 6.5 gigawatt grid of the Eastern Interconnection operates as one big machine. The physics of the grid mean that a wholesale transaction in Pennsylvania can create congestion 1000 miles away in Missouri. That congestion has economic and reliability consequences. In an interstate market interstate institutions are necessary to manage these problems. Yet, they can't be successfully created without state cooperation, and states want to be persuaded that these new institutions will provide value for their retail customers....” (FERC 2003b).

By substituting the *UCTE area*¹ for Eastern Interconnection, and member states for states, this quote also becomes relevant for the EU.

¹ The Union for the Coordination of Transmission of Electricity (UCTE), covering 22 countries in continental Europe.

2

Some General Comments on US Electricity Restructuring and on EU Energy Market Liberalisation

2.1. Introduction

There is a difference in focus between the EU and US developments, despite their common objective of introducing (additional) market forces to increase benefits to all consumers, be it in terms of prices and/or quality of service. This difference is largely a consequence of a wider and already enduring process in the US of restructuring electricity markets, whereas in the EU the focus has been more on opening of markets by establishing nondiscriminatory third party access (TPA) to networks.

Some facts and figures may be useful to put the two markets in perspective. Electricity plays a strong and dominant role in the energy balance of the EU and the US, with around a 20 percent share in total energy consumption. Differences in population (US: 285 million; EU-15: 380 million) are far less relevant than differences in consumption patterns. Electricity generation per capita is around 14000 kWh for the US, compared with 6700 kWh for the EU-15. Installed generation differs widely accordingly, for the US 900 GW and the EU-15 600 GW. Fossil fuels dominate the generation mixes in the two countries where more than 5000 electricity companies are active in the US, and some 2200 in the EU. Total turnover in the EU-15 is around 150 billion euro (USD 196 billion at time of writing), versus some 250 billion USD (190 billion euro) for the US. A further major difference is the degree of interconnection. The US mainland's 48 states are split into three zones (Eastern and Western interconnected systems, with the state of Texas wholly separated); the EU-continent is a single interconnected system through the networks of the Union for the Co-ordination of Transmission of Electricity (UCTE). Great Britain and Ireland together with the networks from Scandinavia are also connected, but are operated on a much more separate basis.

2.2. Some noteworthy differences

Before moving to a broader discussion, it is important to identify some key differences between the two markets. These are useful to keep in mind when considering market design and other related issues.

- The EU has embarked upon an overall EU-wide legal framework for opening up energy markets, leaving legislative details to the national member states. Despite several past attempts, the US has yet to develop a country-wide mandatory approach for market liberalisation.
- The US federal approach is limited to the introduction of more competition within the generation market and has mandated FERC to introduce TPA into interstate transmission systems, with the individual states deciding whether or not to introduce customer choice in supply. The general rule is that FERC has authority on (interstate) wholesale markets; and the (state) Public Utility Commissions (PUCs, the utility regulators) oversee retail markets.
- The EU focuses on eligibility: consumers are gradually acquiring eligibility for access to networks and – as a consequence – a choice of suppliers. Thus, independent, unbundled network operations are absolutely essential, as are additional rules for public service obligations (PSOs) and consumer protection. Network access is at the heart of the EU liberalisation project.
- When states in the US act to create customer choice for supply, in addition to the federal (FERC) rules with regards to transmission, they will primarily concentrate on large consumers, without explicit or implicit rules for access to the grids.

- If US retail markets are liberalised, there is the general conception that the existing monopoly-supplier will be the default supplier, and will continue to supply at regulated rates; any new competitive supplier will thus have to beat the incumbent provider. Within the EU, there is the concept of 'supplier of last resort' which serves as a safety net for household consumers when their chosen competitive supplier fails to deliver. US consumers do not have to act when they get their 'choice too choose'; EU-consumers will have to act as they must 'choose their choice'.
- The US has a long history of regulatory institutions, with a complex interaction between state and federal levels, whereas the EU terrain is based on a principle of subsidiarity with national laws and regulators – and without an EU regulatory authority (although the Electricity Regulation does provide some specific authority to the EU Commission with respect to cross-border trade). National regulators in most EU markets are relatively new, without – as yet – established positions, notably in relation to national governments and parliaments.
- EU transmission network operators have created, via the European Transmission System Operators (ETSO), a global European framework for coordination in transmission and system operation, with regional organisations such as UCTE, Nordel and others, covering the whole EU-25 system and even beyond. Such a system is still lacking in the US, with its varied regional and interstate approaches, including the North American Electric Reliability Council (NERC), a voluntary system of operational reliability. Discussions are underway to improve and strengthen this voluntary system.

2.3. EU developments

As of July 2003, the EU has embarked upon a fully mandatory scheme for liberalising its electricity and gas markets. Box A provides an historic overview of the project. Member states were required to have implemented the two Energy Directives into their national legislation by July 2004, containing the following key characteristics:

- Full market liberalisation for all electricity and gas consumers by July 2007, with an intermediate step for all non-household consumers by July 2004;
- Full legal unbundling for Transmission System Operators (TSOs) in electricity and gas as well as for Distribution System Operators (DSOs), with a specific exemption clause for DSOs after a specific assessment;
- Regulated third party access, with independent regulators;
- A clear set of minimum public service obligations, focussing on consumer protection;

Separate regulation confers power on the European Commission to set binding guidelines for further development of cross-border intra-European Community trade in electricity. These guidelines are required for inter-TSO compensation resulting from physical cross-border flows, managing congestion (especially for cross-border interconnection), and for harmonising tariff structures for transmission, with due regard to locational signals. This regulation could be understood as a step toward establishing the internal market, but not as a design for the wholesale market, or as setting rules for standardisation between national markets (Boucher and Smeers 2003). It does, however, provide procedures for establishing and determining the guidelines, using both the role of national regulators and the Florence Forum for consultation with all relevant stakeholders. A similar regulation is under discussion for the gas market.

The Commission has also formalised the advisory role of the national regulators via the European Regulators Group for Electricity and Gas (EREG) (CEC 2003b), and has proposed a wider legislative package for improving and expanding energy infrastructure and the security of supply in electricity (CEC 2003a). When adopted, these proposals will complement relevant actions at the EU level. However, the focus is still more on framework than on content. A clear vision is lacking with regard to the design of

the EU-wide (wholesale) market, or in US terminology, a model for standardised market design (SMD). The Florence process should provide impetus for the development of such a design. The March 2004 Strategy Paper from the European Commission is a road map, an agenda, a further step in the direction

BOX A Brief historic overview of EU energy market liberalisation

- 1985-1988** EU White Paper (1985), on completing the internal market, listing a number of sectors, including gas and electricity, eligible for further action; followed by a White Paper on energy in 1988.
- 1990** Adoption of Directives on transit in electricity and price transparency.
- 1991** First set of EU Commission proposals for liberalising the electricity and gas markets, introducing TPA in energy networks. Proposals were, however, 'dead-on-arrival'.
- 1994-1998** Second set of EU Commission proposals, separating gas and electricity (1994), leading to political adoption in 1996 (the Electricity Directive) and in 1998 (the Gas Directive); various degrees of network unbundling securing nondiscriminatory TPA; single buyer concept in electricity as an allowed alternative model.
- 1998-2000** Beginning of the Florence process (1998); setting of the agenda 'beyond the Directive'; primary focus on independent network operation and restructuring stakeholder organisation at the EU level: creation of the organisation for European Transmission System Operators (ETSO) in 1999; the former Union for the Co-ordination of Production and Transmission of Energy (UCPTE, covering production and transmission) lost its 'P' (production) role; and the two industry lobby groups (Unipede and Eurelectric) merged in one organisation (Eurelectric), covering all commercial non-network interests. 'Free' traders organised via the European Federation of Energy Traders (EFET) and the regulators founded their own club, the Council of European Energy Regulators (CEER) in 2000.
- 1999-2004** Florence process: Forum meets 11 times during this period with limited progress, focussing on inter-transmission system operator compensation and on congestion management. No binding conclusions were achieved, limiting implementation to voluntarism and accordingly poor performance.
- 2001-2003** Third set of EU Commission proposals, finalizing terms for the internal energy market (2001), strengthening the regulatory setting and system for mandatory regulated third party access in legally unbundled networks for transmission and distribution; final adoption with full political agreement in June 2003.
- 2003** Adoption of the Electricity Regulation (2003), conferring upon the European Commission a mandate for setting binding guidelines with respect to inter-transmission system operator compensation schemes, congestion management and tariff harmonisation. Florence process (as of late 2003), focuses on a strategic road map and Strategy Paper, and introduces the concept of regional markets. Creation of the European Regulators Group for Electricity and Gas (EREGG, November 2003), establishing a formal position for regulators in advising the Commission on the guidelines under the Electricity Regulation.
- 2003-2004** In response to the blackouts during the summer of 2003, the Commission proposes an 'electricity supply package' (December 2003) with greater regulatory oversight on infrastructure development and reliability; discussions in Council and Parliament ongoing during 2004.

BOX B Brief overview of federal US electricity restructuring

- 1935** The Public Utilities Holding Company Act (PUHCA) – sets rules for a national regulatory system for vertically integrated monopolies, serving all existing and future customers, but with state regulated business operations. During same period, separate legislation is created huge federally-owned utilities: the Tennessee Valley Authority (TVA) and the Bonneville Power Administration (BPA) in the Pacific Northwest.
- 1977** Federal Energy Regulatory Commission – established by Congress to regulate interstate transmission of oil, natural gas, and electricity and to licence state and local hydro-electric projects.
- 1978** Public Utilities Regulatory Power Act (PURPA) – sets rules and incentives for cheap and clean independent power production, granting access for non-utility generators to the grid, plus some other rights.
- 1992** Energy Policy Act – sets rules for open access to transmission, market-based rates authorized.
- 1996** FERC orders 888 and 889 – create a system of independent system operators and open access requirements for interstate transmission, allowing market-based rates basically following 'contract path' methodologies. As a consequence, the North American Electric Reliability Council (NERC) had to step up its (voluntary) rules and procedures on system reliability.
- 1999** FERC order 2000 – signals drives towards larger markets, strongly pushing for regional transmission organisations (RTOs), with specific focus on tariff design (the 'contract path' methodology was abandoned, indicating in very general terms the acceptance of physical loop flows as a basis for a regulatory framework), congestion management, ancillary services, available transmission capacity (ATC) calculation and reporting, market monitoring, planning and expansion and inter-regional coordination.
- 2002** FERC's notice of proposed rulemaking on standardised market designs – a set of binding and detailed rules, building on the RTO model, using locational marginal pricing (LMP) methodologies and introducing a nodal pricing system in RTO areas.
- 2003** FERC White Paper on regional wholesale markets – the SMD model is watered down, giving (much) more room for regional implementation (subsidiarity!), taking specific regional circumstances into account.
- 2003-2004** Lengthy discussions during 2003-2004 on a new Energy Policy Act, leading to scattered regulatory patterns and continuing (as at late 2004) uncertainties on federal mandates for electricity markets and infrastructure reliability.

2.4. Developments in the US

Electricity restructuring in the US is constantly under review at all levels of government. Box B provides a brief historic overview of US electricity restructuring. To summarise relevant legislative developments during the last few years, the US House of Representatives passed an Energy Policy Act in April 2003. The EPACT03 was the result of an intense debate in the House of the May 2001 National Energy Plan from the Bush Administration. The Senate passed a different Act in July 2003, and a Conference Committee was convened to resolve differences between the two bills, and a conference report was

approved and issued in November 2003. The House approved the conference report, but a Senate vote on cloture (to place a time limit on deliberations) failed, and further action has been delayed on a comprehensive package.

The electricity title of the Energy Policy Act in the conference report (US Congress 2003) contains numerous provisions aimed at improving the reliability and operation of the electricity grid, encouraging additional investment in critical grid infrastructure, and revising rules on utility ownership structure and power purchase requirements. For example, to improve reliability, it calls for the creation of mandatory grid reliability standards to replace the voluntary standards that currently exist. These standards would be administered by new 'electric reliability organisations', to be certified by FERC and responsible for developing and enforcing reliability standards for their respective regions. Subject to FERC approval, electric reliability organisations can propose and modify reliability standards and issue fines to those who violate them. To improve grid operation, EPACT03 calls for open nondiscriminatory access to the grid for all market participants. In other words, transmission-owning utilities are required to offer grid services to others under the same terms and conditions that they provide for themselves.

The bill would call for FERC to reconsider its standard market design (SMD),² and no final rule would be issued before 31 October 2006. However, given the Congress provision, utilities engaging in interstate commerce would be encouraged to voluntarily join regional transmission organisations. The bill states that Regional Transmission Organisations (RTOs) are needed "in order to promote fair, open access to electric transmission service, to benefit retail consumers, facilitate wholesale competition, improve efficiencies in transmission grid management, promote grid reliability, remove opportunities for unduly discriminatory or preferential transmission practices, and provide for the efficient development of transmission infrastructure needed to meet the growing demands of competitive wholesale power markets."

To stimulate investment in the nation's transmission grid, the bill would give the Secretary of Energy the authority to designate national interest electric transmission corridors in areas experiencing transmission constraints or congestion. Once an area has been designated as a national interest electric transmission corridor, within certain limitations, FERC could issue a permit to modify existing or construct new transmission infrastructure. The goal of these provisions is to expedite the review, authorisation and construction of needed grid enhancements. FERC would also be required to develop incentive rate structures for transmission pricing and to provide incentives for investments in advanced transmission equipment. EPACT03 also calls for key changes in existing utility legislation giving more freedom to public utilities and co-generation plants. Had EPACT03 been limited to electricity, it would probably already be enacted, providing FERC with further guidance and mandate. The inclusion of various energy support schemes, given their specific interest group involvements, probably killed the comprehensive package. Parts of EPACT03 are now being included in other draft legislation, rendering the electricity component uncertain to-date. However, it still lags behind the 2003 EU legislation on competition in energy markets.

Map 1 shows the status of US electricity market liberalisation as of March 2003. Eighteen states have either enacted enabling legislation or issued a regulatory order implementing retail access. Almost all of these 18 states are located in the Northeast, with Texas, Oregon and Arizona being the exceptions. A very general observation is that all states not active in restructuring typically have very large vertically integrated utilities (that tend to oppose competition anyway). All of these (white and yellow) states also oppose further mandatory FERC action to establish wholesale market competition. This map has been updated on a regular basis by the Energy Information Administration of the US Department of Energy (EIA, DOE); with this being the latest version at the time of writing. That there are currently no plans for further updates is an indication of the stalled state of electricity restructuring.

² This will be further discussed in section 4 of this paper.

