European University Institute

FLORENCE SCHOOL OF REGULATION

ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES









EUROPEAN ENERGY POLICY: COULD IT BE BETTER?

ISBN: 978-92-9084-096-1
doi: 10.2870/53290

Front cover images, clockwise (picture in the centre as last): Image courtesy of Thomas Binderhofer / Wikimedia commons; Image courtesy of bplanet / FreeDigitalPhotos.net; Image courtesy of dan / FreeDigitalPhotos.net; Image courtesy of xedos4 / FreeDigitalPhotos.net; Image courtesy of -Marcus- / FreeDigitalPhotos.net; Image courtesy of dan / FreeDigitalPhotos.net; Image courtesy of mconnors / Morguefile.com; Image courtesy of anekoho / FreeDigitalPhotos.net; iStockPhoto 12663838, Trout55; Image courtesy of worradmu / FreeDigitalPhotos.net

Contents

Foreword

Jean-Michel Glachant

This booklet shares some of the research carried out by the Florence School of Regulation since 2010.

We have looked at various areas: from smart grids to Schengen-like energy agreements, and from incentive regulation to European Gas Target Model.

The relevance of our work (three booklets of that kind circulate) will be better explained by qualified introductions:

• Lord Mogg, President of the Council of European Energy Regulators (CEER), Chair of the International Confederation of Energy Regulators (ICER), Chair of the Board of Regulators at ACER (Agency for the Cooperation of Energy Regulators);

• Fulvio Conti, CEO of Enel and until recently President of Eurelectric, the union of the electricity industry;

• Daniel Dobbeni, Chairman of the European Network of Transmission System Operators - Electricity and President of Eurogrid International, former CEO of Elia.

We did work a lot and did our best. We hope that you will enjoy reading.

What does energy research bring to regulators?

Lord Mogg

1. Energy regulation in Europe is a relatively young profession. Its birth can be traced to the mid 1980s when the clear aim was to enhance the economic efficiency of the monopolistic gas and electricity industry and so bring benefits to energy consumers.

2. In the intervening years the challenges faced by energy regulators have become more complex and interrelated. Today's challenges – to name but a few - include meeting the challenge of climate change, ensuring adequate investment in energy infrastructure in the current financial crisis, dealing with the growing pace of political and technological changes which increase the uncertainties that energy companies face in knowing where and when to invest, increasing market integration, growing consumer involvement in energy markets, and growing concerns about energy prices. Regulators today must fulfil objectives which often compete one with another, face increasing demands from consumers and Governments, and must operate against the background of less certain information on what the future holds.

3. It is clear that the regulatory framework of the last ten years will not be adequate to meet the challenges regulators face in the next ten. The framework must evolve, and the skills of regulators must evolve also. Energy regulators have to keep up with the pace of change and to ensure that the regulatory framework and their techniques are fit for today's tasks. That would be a difficult and lonely task, but I am very pleased to say that academic interest in energy has grown in recent years. This friendly expert external review of energy regulation is an essential check that regulators and policy makers are steering a true path through these difficult times.

4. The Florence School of Regulation is a major centre of excellence in the field of energy research. Energy research provides regulators with leading edge thinking on the current challenges which are central to the work of regulators. This booklet contains recent examples of the valuable contribution that FSR continues to make to current challenges that face regulators (and policy makers) in Europe and on behalf of European energy regulators I am grateful to all those who have contributed to this work.

Energy research from an independent research institute: What does the industry gain?

Fulvio Conti

The business environment in which the energy industry operates has gone through deep transformations and reforms in the last 20 years. Despite the liberalization and deregulation of parts of the industry chain, there still is a relevant regulatory oversight of the whole industry which significantly impacts on income of energy companies, both grid networks and market based segments.

The relevance and growing complexity of regulation is demanding - now more than ever - for particular consideration by energy companies. All relevant European and global energy regulatory dossiers currently under discussion among industry, policy and decision makers are deeply intertwined and need to be carefully monitored and analysed for their potential impact on the business.

Energy companies should always try challenging their business beliefs by confronting with all stakeholders, either business or institution, in independent *fora* where to meet and debate in an open and friendly atmosphere. This kind of interaction allows all involved players to think ahead of the evolution of the energy sector and to get a broader strategic view on issues that are key to the business and to the community.

It is vital for a Company like Enel not to lose track of forefront regulatory analysis through debates with policy makers, academics and peer Companies.

Being a donor for the Florence School of Regulation from the outset of its foundation has been a real privilege and a necessity for Enel to get a wider and more informed understanding of the evolution of the economic and regulatory framework.

The Florence School of Regulation, born within the broader setting of the European University Institute, is in fact among the most valuable players to exchange views with and to provide inputs and insights on next challenges and their possible solutions.

The distinguished and passionate direction of Jean-Michel Glachant, who also holds the Loyola de Palacio Chair, has brought an innovative and dynamic approach to the school, which is now a worldwide benchmark for research in the energy field, providing cutting edge research programmes and projects, high level seminars, conferences and other engaging initiatives. Among these it's definitely worth mentioning the school's renowned training courses, from which Enel had the opportunity to lay the grounding for its future results by growing a valuable group of young expert regulatory professionals.

With its ever inspiring research activity and strong international orientation, the Florence School of Regulation has also been a reference interlocutor of the European Commission and has deeply contributed to the European energy regulatory and policy debates.

The interaction between policy makers, decision makers, the business community and high level research centres provides a unique way of looking into the future and contributing to the growth of knowledge and to the development of a sound European regulatory framework. In this respect, the School has always provided for a valid ground through informal networking opportunities with the most prominent international personalities in the field of regulation.

In the quest of an informed and conscious look into the future, companies have the opportunity to rely and lever on the input from such an authoritative and unbiased research institution. As we see it, the Florence School of Regulation has always proved to be an invaluable asset for our Company in particular and for the industry as a whole.

What is a smart regulation research for regulated companies?

Daniel Dobbeni

A number of key events over the past few years are shifting the world's geopolitical equilibrium, such as the protracted financial and economic crisis, the 2011 earthquake in Japan, the industrialisation of shale gas in the United States or the fast growing share of (variable) renewable energy sources in Europe. All of them could scarcely have been anticipated beforehand but will nevertheless shape the energy policies for decades to come.

Amidst this unprecedented turmoil, providing the stable and attractive regulation contemplated by investors and operators of generation and network assets turns out to be quite a challenge. Gone are the days when long-term energy and environmental policies could be determined without caring too much about their impact on GDP! Restoring Europe's economy and competitiveness so as to re-create jobs are now receiving top priority.

Thereby, uncertainties about security of supply, the rising costs of some energy policies and their impact on competitiveness have become daily headlines. Such media attention encourages decision-makers to take short-term decisions designed to resolve national issues. There is apparently not enough time (or perhaps not enough trust) to work out a long-term approach coordinated at European level.

Against such a background, exchanging ideas and experiences and brainstorming about concepts of smarter regulations are essential. Actually, the traditional cost-plus approach has reached its limits. Tomorrow's regulation shall foster innovation, out-of-the-box thinking, more risky approaches for network operators and, last but not least, be attractive to investors as the challenges facing the power and gas industries are steadily increasing in number, complexity and cost.

As one of the first participants for the Elia Group in the Florence School of Regulation, I was able to witness the benefits that could be reaped from bringing together delegates from universities, regulatory commissions, generators, grid operators and last but not least Consumers! Seminars, workshops, studies and courses enable those taking part to build up their knowledge and expertise about this complex industry while gaining a better understanding of the ambitions and constraints of each key part of the value chain.

I am grateful to my friend Jean-Michel Glachant and all those who have contributed to the debates and studies that form the core of this book. The contents illustrate the many tests facing energy regulation and industry in the drive to meet one of the greatest challenges of the 21st century: a reliable, sustainable and affordable energy supply for everyone in Europe.

Chapter I

Regulation of Infrastructure

Smart Regulation for Smart Grids[1]

Authors: Leonardo Meeus, Marcelo Saguan, Jean-Michel Glachant and Ronnie Belmans
Editors: Jean-Michel Glachant and Emanuela Michetti

2010

Highlights

- **The European Union** set ambitious objectives for the year 2020 in terms of increase of renewable generation, energy savings and reduction of GHG emissions. These objectives lead Europe towards a complete decarbonisation of the electricity system
- **There is a key role** to be played by grids in facilitating the required transformation and this implies they need to become "smart"
- **In practical terms**, making grids smart means deepening the energy system integration and grid users participation. Grids have to reconfigure notably for the integration of distributed generation (DG), the integration of massive large-scale renewable (RES), and for the integration of facilitating demand response
- **Smarter grids need a smarter regulation**. A smart regulation reconfigures the incentives and coordination tools of grid companies and grid users and aligns them towards the new policy objectives
- **Some of the incentives** provided to grid companies and grid users by the existing regulation must be corrected and some additional mechanisms must be conceived and experienced

1. This PB is based on the Working Paper Smart Regulation for Smart Grids by Leonardo Meeus, Marcelo Saguan, Jean-Michel Glachant and Ronnie Belmans.

Background

The European Union set up ambitious objectives for the year 2020 in terms of increase of renewable generation, energy savings and reduction of GHG emissions. Even more ambitious objectives are being discussed and developed for 2050.

These objectives lead Europe towards a complete decarbonisation of the electricity system, a high priority in the European context. Decarbonisation requires energy supply, energy consumption as well as the overall electricity system in Europe to undergo a deep and complex transformation.

Box 1 - System integration to the purpose of decarbonisation

1. Distributed Generation: medium and small-scale RES (Renewable Energy Sources) and CHP (Combined Heat and Power) generation technologies located close to the load being served

What does the integration of DG imply?

- Efficient grid planning and development
- Participation of distributed generators and aggregators to grid planning and development
- More flexibility in connection and access services
- Participation in ancillary services and wholesale markets
- Incorporation of new technologies

2. Demand Response: processes of advanced energy demand management

What does the integration of demand response imply?

- More flexibility of grid services
- Bigger use of information to coordinate and optimize grid operations
- Incorporation of new technologies (such as smart information services) and communication infrastructure
- Communication of more information to consumers
- Incentives to consumers to use this information

3. Large-scale RES: large-scale renewable generation sets

What does the integration of large-scale RES imply?

- Massive grid reinforcements
- Dealing with increased coordination and balancing costs
- Incorporation of new technologies
- Participation to grid planning and development

There is a key role to be played by grids in facilitating the required transformation and this implies they need to become "smart".

What makes grids smart?

In practical terms, making grids smart means deepening the energy system integration and grid users participation. Grids have to reconfigure notably for the integration of distributed generation (DG), the integration of massive large-scale renewable (RES), and for the integration of facilitating demand response (Box 1).

The distribution grids till today didn't have to be so smart because they are mainly supposed to "passively" connect the load to dedicated power exit points on the transmission grid. Distribution grids will then have to deeply reconfigure to become smart.

The transmission grids are already "active" and therefore relatively smarter than distribution grids, but they will face new challenges both to balance massive intermittent generation and to evacuate power from remote new areas of generation. In order for grids to get enough of the "smartness" required by the new energy policy goals, the regulatory framework for grids should also be smartened. A smart regulation reconfigures the incentives and coordination tools of grid companies and grid users and aligns them towards the new policy objectives.


EUI Working Papers
RSCAS 2010/45
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
Florence School of Regulation
"SMART REGULATION FOR SMART GRIDS"

Smart Regulation for Smart Grids

WORKING PAPER
by *Leonardo Meeus, Marcelo Saguan, Jean-Michel Glachant and Ronnie Belmans*

THINK

Shift, Not Drift: Towards Active Demand Response and Beyond

THINK TOPIC 11

From Distribution Networks to Smart Distribution Systems: Rethinking the Regulation of European Electricity DSOs

THINK TOPIC 12

What makes regulations smart?

The deep process of transformation of the European electricity grids into smart grids is going to be a challenge for grid companies and users. There are three main issues:

A. Costs are likely to increase: The integration of DG, demand response and large scale RES should increase certain grid costs, especially system operation costs and service quality costs. Furthermore, grid companies will not be willing to make significant new investment (e.g., grid reinforcement, voltage control, specific maintenance, or smart meters) without a guaranteed adjusted remuneration

B. Revenues are likely to shrink: At the same time, integrating more DG and more demand response should reduce the amount of energy to be distributed (or transmitted) trough the grid. So that overall several aspects of integration should work against the grid company revenues.