CAEM, a not-for-profit corporation with the mission of promoting competition in energy markets, in its 2003 Index concludes:

“Market instabilities in 2001 and 2002 have resulted in some US states delaying or cancelling their plans to reform their retail markets. Jurisdictions that have just begun reform are moving cautiously to avoid ‘another California’. The structure and pricing of default service has taken centre stage in many regulatory proceedings. Regulatory inaction has increased uncertainty for market shareholders....”

Comments such as these should not necessarily lead one to negative conclusions on electricity restructuring in the US. A General Accounting Office (GAO) report concluded, for instance, that for the period between 1997 and 2001:

“Restructuring states witnessed almost no change in average retail price over that period, while states that delayed restructuring or did nothing had 4-5% price increases.”³

But in realistic terms, the overall issue of restructuring is currently (2004) fully politicised. Because of the ‘four horseman of the electric apocalypse’ (the California blackouts, Enron’s collapse, the meltdown of trading, and the 2003 blackout (CAEM 2003a), the restructuring project has lost its momentum (Malloy 2004) and the US is stuck in the transition between the traditional model for regulating utilities and a competitive model – with no obvious solution resolve this conundrum. The matter more concerns jurisdictions than concepts and views. It is bizarre that the world’s largest economy and energy market has thus far been unable to marshal a nationwide design for the electricity market. This is all the more remarkable in light of the successful development and implementation of such a model for the gas market in the 1980s. In that case, jurisdictional issues also played a role, although the nature of the issues was very different. For natural gas, FERC had plenary jurisdiction over the entire wellhead and wholesale infrastructure. Because the industry was not vertically integrated, the line of demarcation between federal jurisdiction over pipelines and state jurisdiction over distribution activities was well understood. Electricity, on the other hand, poses far more challenges in the federal arena. The fact that many utilities are vertically integrated means that states have control over a much more significant part of the value chain. FERC does not have siting authority for wholesale electric facilities the way that it has for gas and thus accords the states much more power in regulatory affairs. It is surprising that advocates for competition in electricity did not understand the impact of these differences as barriers to the effective implementation of competition policy.

Despite the importance of electricity in modern societies, an integral view is nonetheless necessary regarding different fuels, technologies, structures and rules. Such a commonly shared view does not exist in the US. Nor does it in the EU, but the latter did however agree upon a common set of rules for market forces in electricity, as it did for gas.

³ As noted by Commissioner Frederick Butler (New Jersey BPU) in his presentation at the 2nd Energy Regulation and Investment Conference, Budapest, 2002.

Table 2 – CAEM Index**RED Index Attributes & Scoring Weights**

Attribute	Description	Weight
Competitive Framework Cluster		
Attribute 1	Deregulation Plan	5%
Attribute 2	Percent of Eligible Customers	5%
Attribute 3	Percent Switching	5%
Attribute 4	Competitive Safeguards	10%
Attribute 5	Uniform business Practices	10%
Attribute 6	Competitive Billing	3%
Attribute 7	Competitive Metering	2%
General Cluster		
Attribute 8	Generation Market Structure	10%
Attribute 9	Wholesale Market Model	10%
Attribute 10	Standard Cost Calculation	3%
Attribute 11	Standard Cost Implementation	3%
Customer Cluster		
Attribute 12	Customer Information	2%
Attribute 13	Customer Education	2%
Attribute 14	Default Provider	10%
Distribution Cluster		
Attribute 15	Default Provider Price Risk	4%
Attribute 16	Default Provider Rates	4%
Attribute 17	Performance-Based Regulation for Network Facilities	2%
Attribute 18	Network Pricing	2%
Attribute 19	Interconnection to Grid	5%
Commission Cluster		
Attribute 20	Regulatory Convergence	1%
Attribute 21	Commission Reengineering	1%
Attribute 22	Commission Budget	1%

3

Strategic Views on Electricity Market Integration

3.1. Introduction

In this section we briefly discuss the ongoing debates in the EU and the US on wholesale market design and their cross-border, multi-state integration approaches. For the EU, the discussion largely focuses on the Commission's Strategy Paper, outlining a strategic roadmap for further action beyond the framework of the Energy Directives. In the US, discussion is organised around FERC initiatives, such as for the regional transmission organisations, standardised market design, and the April 2003 White Paper on bulk power market design.⁴

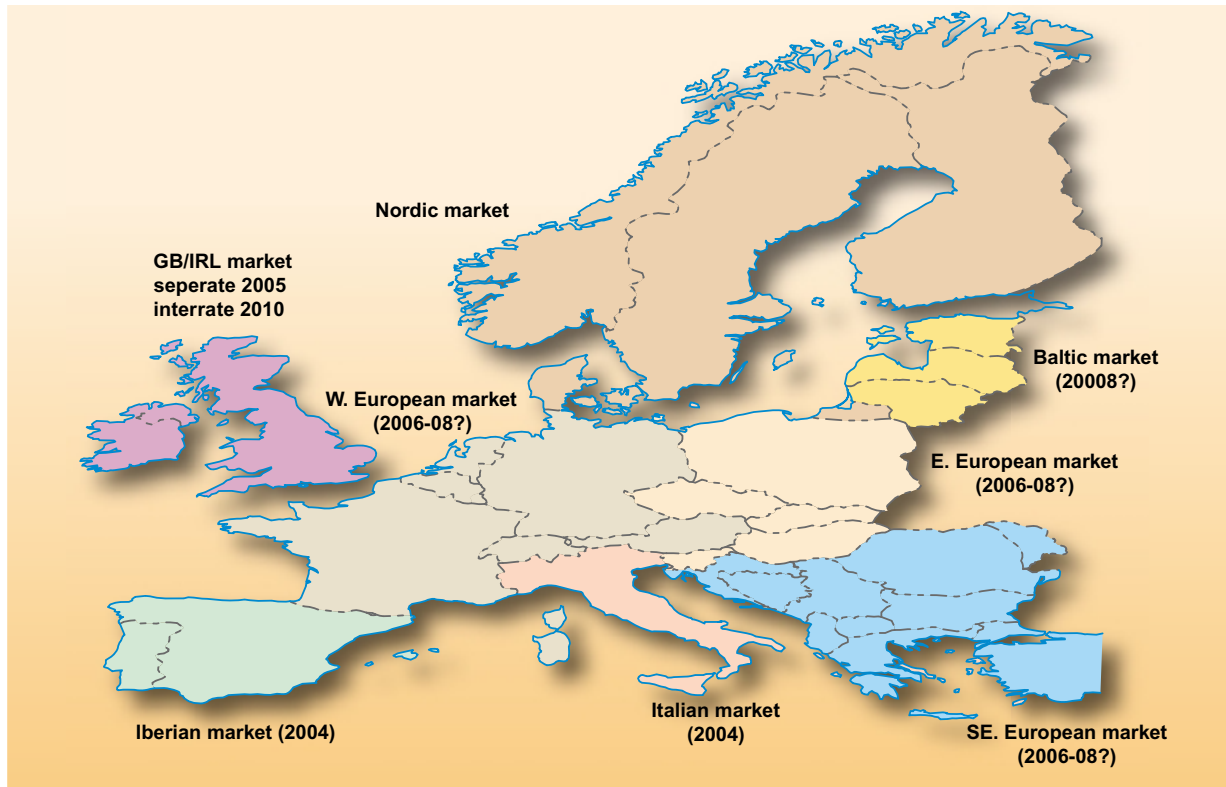
3.2. The EU strategy paper and its discussion

During the course of 2003, the Commission's Directorate-General for Energy and Transport (DG TREN) published several drafts of a Strategy Paper with a medium-term vision for the internal electricity market. The paper highlights issues that still need to be considered for monitoring and developing the IEM over time, including: a detailed road map for further work and discussion (such as setting rules for developing cross-border trade); market structure and interconnection; promoting the customer's right to freely switch supplier; developing a framework to guarantee supply security; ensuring single market consistency with renewable support and carbon emission reduction schemes; removal of other distortions to trade (taxation); and establishing a framework for trade with third countries (DG TREN 2004b).

The Strategy Paper devotes significant attention to cross-border market development and to the role of regional markets. The Commission recognises that today's electricity networks are not particularly well interconnected, but that certain regions such as the Nordic market and the neighbouring parts of Austria and Germany have already adopted common rules. The development of regional markets in neighbouring countries where interconnection is reasonably strong, may be seen as a necessary interim stage. Issues such as the rules for bilateral trading, for standardised day-ahead and intra-day markets as well as balancing, congestion and ancillary services could be developed on an interim basis. Harmonised methods for setting transmission tariffs could also be envisaged. It goes without saying, however, that the objective of a single internal market should not be compromised. There will continue to be a minimum degree of harmonisation to which *all* member states will need to comply and regional markets should not diverge too significantly in their basic design. Market arrangements that impede trade or distort competition between these regions should be prohibited. In any case, all of the regional markets will be expected to follow the same path of development in order to facilitate eventual full integration. In addition to these remarks, the Commission drafted a map with potential regional market areas, including a rigorous timetable for their realisation (see Map 2). Interestingly, the whole Western European market is viewed as one regional market. The question is whether that is realistically feasible.

More specifically, in terms of cross-border trade, the overall goal for the EU would be to function in the same manner as a national market. Eventually, all system operators would use the same assumptions and mechanisms to manage their networks and network users would face a single interface. Functional separation between the network operator and the owner would ostensibly allow system operators to co-operate more closely across political and transmission network borders, unencumbered by potential conflicts

⁴ All relevant material is published on the SMD part of the FERC website.

Map 2 – EU regional markets

of interest regarding transmission revenue or other competitive market activities. Regarding tariffs, it is clear that for the medium-term, an approach whereby tariffs for cross-border trade are a combination of different national tariffs schemes and for which TSOs are compensated for transit and/or other cost-inducing flows, is the most sensible. However, for the longer-term, a pan-European tariff mechanism, would clearly contribute to the integration of markets. Methods for allocating capacity for congestion management and system operation should be market-based and designed to give correct locational signals to producers and consumers. This will also help to identify appropriate interconnection projects. There should also be an automatically functioning use-it-or-loose-it rule. These objectives imply some co-ordination of the capacity allocation process of power exchanges and other wholesale markets, as well as balancing mechanisms and ancillary services. Such harmonisation efforts imply a review of network security rules, grid codes, and access and tariff methodologies, such that trade within a region is as easy as trade within a country or a TSO control area.

It should be noted that as relevant as these remarks seem, there is no clear view in the paper as to the market design that should be developed or for the necessary decision-making and oversight framework. If regional markets are to play a role as an intermediate step in the further integration of the EU electricity market, one might expect some criteria or boundary conditions for such regional markets. The paper falls short in this regard, as does also the brief reaction from the Council of European Energy Regulators (CEER 2003a). The CEER highlighted several points on effective and efficient transmission access, on the lack of ease of cross-border trade and the need for promoting deep and fluidly organised energy markets, together with the role of competition policy in market structures and the maintenance of supply security. But the CEER is rather prudent in elaborating the regional market approach further and refrains from mentioning specific regional market areas. Other stakeholders have reacted as well, but in even less pronounced terms on regional markets. We note however at this stage that regional markets are on the

agenda, as was recently concluded at the Florence Forum Meeting XI in September 2004. This will be further discussed in section 4.

3.3. FERC actions

As indicated in Box B, FERC was mandated to promote interstate transmission and regional interstate wholesale markets. FERC had to do this without an overall legal framework or a vision for the US as a whole, such as exists in the EU. In its successive orders 888 and 889 (FERC 1996a; 1996b) and 2000 (FERC 1999), FERC tried to develop such a vision for development towards a full and comprehensive US-wide electricity market. Finding that the absence of a single set of clear rules governing wholesale electricity markets would prevent markets from realising their full potential, FERC proposed, in July 2002, a new foundation for bulk power markets with clear standardised rules and vigilant oversight. It also embarked upon a process of public hearings and consultations. In a landmark notice of proposed rulemaking (NOPR), FERC announced a blueprint for change, “to create genuine wholesale competition, efficient transmission systems, the right pricing signals for investment in transmission, generation facilities and demand reduction, and more customer options. Market monitoring and market power mitigation proposals are also critical parts of the proposals.” This NOPR became known under the acronym for Standardised Market Design – SMD.

Due to strong political pressure, notably from regulators and law-makers in the southern and western states and supported by key Republican lawmakers in Congress, FERC had to move away from the concept of a single, nationwide market and dropped the SMD concept. Instead, in April 2003, it published a White Paper on Bulk Power Market Designs, focussing on the concept of RTOs,⁵ citing deference to regional needs. In other words, FERC talked of ‘wholesale power market platforms’, which embraces a greater level of state participation in the design of RTOs. This was a compromise proposal to accommodate federal and state powers in the establishment of US electricity markets. In EU jargon, subsidiarity had to prevail. Below, we analyse in the SMD proposal and the succeeding White Paper in more detail and discuss some lessons from the US developments for the EU scene and agenda. As much as possible, we take into account ongoing efforts to push or not to push, to limit or not to limit FERC’s actions in this context, as Congress finalises discussions and negotiations on the New Energy Policy Act.

In 1999, FERC started its Order 2000 – the voluntary formation of regional transmission organisations. Unhappy with the progress to-date and in an effort to foster seamless transmission and wholesale energy markets, FERC issued its proposed rule on SMD in mid-2002. This proposed rule would require the mandatory formation of Independent Transmission Providers (ITPs) to implement and administer the new SMD. The aim of this proposal was to create genuine wholesale competition, efficient transmission, proper pricing signals for investment in transmission and generation facilities and demand side management and other customer options. Moreover, market monitoring and market power mitigation were also key features. The main elements of the SMD proposal are:

- A single flexible transmission service (the Network Access Service), with a single open access transmission tariff applicable to all transmission customers, wholesale, unbundled retail and bundled retail;
- Transmission and the operation of balancing energy markets to be operated by entities independent of market participants; real-time and day-ahead markets should be facilitated and fair treatment of transmission capacity reserved for reliability should be provided for;
- Locational marginal pricing (LMP) – a market-based method for congestion management and tradable financial rights (Congestion Revenue Rights – CRRs) as a means to lock in fixed prices for transmission; CRRs should be auctioned in principle, with the possibility of giving some preferential treatment to existing customers during a transition period;

⁵ The concept developed in FERC Order 2000 (FERC 1999).

- Procedures for monitoring and mitigating market power and for the assurance on a long-term regional basis of adequate resources for transmission, generation and demand side management;
- Access charges to recover embedded transmission costs based on customer's load ratios to be paid by any entity taking power off the grid;
- To create a formal role for state representatives to participate in the decision-making processes of RTOs.

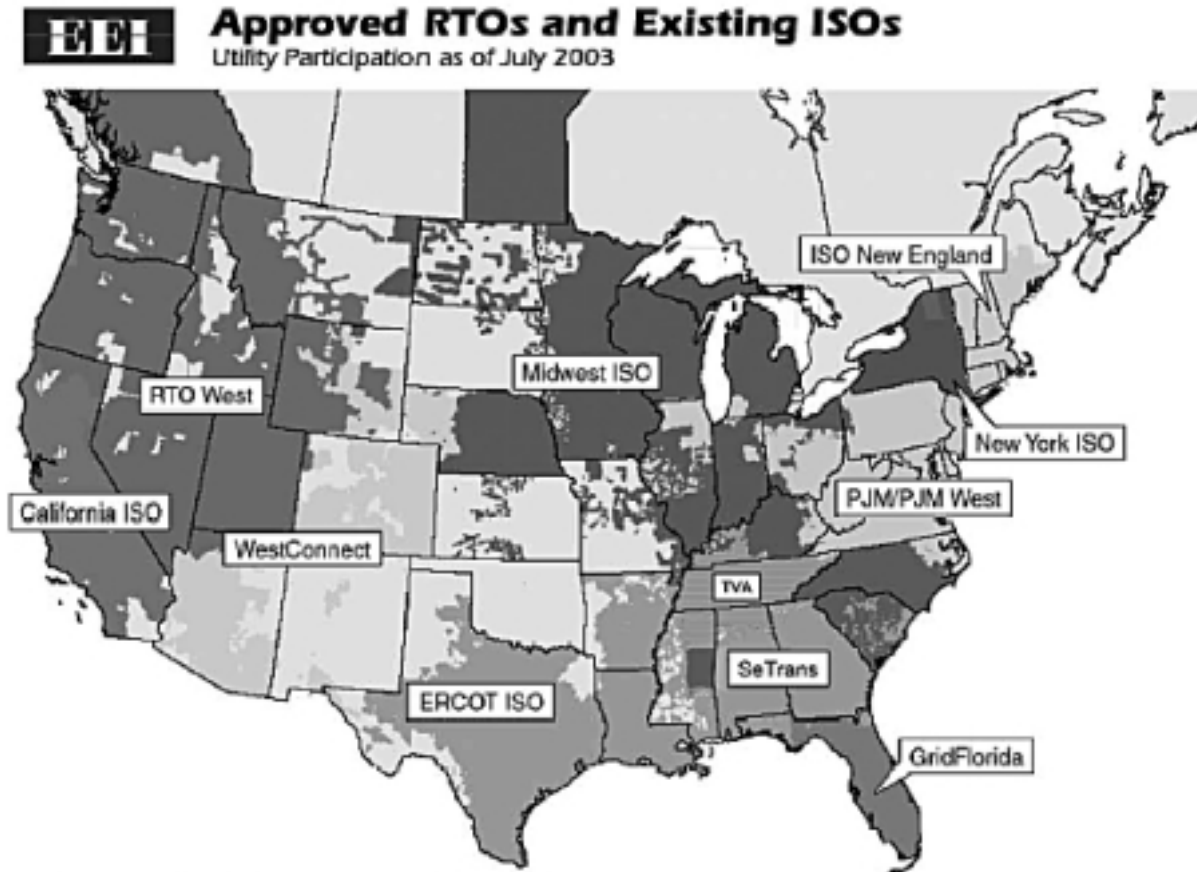
The SMD proposal represented a significant step toward further enhancement of competition in US power markets (in section 4 we go into some of these issues in more detail). During the consultation process many critical remarks were voiced, mainly regarding the obligatory nature of many of the proposals, leaving little room for regional solutions, especially regarding existing customers and bundled retail consumers. The issues also became increasingly political and influenced ongoing legislative discussions in Congress on the draft Energy Bill. Especially southern and western senators and House representatives started to lobby against the perceived further expansion of FERC authority. In the spring of 2003, FERC had to amend the SMD model as an obligatory tool and introduced more flexibility with room for regional solutions.

In its April 2003 White Paper, "Wholesale Power Market Platforms", FERC developed a 'principled approach', elaborating on three major points (FERC 2003c):

- The wholesale market will rely heavily on long-term contracts, negotiated in the context of transparent spot markets with reasonable and locational price signals; independent grid and market operation is key for fair competition of all sources; markets are not allowed to tolerate affiliate abuse, needing clear rules defining acceptable and unacceptable behaviour; and potential for price moderating market responses with highly professional and aggressive market monitoring functions serving as early warning devices should problems arise.
- RTOs remain the foundation of the wholesale market platform and all public utilities will be required to join. However, regional differences and specificities will be respected and all implementing measures will have to be subjected to a cost/benefit analysis. FERC wanted to stick to its role in setting terms and conditions for all transmission services, leaving rate setting for bundled retail services at the regional level.
- State roles will be very important, through the regional state committee that every RTO is required to organise. That committee will lead the formulation of regional proposals for critical implementation issues, such as basic pricing schemes. This includes transmission access charges, either via a postage stamp rate, which would be the same all over the RTO area, or a license plate rate, for which the charge is contingent on the zone of delivery, introducing locational signals. The state committee will also determine allocation of transmission rights, including for existing customers. Finally, the region will determine its approach to resource adequacy and will make its own regional plan in that regard.

Critics of this new approach expressed concern that reversion to smaller regional markets could perpetuate problems in moving electricity between markets. This is the so-called 'seams issue', referring to difficulties in communication between markets due to mutually inconsistent designs, procedures and systems, leading to artificial barriers to trade, raising costs and limiting customer supply choices. Others have argued that resolving this issue is merely a question of political will. The real challenge seems to be bringing state regulators in line with the RTOs in setting good rules for the market place. This could be a difficult process and it is therefore appropriate to look to experiences of existing cross-state border regional market organisations and their regulatory oversights. Map 3 provides an overview of approved RTOs and existing independent system operators (ISOs).

Map 3 – US RTOs and ISOs



3.4. Some concluding observations

It is remarkable that, thus far, the EU, with its strong legal framework, has approached market development strategy by stating that there would either be only 15 national liberalised markets or the one big Internal European Market. The choice was obvious: one big market. Gradually, the more pragmatic concept of looking to regional models becomes more appropriate for technical issues such as transmission pricing and congestion management. A full and consistent model for the wider European electricity market probably won't work. In that sense, the EU presented a more top-down type of approach whereas the US evidenced more bottom-up characteristics. This is all the more clear in the wake of FERC's actions to impose RTO models having failed, instigating a wide debate on jurisdictional issues. Both experiences to-date suggest that regional models would be appropriate in reflecting physical and commercial realities. Seams issues are however potentially threatening to inter-regional market integration and require a corresponding set of general and more global boundary conditions. A further exchange of views on US and EU regulatory experiences could be useful for both parties.

The question of defining regional markets engenders another question: How to achieve regional markets? Discussions indicate two main streams of thinking concerning the development of regional markets. Some argue that regional markets evolve naturally in areas where no or few (technical) impediments exist. The development of the German-Austrian wholesale market might serve as a supporting example for this hypothesis. This example, however, may be contingent on the fact of very different sizes of the two countries, with the bigger country revealing higher market prices. Market forces evidently facilitated the natural harmonisation process. The Commission also supported the idea of unplanned or organic

development. Others hold the view that political support is the predominant condition for regional integration. If political support is sufficient, technical issues (lack of interconnection capacity) or commercial problems (trading arrangements) will be overcome. Again, prominent examples exist such as the development of the Nordic Power Exchange (Nordpool) system and the ongoing Iberian MIBEL project. In the following section we discuss a number of the more practical and complex issues and consider to what extent global conclusions might be formulated.

4

Key Issues Concerning EU and US Wholesale Markets

4.1. Introduction

For both the US and the EU, there are some effective and efficient wholesale markets in electricity. In the EU, the Nordpool and the England and Wales markets are generally considered as good examples. Both cover transnational flows, although this is more pronounced in Scandinavia. National wholesale markets seem to be emerging in the Netherlands, Spain and Germany. France, Italy, Austria and Belgium are taking steps in this direction, but are still some way off.

The Nordpool market, beginning in the early 1990s, has some interesting features. With the exception of Denmark, all countries in the Nordic region have in common a large hydro-based generation system. The creation of the Nordic electricity wholesale pool led to further market integration, making Nordpool the common marketplace for electricity trade in the four countries, with no trading tariffs between the countries. All markets have been fully deregulated, with full unbundling of transmission and distribution and competition in generation and supply. Although proposals have been made, a single Nordic TSO is as yet a step too far, due to prevailing national interests. Transmission tariffs and distribution services as well as short-term stability are still regulated separately leaving the overall control of the system as a national responsibility. Balancing is also still effected on a national basis with different models for pricing and settlement, partly due to the full hydro-base of the Norwegian system. The question of whether or not Nordpool could serve as a model for further European developments is often answered negatively. The structure of the Scandinavian system, with its very large hydro and nuclear basis and its specific transmission infrastructures due to geographical circumstances, makes it hard to compare with the much more meshed, multi-fuel generation servicing network system on the continent.

Regional markets in the EU are further considered, already leading to concrete steps and roadmaps:

- **MIBEL** – the Mercado Ibérico de Electricidade – In November 2001, Spain and Portugal signed an agreement calling for complete integration of their electricity markets (CNE and ERSE 2002). Both governments agreed to incrementally finalise terms for the market in stages by 2006. All companies will operate under the same competition guidelines, tariffs will be harmonised and all market participants are to be granted equal rights and obligations. In January 2004, a further agreement was signed, allowing generators in the two countries to sell their electricity on both sides of the Spanish-Portugal border and to create a single operator for the MIBEL electricity market. Inauguration of MIBEL was scheduled for April 2004 but was postponed due to the transition to a new Spanish government and because of delays with the transfer of the existing Portuguese Power Purchase Agreements (PPAs). In September 2004, a new agreement was concluded to make all the necessary changes for single market operation, cross-border trade management and tariffs before 30 June 2005. MIBEL will then start on 1 July 2005 and a council of the national regulatory authorities (CNE and ERSE) will be created with monitoring and arbitration functions.
- **BETTA** – British Electricity Trading and Transmission Arrangements – Starting in late 2003, the UK Government introduced legislation to further establish BETTA.⁶ BETTA will institute wholesale electricity trading and transmission arrangements for Great Britain as a whole with a common set of trading rules so that electricity can be traded freely. BETTA will have a common set

of rules for access to and charging for the transmission network, and a Great Britain system operator, independent of generation and supply interests so that those who seek to use the system and access the market can be confident that the system operator has no incentives towards bias. BETTA is scheduled to commence in 2005.

- **SEEREM** – Southeast Europe Regional Energy Market⁷ – Sponsored by the European Commission, the Balkan-countries and Turkey committed in 2002 and 2003 to develop a regional market for electricity and for gas. The CEER proposed a set of SMD principles for this project, which was adopted by the respective governments in late 2003. The SMD covers features such as a trading structure (bilateral contracts, day-ahead market, real-time dispatching), system access (regulated third party access – RTPA), unbundled TSO and DSO functions, tariffs for grid use and services, competition in supply and regulated tariffs for captive users, a generation capacity support scheme and a regional institutional framework with a regional regulatory entity and ultimately developing towards a single TSO.
- **Germany/Austria** – The lack of transmission constraints between Germany and Austria together with close contractual relationships on the generation side have integrated parts of the Austrian market with neighbouring German TSOs. In order to facilitate cross-border trade with balancing energy, German and Austrian TSOs agreed to pursue the development of a unified platform and a suitable process to enable the appropriate handling and settlement of such deals. At the moment, these markets are to a large extent restricted to generators in the respective control areas, but cross-border TSO areas are planned to be operational in early 2005.
- – Political and inter-TSO discussions are ongoing to further integrate the separate, but well-interconnected Dutch and Belgian electricity markets. Two possible mechanisms are considered: 'market coupling' (similar to the Nordpool concept of market splitting) and a 'single price market', creating an alternative to the current auctioning of the Interconnector capacity. Market coupling seems to be the leading notion, but so far no formal steps between the governments, the regulatory authorities or the TSOs have been made. The Market Surveillance Committee of the Dutch Energy Regulator (DTe) has expressed some doubts on competition in the Benelux market (Newbery et al. 2003). Discussions could however be extended to Germany and France leading to a wider north-western European electricity market.

The concept of regional markets in electricity received further momentum during the recent meeting of the Florence Forum (September 2004, Florence Forum XI). Instigated by a CEER working paper on interactions and potential trade distortions between electricity markets (CEER 2004), the Forum set up a number of 'mini-fora' to discuss specific issues for market-based mechanisms dealing with congestion at the borders. These mini-fora will be organised by the European Commission, dealing with the regions of the Iberian Peninsula, the UK and Ireland, Benelux (including France and Germany), Italy and neighbours, the Nordic countries, Central Eastern Europe and the Baltic states. The mini-fora are requested prepare detailed plans and timetables for the next meeting of the Florence Forum scheduled for spring 2005.

The US experience records the PJM-Interconnection (a regional transmission organisation), the New England ISO and the Texas system as the three success stories in wholesale market developments. Texas however is a single state, with insular electricity operation and is less relevant for further comparison. Below we provide a closer look at the PJM area. In the rest of this section we focus on a number of specific issues dealing with multi-state, cross-border wholesale market designs. Consecutively, we address

⁶ For further information about BETTA see the OFGEM's website:

<www.ofgas.gov.uk/ofgem/work/index.jsp?section=/areasofwork/betttagbcons>.

⁷ See Athens Forum and subsequent information:

<www.europa.eu.int/comm/energy/electricity/south_east/doc/2003_athens_meeting_memorendum_en.pdf>.

congestion management, tariff structures, TSO governance, resource planning and resource adequacy, market monitoring and mitigation, jurisdiction and subsidiarity. Additionally, we discuss, system failures, the issue of gas-electric interaction and the emissions trading and renewables challenge.

Box C provides a brief overview of the PJM setting, which could prove useful as a further reference point.

BOX C

Key characteristics of the PJM Interconnection

- States (some only partly) covered include: Delaware, Maryland, New Jersey, Ohio, Pennsylvania, Virginia, West Virginia, Washington DC; servicing more than 25 million people, dispatching 73,000 MWe, administering a USD 9 billion market. Future market potential includes large areas in the Midwest, servicing some 130,000 Mwe;
- Some 200 members: stakeholders, including generators, distributors, marketers, large consumers. Members are strongly active in market rule developments;
- PJM markets: energy (day-ahead, real-time), capacity credits (daily, long-term), financial transmission market, ancillary services (regulation, spinning reserve);
- Governance: two-tiered with independent board and Member's Committee organised by sector, with weighted voting procedures;
- Relation with Transmission Owners (TOs) via separate TO agreements: coordination of planning and operation of transmission facilities, including transfer of responsibilities to PJM;
- FERC oversight on transmission tariff structures and tariff levels, TO agreements and any RTO-related task or function;
- Relation with state regulators: mainly via tripartite communication committees (PUCs, FERC, PJM) under the terms of a separate memorandum of understanding.