C. Incentives are likely to be lacking: The first two issues with costs and revenues can be dealt with by correcting the distortion of incentives in the existing regulatory framework. However there is a need for introducing further incentives for both grid companies and grid users. The implementation of new incentivising mechanisms (such as "output regulation") is able to correct the lack of incentives for certain new output (as "renewable hosting capacity", "openness and robustness of information or control systems"). Output regulation can define some output metrics to measure and stimulate the performance of grid companies.

Box 2 illustrates smart regulations that have already been applied to deal with these issues.

Box 2 - Three case studies

1. Integration of DG: The Orkney Isles

The case
The Orkney Isles in the north of Scotland are well-known for their attractive RES potential. At the same time, they represent a typical rural distribution setting with very low demand, relatively weak distribution grid and very limited connection capacity with the transmission grid.

In order to improve the grid hosting capacity without upgrading the connection with the mainland, the distribution company is implementing an innovative solution. The so-called Active Network Management (ANM) controls electricity output of new generators to match the available capacity of the network in real time. Thanks to this innovative solution, 21 MW of additional DG can be connected to the grid.

Which regulatory tools were implemented?
The Orkney distribution company has benefited from two UK innovation funding mechanisms: IFI (Innovation Funding Incentive) - covering R&D costs - and RPZ (Registered Power Zone) – rewarding R&D outputs, which in this case of Orkney Isles is the connection of new DG via the ANM innovation.

Main lessons learned
A smart regulation, based on incentives and output regulation as well as on ad hoc funding mechanisms, could provide the right incentives to the innovation of the grid technology.

2. Integration of demand response: Italy

The case
Italy is well-known to be a frontrunner in smart metering: it has the largest smart metering system in the world, with 90% of low voltage customers having such a meter.
A recent Government Decree establishes that distribution companies should also install a visual display for electricity and energy customers. The so-called "Smart Info" device is an innovative solution considered by Enel Distribuzione to comply with this new legislation. The device has a USB connection and can make the meter accessible from any plug in a house. This device would not only allow distribution companies to comply with the new legislation concerning the visual display, but also improve third party access to smart metering, since third parties might develop new services via the USB connection.

Which regulatory tools were implemented?
Electricity distribution in Italy is regulated through a price cap tariffs system reviewed every 4 years. Price cap regulation provides incentives to distribution grids to reduce operational costs and smart meters can indeed help reducing costs in many ways (e.g., logistic costs, field operations costs, customer services costs). The regulation of electricity distribution activities in Italy also includes service quality regulation, therefore companies have incentives to improve service quality and use smart meters to record the quality of supply.
Starting from 2004, metering activities have been subjected to a specific and separated tariffs regulation with stronger incentives to cut costs and get efficiency gains.
Moreover, the Italian Energy Authority has recently issued a competitive procedure to incentivise active grid projects that can be supplemented with experimental demand response schemes. The selected project will be allowed an extra WACC (+2%) for a period of 12 years. Finally, user participation on the demand side in Italy has also been incentivised through white certificates and ToU (Time-of-Use) prices.

Main lessons learned
Several regulatory tools have been implemented to promote user participation on the demand side. More positive outcomes will be fully achieved with the improvement of the access to smart meters.

3. Integration of a large-scale off-shore park: The Kriegers Flak area

The case
The Kriegers Flak area in the Baltic Sea was recognised a potential generation capacity of 1600 MW to be developed through offshore wind plants across the three regions included in the Danish, German and Swedish territories. The three correspondent TSOs are considering an innovative combined solution to connect the wind farms to their transmission grids, instead of separate solutions. The big advantages associated to a combined solution would be at least two. First, the pooling of the connection capacity means that the energy produced by one wind farm can escape via the connection of another wind farm in case there are problems with its connection. Second, the pooling allows the capacity that is not used by the wind farms to be used to transfer energy from a low price zone to a high price zone. This would guarantee a more efficient and more reliable use of the connections for the wind farms as well as the promotion of market integration.

The innovative solution (multi-terminal High Voltage Direct Current Voltage Source Converter system, HVDC VSC) would be the first large scale implementation of this kind. This technology is considered to be exactly what Europe needs to realize its vision of a super trans-national grid to unlock the large scale RES potentials.

Which regulatory tools were implemented?
The integration case of the Kriegers Flak area clearly requires a very high level of coordination among the three TSOs. A feasibility study published in a joint report shows that the combined solution generates net benefits relative to the separate solution. Nevertheless, the current regulation in force is not incentivising coordination. TSOs are subject to regulations that are mainly national in scope and they have no incentive to enable the integration of large scale offshore wind or to increase the interconnection capabilities with neighbouring countries.

Moreover, the specific regulation for the connection of renewable plants can be quite different in the three countries. For instance, the German TSOs must connect all renewable plants (regardless of their capacity) and undertake the due investments to reinforce the grid. As opposed to Sweden, where the plant owner is in charge of the connection from the off shore wind park to the online grid.

As a result, a separated solution is currently being established for the first wind park that will be connected in Germany, before the combined solution can be ready. Meanwhile, the Swedish wind park has been postponed and the Danish wind park has been reduced from 400 MW to 300 MW.

Main lessons learned
The implementation of an international cooperative solution is affected by the lack of deep coordination among TSOs and regulators. The regulation of wind farms development and grid expansion are too different regarding support schemes, connection costs, technology choices, and investment scheduling and balancing rules. Massive European renewable penetration will not succeed if countries do not duly cooperate.

Recommendations

Making grid smarter is absolutely not an objective in itself. Making grid smarter is mainly a fundamental step towards the achievement of the European policy objective of decarbonisation of the electricity system. It targets higher energy efficiency and a more responsive demand; a higher proportion of distributed generation and a massive penetration of renewable. Grids will however only be smart if grid companies develop the corresponding new services based on certain grid technology innovations. It will work only if grid users participate in this ongoing grid innovation, adopt the complementary technologies and use the services that will be derived from the grid technology innovation.

Smarter grids need a smarter regulation. Some of the incentives provided to grid companies and grid users by the existing regulation must be corrected and some additional mechanisms must be conceived and experienced (Box 3).

Box 3 - Regulation gets smarter when it…

Recognises the new grid service requirements and their respective costs
Includes these service outputs in the revenue drives of grid companies by defining and measuring new services
Allows grid users to participate at this definition so that they can value the services they ask for

Addresses grid technology innovation separately
Extends output regulation over several regulatory periods
Establishes specific additional incentivising regulatory mechanisms to ensure the transition from R&D to value for money grid services
Identifies and ranks the beneficiaries of the technology innovation
Provides for public money to contribute to ensure the electric system transformation process
Considers the regulatory framework as a whole and identifies the existing regulation which may possibly work against grid innovation
Experiments and ensures that learning loops will take place

EU Electricity Interconnector Policy: Shedding Some Light on the European Commission's Approach to Exemptions

Authors: Michael Cuomo and Jean-Michel Glachant

2012

Highlights

- In order to foster infrastructure investment, National Regulatory Authorities (NRAs) may exempt privately funded electricity interconnectors from one or more of the following: (i) regulated third party access (TPA), (ii) restrictions on the use of congestion revenues, (iii) tariff regulation and (iv) ownership unbundling.
- National exemption decisions are reviewed by the European Commission (EC) when interconnectors touch two or more Member States. So far, four so-called "merchant" projects have reached the EC (all were approved): EstLink (2005), BritNed (2007), Imera/East-West Cables (2008) and Arnoldstein-Tarvisio (2010).
- Without explanation, the EC has been gradually tightening the reins on the exemption regime since first approving an exemption in 2005. Yet analysis of these cases reveals an implicit set of preferences narrowly tailored to enable the development of a high-risk project without unduly advantaging its sponsor.
- By analysing the existing EU exemption cases, this policy brief aims to uncover the EC's implicit preferences with regards to exemptions from the regulatory provisions governing cross-border interconnector development and operation.

Background

The Electricity Directive generally promotes electricity interconnector investment on a fully regulated basis by a transmission system operator (TSO) in order to "ensur[e] the long term ability of the system to meet reasonable demands for the transmission of electricity."[1] As an exception, exemptions from the regulatory framework are available in cases where an interconnector's risk level is "such that the investment would not take place unless the exemption is granted."[2] The primary risks affecting interconnector investments are non-use and future change in costs and/or revenues, e.g. revenues would be negatively affected by volume or price fluctuations or future changes to congestion management rules.[3] Exemptions give project owners greater control over cash flow, which increases business opportunity when determining an investment's payback period. A full exemption provides maximum control, by making inapplicable regulated TPA, restrictions on the use of congestion revenues, regulation of tariffs and since 3 March 2011 ownership unbundling; however, such independence from the regulatory framework may be detrimental to competition. For example, where an exemption from regulated TPA enables a dominant undertaking in one of the linked markets " to consolidate its position or otherwise foreclose the market."[4] Thus, partial exemptions (i.e. exemptions covering only a portion of total capacity or, for example, applying to third party access but not tariff regulation) may be granted to projects whose business risk level does not justify the potential risk to competition of a full exemption.[5]

Debate on Exemptions at FSR

WORKSHOP on **TPA and Unbundling Exemptions: What Role Should They Play in Promoting an Integrated Energy?**

Eligibility for an exemption

The existing EU regulatory framework promotes electricity interconnector investment within a regulated access regime as part of a Member State's regulated asset base ("RAB"). Exemptions are intended to enable investment only in those projects deemed too risky to be developed as part of the RAB. To determine eligibility for an exemption, a project must pass a six-part risk and competition analysis outlined in Article 17(1) of the Electricity Regula-

1. Article 12(a) of the Electricity Directive and section 1.1 of Commission Staff Working Paper SEC(2009)642.
2. Article 7(1)(b) of the Electricity Regulation.
3. Section 1.3(10) of Commission Staff Working Paper SEC(2009)642.
4. See section 35 of the Exemption decision on the East-West-Cable Project, dated 19 December 2008 (the "Imera Exemption Decision").
5. "Exemptions must be limited to what is strictly necessary to realize the investment and the scope of the exemption has to be proportionate." Section 1.3(17) of Commission Staff Working Paper SEC(2009)642.

Box 1 - The current exemption request procedure

1. *Submit Request*. Applicant submits a "request for exemption" to the NRAs
2. *National Decision(s)*. Since the establishment of ACER, the NRAs must inform ACER of their decision within six months. If the NRAs do not reach a decision, ACER may decide on their behalf
3. *EC Review*. Within two months after being notified (?) of a national-decision, the EC will either approve the exemption or request that the NRAs modify or withdraw their decision[6]

tion (the "Threshold Test"). This determination is made by each NRA on a case-by-case basis and, ultimately, approved or rejected by the EC in cases where interconnectors involve more than one Member State. A successful applicant is eligible for an exemption from one or more of the following (i) regulated TPA, (ii) restrictions on the use of congestion revenues, (iii) tariff regulation and (iv) ownership unbundling.

What is the Role of the EC in the Exemption Decision Process?

Exemptions granted by NRAs are subject to EC review where projects involve two or more Member States. Such practice shall "ensure a consistent application of the exemption practice and safeguard the wider European interest."[7] The EC may approve, reject or modify a national exemption decision in the final stages of the exemption request process, making the process itself a significant risk for investors. These late stage conditions are not yet predictable, and, thus, represent a risk for merchant projects that typically incur several years of planning costs before submitting an exemption request. Aggravating this situation, the EC's actual criteria in making a decision are not yet fully revealed, appearing only implicitly in the exemption decisions.

The Cases So Far

EstLink (2005). Estlink is a submarine 350 MW HVDC twin-cable interconnector constructed to link the electricity transmission grids of Estonia and Finland. On 27 April 2005, the EC confirmed the national level exemption from regulated third party access, restrictions on the use of congestion revenues and tariff regulation until 31 December 2013. On or before that date, Estlink will be transferred to Fingrid Oy and the TSOs in the Baltic States.

The EC did not request any modification to the NRA decision.

6.This initial two-month period is subject to extension where the EC requests additional information or by consent of the relevant parties

7. Note 4, at section 12.

BritNed (2007). BritNed is a submarine 1000 MW HVDC cable constructed to link the electricity transmission grids of Great Britain and the Netherlands. On 18 October 2007, the EC approved a twenty-five year exemption. However, due to its concern that BritNed may have undersized the capacity of the interconnector in order to artificially inflate congestion revenues, the EC requested that the NRAs amend their exemption decisions with the addition of a financial review after ten years of operation. At such time, BritNed must present the NRAs with a report of total costs, total revenues and the rate of return using 2007 as a base year.[8] If the actual ex post revenue estimate is more than one percentage point greater than the estimate contained in BritNed's exemption request, BritNed will be given two options: (a) increase capacity – this additional capacity will not be covered automatically by the original exemption; or (b) cap any profits (discounted to 2007 levels) that exceed BritNed's estimated rate of return by more than one percentage point and surrender such excess to be used to finance the RAB in the UK and the Netherlands.[9]

Imera/East-West Cables (2008). Imera is a submarine 700 MW HVDC dual-cable interconnector that was anticipated to link the grids of Ireland and Great Britain. On 19 December 2008, the EC approved a twenty-five year exemption from regulated third party access, restrictions on the use of congestion revenues and tariff regulation. In its analysis, the EC concluded that Imera satisfied the risk threshold only because of the "significantly higher economic risk" created by the planned development of a competing, fully regulated interconnector (EirGrid).[10] The completion of EirGrid and the actual availability of its capacity were the principal conditions to approval.[11] Other conditions included: a 40% capacity cap for any dominant undertaking in either system or market to which the interconnector is connected; effective congestion management pursuant to the Congestion Management Guidelines, including intra-day trading; and, assessment by CER and Ofgem of the effectiveness of Imera's facilitated secondary trading and UIOLI procedures.[12]

Learn more on the EU infrastructure package

Development of European Energy Infrastructure Projects

INTERVIEW
with *Jean-Arnold Vinois*

Cost Benefit Analysis in the Context of the Energy Infrastructure Package

THINK Repert
by *Leonardo Meeus, Nils-Henrik M. von der Fehr, Isabel Azevedo, Xian He, Luis Olmos, and Jean-Michel Glachant*

8. Section 13(a) of the BritNed Exemption Decision by the European Commission, dated 18 October 2007.
9. *Supra* at subsections 13(b)(i) and (b)(ii).
10. Section 25 of the Imera Exemption Decision.
11. *Id.* at sections 27 and 55.
12. *Id.* at section 56.

Box 2

(a) Three Conditions for an Approval of an Exemption

The interconnector must enhance competition	A general competition analysis is conducted – the interconnector must show a positive effect on competition.
The risk level must necessitate an exemption	The risks must rise to a level that rules out development of the interconnector as a regulated investment.
Granting an exemption must leave competition unharmed	Focus is on whether exempting the project from regulation would harm competition conditions.

(b) The EC's Analysis of the Four Cases

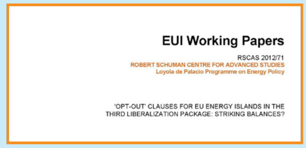
	EstLink	BritNed	Imera	Arnoldstein -Tarvisio
Would the interconnector enhance competition?	YES	YES	YES	YES
Does risk level necessitate an exemption?	YES	YES	YES	YES
Would exemption leave competition unharmed?	YES	MAYBE	MAYBE	MAYBE

(c) Consequences of a "Maybe" by the EC

Additional Conditions Imposed →	Review of Revenues (de facto cap)	Cap on Capacity share held by any single party	Congestion Management Requirements	Withdraw Exemption
BritNed	X			
Imera		X	X	
Arnoldstein-Tarvisio				X

Arnoldstein-Tarvisio (2010). Arnoldstein-Tarvisio is an overland Austria to Italy AC interconnector with a nominal voltage of 132kV and a maximum capacity of 160 MVA. On 26 October 2010, the EC issued a decision approving the exemption but requesting that the 50% exemption from regulated TPA granted by the NRAs should be withdrawn altogether so that 100% of capacity is available for auction. Rejecting the applicant's argument that reserving capacity was necessary to recover its investment, the EC reasoned that since the congestion management guidelines require unused capacity to be sold on the secondary market, reserving capacity was not necessary to recovering the investment. Auctioning 100% of capacity should be equally as effective.[13] In addition, any further exemption for significant capacity increases must be approved by the EC; and, the exemption will expire if the interconnector is not operational within five years.[14]

Learn more on exemptions for EU Energy islands


EUI Working Papers
RSCAS 2012/71
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
Loyola de Palacio Programme on Energy Policy
'OPT-OUT' CLAUSES FOR EU ENERGY ISLANDS IN THE THIRD LIBERALIZATION PACKAGE: STRIKING BALANCES?

'Opt-out' Clauses for EU Energy Islands in the Third Liberalization Package: Striking Balances?

WORKING PAPER
by *Adrien de Hauteclocque and Nicole Ahner*

Shedding Some Light on the EC's Reasoning

The analysis of the existing cases reveals an implicit set of preferences on the EC's side as an exemption can touch one or more of TPA, congestion revenues, tariffs and unbundling to differing degrees (from full exemption to very partial or very temporary exemption). To shed some light on the EC's reasoning, we use a three-point approach consisting of the three conditions raised most often in the EC's decisions (see *Box 2*).

Out of four cases, only one (EstLink) was approved without the imposition of additional conditions. As *Box 2(c)* shows, the EC imposed conditions on the other three merchant interconnectors based solely on the third point of analysis: "whether exempting a project from certain aspects of regulation would harm competition." In other words, it was the sanctioned departure from the regulatory framework, not the proposed interconnector itself that the EC deemed problematic. A "Maybe" led, in all cases, to the imposition of additional conditions intended to ensure conformity with the exemption criteria, e.g. the review of revenues imposed on BritNed was intended to counterbalance the risk that BritNed intentionally undersized capacity in order to boost revenues from artificially created congestion.[15]

Conclusion

Since approving the first exemption in 2005, the EC has been gradually tightening the reins on the exemption regime: the EstLink exemption was approved by the EC without condition, while the latest decision, Arnoldstein-Tarvisio, requested the complete withdrawal of a national level TPA exemption. In the absence of explicit evidence, it is not clear whether the EC's increased stringency represents an intentional shift in attitude towards the exemption regime (and/or divergence in the EC's standards and those of national regulators). It is clear, however, that the spectre of additional conditions in the final stage of the exemption approval process has a *de facto* chilling effect on merchant investment. At a time when additional interconnection capacity is crucial to the achievement of the single energy market in 2014, the EC might consider loosening its grip?

13. Sections 22-27 of the Arnoldstein-Tarvisio Exemption Decision, dated 26/10/2010.
14. *Id.* at sections 35-41.
15. Note 4, at Box 7.

Implementing Incentive Regulation through an Alignment with Resource Bounded Regulators[1]

Authors: Jean-Michel Glachant, Haikel Khalfallah, Yannick Perez, Vincent Rious and Marcelo Saguan
Editor: Haikel Khalfallah

2012

Highlights

– Several regulatory regimes have been conceived to incentivize network operators to provide services in an efficient manner and to pull them in a continuous process of revelation of the economics of their tasks' operation.

– Major challenges are arising today for the electricity system (such as: network quality concerns, various grid innovations, or climate change policy). The classical "cost killing" goals of incentive regulation are then challenged with new goals. The regulators must find how to optimally match their existing regulatory tools with these renewed goals while taking into account more of the actual specificities of the network operation.

– The economic literature built the existing regulatory tools we have today by assuming that a regulator behaves like a theoretical actor, having all the ideally desired cognitive and computational capabilities. The reality, however, is that the regulators are endowed with only limited and heterogeneous resources.

– Theory frequently assumed that a regulator uses a single type of regulatory tool to give incentives to a network company performing a single type of tasks. In real life, the regulators are facing companies performing multiple types of tasks and have to use several types of regulatory tools to deal with these different tasks.

– Regulatory tools should then be assessed to properly match with the real characteristics of the network operator's tasks. We assume that the key characteristics for an operationalization of this "regulatory alignment" are: the controllability, predictability and observability of the tasks, the costs and the output. However these regulatory characteristics have to be aligned as well with the requirements of the various regulatory tools in terms of regulator's resources and capabilities.

1. This PB is based on the Working Paper Implementing Incentive Regulation and Regulatory Alignment with Resource Bounded Regulators by Jean-Michel Glachant, Haikel Khalfallah, Yannick Perez, Vincent Rious and Marcelo Saguan.

Background

Electricity network regulation has been conceived to ensure that network services are produced at minimum costs for a given quality of service. Due to asymmetrical information between the regulator and the network operator, several regulatory regimes have been conceived to incentivize companies to provide their services in an efficient manner and to push / pull them in a process of revealing their private information on the economics of their tasks operation (Box 1).

Major changes have recently occurred with electricity systems: new network quality concerns have appeared, climate change policy is now a key driver of the EU energy policy and grid growing innovation is becoming a concern. Regulation should then reconsider what are the right incentives to undertake all this. The classical cost-killing goal of "RPI-x" has to adapt to new goals of regulation. The regulators have to find how to optimally match all workable regulatory tools with today's relevant goals as well as with the actual economic characteristics of network operators' tasks.

The economic literature built most of the existing regulatory tools by assuming that the regulator is an agent having all the desired cognitive and computational abilities to properly deal with information asymmetry. The reality, however, is that regulators are endowed with only limited and heterogeneous resources. Furthermore the regulator is supposed to control the network operators' costs as a whole while they actually are the byproducts of different tasks with different economic characteristics. Today, the right regulatory question should then be: how to align the regulatory tools, the regulator capabilities and the targeted network tasks to deliver a set of efficient outcomes?

Box 1: Theoretical regulatory tools

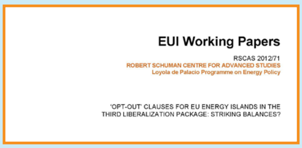
- **Cost plus:** The simpler regulation of electricity networks has had to focus on controlling the costs of services provided by the regulated firms. This was based on the principle of compensating the regulated firms up to their costs. In this regulatory frame the regulator observes and audits, each year generally, the firms' operating and investment costs and sets the allowed revenue for that (or the next) year. This revenue includes a reward in the form of a rate-of-return compensating the firms' capital assets. In very general terms, with this regime, the regulated firms keep the benefit from their informational advantage. Rather, they are not incited to reveal more than their observable costs from their own set of economic information.
- **Price/Revenue Cap:** Contrarily to cost plus regulation, price cap regulation implies that the regulator unilaterally sets a maximum allowed revenue (or a price per unit of output) that the firm can get for the services provided in a conventional period –four

to five years- so as to be partially but not totally linked to its incurred costs. As the length of the regulatory period is relatively longer than with cost plus regulation, the incurred costs could happen to be lower than the earned revenue. This allows the firm to benefit from its cost cutting. This regulatory scheme provides simple and clear incentives for cost reduction which would increase the social welfare (with less costs for the same output) in an environment based on asymmetric information. This does not mean that the asymmetrical information problem is easily solved. Notably in cases where there is a too important lack of regulator expertise to properly anticipate and predict the future firm's costs, firms might earn excessive rents within that regulatory period. However, only very dramatic regulator mistakes could end reducing the social welfare.

- **Menu of Contracts:** Cost plus and price cap regulations are, in theory, the two extreme cases in terms of gain and risk sharing. The menu of contract scheme lies in between these two extremes. The price that the regulated firm will receive is linked ex ante to its realized costs observed ex post as well as to a reference cost determined ex ante. The regulator then offers a set of benefits / costs sharing contracts and the firm chooses the more suitable one regarding its privately projected expenditures, its efficiency capability belief and its own risk aversion. Such contract mechanism would open higher productive and allocative efficiency objectives. On the one hand it is conceived to provide incentives to perform much better by giving the firm the opportunity to benefit from its own knowledge of feasible cost saving and better serving. On the other hand, it ensures that prices have to follow an underlying cost variation within a reasonable distance.
- **Performance-based Regulation:** Menu of contracts is a general category which covers PBR (Performance Based Regulation). PBR has been used to better target a particular task with its own particular incentive schemes (like: cost of losses; cost of reserves; cost of congestions; etc.). It gives a direct link between the ex post observed performance and an ex ante defined set of financial reward and penalty. Ex ante the regulator has set a specific formula that links a financial reward-penalty scheme to a firm's expected tasks expressed in an agreed KPI ("Key Performance Indicator").
- **Yardstick (Benchmarking):** It is a way to set performances or prices of a given company on the basis of the outcomes of other similar companies. In its full form, each benchmarked company has no control over its own revenues. Its allowed revenues are only linked to an index of the other suppliers' performances. A second and relaxed approach relies on external performances for only one part of the firm's revenues. It usually covers the calculation of a productivity trend factor or an initial price in a price cap scheme. It may also be the ex ante targeting of a task performance in the performance-based regulation.