4.2. Managing congestion

4.2.1. Introduction

Reliable and secure transmission systems are the essential precondition for wholesale electricity markets (Perez Arriaga and Olmos 2004). Lack of operational reliability and security limit patterns of commercial transactions. The pace and scope of commercial transactions will, at least in the short-term, lead to network constraints or congestion. Proper management should not unduly limit market development and should provide proper and adequate incentives for both the TSOs and market parties – either to invest in networks to diminish constraints or to effect market decisions that would limit those constraints. In the context of large multi-national or multi-state markets, both in the EU and the US, the issue of network constraint management is highly relevant. Any approach to this issue should balance economic and technical requirements with the diversity of regulatory regimes. Theoretically speaking, a nationwide or EU-wide centralised dispatch of generation and demand would be the optimal solution, but this is not currently realistic given the prevailing political climate on both sides of the Atlantic. Therefore, alternative schemes have been developed or are in a process of development. Coordinated congestion management by TSOs, or in the US case by RTOs, is a second best solution. This makes sense especially on a region-

al basis, in which regional markets are developing with expanding physical and commercial connections and a wide array of market transactions. Adequate and effective congestion management cannot be separated from transmission tariffication and from the even wider issues of market structure and market behaviour.

4.2.2. The EU

In the EU, the issue of congestion management has been high on the agenda from the beginning in the Florence process. This led to a promising start with a set of detailed guidelines in November 2000. Now more than three years later, as evidenced by Commission benchmarks, the average compliance by TSOs is still insufficient and discussions for developing more effective and sophisticated approaches for cross-border markets have not been apparent. Non-compliance has largely been due to slow and insufficient unbundling of the TSO function and a consequent lack of willingness to implement these guidelines. This is another example of the failure of the voluntary approaches of the Florence process. Stalled discussions in the Forum were due to different priorities and interests between the national regulators and other stakeholders, despite the ongoing pressures by the trading community and the large consumers in the EU. This is another argument for approaching issues in a pragmatic way by starting to work on a regional basis. Focussing in somewhat more detail on EU developments, the following facts and steps are worth mentioning:

- Transmission networks in the EU were, according to most views, mainly developed to service national markets, with cross-border exchanges of limited importance and mainly to the advantage of the vertically integrated incumbents (long-term contracts) and for system security and mutual support.
- Especially on the continent, the transmission network is both complex and heavily enmeshed, leading to an increasing amount of physical cross-border flows, partly due to market liberalisation. Congestion has progressively been a problem, with increased calls by the EU Commission and others to expand network interconnection capacities.
- As a first step, work started (both at national level and within the Florence process) on increasing transparency around interconnection capacities, including transparency on ATC figures, and their definition and calculation methods and on principles for allocation. For example, via its website, ETSO publishes useful information on interconnecting capacities and their availability. Transparency will have to be further developed, along with more market-based allocation mechanisms.
- On allocation thus far, explicit auctions are taking place on Dutch, German/Danish and French/UK borders, with differing modalities; a full market splitting approach is used in Scandinavia; and more pro rata oriented procedures are used on other borders.
- The 2003 Electricity Regulation affords new opportunities for defining binding guidelines for the TSOs and work has started on the basis of some general principles developed by the CEER (CEER 2003a). More concrete approaches such as integrated balancing markets and full coordination of congestion management should be viewed as priority issues and addressed at the regional level. There is, however, no common view between European regulators as to the appropriateness of different methods in relation to prevailing market structures. The CEER has indicated some further concepts for managing cross-border congestion, but without being able to make clear choices due to national and/or regional differences. The usual references are made in this context – such as implicit auctions, market splitting, explicit auctions, coordinated auctions and nonmarket-based allocation procedures, such as pro rata systems. All of these have their respective pros and cons, to which CEER limits itself to merely highlighting.
- The Commission has been preparing binding guidelines under the Electricity Regulation, with a view to a formal decision in 2005. The guidelines will need to focus on issues around maximising ATC and capacity use, on transparency and TSO revenue neutrality (EC 2003c, articles

6[3,4,5], 5[3] and 6[6]). The guidelines will be further enhanced by ongoing discussions concerning market power and the work of the mini-fora mentioned in section 4.1.

- ETSO has launched some interesting projects such as the pilot for a Coordinated Congestion Management scheme around Benelux, involving five TSOs and studying the practical feasibility of such a scheme, and with project schedules for its application (ETSO 2003a). Implementation of this pilot is losing momentum due to regulatory uncertainties. However, ETSO continues work on improvements for allowing increasing market efficiency without jeopardising system security (ETSO 2004a) and making clear distinctions between the physical dimensions and the commercial ones. ETSO also facilitates discussions on joint cross-border redispatch and has started cooperation with the group of power exchanges in the EU, Europex, on the elaboration of market coupling (coordinated implicit auctions). Joint proposals have emerged on Flow-based Market Coupling for which the needs of effective congestion management and efficient energy trading are balanced (ETSO 2004b). The relation between congestion management and market power on the two sides of the congestion issue is increasingly recognised and discussed (ETSO 2003a).
- The idea of cross-border balancing markets is worth further developing. Whereas primary and secondary control will probably remain a local or regional issue, tertiary reserves and balancing markets could be fully transparent and inter-working throughout the whole internal energy market. In order to establish a common balancing market over a larger, regional area including more TSOs, pre-conditions must be met such as common operational rules, including the use of the cross-border interconnection capacity for the exchange of the balancing power. Even more important would be the supervision and the legal operationally and technically responsible body for clearing and settlement, together with common program/schedule management systems and their implementation between the TSOs involved. This would also require a joint regulatory framework by the responsible authorities. Interesting developments are taking place in the Benelux countries, the Iberian Peninsula and in the UK and Ireland. A further question would concern the involvement of the EU Commission, since some degree of coordination for these schemes should be required.

To summarise, discussions in the EU have not achieved much practical progress in starting concrete projects on joint schemes for congestion management. However, the ETSO proposed pilot for a coordinated scheme between five TSOs should be interesting for further elaboration, together with the proposed flow-based market coupling. Now that the EU Commission has the mandate to establish legally binding guidelines, there is also some acceleration of activities. Timeframes for application are still unclear and a global overall strategy, focussing on the more promising regional schemes with the development of some boundary conditions, is lacking. The establishment of mini-fora for specific regions and the bottom-up initiatives from ETSO and Europex should be further stimulated, including the formulation of clear and binding objectives and commitments. Some kind of political backing will be necessary, both from the European Commission and from the relevant member states. This would also give further guidance to regulators and TSOs.

4.2.3. The US

In the US, FERC has since its orders 888 and 889 addressed issues regarding constraints and congestion. Despite the regional approach of the PJM Interconnect, the New England ISO and discussions on the RTO model, overall progress has been inadequate, with exceptions in the already established RTO areas. Key elements in FERC's proposals, as amended in the wholesale market platform concept (FERC 2003c), are as follows:

- The RTO must ensure the development and operation of market mechanisms to manage transmission congestion. These mechanisms must accommodate broad participation by all market parties and must provide for efficient price signals to transmission users, including the cost/benefit

causality principles. They also must include global objectives, such as the prevention of manipulation, promotion of efficient transmission, promotion of using low-cost generation, and avoidance of trade barriers with neighbouring regions.

- FERC's favoured option is a system of market-based LMP. This system would provide a mechanism for allocating transmission capacity to those who value it most and would encourage efficient provision of transmission service and the development of needed transmission, generation and demand response infrastructure. Through LMP, separate energy prices at each transmission grid node and for the transmission between nodes would be established. In this model, cost of congestion and losses would be reflected and spot markets would be required to manage congestion efficiently. Other methods may be proposed, but the RTO should demonstrate that it meets the general principles.
- If LMP is applied, a system of tradable financial rights, i.e. firm transmission rights (FTRs), must be introduced. This would create a secondary market and initially would preferably be auctioned, although some flexibility now is allowed for existing customers.
- To operate such a system, a single entity should be made responsible and thus the concept of RTOs or ISOs would be fully consistent with this approach.

It is noteworthy that some experience with this approach already exists within the PJM area, in which LMP and FTRs are taking place, together with the operation of the relevant market mechanisms.

4.2.4. Concluding observations

In the EU, cross-border congestion management to service regional markets exists virtually only on drawing boards. In the US, existing regional markets have quite some experience with efficient market-based cross-border congestion management schemes. The fact of a single responsible entity is very instrumental to these experiences. However, efforts to promote these more widely for other regions have thus far failed, making the EU record comparable to that of the US, or vice versa. A more general focus moving beyond the regional level appears to be necessary.

4.3. Tariff structures

4.3.1. Introduction

Tariff structures for transmission, and even more so for tariff setting, are issues that are included in considerations extending beyond the technical and economic rationalities. This is the case in the EU, where national governments and regulators have more or less set rules for the network sector, sometimes in close consultation with them. In the Florence process during 2000-2003, cross-border tariff issues were high on the agenda, but results were poor.⁸ With the new Electricity Regulation, a more direct involvement of the EU Commission is to be expected. Interstate transmission pricing in the US is an established practice for FERC. In comparison with EU practices, a more coordinated approach is possible between tariffs, congestion management and other features of (regional) transmission grid operation, although it is not always fully accomplished.

4.3.2. The EU

Cross-border transmission tariffs were from the outset the number one issue in the Florence process. Existing cross-border or transit charges were seen as a major impediment for the further development of cross-border trade, especially since this could lead to 'pancaking', in which every TSO area would add a charge for meeting its own system cost. ETSO was invited (or even strongly encouraged), to propose a

⁸ Documents circulated at the Florence Forum meetings V-IX.

scheme for cost allocation of cross-border loop flows and transfers and for their redistribution between TSOs. The whole issue, however, became symbolic and political, and dominated the Florence agenda for quite some time, going far beyond the practical meaning of the issues. There were several reasons for this.

- ETSO had just started as an organisation of TSOs, with very different positions amongst its members. It had to prove its effectiveness while facing many difficulties due to the specific positions of the largely bundled German, Belgian and Swiss TSOs. The Swiss position was extraordinary. On the one hand, Switzerland is not a member of the EU or committed to the liberalisation program, but played a crucial role due to its central physical position in electricity trade and transfers. On the other hand, Swiss utilities were very commercial in their positioning. This led to extra internal tensions in ETSO. Swiss government officials participating in the Florence process as observers were not amused, as they attempted to limit damage to the EU Swiss relationship.
- The national regulators, starting their cooperation in the CEER, also had to establish their position in the process. The ETSO proposals for inter-TSO compensation proved to be a good test case, due to its clear flaws with respect to cost determination and allocation, together with the introduction of an export charge. CEER managed to develop a set of consistent counter-proposals, which were supported by all other parties in the process, but failed to push these through at the end of 2002.
- The dominant position of the German TSOs could not be counter-balanced by a national regulator because there was none. CEER was also faced with this problem and could not take German views into account, because there were none. Official German government positions typically echoed the views of the major German integrated utilities.
- The Florence process was basically a voluntary one. There was no mandate for the EU Commission to translate the conclusions into legally binding commitments.

On a more positive note, one could argue that this failure to properly develop implementing devices for the further establishment of the internal EU electricity market created the political climate for amending the EU Directive and mandating the Commission to set binding guidelines. On the downside, after some four years of discussion, hardly any progress has been made on developing common views for the design of a transmission tariff policy that would meet the needs of an integrated market and consistently combine this with congestion management policies. Some tentative efforts were made by some national regulators to initiate discussion on relevant harmonisation issues of tariff structures, especially with regard to the balance between charges on generators and on load (the G/L balance). At a later stage, the notion of locational signals was introduced into the debate and even in the legislative framework, albeit without a clear indication of its meaning and interpretation. The EU Electricity Regulation will require guidelines on transmission tariffs. Drafts were discussed during 2004, but without concrete progress. CEER input again focuses on the balance between generators and load and is moving toward a zero G-component for continental Europe (CEER 2003b).

In late 2003, ETSO was finally able to arrive at a compensation mechanism, based on transparent and verifiable cost allocations, without any export charges. This system was accepted by the Commission and the regulators and will be implemented as of 2004. During 2004, it was not possible to reach agreement on a binding guideline under the Electricity Regulation. The existing ETSO mechanism, including its expansion into the Nordic market and the accession countries will therefore continue (ETSO 2004). The tariff issue remains on the EU agenda. There is still no clear common strategic view or consensus on the way forward. The concept of regional markets or models should be useful for this issue and warrants further elaboration.

4.3.3. The US

Clearly FERC has jurisdiction to approve tariff design and tariffs for all interstate transmission. In its suc-

ceeding orders on regional transmission organisation it further developed this mandate, leading to its latest proposals for wholesale market platforms. The major elements are summarised as follows:

- The RTO must have a transmission pricing system that will promote efficient use and expansion of transmission and generation facilities;
- Where states have not permitted retail supplier choice, FERC will have no jurisdiction on the transmission component in the price component of the bundled retail service. The question of bundled retail services was a controversial part of the SMD proposal and was amended in the White Paper;
- FERC makes a clear distinction between the energy charge for transmission and the load charge for grid access. For the energy charge, covering costs of congestion and losses, it strongly favours a nodal pricing system with locational marginal pricing, leaving room for alternative proposals. The access charge, which covers the transmission owners' revenue requirements, could be either a postage stamp rate or a license plate rate. In any event, the charge would give access to the entire regional grid;
- Where there is no notable imbalance between imports and exports between RTO areas, border charges are not allowed. If imbalances exist, some of the transmission cost might be recovered through border charges;
- Ancillary services will have to be provided for by the RTO and will be included in the transmission tariff. The RTO will operate a real-time market for balancing, fully separated from an eventual spot market (which should have as a sole function to supplement long-term supply arrangements). The RTO will also have to operate a day-ahead market for energy and a market for various ancillary services unless it demonstrates that costs exceed benefits.

As with congestion management and its pricing component, the FERC approach to transmission tariffs has been successfully applied in the existing RTO frameworks, such as PJM.