Discrepancy between the practice of regulation and the textbook model of a regulator

In the textbook model, the regulator is assumed to have sufficient cognitive, computational and administrative abilities to implement a regulatory regime decreasing the information asymmetry and dealing efficiently with the risk and uncertainty in the regulatory environment. However in reality, most regulators have severely limited resources (power, budget and skills) to efficiently implement all the conceivable regulatory tools. Regulators' actual capabilities depend primarily on their current resources and accumulated experiences which may strongly deviate from what the textbook model assumes. Furthermore regulators behave according to countries' political and judicial profiles which influence their willingness to undertake risky decisions. Regulators may have to be conservative to avoid negative judicial reviews (like in the USA). They may also be small administrative units of 10-20 people unable to enter into uncertain and complex regulatory innovation. On the contrary, the UK's regulator has been an atypical case of a rather rich, free and sometimes risk taking regulator able to invest in innovative regulatory regimes, to adapt to the changing energy scene, and to look after dynamic efficiency going beyond the already acclaimed cost killing objectives. A regulator with resources and power may undertake uncertain changes and face a risk of error.


EUI Working Papers
RSCAS 2012/71
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
Loyola de Palacio Programme on Energy Policy
'OPT-OUT' CLAUSES FOR EU ENERGY ISLANDS IN THE THIRD LIBERALIZATION PACKAGE: STRIKING BALANCES?

Implementing Incentive Regulation and Regulatory Alignment with Resource Bounded Regulators

WORKING PAPER
by *Jean-Michel Glachant, Haikel Khalfallah, Yannick Perez, Vincent Rious, and Marcelo Saguan*

Besides this, textbook regulation generally assumed that the regulator addresses a company performing a unique task with a single regulatory tool. In practice however, the regulator is facing a company performing various types of tasks and may have to apply various regulatory tools to these different tasks. Any applied economic reasoning should now reevaluate the regulatory tools in a renewed rational choice frame.

Characteristics of the network operator's tasks

Beside the discrepancy between the reality of regulators' abilities and the assumption of the textbook model, it is also usually assumed that the regulator frames a company performing a single task with a single regulatory tool. In practice, network operators perform various types of tasks with different characteristics. For transmission, the main tasks may be seen as various as: 1- system operation, 2- grid maintenance, 3- network user connection, 4- customer relationship management and 5- grid expansion. TSOs may also face new tasks arising from the new regulatory objectives, like a revival of RD&D in both domains of infrastructure and services.

Controlling the network operator's costs and service quality as a whole would then be inefficient given the heterogeneous nature of its tasks. Encouraging companies to reduce operational expenditures could lead to a lower quality of this or that provided service. Another drawback arises with innovation which is inevitably costly in the short term with an expected benefit only obtained in a longer period while exposing the company to a higher risk. That is why, first, the regulator should strike a proper balance between medium term novelties and short term cost efficiency by assessing the firm's financial sustainability in the long run. Second, the regulator may have to conceive a hybrid approach that combines various kinds of regulatory tools to better address the various characteristics of the different tasks.

The key regulatory characteristics of the various network tasks belong to three categories: Controllability, Predictability (ex ante) and Observability (ex post) (Box 2).

Box 2: Regulatory characteristics of network operator's tasks

Controllability: It qualifies the network operator's ability to manage a single cost/task or a combination of several as to get a defined level and quality of output.
Predictability: It qualifies the possibility of predicting (then: ex ante) the influence of external factors on network costs/tasks and the relationship between a given set of costs/tasks and the level and quality of outputs.
Observability: It qualifies the possibility of verifying (then: ex post) the influence of external factors on network costs/tasks and the relationship between a given set of costs/tasks and the level and quality of outputs.

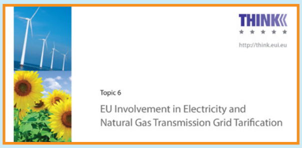
The regulatory alignment between network tasks, regulatory tools and regulator's abilities

The first criterion to look at when wanting to match a network task and a regulatory tool is the controllability of the task by the network operator. When the network operator is unable to significantly influence the cost or the outcome of a task, the economics of the output are mainly out of the company's control. It will not make much sense to regulate such a task with an incentive scheme. This will be better addressed via a cost plus scheme. To get the maximum benefits of that scheme the regulator should then have minimum accounting capabilities as to audit the company's uncontrollable costs and to set a tariff for them (for instance, in a meshed grid used for high transit from abroad the operator cannot easily control its aggregated volume of losses).

When network tasks are controllable, the TSO can undertake actions to reach an efficient level of operation, and an incentive regulatory scheme makes sense (for instance, congestion costs being controllable in the medium term -while not easily in the short term- and volume of losses in an isolated power system where the TSO is actually able to act on these levels).

In practice, however, the choice of the appropriate regulatory tool will then depend on the (ex ante) predictability of the task operation, and the regulator's own capability to manage more complex and more hazardous decision processes to influence the targeted efficient outcome.

Learn more on grid tarification



EU Involvement in Electricity and Natural Gas Transmission Grid Tarification

THINK Report
by *Sophia Ruester, Christian von Hirschhausen, Claudio Marcantonini, Xian He, Jonas Egerer and Jean-Michel Glachant*

However, when the task's outcomes are too difficult to predict (by the company or by the regulator), a cost plus scheme could always be applied as a "safe plan B". It can also be the case with unfamiliar innovation undertaking.

Inversely, a regulator might conceive more complex incentive schemes whose risks depend on the degree of task predictability, given that a low predictability should imply a higher risk and vice versa. The degree of task predictability is also linked to the regulator's proper capabilities. A regulator with a large senior and experienced team plus a large consultancy budget can better tackle the hazards of complex schemes than a regulator with a limited junior staff and a starvation budget.

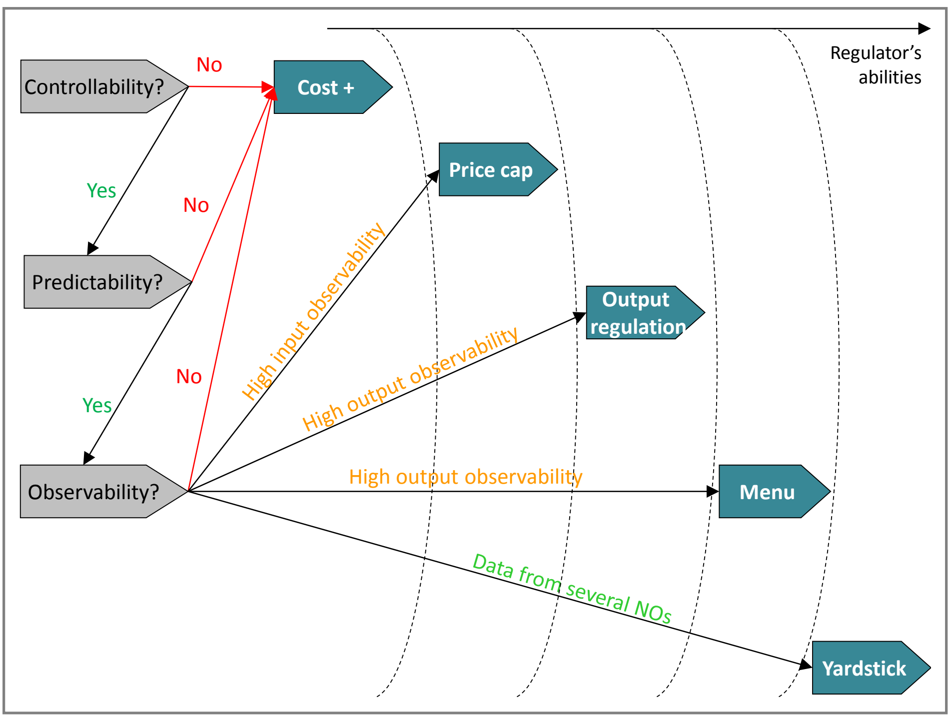
Finally, the last step in a regulatory tool choice comes with the task / cost's (ex post) observability. Observability may be too low or the regulator may think that its very limited resources will not allow it to collect relevant enough information on the actual management of the tasks having been performed. Here again the regulator may prefer the safeguard of a cost plus scheme.

On the contrary, in case of a limited observability of certain tasks for a rich and experienced regulator, it makes sense for it to invest in more advanced regulatory tools as a "menu of contracts" where the company is pulled into a voluntary efficiency revelation scheme. When the menu of contracts is conceived correctly enough, the company will rationaly choose a contract that fits best with its true (while unobservable) task characteristics. Another sophisticated way to address this information problem is to apply benchmarking techniques, creating a "virtual competition environment" upon the condition that the regulator could get enough relevant information from several comparable network operators. It also assumes that the regulator has enough cognitive and computational capabilities as to manage the demanding process of benchmarking results interpretation.

Of course with a high observability of tasks, a regulator may choose less sophisticated tools requiring lower experience and resources. We must however distinguish two types of observable tasks. When the observable task is an input into the firm's activity process and is required to provide a well-defined output, a price cap regulation might be appropriate. Under this regime, the network operator could undertake efficient actions to reduce the cost / increase the output of the task and to benefit from this improvment (for instance, transmission maintenance tasks are controllable, predictable and observable. Assuming that the regulator could easily observe the past firm's performances, a price cap regulation with a defined efficiency target should be sufficient).

However the output may have two separated dimensions: the quantity (the volume) and the quality (the unitary utility for the consumer) of the provided service. When both are observable and the regulator is also able to properly define (ex ante) and measure (ex post) the quality of service, a "performance-based" regulation of the output would be more appropriate than a price cap. When quality is controllable in the medium term it is because the network operator knows how to influence it by her investment and maintenance decisions. Quality may also be predictable if extreme events are filtered out from the quality indicators. Quality may then be observable to some extents, depending on the set of indicators that the regulator is able to conceive and to use. With an output regulation for quality, the regulator sets the output targets that the network operator should meet within a predefined period as well as certain economic schemes reacting to the observed deviations. Any gap vis-a-vis the ex ante target will be treated in a predefined penalty or a reward function.

Figure 1: A Regulatory Alignment Decision Tree



Learn more on energy regulation and EU energy policy

We now look at tasks closely linked to an innovation process. An innovation process may be controllable in the sense that the network operator may significantly influence the output of innovation that it will produce. However innovation has a low degree of predictability and observability. Nevertheless this predictability and observability also increases with the technological and managerial maturity of the innovation process. In case of low maturity, it seems inappropriate to put in place an incentive regulation tool because of the difficulty for both the regulator and the network operator to predict innovation's costs and benefits, whatever the actual degree of regulator abilities. In case of higher maturity, however, an incentive regulation that sets a rule of risk sharing between the network operator and the grid users may usefully be considered. A scheme is to pay innovation by unit of outcome measured by some KPI. Again, the degree of observability of the innovation process depends significantly on the innovation maturity.

Figure 1 summarizes the "regulatory alignment" decision tree to identify the appropriate regulatory tool assuming certain regulator's capabilities, the network operator's nature of tasks and the implementable regulatory tools. To sum up: If a particular task does not satisfy any of the controllability, predictability and observability criteria, then the cost plus scheme is the most likely tool to recover the incurred cost. Otherwise, the usefulness of any other appropriate regulatory tool would mainly depend on the actual regulator endowment.

Financing Investment in the European Electricity Transmission Network: Consequences on Long-Term Sustainability of the TSOs Financial Structure[1]

Author: Arthur Henriot
2013

Highlights

– European electricity TSOs will have to achieve substantial capital expenditures over the next two decades. Their current financing strategy will not be adapted to these unprecedented costs. Even in a 'best-case' scenario of full cooperation between the different national and regional TSOs, it will result in constraints on the volume of investment achievable.

– Under current trends in the evolution of transmission tariffs, the investment programs that are currently planned will be unsustainable in the long-term. To avoid severe degradation of the TSOs financial profile, a significant increase in tariffs will be required.

– Alternative financing strategies, such as issuing additional equity, or restraining dividends, could help achieving the whole-scale investment volumes at a lower cost for consumers. However these financing strategies cannot substitute fully to an increase in tariffs. A very radical shift in the financing strategy would only allow a slightly higher share of the investment plans to be financed, at the expense of a reduced return-on-equity. Injecting capital in the transmission business would not remain attractive under such conditions.

1. This PB is based on the Working Paper Financing Investment in the European Electricity Transmission Network: Consequences on Long-Term Sustainability of the TSOs Financial Structure by Arthur Henriot.

Background: The financeability challenge

The need for investment in the European transmission grid

The European Transmission System Operators (TSOs) will face unprecedented capital expenditures over the next decades. This need for investment has two main drivers. On the one hand, the development of the European electricity transmission grid is to play a key-role in the strategy of the European Union, to address challenges such as the accommodation of large-scale renewable sources of energy and market integration. On the other hand, a major share of the existing network is to be renewed in the coming decades.

The resulting volumes of investment will be challenging for TSOs. The ten-year plan established in 2012 by the European Network of Transmission System Operators for electricity (ENTSO-E) for instance mentions investments of €104 billion to be spent in the next ten years for projects of pan-European significance alone. Even with plans by European TSOs to raise their investments by approximately 70% compared to the period 2005-2009, there would still be a significant financing gap to be met.

TSOs financing strategies: Options and limits

Financeability hereby refers to the ability of TSOs to raise finance from capital markets in order to meet their investment program. It implies that the TSOs conserve adequate financial ratios, corresponding to an investment grade status for rating agencies (See Box 1 for a description of the ratios we took into consideration in this study). In addition, the return on the regulatory asset base must be sufficient to cover the costs of capital of investors.

There are three basic ways in which TSOs can finance capital expenditures: investors can raise debt, fund investment internally by retaining earnings, or find external sources of equity.

Since liberalisation, **debt emission** has been the option most commonly employed by integrated utilities in general and European TSOs in particular. As a result, the volume of debt has kept rising, and the leverage of European electricity TSOs is typically about 60-70% today, which limits the ability of these companies to acquire further debt without losing their credit rating.

Internal equity is a major source of financing for some small European TSOs, but it cannot be sufficient alone at times when the investment needs increase significantly. Moreover, investors in TSOs traditionally expect a high dividend pay-out ratio, which limits the ability of TSOs to finance investments internally.

Raising external equity is an attractive option when the debt level has to be kept under a given threshold. Yet it is also a more expensive option. In addition to higher costs, there are two main obstacles to financing investments by injecting external equity, due to the fact that most European TSOs are still publicly owned[2] . Cash-strapped European States are not able to inject liquidities themselves, and States might also be reluctant to dilute their ownership share of crucial assets with major public goods properties.

Box 1: A tailor-made quantitative approach to financeability

In order to assess the quality of the financial ratios of the single TSO, we used the methodology employed by the rating agency Moody's to establish the rating of companies developing regulated electric and gas networks.

We focused on the main quantitative metrics used by the rating agency Moody's. Each of them account for 15% of the overall rating, and about 40% of the quantitative part of the rating. The **adjusted Interest-Cover Ratio** is calculated as Earnings before Interest and Taxes (EBIT) divided by interest payments: it reflects the **flexibility of the regulated TSOs to pay interests on their debts.** The **Gearing level** is calculated as the volume of debt divided by the total value of the Regulated Asset Base: it represents the **loan to value ratio**.

Main assumptions behind our calculations

Focus on a virtual integrated TSO

In order to identify constraints at the scale of the European transmission grid industry, we considered a best-case scenario, for which **full cooperation (or integration) between the national or regional TSOs** would be achieved. We hence made the assumption that the different European (i.e. members of ENTSO-E) TSOs could be virtually aggregated into a single European TSO, facing the whole volume of investments.

Note that, when relaxing this assumption, smaller TSOs facing significant investment needs and ownership-restrictions might be exposed to more challenging local constraints that would not appear in this study.

Calculation of revenues and tariffs

In this study, the **volume of investment is exogenously determined and is independent from the financing strategy**. A detailed description of the investment profiles employed can be found in Box 2.

It was assumed that both **operating expenditures and capital expenditures would be directly passed through to consumers**. Costs related to the provision of system services were

2. Even in situations of private ownership (as in Belgium, Italy and Spain), public entities still hold a large minority share.

excluded, but losses and other network-related OPEX were taken into consideration. Tariffs were then determined as the sum of these costs and of a fixed return-on-assets.

Box 2: Estimation of the required capital expenditures over 2012-2030

Each of our scenario features a scenario for new developments, as well as a scenario for infrastructure renewal.

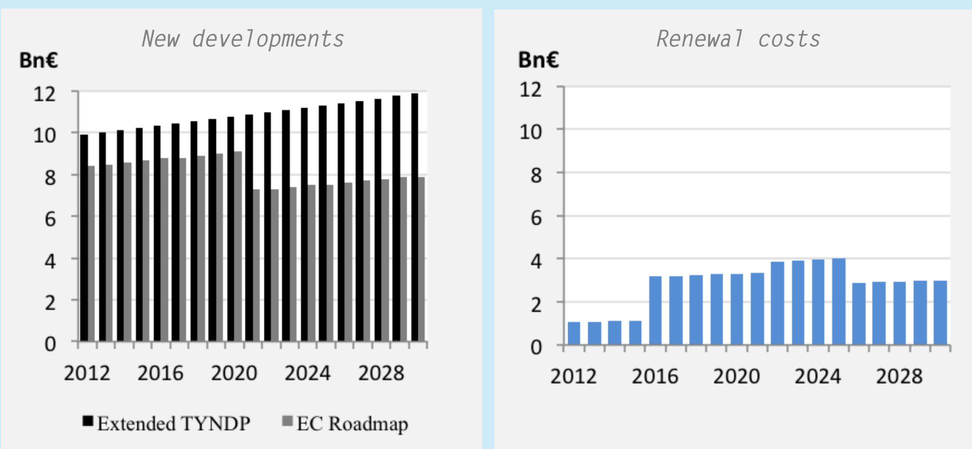
Two alternative scenarios for investments related to new projects

The first scenario (**'Extended TYNDP'**) was based on the ten-year network development plan published by ENTSO-E for the period 2012-2021. We extended this scenario by considering investments needs would follow the same trend until 2030. The total volume of investment by 2030 would amount to **€ 207 billion**.

The second scenario (**'EC roadmap'**) was based on the Impact Assessment of the Energy Roadmap 2050 published by the European Commission in 2011 and featured investment needs equal to **€ 155 billion** by 2030.

One complementary scenario for infrastructure renewal

A major share of the existing infrastructure will have to be replaced in the coming decades. We used the results of calculations realised by the IEA in its World Energy Outlook 2011, and subtracted savings realised thanks to investment in new projects. The resulting need for investment would amount to **€55 billion by** 2030.



Annual investment costs in the ENTSO-E area over the period 2012-2030 (€2012 Billion)

We also referred in our analysis to "current trends in the evolution of transmission tariffs". In this case, the annual growth of tariffs is limited to the average increase in the ENTSO-E area over the last 3 years, i.e. CPI+1.04%.

Getting European Electricity Transmission Infrastructure Financed

WEBINAR
by *Arthur Henriot*

Results

Results in the BAU scenario

Under the financing strategy applied in our ***business-as-usual (BAU) scenario***, there is no injection of external equity into the TSO, and the pay-out ratio is equal to 70%.

Our results indicate that there is a clear financeability issue: with a financing strategy purely based on debt emission, and with a rise in tariffs limited to current trends, both investment scenarios would lead to a severe degradation of the TSO financial status. **If an investment-grade were to be maintained under the current trend in tariffs, it would only be possible for the TSO to develop 47% of the new investments planned in the TYNDP scenario, and 61% of the EC Roadmap scenario.**

We estimated the **increase in tariffs required to ensure the financeability of 100% of our first investment scenario (extended TYNDP) to be equal to an annual rate of CPI+3.4%, roughly three times the trend observed in the past years**. Similarly, ensuring financeability of our second investment scenario (EC Roadmap) would require an annual increase in tariffs equal to CPI+2.1%.

Note that the two most important sources of increase would be depreciation and interests payments, with rise of dividends only accounting for a minor share of the total increase.

Alternative financing strategies

We then studied the impact of two alternative financing strategies to achieve a higher share of the investment program while keeping tariffs at a lower level.

In the ***"Issue additional equity"*** scenario, the high dividend pay-out ratio is maintained but the TSOs issue additional equity (instead of debt) to finance capital expenditures.

In the ***"Shift to growth model"*** scenario, the dividend pay-out ratio is lowered and TSOs retain earnings in order to finance capital expenditures internally. Shareholders do not receive their return as cash but from holding the share for a while and selling it at a higher value.

By increasing the equity share (whether internally or externally), it is possible to finance a larger share of investments program while conserving an investment-grade. Yet, as the costs

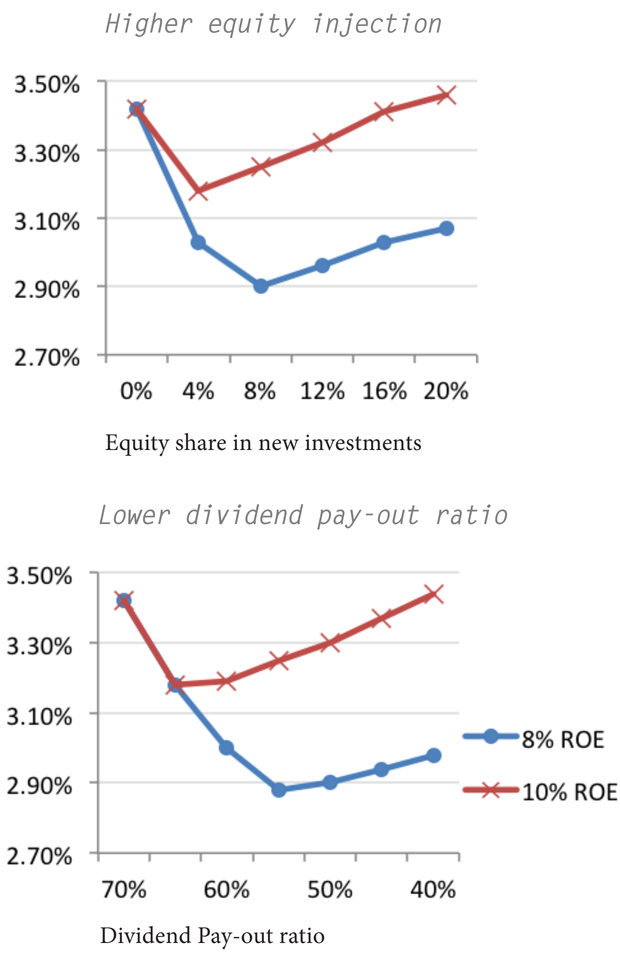


Figure 1: Average annual increase in tariffs required over the period 2012-2030 to achieve a given average ROE while conserving investment grade for different financing strategies in the 'Extended TYNDP' scenario

of interests on debt are fixed and lower than the costs of equity, injecting further equity while maintaining tariffs at the same level will result mechanically in reducing the ROE. **The extent to which external sources of equity can be used to finance large-scale investments without increasing tariffs is therefore limited.**

However, **by injecting a small share of external equity, or retaining a slightly higher share of the earnings, it is possible to achieve the whole scale of the investment program while conserving the same return on equity and reducing the needed increase in tariffs.**

In the case of external equity injection, the optimum is reached for relatively small level of equity injections, as illustrated in Figure 1. In order to achieve a 8% post-tax nominal ROE, the minimum annual increase in tariffs is obtained for equity injections equal to 8% of financing needs, which amount to €10 billion over the time period 2012-2030. In order to achieve a 10% post-tax nominal ROE, the minimum annual increase in tariffs is obtained for equity injections equal to 4% of financing needs, which amount to €5 billion over the time period 2012-2030.

Similar results can be obtained for the *shift to growth model* strategy. In order to achieve a ROE equal to 8%, the optimum is found for a dividends pay-out ratio equal to 55%. In order to achieve a ROE equal to 10%, the optimum is found for a dividends pay-out ratio equal to 65%.

Note that in any case, a significant rise in tariffs would still be required to achieve the whole scale of the investment programs.