4.3.4. Concluding observations

One could conclude that the US has set, based on FERC jurisdiction, clear conditions for transmission pricing from one state to another. The regional concept via the RTO model has elaborated these conditions and is in a process of even further refining and development. FERC is leaving the detailed structures to the regional levels, but makes a final finding of its compliance. For the EU, there is still no common view on transmission pricing, despite various proposals (Perez Arriaga and Olmos 2004). The EU Electricity Regulation requires mandatory guidelines and sets some notions for the relatively non-issue of inter TSO compensation, and for transmission access harmonisation, especially for the share between consumers and producers. The concept of locational signals is also mentioned, however without any practical meaning. On these issues, the EU thus appears to be lagging far behind the US. Again, the regional market model could be useful for making detailed progress, but this would probably require an additional EU mandate for setting boundary conditions such as is the case in the US.

4.4. Independent TSO governance

4.4.1. Introduction

Independent operation of the transmission and system functions is crucial for efficient electricity markets. This is fully recognised on both sides of the Atlantic. Implementation of this principle, however, is very different. The EU considered making it a *conditio sine qua non*, even in a legal sense. For the US, this is much more understood as a logical step, once customer choice is introduced. We will explore the differences and their further implications in some more detail.

4.4.2. The EU

From the outset, the EU focus has been on achieving independence between system and transmission operations. Because these functions are generally understood as intertwined, law and policymakers concentrated on functional and financial unbundling, and subsequently legal unbundling. Ownership was left untouched and therefore almost all TSOs are owners of the transmission grids and are themselves still owned by the former vertically integrated utilities. Traditionally, EU utilities are strong in international cooperation. They have been cooperating for decades, mainly in order to maximise system reliability and quality of supply, while optimising the use of primary energy and capacity resources. The regional organisations that have emerged from this cooperation are: the association of TSOs in Ireland (TSOI); the UK TSO association (UKTSOA); NORDEL, the Nordic TSOs; and the Union for the Coordination of Transmission of Electricity (UCTE); together with CENTREL, covering central and eastern Europe. The geographic perimeters of these organisations roughly coincide with the boundaries of synchronously interconnected areas.

UCTE, formerly UCPTE, was an important driver in this process of international cooperation. With the emergence of the IEM and its drive for functional and operational unbundling, the production (the 'P') involvement in UCTE was deleted, and – with political pressure from the EU Commission – ETSO was created in 1999. Currently (2004), ETSO is an international association with direct membership of 36 independent TSO companies from 23 countries of the European Union plus Norway and Switzerland.⁹ The networks represented by ETSO supply more than 400 million people with electric energy. The consumption of electric energy amounts to approximately 3000 TWh per year.

It is evident that ETSO, after some difficulty in the early years of the Florence process, has emerged as a strong and increasingly independent stakeholder in the development of the EU market. The EU Commission, the CEER and ETSO are all the key players in that process. ETSO positions are formally based on majority voting by its members, but consensus is the rule in practice. To be a member, the entity has to be formally designated as a TSO, based on national legislation and has to be solely responsible for the frequency control (primary and secondary) and the balance of the energy interchange at the scheduled value within a given control area. Ownership of the transmission system is not a condition, but most TSOs do own their systems. Over time, it might be appropriate to combine all existing European regional TSO organisations in ETSO. This would not only make the consultation process more effective, it would also set the pace for a mandatory and single set of reliability rules¹⁰ and for more binding procedures for information exchanges between TSOs – requiring more detail than is currently provided.

With regards to ownership and functionality, the EU situation is quite diverse. Dutch, Belgian, British, Scandinavian, Spanish and Czech TSOs combine transmission and operation functions in fully unbundled entities. Italy has separated transmission and system operations, whereas the French and most German TSOs are still part of the old, incumbent utilities. The new EU Directive sets rules for full and legally independent operation, together with mandatory compliance. Ownership as such is hardly an issue in the EU, except for a few member states. Cross-border mergers and acquisitions in the TSO world have not yet occurred, with the exception of the British TSO Transco/NGC and its US acquisitions. Nor are there joint cross-border alliances or other forms of cooperation in system management, although cross-border cooperation in the Scandinavian market with its four separate TSOs is under consideration. Part of the Austrian market is operated by the two large German TSOs, with their control areas expanding into Austria. No further separation of the transmission function and system operation has been introduced or is under consideration. It would make sense, however, in a regional market model to consider further integration, leading ultimately to a single TSO. This is already on the agenda of the Athens process.

⁹ Excluding Cyprus, Malta and the three Baltic states.

¹⁰ See also paragraph 4.8.

4.4.3. The US

Interstate cooperation in the US began with the voluntary (regional) reliability councils, of which NERC is the most prominent. Restructuring in electricity was approached on a more functional basis as to system operation and markets. The transmission function, owned by many utilities, was more or less left apart. The FERC Order 888, created the ISO not-for-profit entity and ensured this it would be governed on a completely independent basis. In Order 2000 on RTOs, FERC created interstate regional functionality in system operation. Usually the system operation function is combined with the one of market operations. In the EU, this latter function, if it exists, is the purview of a separate organisation. The independence rule was reaffirmed and further elaborated, in reality and in perception. Rulings were given on ownership interests, operational independence, governing boards, voting by participating stakeholder groups, and so forth. How all these requirements worked out in practice could perhaps best be seen in the PJM context (see Box C). More specifically, mention is made of:

- A governing management board, operating neutrally and fully independent, and ensuring that no member of customer group has undue influence on grid operation. Board members have no affiliation with or financial stake in any market participant;
- A members committee that votes on any program changes and recommendations to the Board. The committee elects the Board members, voting procedures ensure that no veto by any member/customer group can occur, or that any two groups could force through decisions opposed by the others. Five groups are represented – generation-owners, transmission-owners, electric distributors, other suppliers and end-users.

An interesting characteristic of these governance arrangements is the participation of stakeholders in the early stages of the process. It is quite clear, however, that the final word is with the independent Board, and with FERC assessing compliance with federal rules. A weak aspect is the relationship with the transmission owners. Although clear agreements are made, with do's and don'ts, difficult relationships will persist since the RTO is basically deciding on any relevant issue about assets owned by another entity.

4.4.4. Concluding observations

The EU model for TSO-governance is largely based on initiatives by TSOs, in the context of some developing legal boundary conditions set at the EU level. The overarching model developed as a top-down process and seems now to be more and more focused on business approaches. TSO business is business, although of a regulated nature. Governance models therefore are business models, and thus stakeholder interest is not formally secured: market participants are clients. In the US, from the beginning, the model was strongly focussed on functionality. Transmission system and market operation functions were seen as separate, albeit sometimes combined, functions. They are functions that need to serve a system and a market and should thus be governed on a strictly independent basis, with strong stakeholder input and even membership.

4.5. Resource planning and adequacy

4.5.1. Introduction

Resource planning and adequacy of generation capacity are issues that have received attention from the outset within discussions on RTO and regional models. The role of US regulators, be it at the state or federal level, was never under discussion. This is different in the EU, although at the national level, largely dating from pre-liberalisation periods, governments and their agencies had, together with the vertically organised utilities, predominant roles in the planning and licensing of generation and infrastructure capacities. The EU Commission has tried in recent years to become more involved, especially with regards to infrastructure. The impact of 'California' has increased these efforts, as have the more recent

Italy blackouts. In the EU there is still no clear consensus or framework for assessing and making decisions on resource planning and adequacy. This is likely to be considered as a shortcoming. In the following paragraphs, both the issues of infrastructure and of generation capacity will be discussed, inspired by a recent DTe paper (DTe, 2003). The blackouts in both the US and the EU are discussed separately in section 4.8.

4.5.2. The EU

Only the UK, Spain and Scandinavia have addressed adequacy in generation issues in the context of market design regulation and have introduced regulatory measures (these are not fully successful to-date). Other member states are apparently still keeping an eye on developments, without yet taking action. The existing oversupply situation in many countries makes this possible, although the California crisis and the 2003 heat waves in the EU have increased political attention on this subject, both at the national and EU levels. Spain has introduced a system of capacity payments, with fixed payments based on the capital expenses of peak plant. The system operator aims to maintain a reserve margin of ten percent, however, without correlation to the actual reserve margin of the system. The system therefore lacks a clear relation with a certain level of security of supply. In addition, the payments have been changed several times without a clear, transparent methodology. It is precisely because of this that the system may be rendered ineffective in the long-term, as it offers investors insufficient certainty with regard to future revenues. Both in 2001 and 2003, weather problems lead to disconnections to absorb shortages. Sweden used a system of a strategic reserve amounting to a certain percentage of electricity demand, determined by the TSO. This reserve consists of plant, which is contracted from producers or consists of 'mothballed reserves' purchased by the TSO. The costs are passed on to consumers and the TSO is given de facto responsibility for ensuring sufficient investment in reserve capacity. This system may result in significant market distortion, since the market players may receive lower revenues for their peak plant (due to the deployment of the system operator's reserve plant), so that the incentive to invest in such plant is reduced. Partly due to the continued absence of investment, Sweden is considering abandoning this system. In the UK, there was also a system of capacity payments, but with the introduction of the NETA system, this was abandoned due to severe market manipulation risk. In the Netherlands, the Dutch government is opting for a system based on extended reserve contracting by the TSO.

The 2003 EU Directive requires monitoring by member states and the Commission, but leaves open the opportunity for policy actions as the need arises. It includes possibilities for direct market intervention when a capacity shortage is anticipated. Governments may take action to initiate a transparent and nondiscriminatory tendering process for new generation if they consider this necessary. In its proposed new Supply Package (CEC 2003a), the Commission extends this by requiring member states to develop a general policy for ensuring high levels of supply security. They must define the roles of the TSOs and the other market players and take the 'utmost account' of cross-border cooperation, reserve capacities, fuel diversification, electricity efficiency and the role of renewable energy. In terms of policy or regulatory measures, the Strategy Paper also focuses on demand response measures and points to the notion of shared reserve capacity when regional market areas are introduced. Common approaches are considered necessary and a timeframe has been set to achieve this by around 2007, including a code of conduct for emergency situations. The CEER has also commented on the need to undertake a more particular account of market-based incentive schemes.

In terms of *adequacy in infrastructure*, the story is somewhat different. This is predominantly a national matter. Efforts by the European Commission to address this issue in the past have been met with suspicion and resistance. This did not prevent the EU from starting a program on Trans European Networks, in which specific large projects for new interconnection could attain the status of 'European interest', with preferred access to EU-funding and financing. During the past few years the Commission has stepped up its efforts to gradually move in the direction of increased monitoring and specifying specific

barriers and bottlenecks. This has also emerged in proposals for the new Supply Package (CEC 2003a), for which obligatory reporting for TSOs is introduced for cross-border interconnection capacity with regulatory oversight and even action when capacities are deemed to be insufficient. It is especially this proposed role for regulators that has immediately led to negative reactions from the TSOs (ETSO 2003b). The CEER itself has already formulated a global roadmap with principles for regulatory control and financial rewards for new projects (CEER 2002). The role of private investment and merchant lines is recognised in this approach, which is in accordance with the possibility of exempting these lines from the TPA requirements under certain conditions (EC 2003c, article7). The Strategy Paper, emphasising the role that extended Interconnector capacity can play in improving competitive market structures, calls for more detailed and joint planning by TSOs with clear indications of ex ante regulatory treatment. Developments are therefore moving in the direction of more collective and centralised monitoring and decision-making. It remains to be seen how far member states will go in this process, for which the questions of subsidiarity and regulatory responsibilities go hand-in-hand.

4.5.3. The US

For US regional electricity markets that have not yet been deregulated, generation adequacy is addressed by obliging vertically integrated electricity companies to maintain fixed reserve margins. These margins serve to guarantee the reliability of supply and to assist other companies in the event of calamity. In liberalised markets in the eastern US, vertically integrated companies were split, but the requirements with regard to the reserve margin were maintained. A system of capacity requirements was introduced with generators buying capacity certificates, or with buyers using interruptible contracts. At PJM, for example, peak load for the next summer is determined on an annual basis and a reserve factor of approximately 20 percent is used to calculate total quantity of capacity for the whole area. Required capacity is then allocated to large consumers and supply companies (servicing small consumers), in proportion to their contribution to peak load. In New York, capacity requirements are set separately for the winter and summer periods because some large consumers and suppliers experience their maximum load in the summer and others in the winter. The reserve capacity can then be used in the summer for consumers with a high summer peak and in the winter for consumers with a high winter peak. Capacity certificates can usually be traded via an exchange on a twelve-month forward basis or via day-ahead contracts. The market prices of the former have proven to be relatively stable. In contrast, prices on the day-ahead market were extremely volatile between 1999 and 2002. Partly due to the effect of exporting to neighbouring states, it did not provide the energy market with the desired price stability. Moreover, guarantees for the actual availability of capacity in the event of scarcity were insufficient. A very detailed system of obligations and penalties was thus introduced, aimed at all suppliers in the region on the basis of their share of total demand. The experience with capacity markets is difficult to judge, due to the large reserve margins that were in place before deregulation started.

FERC's SMD proposals recognise the need for security of supply in the context of a workable and competitive market. FERC has therefore included a long-term capacity requirement in the SMD. This system requires the system operator to provide three to five-year forecasts and to determine a reserve margin of at least 12 percent, up to 18 percent or more, depending on the local situation. Choice can be made between a bilateral system of capacity markets and a more centralised system in which the system operator meets the capacity requirements on behalf of buyers. The White Paper does not prescribe a uniform approach, leaving the responsibility fully to the regional level, but does require the regional level to determine the adequacy approach.

Adequacy in infrastructure is always approached on the basis of regional or state planning devices. Planning, siting and licensing are therefore state responsibilities. RTOs, however, are responsible for planning and directing or arranging necessary transmission expansions, additions and upgrades. PJM, for instance, made this requirement part of their Transmission Owners Agreement. The RTO process must

accommodate efforts by state regulators to create multi-state agreements. In the White Paper, regional flexibility is even more pronounced, by leaving the states to determine the financing and cost recovery arrangements for new lines and expansions. The August 2003 blackout has accelerated the issue of state versus federal jurisdictions in siting and planning large multi-state interconnections, and this issue is still unresolved with discussion continuing in context of the new Energy Bill.

4.5.4. Concluding observations

Resource adequacy is an issue for both the US and the EU. Regulatory involvement in the adequacy assessment appears far less controversial in the US. The EU is still searching for the right model to balance market forces and regulatory control and oversight, and seems to be heading towards a more centralised approach. Conversely, the trend in the US is toward decentralisation with regional approaches, using the regional platform as a model.