Policy implications

In this article we looked at the issue of financeability of investments in the transmission network with a different angle from existing works. More traditional issues include identifying and allocating costs and benefits, delivering adequate incentives to TSOs, or getting access to debt at reasonable costs. Our analysis revealed that in addition, **even if all these challenges were solved, there could still be limits on TSOs' ability to meet the need for investments.**

Pure debt financing will lead to a threat that the volume of the debt might become too important for TSOs to face repayments. This situation is reflected in the degradation of key financial metrics. It means that TSOs' ability to meet their obligations would then be vulnerable to small perturbations of the allowed rate-of-return. **Financing institutions will only accept such a situation if the regulatory frame is very stable and if returns are guaranteed in the long-term.** Rules put into place should in particular minimise the eventuality of a regulatory hold-up.

Besides, according to our results, the business-as-usual financing strategy of TSO will not be the most adequate strategy to finance a significant wave of investments. **Consequential savings could be achieved by resorting to alternative financing strategies. The implementation of these strategies will require an evolution of the perception of TSOs owners** (mainly public entities), for instance opening TSOs to external sources of equity, and to new kind of investors attracted by growth entities.


EUI WORKING PAPERS

RSCAS 2013/27
Robert Schuman Centre for Advanced Studies
Florence School of Regulation

Financing investment in the European electricity transmission network: Consequences on long-term sustainability of the TSOs financial structure

[Financing Investment in the European Electricity Transmission Network: Consequences on Long-Term Sustainability of the TSOs Financial Structure]

WORKING PAPER

by *Arthur Henriot*

[What Regulatory Frame to Implement the EU Infrastructure Package?]

Presentation by *Jean-Michel Glachant*

In any case, an increase in investment will lead to a significant increase of costs, mostly to cover depreciation and interest payments. Transmission tariffs only constitute a small share of the total costs of electricity for consumers, but a three-fold increase of their annual growth might nevertheless generate protests. It is important not to sacrifice significant benefits in the long-term to limit spending in the short-term. Similarly, it is key to make sure that the need for important sources of financing is perceived as being associated to real needs and not a result of bad management and costs getting out-of control.

Chapter II

Market Design

A Gas Target Model for the EU: Florence School Proposes MECOS[1]

Author: Jean-Michel Glachant
Editors: Michelle Hallack and Miguel Vazquez

2011

Highlights

- The discussion about the need for and the pros and cons of a gas target model started around the beginning of 2010 and found its first point of culmination in the conclusions of the 18th Madrid Forum in September 2010 which invited stakeholders to start a process to develop a EU Gas Target Model.
- Florence School of Regulation proposes a European gas target model with a special focus on market architectures and investment: The MECO-S Model. The MECO-S is a "**M**arket **E**nabling, **Co**nnecting and **S**ecuring" Model describing an end-state of the gas market to be achieved over time.
- The common foundation of the MECO-S Model is the economic investment. Investment aims at supporting the other pillars in realizing their respective goals e.g. in contributing to the creation of functioning markets or in contributing to improved price alignment.

1. This PB is based on the Working Paper A Vision for the EU Gas Target Model: the MECO-S Model by Jean-Michel Glachant.
The author particularly thanks Sergio Ascari (FSR gas adviser), Jacques de Jong and Leonie Meulman (Clingendael International Energy Programme), Albrecht Wagner (Wagner, Elbling and Company), Christophe Pouillon (GRT Gaz), Margot London (Eurogas) and Stephan Kamphues (ENTSOG). The author, however, underlines that the vision delivered in this paper is only his and does not bind or tie any of these persons. Moreover, Sergio Ascari, Jacques de Jong and Leonie Meulman, on the other hand, published separately their own conclusions. The author also wants to thank the experts of the Austrian and German National Regulatory Agencies, notably: Michael Schmöltzer, Markus Krug and Stefanie Neveling. However it is underlined that the vision that is expressed in the MECO-S model is the author and not theirs.

Gas Target Model: Definition and Objectives

A Gas Target Model (GTM) is a non-binding, top-down framework of principles and characteristics that are as broad as possible, providing a description of how the market is expected to develop till 2020. This would serve as a tool for guiding and assessing the on-going process of developing framework guidelines and guidelines that are the foundations of the broader Network Codes under the 3rd Energy Market Package. In addition, its objective will also be to guide and assess the on-going process of the Gas Regional Initiatives. A GTM will furthermore have to take due account of the wider energy policy objectives with regard to sustainability and supply security.


EUI Working Papers
RSCAS 2011/38
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
Florence School of Regulation
A VISION FOR THE EU GAS TARGET MODEL:
THE MECO-S MODEL

A Vision for the EU Gas Target Model: the MECO-S Model

WORKING PAPER
by *Jean-Michel Glachant*

The 3rd Energy Market Package set into force in 2010 defines a number of structural elements towards realizing an architecture for the internal market for gas. The most notable among these elements being the mandatory entry/exit organisation of TSO network access and the processes that shall lead to a harmonized system of European TSO network codes.

Now, many different stakeholders at European and national level are working on the implementation of the 3rd package. These include: lawmakers in the 25 member states with natural gas; regulators in the 25 member states with natural gas; ACER; ENTSOG; the EU Commission; members of comitology committees; TSOs, DSOs and their associations; suppliers, wholesalers, retailers and traders and their associations.

A challenge for these implementation efforts is that the 3rd Energy Market Package does not include a comprehensive vision of the organisation of network access across the European Union. For instance, the 3rd Energy Market Package does not say if every single TSO shall set up its own entry/exit system or if the number of entry/exit networks shall be smaller than the number of TSOs, if the TSO balancing system shall include distribution networks or not, if entry/exit network access shall extend from transmission systems down to distribution networks or not, etc.

Depending on the answers to these questions certain issues might need to be addressed on a European level. For instance if the TSO balancing system includes distribution systems, the European balancing harmonization has a much wider scope (and requires much more detail) then otherwise; also national action would be required, obligating DSOs to blend into that system. Or if the entry/exit systems shall include distribution systems, then action on a national level will be required to deal with the corollary cost (and tariff) issues for DSOs (which may receive a cost allocation from TSOs in such a system).

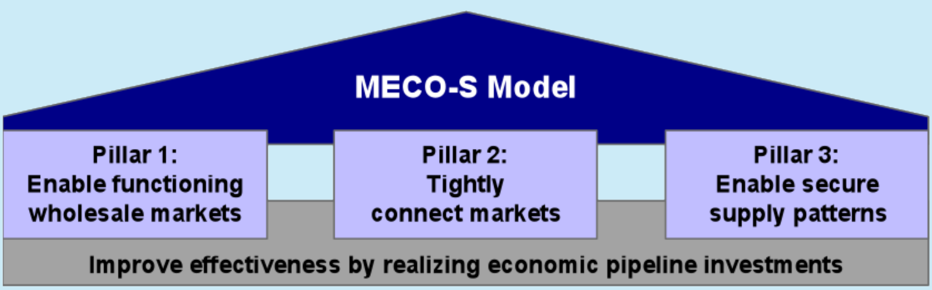
The Target Model Coordinating the 3rd Package Implementation

Now the risk is that – within a very limited timescale – a lot of policy makers and other stakeholders while doing their best to implement the 3rd Energy Market Package – interpret and implement the package in a different way or work on different strands of implementation that – after having been elaborated in great detail – contradict each other. This problem is aggravated by the fact that – inter alia due to resource limitations – not all European network codes envisaged at the moment (e.g. for capacity allocation management, balancing, interoperability, tariffs, etc.) can be developed at the same time.

It is in this potential problem area where a gas target model can play a beneficial role by helping to make visions about the future of the internal gas market transparent and by enabling discussions about unifying those visions. The discussion about the need for and the pros and cons of a gas target model started around the beginning of 2010 and found its first point of culmination in the conclusions of the 18th Madrid Forum in September 2010 which invited "*the Commission and the regulators to explore, in close cooperation with system operators and other stakeholders,*

Box 1 - The 3 Pillars of MECO-Target Model

- **Pillar 1:** Structuring network access to the European gas grid in a way that enables functioning wholesale markets so that every European final customer is easily accessible from such a market.
- **Pillar 2:** Fostering short- and mid-term price alignment between the functioning wholesale markets *by tightly connecting the markets* through facilitating cross-market supply and trading and potentially implementing market coupling as far as the (at any time) given infrastructure allows.
- **Pillar 3:** *Enabling* the establishment of *secure supply patterns* to the functioning wholesale markets.



the interaction and interdependence of all relevant areas for network codes and to initiate a process establishing a gas market target model". Based on this conclusion CEER started – by the end of 2010 – the process of developing a gas target model for Europe.

The MECO-S Target Model

The Florence School of Regulation proposes a European gas target model with a special focus on market architectures and investment. It is termed the MECO-S Model. The MECO-S is a "Market Enabling, Connecting and Securing" Model describing an end-state of the gas market to be achieved over time. The MECO-S Model rests on three pillars that share a common foundation, making sure that economical investments in pipelines are realized

The MECO-S model aims at the creation of a number of functioning wholesale markets within the EU (together enabling easy access to all European final customers of gas), at connecting these markets tightly in order to maximize short- and mid-term price alignment between those markets, at enabling secure supply patterns to those markets and at making sure that all economic investments in gas transmission capacity are done.

First Pillar: Wholesale Markets

Pillar 1 shall realize the goal of enabling functioning wholesale markets. Such markets are an essential feature of the internal market since they contribute to efficiency in managing gas and gas-related assets such as supply contracts, storage and gas-fired power stations. Additionally and no less importantly, such markets are an essential basis for retail competition. Finally, functioning wholesale markets are a basis for market based balancing and market coupling. Without functioning markets, both of these concepts could not be harnessed.

Pillar 1 is realized by structuring Europe into markets that are sufficiently sized[2] and well connected to sources of gas[3] so that the emergence of a competitive traded wholesale market is likely. Where necessary with a view to that goal, member states have to create cross-border markets in order to increase market size and connectivity.

Box 2 - Two models to create cross -borders markets

- **Market Areas**, that implement integrated balancing zones reaching down to the final customers
- **Trading Regions**, that implement integrated wholesale markets which are tightly connected to national end user zones

2. i.e. ≥ 20 bcm of final customer consumption
3. i.e. at least three different sources of gas

The two models to create cross-border market are based on entry/exit systems. Moreover, both models may be used in parallel in Europe, whereby the market area model appears attractive for larger member states and the trading region model has specific merits for smaller member states that need to cooperate cross-border in order to gain sufficient market size and connectivity.

Second Pillar: Allocation of 'gas-related assets' in European Scale

Pillar 2 aims at maximizing the efficiency of managing gas and gas-related assets on a European scale by making sure that the existing interconnecting infrastructure is put to the best use. The resulting tight connection of markets will lead to price alignment between European markets as far as the – at any time existing – infrastructure allows. Price alignment virtually unifies all European markets by enabling cross-portfolio optimisation via those markets on a European scale. Measures are foreseen so that TSOs do not suffer any loss from price alignment.

A "Target Model" for the Internal Gas Market

WEBINAR
by *Jean-Michel Glachant*

Pillar 2 is firstly realized by implementing hub-to-hub transport products and a number of harmonisation measures that make inter-market supply and trading significantly easier. The allocation of hub-to-hub transport products shall be by auction for the mid- and short-term markets and by first come first serve for the intra-day market.

Secondly it is proposed to implement pilot projects for day-ahead market coupling to explore if the potential benefits of market coupling can be realized in practice for gas. If so, day-ahead market coupling would become an integral part of the MECO-S Model.

Third Pillar: Security of Supply

Pillar 3 aims at enabling secure supply patterns to the European markets. Specifically Pillar 3 creates the preconditions for underpinning long-term supply contracts with appropriate transport products, taking into consideration that currently about 30% of all gas consumed in Europe crosses more than one border point. Additionally Pillar 3 aims at providing a market based solution for realizing transport security of supply where collaboration with adjoining markets is required.

Pillar 3 is realized by foreseeing the execution (if demanded by shippers) of new long-term transport contracts. These contracts can be requested periodically in an open season style process for the full term of interest to the shipper, e.g. 15 years. If in the process the demand for long-term capacity proves higher than the availability of such capacities, then capacities will be expanded by investment if they are economical. In order to allow for such investment, the lead time for allocating long-term capacity shall always be at least as long as the time required for expanding capacity. Since in this structure capacity can always be expanded, long-term capacity is not a scarce good anymore and auctioning of that capacity can be avoided. Allocation questions at the fringe of the allocation problem can be solved by an optimisation procedure.