4.6. Market monitoring and mitigation

4.6.1. Introduction

Designing a market, if possible, is one thing. Setting rules for a market-to-be, with differing degrees of engineered competition, is quite another. Subsequent monitoring by the public sphere could even be more controversial. In the US this appears to be self-evident, but this is not the case for the EU. Rather naively, many legislators in the EU believed that simply determining ground rules for liberalisation (such as network separation with nondiscriminatory TPA) would create a market. Experience increasingly indicates that more market engineering, mostly by regulators, is needed. In accepting this proposition, one also accepts the need for monitoring of both market development and (non-)compliance. The EU can learn from the US experience.

4.6.2. The EU

The 2003 Directive requires market transparency and competition monitored by the regulatory authorities, and for member states to report on these developments on a yearly basis. In these reports, market dominance, predatory and anti-competitive behaviour must also be addressed. In addition, the EU Commission is required to report on similar issues, including market concentration, to the European Parliament and the Council. Most EU regulators have a legal mandate for these monitoring activities, except for Germany and the Netherlands. Interestingly, only the Netherlands has introduced an independent Market Surveillance Committee charged with monitoring market development, the impact of regulatory measures and potential market abuses. At the EU level there is little happening on this oversight and surveillance function. The question is however addressed in the Strategy Paper, although in relation to interconnection and market structure. Also, the CEER has been invited to devise a Code of Practices for wholesale market monitoring and control although it is questionable whether this is an appropriate initiative as a role under the lead of the Commission might be more effective – especially considering the authority the Commission has in competition policy. This latter approach would make it possible to further explore the notion of the regional market as the ‘relevant market’, instead of the national market. The CEER itself addressed this issue in a more general way by referring to EU-wide competitive market structures and the role of competition policy and authorities (CEER 2003a). Concrete action is lacking, although energy regulators and competition authorities had their first joint meeting in September 2004. Also relevant is the recent interest expressed by ETSO in their call for a greater role for TSOs in monitoring market power issues (ETSO 2003a). Especially in the context of regional market models, it would be highly advisable to address issues around market structures and market power.

4.6.3. The US

Independent market monitoring systems have been established in some US states, mostly by the system operators. The California ISO established such a function in early 2000, to “review market performance and market power problems; to develop a record of structural problems and propose corrective action; to review rule changes, penalties, and sanctions.” The New England ISO also has such a system, although it is not independent. At the federal level, FERC requires that RTOs undertake objective market monitoring and market power mitigation. The monitoring function has to be done on an independent basis and should periodically report to FERC. FERC itself has set up a separate Office for Market Oversight and Investigations (OMOI), which reports directly to the Chairman and has been charged with the tasks of “understanding markets, providing market oversight and conducting audits and investigations”. OMOI has a staff of about 100 and is now seeking to increase its contact with state regulators and the regional levels. The challenge is to build a platform for sharing tools and information, together with direct and efficient communication channels. For OMOI it is key that this platform includes awareness and communication protocols, together with issues of access to information and data and their perceived confidentiality. On this last issue, rules are different across the different states and policy views also differ. Frank Wolak (chair of the California ISO’s Market Surveillance Committee) has strongly argued for full and unlimited public availability.¹¹

For market power mitigation, FERC will require that RTOs spell-out tariff rules for governing market conduct with clear consequences when violations occur. Recent developments in the US market have also increased public and policymaker’s awareness of the need for adequate market monitoring and assessment of market behaviour. It is expected that more means will be made available to expand activities in this regard, including the platform functions for various regulators.

4.6.4. Concluding observations

Market surveillance and assessment are both new tasks that regulators should organise. This is especially important for markets that are being integrated. The US has embarked upon the development of a set of procedures and practical arrangements between regulators. The EU has put the issue on the agenda, but coordinated action has yet to begin. The EU Commission could lead the initiative, based on its mandate under the 2003 Directives. Here again, regional approaches might be practical and could be further explored, including the conceptual use of the ‘relevant market’ on a regional basis.

4.7. Jurisdiction and subsidiarity

4.7.1. Introduction

Technical issues are solvable. Economic conditions are basically calculable. Legal issues require interpretative decisions, in the end by courts. Issues on jurisdiction are mostly beyond the legal setting. Subsidiarity is about the division of powers. Any discussion about the organisation of national or European-wide or US electricity markets cannot escape issues of governance, regulatory oversight and legislative powers. In considering regional models it is thus necessary to address jurisdiction and subsidiarity.

¹¹ In a presentation given at the NARUC 2003 summer meeting, in Denver, Colorado, Wolak made the point that FERC’s confidentiality rules were partly to blame for the California and Enron.

¹² This is a generic issue, not only dealing with energy. On details, there may be, however, sector specific solutions.

4.7.2. The EU

In the EU, the leading notion is that of subsidiarity.¹² The EU Commission, the ‘European level’, should only be involved when decisions at national levels are not practical or are insufficient in relation to the creation of the internal market. Therefore, the Commission proposes new legislation (Directives) that member states subsequently implement in their national legislation. The Commission is charged with overseeing that this is done properly and has no other mandate than that deriving from the EU Treaty or from specific additional legislation, such as the Electricity Regulation. This however is far from the end of the story, because member states basically do not trust the Commission. They therefore have created a complicated structure of implementing involvement and oversight by national governments. In EU jargon this is called ‘comitology’. In regulated sectors, such as energy, telecommunication and financial markets, the introduction of national regulators is engendering further complication to jurisdictional structure. In most member states, the role and position of national regulators is not yet fully established, especially regarding their independence and relation to national governments and parliaments. This is all the more so at the European level, where national regulators have joined forces in the CEER. But CEER has no status in EU decision-making processes or the comitology framework. To overcome this, the Commission established the European Regulators Group for Electricity and Gas (EREG) (CEC 2003b), which serves to (merely) advise the Commission. It remains to be seen how well this function will work and to what extent national regulators will succeed in making joint decisions, that will have ‘binding’ impact in their national markets.¹³ Some benchmarking has been done on independence of European energy regulators (Pierce Atwood 2004; Johannsen et al. 2004) with some surprising conclusions. Regulatory independence seems to have more ground in southern and eastern EU member countries than in the north-western countries.

It should be noted that the concept of regional models and markets has yet to address the issue of jurisdictional systems. It might be appropriate to start thinking about this issue and to develop some practical concepts. These concepts must strike a balance between the role of the Commission (as guardian of the overall Community framework and its rules) and the national regulators (that are competent in setting rules on system operation and market design). This will likely require an overall ruling from the Commission on the regional market model, and will need to be entrenched in a new Regulation, as the current one is probably much too limited. Political involvement by the national governments in the process may also be necessary, since this process could lead to amending national legislation. This is the case for the MIBEL project and even more so for SEEREM. The Athens memorandum will eventually be translated into a legally binding Treaty.

In the discussion of jurisdiction and governance, a further theme warrants mention: the role of the stakeholders. Stakeholder involvement in developing workable and fair regulatory solutions is essential. This is effected on a national basis in accordance with national legislation and practices. In most member states, the procedure of consultations and hearings is widely applied. At the EU level there is the Florence Forum process, in which all stakeholders are involved via their European organisations. The process is one of discussion and consultation and of seeking consensus wherever possible. Experience to-date indicates that this is difficult to achieve and that voluntary solutions are not always workable. Because of this, the Commission was mandated by the 2003 Electricity Regulation to enforce majority conclusions of the Florence process into legally binding guidelines. It is striking, but not surprising, that for these majority conclusions, the TSOs – the entities that will have to implement and apply the decisions – are mostly in a minority position. This creates the risk of there no longer being an incentive for the TSOs to continue as a constructive partner in the process and to adopt a ‘wait-and-see’ attitude. Similar developments are occurring in the gas market with its comparable Madrid process and the proposal for a Gas Regulation.

¹³ Similar developments are occurring in other regulated sectors.

The EU-setting is not yet stable and all involved parties are still sussing out their roles in the EU theatre. Especially for development of regional approaches, innovative strategies will be needed to balance not only the role of national regulators and governments with the Commission, but also with the stakeholders and, even more importantly, the TSOs.

4.7.3. The US

The US terrain is clearer, especially from the EU perspective. There is the federal level with its federal laws and lawmakers in Congress, and a large federal executive organisation with numerous agencies, including federal regulators. Federal jurisdiction is about interstate matters, such as interstate electricity transmission, and therefore much more focussed on wholesale than on retail functions. At the state level there is a similar pattern, with state law and lawmakers, and state executive bodies, including state regulators – covering various utility functions. Jurisdiction is mainly focussed on retail markets. Here it is relevant to quote former US Justice, Louis Brandeis, who noted in 1932: “the states are the laboratories for democracy and innovation. It is one of the happy accidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory, and try novel social and economic experiments without risk to the rest of the country.” Examples of this from the electricity sector are found in California, Texas, Maine, Oregon and other states, all with differing degrees of success. Success ratios increase when the impact of state restructuring is limited to the single state. This is the case in Texas, with its efficient electricity market and insular electric system. The bad example is California, where restructuring had a very wide impact on other states and led to numerous, still ongoing, disputes about federal versus state jurisdiction. For this jurisdictional conflict, court cases being brought by state governments or utilities on mandatory FERC involvement in RTO models, still have no clear outcome.

With regards to market integration and jurisdictional issues, there are two further points to make. The first concerns BPA and TVA; the second, regional market platforms. In electricity markets, there is a full-fledged involvement of large federally owned utilities: the Bonneville Power Administration in the Columbia River basin in the Pacific Northwest¹⁴ and the even more prominent Tennessee Valley Authority.¹⁵ Both market players have their statutory obligations and mandates based on specific federal legislation. In practice, they are run as large monopolies, taking their own business decisions in relation to their own mandate. They both cover wide service areas and also have an impact on neighbouring systems. It is unclear how the regulatory and jurisdictional environment will develop, not only with respect to these two powerful utilities, but also in relation to the oversight of connected markets.

For regional wholesale market platforms, RTOs with the sole functions of transmission and wholesale are regulated by FERC. The role of state regulators is rather minimal. There is, however, a coordination mechanism (in the PJM case) between PJM, FERC and the relevant state regulators. Under the newly proposed wholesale market platform, one could conclude that state regulators have a larger stake in proposing and deciding on regional market details, such as transmission pricing and allocating transmission rights to existing load. FERC remains responsible and has the ultimate test of compliance with the new rules.

¹⁴ BPA, operating a group of federally and privately owned hydro plants, services about 40% of all power sold and controls about 70% of all transmission lines in the Pacific Northwest, covering large areas of Washington, Oregon, Montana and Idaho. BPA is applying a system of contractual relationships with numerous utilities, bearing large resemblance to the single buyer model as introduced in the EU first Directive (but never applied) and to the small fields policy in gas production in the Netherlands. BPA and the Pacific Northwest states are opposing FERC's RTO and SMD proposals and are working on the alternative concept of RTO West.

¹⁵ TVA, with its 30 GW installed capacity, 17,000 miles of transmission lines, servicing the whole of Tennessee and (smaller) parts of neighbouring states, is under obligation not to sell outside its own region or to allow others to enter its market. Recently, TVA began a process of defining its own market design in relation to the competitive wholesale markets evolving around its own territory.

4.7.4. Concluding observations

EU and US regulators are both facing jurisdictional issues. These are not only complicated in a legal sense, but are even more sensitive from a political perspective. If the notion or even the objective of wider integration of national electricity markets is ultimately beneficial to consumers (and voters), these difficulties will have to be resolved. Very gradually, with the newly proposed regional platform in the US and the concept of regional electricity markets in the EU, new regulatory models with sufficient degrees of subsidiarity are being brought under consideration or even under construction.

4.8. System failures

4.8.1. Introduction

Any discussion on the organisation of electricity markets today cannot ignore the issues of system reliability and system failure. Events during the summer of 2003, both in the US Northeast and in Italy, have heightened the general public's concerns regarding the relation between liberalisation/restructuring and secure and reliable supplies. It is therefore useful to consider these events and to draw some comparisons between the EU and US situations. Box D summarises the events and findings.

4.8.2. The US situation

The following comments and observations have been made with regards to the August 2003 blackout:

- Transmission system problems, not deregulation of the wholesale and retail markets, appear to have been the problem, although the initial event took place in heavily deregulated Ohio and spread to the deregulated markets in the Northeast;
- FERC concluded: "If we draw any conclusions from this blackout, it is the urgent need for more investment in the nation's transmission grid to serve broad regional needs" (FERC 2003a). The DOE has projected that, over the next decade, transmission investment will grow only six percent, whereas demand will grow by 20 percent;
- Leading experts (Wolak 2003; Weissman 2003b; 2003c) caution against diving into massive investment plans for improving and expanding the transmission grids, without first making proper cost-benefit analyses. They also point out that the more efficient that bulk power markets are in economic terms (with the treatment of transmission costs as sunk costs), the more difficult it may be to reliably operate the grid. Grid use has changed dramatically over the last five years, being operated as a single, fully integrated network and managed by a single system operator. In reality this is not at all the case (!);
- The administration has started to push for the inclusion of mandatory and enforceable reliability rules and the expansion of investment in transmission and generation, including the possibility of bypassing state siting authorities in the Energy Policy Act or any other appropriate legislation. The final draft of the House/Senate version provides for various incentives to expand transmission capacity and expedited siting and for the establishment of an electric reliability organisation to enforce reliability standards (US Congress 2003), but to-date no new legislation has been established;
- The Final Report of the US-Canada Power System Outage Task Force (April 2004), identifies the causes of the power outage and reasons for why the outage was not contained. It also presents comprehensive technical and policy recommendations to prevent or minimise the likelihood of future blackouts, and to reduce the scope of those that do occur. The report concludes that the ability to supply reactive power within the northern Ohio area, where the initiating events occurred, had been inadequate for several years, and that the regional reliability council had not previously identified this vulnerability. As a result, the causes of the blackout are identified as inadequacies in system understanding, situational awareness, in tree trimming and in reliability coordinator diagnostic support;

- Recommendations of the Joint Task Force focussed on implementation of mandatory and enforceable electricity reliability standards in both the US and Canada, with penalties for non-compliance backed by appropriate government oversight; strengthening the institutional framework of the North American Electric Reliability Council and its initiatives on compliance; developing a funding mechanism approved by regulators for NERC and the regional reliability councils, in order to ensure their independence from the parties they oversee; improving near-term and long-term training and certification requirements for operators, reliability coordinators and operator support staff; and on increasing the physical and cyber security of the network.

4.8.3. EU reactions and the EU events

During the summer of 2003, Europe faced an extended period of heat waves with electricity alerts all over and some 'local' blackouts in Italy, London and Scandinavia, immediately following the US blackout. The question asked was if this could happen in Europe and if not, why? The EU Commission clearly reacted on these questions (CEC 2003a). The Commission affirmed that the EU electricity market was much more integrated than the US, in terms of organisation, regulation, market liberalisation and cooperation between network operators. Although significant power cuts could not completely be ruled out, the EU electricity market appeared to be better equipped to deal with such situations. In particular, the Commission was referring to aging grids, excessive consumption (roughly twice as much as in the EU), overly cheap transmission tariffs, inadequate energy demand management policies and a very low level of inter-state grid cooperation. The Commission continued with its plea to persist and to accelerate the market liberalisation process and the introduction of a regulatory framework, including (new) measures for greater integration leading to increased security, particularly by extending infrastructure. The Commission even suggested that if a regulator considered transmission plans to be inadequate, it should bypass the TSO by issuing tenders for expansion.

And then, on 28 September 2003, the lights went out all over Italy, the largest European blackout since WW II, caused by a tree falling onto a Swiss interconnector line and subsequently inappropriate Swiss reactions (Box D). Recognising that regardless of regulatory framework, no power system can be fully protected from large-scale blackouts, and in reaction to the US and Italian events, the TSOs, both ETSO and UCTE, adopted the following positions and corresponding recommendations (UCTE 2003b):

- Development of network infrastructure in the EU, based on a European harmonised, regulatory framework providing adequate investment signals for both generation and infrastructure. In this respect, it is useful to recognise that regional generation/load balances in Europe should not require the long haul bulk electricity transmission as in the US, limiting further the risk of disturbances;
- Development of a simple and homogenous European procedure for licensing new lines, especially interconnectors, removing administrative barriers that usually require project lead times of five to ten years before lines can be installed;
- TSOs should have full control over development and maintenance of the networks they operate. The combination of transmission asset owning and operation would make this easier;
- Independence of TSOs versus generation, supply and trading (that is further strengthened), allowing TSOs to exchange detailed system data on a daily basis, thus limiting system failures. It would not be surprising if insufficient and non-immediate full information sharing between TSOs in fact added to the problems of the blackouts;
- Lastly and probably most importantly, there is need for continuing support by the EU and national regulators concerning the transformation of UCTE rules into a set of enforceable common security and reliability standards. Existing UCTE handbooks are currently being reviewed, especially to delete all rules that do not conform to the context of a liberalised electricity market. Additionally, the upgrading of rules in a formal, binding sense, based on public law is under consideration.

4.8.4. Concluding observations

Both in the US and the EU, the fact of the 2003 system failures fed into the ongoing restructuring and liberalisation debates. For both, this will result in additional measures and regulatory control. The problems on both continents are structural, albeit in the EU there appears to be a better climate for taking the necessary actions. In particular, existing inter-TSO cooperation is much further advanced in the EU than in the US. Nonetheless, it will be useful for both to explore each other's lessons learned and to take these into account for further elaboration of reliability guarantees.

BOX D (1) US and EU summer 2003 blackouts

The US

- The Chamberlain-Harding 345 kV line tripped (in Ohio, cause unknown), leading to subsequent tripping of numerous other kV-lines and (nuclear and other) generators in the area; the existence of the so-called Lake Erie Loop added to the operational and reliability problems. Ultimately, some 70,500 MW loads were lost in the PJM, Midwest ISO, Hydro Quebec, Ontario IMO, ISO New England and New York ISO areas.
- The US and Canadian governments immediately created a Joint Task Force to identify the causes and make recommendations for necessary actions.
- Transmission system problems appear to have been the cause, although the initial event took place in heavily deregulated Ohio and spread to the deregulated markets in the Northeast. FERC stated "If we draw any conclusions from this blackout, it is the urgent need for more investment in the nation's transmission grid to serve broad regional needs."
- During the congressional hearings on the blackouts, there were almost unanimous calls for broader coordination of the transmission grids and for mandatory reliability requirements. Effective nationwide action has not yet emerged (as at summer 2004), although FERC did take initial steps towards mandatory reliability standards (January 2004), but the utility industry calls for a primary role of their own.
- The Final Report of the US–Canada Power System Outage Task Force (April 2004) identifies the causes of both the power outage and reasons why the outage was not contained. The report concludes that the ability to supply reactive power within the northern Ohio area, where the initiating events occurred, had been inadequate for several years, and that the regional reliability council had not previously identified this vulnerability. As a result, the causes of the blackout are identified as inadequacies in system understanding, situational awareness, tree trimming and reliability coordinator diagnostic support. It also presented comprehensive technical and policy recommendations to prevent or minimize the likelihood of future blackouts, and to reduce the scope of those that do occur.
- Recommendations of the Joint Task Force focussed on mandatory and enforceable electricity reliability standards and strengthening the institutional framework and regulatory oversight and compliance measures.

BOX D (2)

The EU

- On 9 September 2003, the lights went out all over Italy, the largest European blackout since WW II. This was due to a tree falling over a Swiss interconnector line, an otherwise 'normal operational problem' (UCTE 2003b). Within minutes a second line in Switzerland tripped, causing almost immediate tripping of all lines between Italy and the rest of Europe. In Italy, where all its 6 GWe imports were lost, generating plants were unable to kick in and were automatically shut-down for safety reasons.
- The Italian and French regulators jointly concurred in April 2004 on the causes. In the day-ahead planning of the system for 28 September and in the operations of the night between 27-28 September 2003, the operators of the Swiss transmission grids did not effect sufficient prevention and preparation measures to guarantee the security of grid operation and supply across power systems in Europe. The integrated Swiss electricity companies did not comply with the content of UCTE rules during the night of 28 September. During the night of 27-28 September, following the accidental loss of the Mettlen-Lavorgo 380 kV line (the Lukmanier line), the Swiss transmission grid operators took inappropriate measures and underestimated the action that should have been requested of other TSOs. These operational mistakes led to the consequent loss of the Sils-Soazza 380 kV line (San Bernadino line), and thus to a condition of the interconnected grids being out of control.
- As a consequence, the two regulators concluded that future UCTE rules should take into account the experience of these events: compliance with new rules should be made legally binding and monitored with independent assessment, with enforcement via the national regulators. Coordination between TSOs should be reinforced for operational planning and real-time operation of interconnected grids and a legal and regulatory framework coherent with European legislation is necessary in Switzerland to ensure the security of grid operation and supply in Europe.

4.9. Gas and electricity, electricity and gas

4.9.1. Introduction

Both in the US and the EU, it is widely expected that the role of gas in power generation will substantially increase. This will lead to a number of issues and questions such as supply security, impact on gas market designs and business practices due to competitive market design for wholesale electricity, compatibility of gas market designs and access rules for electricity and vice versa. These issues will be discussed briefly after some general comments on the development of gas in power.

4.9.2. General trends

US and EU energy markets have been confronted with some general trends relevant to power generation:

- Demand increases for electricity, combined with escalating difficulties in building new coal and nuclear plants, have lead to a technology push and a market pull for very efficient, low cost and easy-to-build economical gas-fired generating technologies. In both markets, further expansion of power generation is expected, together with the replacement of existing plants. The most recent US forecasts indicate a need for new capacity of some 350 GW for the period up to 2025 (EIA

2004). Forecasts for the EU-15 indicate ranges between 500 and 600 GW of newly built capacity up to 2030 (Eurelectric 2004).

- In the US, the share of natural gas in power generation is expected to rise from some 16 percent in 2000, to 21 percent in 2010, and 23 percent in 2025 (Weissman 2003a, EIA 2004). Anticipated sources for incremental generation over the next 15-20 years, will include some 60 percent from natural gas, overtaking nuclear power as the second largest source of electricity. The rise in gas demand itself will be less sharp due to large replacements of older and less energy efficient generating stations. However, gas for power demand will increase from some 5.5 trillion cubic feet (tcf) today to more than 8 tcf in 2025. US production will barely increase during that period, meaning that imports will have to rise, especially via liquefied natural gas (LNG).
- In the EU, a similar pattern is evolving, with forecasts indicating increased gas consumption in power generation from some 100 million tonnes of oil equivalent (mtoe) in 2000 to more than 220 mtoe in 2030. The share of gas in power generation will rise from some 17 percent in 2000 to almost 40 percent in 2030. This will also contribute substantially to the role of gas in the overall energy mix from around 20 percent in 2000 to more than 30 percent in 2030 (DG TREN 2003). The bulk of this incremental gas will come from abroad, which will add to market complexities in gas and power generation.
- However, doubts also exist as to the actual materialisation of gas supplies from abroad because of prevailing uncertainties in European and North American markets and current investment climates. There are also concerns around the economics of power generation and its impact on new gas build for the foreseeable future. In the US, higher growth rates and subsequent demand scenarios will further boost the role of clean coal technologies when gas prices are presumed too high to be competitive. The risk of continuing high oil prices and their impact on gas prices especially will make the generally risk averse generator companies more reluctant to enter into long-term fuel contracts without secure pricing arrangements, such as is normally still the case with gas.
- Firm conclusions with hard figures are always difficult to arrive at. But there seems to be little doubt that the role of electricity will increase further and with it the role of gas in power generation, both in the EU and in the US. With the bulk of gas coming from abroad, gas supply security will be raised higher on the policy agenda. There is a difference in timing, however, since US experts expect a natural gas crisis within the next five years or so with an import boost in LNG and a more stable supply basis after that period due to anticipated increases in domestic production. There is no general concern as to long-term supply security, either in domestic or import terms. In the EU, the general view looks toward increasing import dependency, notably with supplies coming from the east and the southeast. Long-term supply security for gas is a European concern as is consequently, electricity. This will require further policy action at the EU level (CIEP 2003a; 2003b).

4.9.3. Supply security and market rules

What will increasing power demand for gas mean for gas market rules and procedures? We do not go into the details of the impact on the regulatory framework for the gas market itself, but the increasing interaction between the gas and power markets will have its own dynamics and development, leading to all sorts of arbitrage. To reach full competitive benefits of this integration, consistency in market design is required in conjunction with conditions for using the infrastructure. Some observations are relevant in this context, maybe more from the EU than from the US perspective.

- It may not be attractive for electricity producers to generate more electricity to meet changes in demand or supply that occur on an irregular basis (e.g. maintenance) or unexpectedly (e.g. outages, demand shock) because of the high costs of both flexibility clauses in gas supply contracts and/or imbalance or capacity fines. High imbalance fines and fines in case of a gas transport

capacity overrun could have dramatic impacts on the generation of electricity when more transport capacity is used than is contracted. Sudden supply shortfalls will impact short-term demand for gas, even above normal load levels. The cost of generating extra MWh of electricity could easily increase by a factor of one hundred. Electricity suppliers will only be willing to supply at prices that allow them to recover these costs, prices that could well be at or above cap values used in spot power markets. When supply reaches this critical level sudden jumps in electricity prices might occur, as inefficient plant is substituted for in principle efficient plant that runs into extra costs due to flexibility clauses in gas supply contracts and imbalance charges from the TSO. Meeting unanticipated short-term changes in electricity supply or demand in an efficient way would require that there be no imbalance or capacity overrun fines for gas at exceedingly high prices.

- The high cost of flexibility, due to gas supply contracts, leads to steep supply curves on the electricity market and thus can also lead to high electricity prices. Pooling of gas supplies across different sites of the same generating company may be very difficult, unless the transmission tariffs are based on an entry/exit scheme. If this is not the case, pooling is only achievable if the sites are connected to the same section of the transmission grid. This is another example of possible inconsistency in market rules and succeeding inefficiencies, including reduced possibility to cushion outage. Despite the high peak prices in spot electricity markets, it does not seem possible to run super-peak plants in a profitable way. This can lead to suboptimal long-term investment in generation capacity and divestment of otherwise profitable plant, and may have adverse effects on long-term security of supply in electricity. Inefficiencies and inconsistencies in the overall system could emerge when regional markets in electricity are developing together with the application of entry/exit tariff (EET) arrangements for gas. This would be the case when the respective areas are not geographically consistent or when transfers and transits from one gas EET area to another is not arranged on market-based systems. The EU Commission addresses the gas-electricity interaction in its Strategy Paper, but only in general terms. As for all gas users, electricity generators must be able to depend on exercising their right to choose between different suppliers and sources of gas based on nondiscriminatory access to the grid. The paper does not address any further issues based on the particular characteristics of the two markets.

In conclusion, the tariff system for gas infrastructure use could lead to under investment in plants that are especially built to provide electricity in a flexible way; higher volatility of electricity prices on spot markets; and inefficient use of electricity generating capacity. Clear harmonisation and consistencies between the relevant regulatory frameworks are therefore required. Introduction of regional markets could be helpful in this respect but could also increase complexity. It might be useful to compare in more detail US experiences with EU approaches for the two markets.

4.10. Emission trading and renewable energies

4.10.1. Introduction

Renewable energy and climate and emission control issues are, both in policy and in political terms, very differently approached in the US and the EU. When measures are taken they have an impact on markets, on trade and potentially on industry structures. Policymaking and the consequent regulatory designs do not always recognise these impacts. Although the EU and US situations are very different, it is still useful to take a global look and to see if some common lines can be drawn.

4.10.2. The EU

The EU has adopted a Directive to promote renewable energy sources (RES) (EC 2001), with indicative targets for the share of RES in electricity generation. The EU has also embarked upon a mandatory sys-

tem for cap-and-trade with respect to CO₂ emissions (EC 2003b), in order to secure compliance with the Kyoto Protocol. A further Directive for co-generation and combined heat and power (CHP) systems has been adopted (EC 2004), without indicative targets but with reporting requirements for member states indicating potential expansions. As for RES, member states are free to choose their support schemes. Member states also have created policy approaches and incentives on a national level, both mandatory and voluntary. The relation with the electricity market is recognised in the Strategy Paper, with remarks about potential market disturbances, especially if the various support and trading schemes are not compatible with each other or the IEM. The Commission has not yet announced concrete action for monitoring or prevention.

A common EU15 indicative target of 22 percent of RES in electricity generation is set for 2010. Member states have also agreed on national indicative targets and to pursue policies to meet them. They are free to choose support schemes, be it on the demand side or on the supply side. Imported RES-based electricity could be taken into account, but there is no obligatory common scheme for mutual recognition of tradable green certificates. The Commission, however, encourages the establishment of common approaches for regional markets. TSOs can play a role in issuing certificates and securing their commonalities (ETSO 2003c), but thus far everything is done on a voluntary basis. Especially for wind energy with its difficulties for adhering to production schedules, additional balancing costs have to be met and new connecting rules and grid expansions are necessary. Also the uneven distribution of RES could create further difficulties for overall system operation. Based on present policies, the EU will not reach its 2010 target for electricity generation, partly due to lagging developments in biomass. No targets will be set beyond 2010, pending further studies.