In order to deal with shippers interested in long-distance transport (e.g. from a European border point to the next but one market) link chain products are introduced. Link chain products are packages of (hub-to-hub) transport products at several border points on a continuous route that may be requested by the shipper as a whole and are allocated at the same level of capacity on all requested border points. After allocation they may be used as separate hub-to-hub capacities.

In the area of transport security of supply the instrument of the fall-back capacity contract is introduced. It provides a means for member states to secure that sufficient capacity in a neighbouring market is made and kept available in order to cater to the security needs of said member states. Under a fall-back capacity contract a TSO (A) of the member state in need of redundant transport capacity (as defined by a competent authority) books the required capacity long term with a neighbouring TSO (B). TSO B charges TSO A only that part of the capacity that is not booked by shippers directly with TSO B (hence the name "fall-back contract"). TSO A allocates the cost for this security measure to final customers in his market.

Box 3: The Key Results of MECO-S on Investment

- Investment appraisal and the allocation of long-term capacity should always (even on existing systems) be an integrated process in the style of an open season (see also above under Pillar 3).
- The quantity of capacity that shall be reserved for the mid- and short-term market shall be created (and hence invested) on top of any investment required to satisfy (economic) long-term capacity requests.
- The economic appraisal of investment shall take into account the return from long-term contracts as well as the value expected to be generated by price alignment due to the capacity reserved for the mid- and short-term markets. The cost for mid- and short-term capacities that are not directly recovered by tariffs shall be allocated to the beneficiaries.
- In case TSOs declare that they can/will not invest in an otherwise economic investment project, the project shall be tendered to the market. The scope of the tender would be to build and finance the pipeline (or other asset) against a yearly fee paid long-term. After construction, the realized project would be integrated into the operational responsibility of the respective TSO.

MECO-S Model and network investment

As highlighted the common foundation of the MECO-S Model is economic investment. Investment aims at supporting the other pillars in realizing their respective goals e.g. in contributing to the creation of functioning markets (by new interconnection to these markets) or in contributing to improved price alignment between markets (by new/expanded interconnection between these markets). Several issues are discussed in the study regarding investment including the structuring of investment appraisal processes, the evaluation of investment in interconnection and intraconnection pipelines and the financing of investment.

A Gas Target Model for the European Union: Contrasting MECOS and EURAM Proposal[1]

Authors: Sergio Ascari and Jean-Michel Glachant
Editors: Michelle Hallack and Miguel Vazquez

2011

Highlights

- At the 18th Madrid Forum (2010) the discussion of an EU gas target model was officially launched. It aims at defining a non-binding vision giving coherence to the coming set of European gas framework guidelinesand grid codes.
- There is a European-wide consensus to ensure third party access to interconnections and to promote EU gas trade across the entire EU as to reach – let's say 2014 - a target model of "achievement of the internal market'.
- J.M Glachant (director of FSR) and S. Ascari (FSR gas adviser) agree that interconnection capacity is key to increasing trade among EU countries. However, they do not have the same view on who should decide on and who should pay for the needed investment, and how trading places should be selected.

1. This PB is based on the Working Papers An American Model for the EU Gas Market? by Sergio Ascari and A Vision for the EU Gas Target Model: the MECO-S Model by Jean-Michel Glachant.

Background

The 3rd package did not describe a "target model" – which says a lot on the absence of common vision of the matter among European countries. It did, however, ask for the creation of EU-wide network code(s) to facilitate cross border gas transactions. All the transmission system operators (TSOs) will then have to obey the single network code(s) when operating the transmission networks. To keep these network codes in line with European regulation aims, a set of binding or non-binding framework guidelines are developed by ACER and the European Commission. In this context, with the aim to give global coherence to these guidelines and code(s), the European regulators launched a consultation process in July 2011 to define a gas market target model. It is a non-binding vision providing a unified frame on the future layout of gas market architecture.

On the one hand, a target model should say how the available transmission capacity can be allocated (from the long to the short term), and how it could be expanded through new investments. On the other hand, the target model also has to define key characteristics of the gas trade, and indicate an institutional frame that fits with such characteristics. During the first semester of 2011, the FSR director and gas advisor posed for discussion two top-down target models: MECOS and EURAM. They are a European (MECOS) and an American (EURAM) models for Europe gas market architecture.

Box 1 - MECOS model main pillars

- The network access should enable functioning, liquid and competitive wholesale gas markets. The guarantee will come from a regulated capacity access defined through EU code(s). The corresponding investment will involve a regulatory oversight at Member State and EU levels plus an indicative planning at the EU level.

- The model promotes short and mid-term price alignment by facilitating cross-market borders trading. It will also ease trade by implementing market coupling and by expanding the coupling of market areas. It assumes an increase of interconnection of the grids and a unification of the operation of market and network (entry/exit pricing; congestion management; balancing).

- MECOS establishes a secure supply pattern by favouring open seasons backed with transport long term contracts. These long term contracts, however, should not foreclose shorter term trade nor impede regulators from intervening in the initial capacity definition or the following contracting arrangement. Then "approved" network expansion not being implemented by the locally existing TSOs can be auctioned off to all other interested investors (the grid investment monopoly is made contestable at the margin).

Box 2 - EURAM model main propositions

- EURAM does not challenge all MECOS proposals. It mainly aims at correcting MECOS where it deviates too much from the proper dynamics of market supply forces.
- The gas transport network is not necessarily a natural monopoly, and thus its regulation frame need to take into account its competitive potential and favour it. The competitive potential in transportation is a key source of efficiency improvement which should be accounted for and promoted. Actually, if market forces push gas transport investment as in the U.S, congestion constrains requiring auctions and other managements should be very rare.
- Network tariff regulation should be streamlined across Europe and designed in a way to properly address issues arising from cross border trade, including the transfer of capacity rights to (and payment by) downstream market players including possibly TSOs.
- It is not just network investment which should take market forces into account, but the proper development of hubs. Regulators cannot build or design market places by themselves. They can only enable a dynamic market play or not. The risk of too many hubs would be liquidity fragmentation, and hence the delay of real market integration.

Summary of the proposed MECOS and EURAM target models

MECOS is a "**M**arket **E**nabling, **CO**nnecting and **S**ecuring" model describing the final state that the EU gas market should achieve over time (2015?, 2020?). The main aim is to guarantee to every European final customer easy access to a wholesale gas market respecting a minimum set of rules, notably those "enabling" and "connecting" markets (the EU consumer is guaranteed both a certain access and a certain set of market rules). EURAM (**EUR**opean **A**merican **M**odel) distinguishes from MECOS in underlining the importance of including the market supply forces at the core of the model definition, especially in the definition of the transport investment and market arrangements. Building on these contrasting approaches, these two target models propose different solutions to transport network development and allocation, as well as to the promotion of gas hubs.

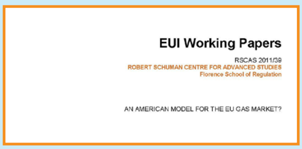
The two target models, while sharing some common views, propose different solutions especially with regard to transport investment. MECOS seeks a regulated development of the network targeted at facilitating EU gas trade and a plan of market areas expansion. This would be done by an ex-ante definition of the efficient network and the well-functioning market places. EURAM relies on freeing market forces to permit them to define the development of an efficient network according to their market strategies. Public interest can be added to market forces here or there, but it cannot replace them as the engine of grid expansion and market place (hubs) building. Trade will occur where there is trade and traders. Trading arrangements should follow traders' needs.

The role of gas transport networks

TSOs cannot create markets just by themselves, but they are a central part of the industry chain where gas markets operate.

Existent Capacity

Both MECOS and EURAM models agree on using an entry/exit frame to allocate transport capacity. In Europe, the entry/exit scheme is widely seen as a pre-condition to create functioning markets.


EUI Working Papers
RSCAS 2011/39
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
Florence School of Regulation
AN AMERICAN MODEL FOR THE EU GAS MARKET?

An American Model for the EU Gas Market?

WORKING PAPER
by *Sergio Ascari*

However the degree of centralization in the capacity allocation differs in the two models. MECOS proposes centralized auctions of standardized transport products via virtual hubs, and does not conceive any other place to trade. The various virtual hubs could be unified by fully merging their corresponding markets. One can also create a single hub on the top of the existing end users' balancing zones through the creation of "trading regions" (with separated balancing areas). MECOS also strongly supports implicit auctions as the mechanism to allocate capacity in the shorter term (at least Day Ahead) and recommend experiencing it through pilots.

EURAM, on its side, still values explicit mechanisms to allocate capacity. The capacity market could be reinforced by the use of an open subscription process, which is close to a kind of coordinated EU-wide open season. This would be based on a common trading platform covering all the EU capacity market. In the case of congested lines, EURAM suggests using shorter-term auctions. EURAM does not see the necessity of trading in any virtual points, as trading is likely to concentrate in few markets. However market coupling may remain a valid option for short term trade involving congested cross-hub capacity.

New Capacity

One of the main consequences of including the active role of markets in network development can be noted in the divergent proposals of EURAM and MECOS models.

The MECOS model addresses the investment in inter-connection and intra-connection mainly under a regulated environment. The inter-connection should include long-term contracts as well. Thus, MECOS proposes an open season process to deal with the inherent uncertainties on investing in new interconnections. This open season process would have to be performed periodically for all existing interconnection capacity and on demand.

According to the MECOS model, the decision to build a new interconnection infrastructure should be based on:

- The contract signed through the open season process where the shippers are able to sign 'long term contracts'
- The capacity expected be contracted in the future through short and mid-term mechanisms.

And the revenue to pay for this capacity should also come from these two kinds of capacity:
- The long term contracts should pay part of the capacity cost.
- The other part of the cost should be paid by the TSO's network tariffs.

Therefore, the TSOs may accept to bear a share of the utilization risk associated with constructing capacity for a short- and mid-term market in exchange for a higher rate of return on that part of investment.

Moreover, according to MECOS, the intra-connection pipelines investment risk should be borne by the regulated tariffs. Thus, inside national/regional market the TSO and the authority responsible for including the asset in the regulated revenue are actually the main players deciding investment localisation and amounts.

The EURAM model diverges in underlining the importance of market forces in investment decisions. The open subscription process would be the tool to allocate existent capacity on a long term basis, and also to give information to market players regarding the demand to build new capacity. This model does not exclude the possibility to have public intervention, as all stakeholders (public and private) should be able to bid in the open subscription process. The investment in interconnections should be mainly decided and paid for by long term contracts. EURAM agrees with MECOS in advocating that some capacity should be kept to be allocated in the middle and short term.

In summary, the EURAM model supports that third party access should be guaranteed mainly by allowing all players to contract under harmonized conditions, instead of increasing the use of implicit auctions.

Hub Development

The two proposed target models aim to promote the connection between markets increasing the liquidity of the European cross-border trade. The tools proposed, however, differ.
MECOS aims to allow all EU end-users to allocate gas at any point of the network. Thus:
- All end-users should be inserted in a market (either national or regional).
- The cross-border trade should be promoted by virtual trading points to allow changes of ownership and accounting of gas flows by merging markets or by region trades.

Box 3 - Inter-connection and intra-connection pipelines

- The interconnection pipelines are the ones which help to connect separated markets better and thereby improve the price alignment among different markets. The access of these pipelines is the key to allowing the interconnection between the different European markets.

- The intra-connection pipelines are the infrastructure which fulfils its task within a market (i.e. within an entry/exit area) and often under control of national or sub-national TSOs. Increasing the intra-connection capacity can either serve increased demand in a market or can help to 'debottleneck' an entry/exit area, which means decreasing the 'balance' costs associated to entry/exit model.

EURAM implies a different view regarding the development of European hubs:

- Hub development is seen as a result of market forces incentives. Furthermore, they will present different sizes and relative importance, depending on the interest of players to trade in them.
- It highlights the recommendation that the regulatory role developing hubs should focus just on the harmonization of rules, instead of developing inefficient hubs.

In that environment, and observing the evolution of the US gas market, the EURAM proposal foresees that the number of hubs will probably be significantly smaller than the number of national markets.