To limit greenhouse gas emissions, member states have accepted national caps for CO₂ emissions that will be allocated on a national basis during 2004 for the period 2005-2007 and then to be extended to 2012. Every eligible operator receives a share of allowances and is allowed to buy or sell, but has to meet allowed emissions on the basis of common monitoring and reporting standards. Cross-border trading is also permitted, even with other parties that have ratified the Kyoto Protocol. The scheme is intended to start in 2005 and could have substantial impacts on the electricity and gas markets. Regulatory inconsistencies for those markets could lead to additional market distortions, but this has not yet led to any action at EU-level or even at national levels.

4.10.3. The US

The US has no nationwide system for introducing renewable energies, be it mandatory or otherwise (Brown and Sedano 2003). This is fully left to individual states. And if they do so, they usually apply the concept of the Renewable Portfolio Standard. Twelve states have established requirements that electricity retailers include, as part of the resource mix, some percentage of RES. California imposed the requirement that 20 percent of all power sold through investor owned utilities should be generated from RES by 2018, whereas for other states this ranges between 1-30 percent.¹⁶ Maine with its 30 percent standard is the exception, introducing this amount in order to protect its already existing RES plants. All other standards are basically designed to promote new RES. Issues that will have to be covered and considered by the states concerned are for example, RES definitions, the question of using green tags or certificates and if a distinction is to be made between existing RES plants and new ones.

¹⁶ The more detailed standards are: California 20% by 2018, Arizona 1.1% by 2007 (50% solar), Nevada 15% by 2013 (> 5% solar), New Mexico 10% by 2011, Texas 2880 Mw by 2009, Wisconsin 2.2% by 2011, Pennsylvania there is variation per utility, New Jersey 6.5% by 2012, Connecticut 13% by 2009, Massachusetts 4% by 2009, and Maine 30% by 2000.

Two states have comparable systems of Emissions Portfolio Standards. In Connecticut and Massachusetts all energy sold must, on average, not exceed a specified level of pollutants/kWh, covering NO_x, SO₂ and CO₂. Trading in emissions tags is allowed. In addition, there is the federal program of a cap-and-trade scheme based on the Clean Air Act for SO₂, to be expanded and strengthened in the Clear Skies program, including NO_x and mercury. The electricity industry is quite happy with these approaches, especially since it seems to provide long-term stability together with market-based solutions. In Congress, there are also amendments to add CO₂ to this multi-emission approach. Generally speaking, there does not seem to be much concern or awareness as to the impacts on interstate electricity markets. RES focus is basically on the retail side of the industry, whereas emissions are much more relevant for the upstream side.

4.10.4. Concluding observations

Emissions and renewable energies will start to receive more priority in electricity generation policies. Market-based instruments are increasingly introduced on both sides of the Atlantic. Their impacts on electricity markets are as yet not fully explored or visible. Potentially, impacts may be substantial, requiring more analysis and policy and regulatory consideration. Consistent rules in emission trading and RES support schemes with electricity market designs are necessary and will need growing attention from policymakers and regulators.

5

Lessons Learned and To Be Learned

5.1.1. Introduction

It is useful to bear in mind the observation quoted in paragraph 4.7.3.,¹⁷ in which we considered the application of regional models or interstate or cross-border regional markets. It could be interesting and worthwhile to compare notes between US and EU experts and policymakers on some of the issues that are addressed in this paper. No proposals however are made as to any practical follow-up. A brief overview is suggested of issues that might be relevant from the US-side and from the EU-side. Finally a global EU agenda for further work or discussions is suggested.

5.1.2. US-EU lessons

From the US perspective, a number of issues and experiences from the EU might be of interest. It would be useful to discuss the overall mandatory liberalisation project with supplier choice options for all consumers and the leading philosophy of third party access arrangements to all grids with the subsequent legal unbundling to secure independent grid operation. Secondly, concurrent to this general notion, the European process of policymaking, organisation and implementation should be examined. Particular emphasis could be placed on the stakeholder participatory arrangements in the Florence process and the TSO cooperation in their voluntary models (ETSO, UCTE, etc). More specific reference could be made to the arrangements for inter-TSO and cross-border system reliability and operation, of the information exchanges and cost allocation and recovery schemes due to cross-border loop flows and transfers. As a third group of issues, the interaction between electricity markets and deregulated gas markets together with renewables and emissions policy schemes should be mentioned. And finally the EU approach to public service obligations and small consumer protection would be relevant for the US-side as well, with increasing EU experience and practice.

5.1.3. EU-US lessons

From the EU perspective, a similar set of issues and experiences on the US-side is worthwhile exploring. The leading notion thus is that of designing and implementing regional markets and crossing state borders. Regional market governance, with the appropriate stakeholder involvement and the balance between federal and state regulatory jurisdictions would be the more relevant issues. The more precise schemes for stakeholder involvement in running and overseeing competitive markets in RTO areas could provide further food for thought in European minds. Next to these more governance-related issues, the whole variety of technical-economic issues in applying RTO concepts should be particular interest. Congestion management issues in a competitive market, transmission pricing schemes, tariff designs, including locational signals in pricing, issues that are high on the EU agenda without a very clear policy orientation in regional market concepts are examples of these complicated technical and economic issues. Finally, market monitoring and mitigation, both in general and more specific regional terms, should complete these issues for further interaction between the Atlantic regulators.

¹⁷ Former US Justice, Louis Brandeis noted in 1932, “the states are the laboratories for democracy and innovation. It is one of the happy accidents of the federal (US) system that a single courageous state may, if its citizens choose, serve as a laboratory, and try novel social and economic experiments without risk to the rest of the country.”

5.1.4. Agenda for further discussion with the US-side

In the preceding sub-paragraphs, issues were mentioned from the two perspectives. In addition to these, issues that are high on regulatory agendas on the two sides are also relevant. Combining the preceding two groups of items, a following agenda for EU-US or US-EU regulatory discussions is suggested:

- a) Development of regional markets as a model for integrating and further connecting national or state markets, with the following more specific issues:
 - Technical and economic issues, such as managing congestion and the application of LMP models, transmission tariff designs, market monitoring and market power mitigation;
 - Legal and jurisdictional issues, such as governance of RTO models and TSO coordinated actions, regulator involvements and oversight and (unrestricted) market information, the federal/EU Commission roles and state/national regulators in regional markets.
- b) Actual generic issues in electricity market regulation, with the following two groups:
 - Generation and transmission adequacy schemes, planning devices, market-based incentive schemes;
 - Emissions and renewable support schemes, their impacts on markets and their market-based solutions.

5.1.5. Agenda for further discussion within the EU

As described above, regional market concepts in the EU are under construction or under consideration. It would be worthwhile to have a procedure in place to compare the 'state-of-their-affairs' on a regular basis. The Athens process and MIBEL seem to be further advanced than the Benelux market, whereas the BETTA project is basically more national than cross-border. In addition, Nordpool remains of course a very important reference model. All models for regional markets have a number of commonalities, based on EU law and regulations. They all share the wider idea of further developing into a larger internal European market. It would therefore be necessary to approach these projects in a wider EU context. Two lines of action are suggested.

Firstly, the European Commission should develop a global framework for regional markets within the EU, consisting of three elements:

- a) A set of minimum requirements for establishing a regional market. These requirements would include a degree of physical and commercial interconnection, a common notion of the national authorities involved as to the objective of the regional market, the ability of national TSOs and national regulators to develop clear and effective cooperative schemes, the existence of comparable levels of TSO unbundling and mutually consistent rules for TPA to the networks, the ambition to develop an integrated regional balancing market and – finally – the ambition to develop an integrated regional power exchange. The creation of a regional platform for the further elaboration and development of the regional market should be the procedural umbrella for these conditions.
- b) A set of market conditions, to be further elaborated by the regional platform with competent regional authorities, market players and other stakeholders. These conditions should concentrate on congestion management, transmission tariff structures, TSO governance structures, resource planning and adequacy, system reliability, market monitoring and mitigation procedures, consistency with other relevant market rules (gas, green certificates, emission allowances), and on jurisdictional issues between the EU-Commission and the national regulators. Overall EU rules and regulations should give the boundary conditions for the more detailed regional market rules.
- c) A procedure for EU compliance assessment, for which the Commission should have the responsibility for safeguarding regional market rules with the overall EU internal energy market.

Secondly, the European Commission should provide the appropriate legal framework to establish the

regional market procedures. As the existing Electricity Regulation, dealing with some cross-border trade issues, would probably be too limited, a new Regulation on 'regional electricity markets' might be more appropriate. The Commission should be granted authority to set binding guidelines within the global framework for a regional market, together with an agenda for national authorities and TSOs for the further elaboration of detailed implementing rules and with a compliance procedure at EU-level.

As the establishment of such a formal process will take time, a more informal way forward might be appropriate. Member states that are interested in establishing regional markets should undertake political action to support these processes. The Athens and MIBEL memoranda could be seen as examples for this with their already operational regional forums to discuss the various steps to take. The Netherlands government is taking action as well with the proposal to conclude memorandums of understanding with neighbouring countries. Also the CEER has started preparatory discussions with the establishment of a Task Force for the Single Energy Market in which regional market models will be discussed (CEER 2004). The Task Force will focus on facilitating regional market integration towards a single European market, but recognises also the need to have a more detailed look at regional models as such. Also relevant is the work done by the electricity industry itself. Eurelectric and UCTE have both worked on the further development of internal electricity trade in the EU and their necessary technical boundary conditions (Eurelectric 2003; UCTE 2003a). The wider context of the political agendas for developing external EU-25 electricity trade, both with the East and the South will have to be taken into account as well. The regional market concept does not stop at the EU-25 borders and might also be seen as a necessary precondition for these wider visionary trading arrangements.

6

Conclusions

Although there are profound differences between EU electricity market liberalisation and US electricity industry restructuring, many issues are alike, in a technical, economic and legal sense. The EU seems, despite its strong and global legal framework with the objective of the one big internal energy market, to be heading more towards the pragmatic concept of regional models for electricity markets. In that sense, the EU-line has seen a more top-down type of approach whereas the US-line has more bottom-up characteristics. This is all the more so, since FERC's actions to impose regional models failed, leaving more room for regional initiatives under certain conditions. Both experiences to-date would suggest that regional models would be appropriate, when reflecting physical and commercial realities. Inter-regional market integration however would require a set of general and more global boundary conditions.

Discussions on defining and/or promoting regional markets are rising higher on policy agendas. Two main streams of thinking are apparent. One argues that regional markets evolve naturally when no or few (technical) impediments exist. Market forces would facilitate such a natural harmonisation process. The other view maintains that political support is the predominant condition for regional integration. If political support is sufficient, then technical or commercial problems will be resolved. Examples of the two lines of development are to be found on both sides of the Atlantic. The more practical and complex issues are further discussed with a view to learning lessons with potential conclusions.

In the EU, cross-border *congestion management* to service regional markets exists almost only on drawing boards. In the US, existing regional markets have quite some experience with efficient market-based cross-border congestion management schemes. The fact of a single responsible entity is very instrumental to these experiences. Efforts to promote these more widely for other regions have failed so far, making the EU record comparable to the US, or vice versa. Some general focus however, going beyond the regional level, seems to be necessary.

In the US, based on FERC jurisdiction, clear rules for *interstate transmission pricing* have been set, with further refining and developing under RTO models. Detailed structures have been left to the regional levels, with final findings of compliance by FERC. The EU is lacking a comprehensive common view on transmission pricing, despite of various efforts. The EU Electricity Regulation and its mandatory guidelines are to be seen as a start, be it however only of a partial nature. Again, regional market models could be useful for making further progress, especially with additional EU mandate to set boundary conditions such as is done by FERC in the US.

Governance of TSO functions varies widely between the EU and the US. The EU model developed as a top-down process, focussing on business approaches. TSO business is business, be it of a regulated nature. Stakeholder interests are therefore not formally secured and market participants are seen as clients. The US model has focussed much more on functionality. Both transmission, system and market operation functions were seen as separate, albeit sometimes combined, functions. These functions need to serve a system and a market and should therefore be governed on a strictly independent basis, with strong stakeholder input and even membership.

Resource adequacy is an issue for the two continents, although regulatory involvement seems to be less controversial in the US than in the EU. The EU seems to be heading towards a more centralised approach, whereas in the US decentralisation with regional approaches is widely accepted.

Market surveillance and assessments are new tasks for regulators, especially where markets are integrating. The US is more advanced on these tasks than the EU. In both markets, regional approaches might be practical and should be further explored, including the conceptual use of 'the relevant market' on a regional basis.

EU and US regulators are facing *jurisdictional issues*, which are legally complicated and politically sensitive. If the objective of wider integration of national electricity markets is to be pursued, these issues will have to be resolved. The US proposed regional platform and the EU concept of regional electricity markets could provide further opportunities for discussions and decisions.

Both in the US and the EU the 2003 *system failures* added to the ongoing debates on restructuring and liberalisation. In both cases this will result in additional measures and regulatory control. The problems are of a more structural nature, with necessary action probably more responsive in the EU due to already existing and advanced inter TSO cooperation.

The role of *gas* in power generation will increase, both in the EU and in the US. Both markets are facing increasing imports of LNG, but supply security considerations will be more on the EU side than on the US, requiring different policy approaches. Tariff systems for gas infrastructure will have impacts on the efficient functioning of gas-based electricity markets. Harmonisation and consistencies between the relevant regulatory frameworks are therefore required. Regional markets could be helpful in this respect but could also add to further complexities.

Emissions and renewable energies will receive more priority in electricity generation policies as market-based instruments are introduced on the two sides of the Atlantic. Impact on electricity markets may be very large and are as yet not fully explored or visible. Consistent rules in emission trading and RES support schemes with electricity market designs are necessary and will need increased attention from policymakers and regulators.

A *cross-Atlantic dialogue* between regulatory authorities would be appropriate for the two sides to compare notes and learn lessons on a number of issues with regional electricity market relevance. Issues would include technical and economic ones such as the management of congestions and LMP models, transmission tariff designs and the procedures for market monitoring and mitigation, together with more legal and jurisdictional ones such as governance models for TSOs and RTOs, regulatory involvements in market oversight, and 'federal' versus 'national' roles.

Within the EU, a *legal framework for regional electricity markets* should be developed with a set of minimum requirements and conditions. Requirements would include degrees of interconnection, shared views by regulators on regional market prospects, cooperative schemes between TSOs and mutually consistent rules for TPA and unbundling. Conditions would include rules for congestion management, transmission pricing, governance structures, resource planning and adequacy, system reliability, and market monitoring and mitigation schemes. Jurisdictional issues between the EU Commission and national regulators will have to be cleared with a procedure for EU compliance assessment. And finally, the appropriate EU legal framework should be provided to establish the regional market procedures in a new EU regulation on *regional electricity markets*.

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