Comparing the proposals

The main differences between the two models are related to the reliance on the potential advantages of introducing competition in gas transport networks.

The MECOS proposal follows the approach of adapting the spirit of the power networks regulation to the regulation of gas networks. Loosely, present European power network regulation seeks promoting efficient markets by the use of implicit auctions to ensure the adequate use of infrastructures, and by the centralized planning of the network.
On the other hand, EURAM observes that several physical features of gas industry are not so close to the power sector, which makes the gas network subject to potential liberalization to enhance its efficiency. This can be thought of as one of the main motivations for the EURAM proposal, which seeks to introduce more competition in the gas transportation activity, especially focusing on network investment decision, paralleling in some ways the US scheme.

However, EURAM keeps the main ideas of EU network code(s) as proposed by the Third Package. It keeps the regulation of capacity use still close to MECOS proposition based on entry/exit model and national tariffs, rather than the bilateral contract model mainly applied in the interstate USA frame.

The two proposed models have many similarities, as they do not disagree in the main aspects defined by the European 3rd package. However, they fundamentally disagree on the role that markets (or long term contracts) should play regarding the use of gas transport networks, the development of market hubs and, regarding decisions on network investments (even when public intervention is accepted in the two models).

LdP Academic Roundtable Redesigning Gas and Electricity Markets to Work Together[1]

Authors: Arthur Henriot, Miguel Vazquez, Michelle Hallack, Jean-Michel Glachant

2012

Highlights

- Due to the significant role already played by gas-fired power plants and the on-going integration of renewables into the existing network, the relationship between the gas and electricity markets is becoming ever closer. As a result, we must consider if the existing gas and electricity market designs can cope with these changes or whether some market redesign is required in gas, electricity or both.
- The decision to invest and trade is dependent on existing market designs, particularly concerning trade timeframes and geographical zones. A design which is too weak may create the possibility of cross-subsidies between time or space flexible users and inflexible ones within each of the gas or electricity market design and between them.
- With an increasingly close relationship between gas and electricity market designs, the role of the TSOs may have to evolve. If transmission networks are facing a higher industry-specific or cross-industry demand for flexibility, increased coordination between operation and planning may be required from both gas TSOs and electricity TSOs.
- Whether the current electricity generation is adequate depends increasingly on the current conditions of access to natural gas. If gas is to play such a significant role in the security of electricity supply, compatibility between long-term arrangements in gas and in electricity markets must be ensured

1. This PB summarises the discussion of the LdP Academic Roundtable Redesigning Gas and Electricity Markets to Work Together? held on 13 October 2012 at the Florence School of Regulation.

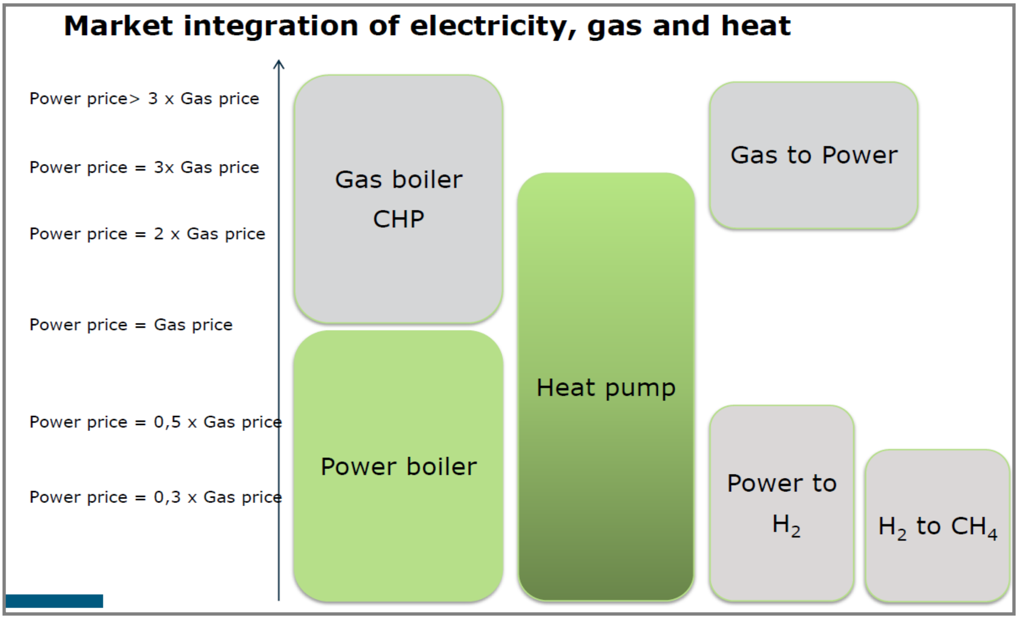


Figure 1: Market integration of gas, heat, and electricity (source: Energinet)

Background

The interaction between gas and electricity markets is not a new phenomenon. Gas and electricity can be competitors, for instance, when a consumer is to install a boiler; but gas can also be an input for gas-fired power plants (GFPPs) to generate electricity as long as the spark spread is high enough (See Figure 1).

This interaction becomes, however, increasingly significant in a context of large-scale development of variable renewable energy sources (RES). GFPPs indeed appear as the technology that is most likely to provide the flexibility needed to cope with the technical challenges introduced by variable RES in power systems.[2]

Gas and electricity have very different physical properties. Gas flows more slowly than electricity, and is also much less expensive to store. Moreover, gas systems feature inherent flexibility thanks to linepack storage. The **balancing** in gas systems is therefore less challenging than in power systems. Consequently, the way markets have been defined in both industries is very different. It is still considered by many today that the two industries should be addressed independently.

2. For more details, see IEA(2012): The Impact of Wind Power on European Natural Gas Markets.

However, if the demand for flexibility in electricity markets is to be met by flexibility in the gas markets, **coordination between gas markets and electricity markets** will be needed **both in the short-term and in the long-term**. In the short-term, the choice of consuming gas to generate electricity, for instance, in case of imbalances in the electricity market, will be made depending on the corresponding opportunity-costs and technical constraints. In the long-term, electricity transmission investments can for instance be a substitute for gas pipelines, which then strongly impacts the location of power plants and gas storage assets.

Short-term interactions between gas and electricity markets

Issue 1: Is harmonisation between the gas and electricity industries required or do the existing market differences simply reflect different technical realities?

Most of the flexibility provided by gas markets is not priced to **the gas network users who then do not perceive the flexibility costs**. Some might argue that GFPPs are simply another consumer of gas and that their needs will be met naturally. This implies that the gas system always responds to the new needs born inside the electricity system. However, the markets taking place in gas and electricity are not based on the same set of rules. The time and place of delivery matter for a gas consumer or an electricity consumer, and the way **time frames and geographical zones** are defined will therefore impact the behaviour of these players. **Price-signals** associated with this flexibility depend in turn on the definitions of those zones.

Debate on the topic at FSR

LdP Academic Roundtable
[Redesigning Gas and Electricity Markets to Work Together?]

In the European Union (EU), **simplifications** have been introduced with the aim to enhance competition and market integration: **intra-zone constraints** are not fully considered while **inter-zone constraints** are taken into account with imprecise proxies. These simplifications result in misguided behaviour and hence efficiency loss. In addition, the zones are defined following political realities that often do not match physical realities. Decisions to invest and trade are taken based on these sets of institutionally-established zones. Distortions could occur within the gas sector and the electricity sector but also in-between both industries.

Issue 2: Will the current market frameworks allow trading in a flexible way? Does a new context require a new market design? Should balancing responsibility be increasingly transferred from TSOs to participants?

As most of the existing schemes were designed to handle large and stable flows of gas and electricity, they might be challenged in a more volatile environment. The simplifications put into place by market designers do inevitably determine **the business-models for flexible generation assets**, storage assets, and transmission assets. Relying on simplifications leads to **cross-subsidies** between flexible users and inflexible ones inside each industry and across them. In any simplification of a market, there is a trade-off. One option is to expose all participants to each category of costs that they generate and to reduce the socialisation created by the improper definition of trade timeframes and market zones. From the viewpoint of the gas market, decreased socialising comes with the possibility for users to reveal their preferences on flexibility. Another option is the exact opposite, which is to enlarge or simplify trade horizons and market zones. This calls for an easing of access to flexibility within the energy system(s) and to socialising the costs created by longer timeframes and larger zones.

In certain gas market design, the short-term market (as within-day) does not exist yet. This "missing market" is key in understanding the short-term interaction challenges between gas and electricity.

Long-term interactions between gas and electricity markets

a) Coordination of investments

Issue 3: Is the current level of coordination between gas and electricity TSOs sufficient to ensure delivery of the needed investments?

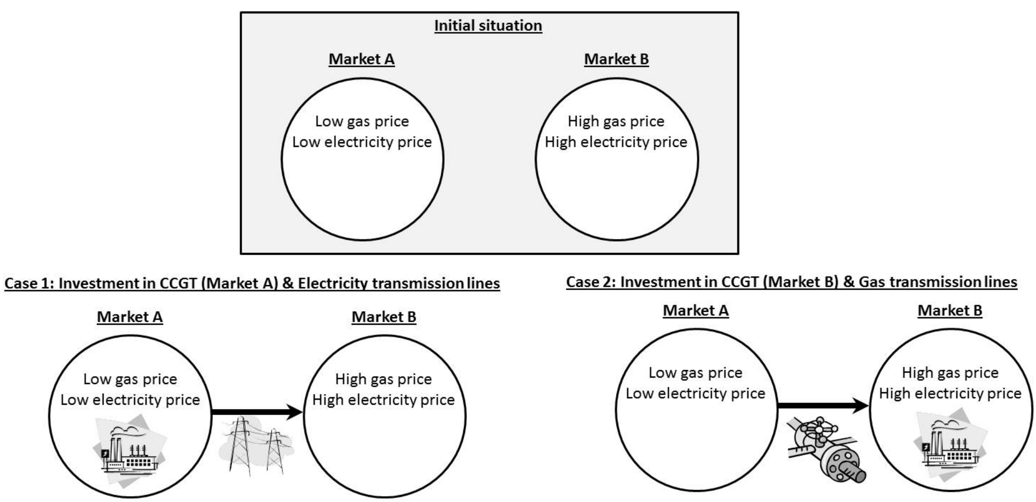


Figure 2: Illustration of mutually exclusive investments

Assets involved in the transmission of gas and power, as well as generation assets, feature high capital costs and long life expectancy, and they require long planning delays and long construction times before operating. **Investment decisions** are therefore strongly affected by uncertainty regarding the future environment. In particular, the profits generated by an asset are impacted by the investment decisions taken by other players, both within the same industry and in the other industry. Figure 2 illustrates the case of two competing investments that are mutually exclusive.

Transmission assets owners in Europe are regulated; their remuneration depends on the approval of a national regulatory authority. The **planning of investments** is then decided at a national level, generally proposed by the TSO and approved by a national authority. As the relationship between the power sector and the gas sector becomes increasingly significant, the **coordination level between Transmission System Operators** (TSOs) in the gas and electricity sector should increase as well.

A Combined View on the Market Design for Gas and Power

WEBINAR
by *Miguel Vazquez*

Issue 4: How are the distortions between price-signals received in the gas and the power sector impacting the investment decisions made by participants?

Distortions in short-term price-signals affect long-term decisions taken by the participants. If the network system flexibility can be used for free, network users will not have enough incentives to invest in other kinds of flexible assets. If the price-signals received by participants in one of the industries do not reflect the real characteristics, misguided investment decisions will lead to inefficiency across both industries.

Issue 5: How to ensure that TSOs receive the adequate incentives to invest and efficiently operate these new assets? Can the old model adapt to this new role of the TSOs? Are there any competition issues regarding the operation of flexibility assets by TSOs?

The **role of the TSOs** will have to evolve if transmission assets are used to deliver **a high amount of flexibility**. Gas TSOs can for instance offer more line-pack capacity but this will reduce the available transportation capacity; electricity TSOs might have to invest in storage capacities (as it is already the case in Italy) or in demand response. It is not clear today how TSOs will deal with **conflicting incentives** between the need of an efficient operation of the network and the existing regulatory frame governing the ownership of various assets able to deliver flexibility.

b) Long-term contracts and security of supply

Issue 6: How can compatibility of long-term security of supply in the power and in the gas systems be ensured, for instance, at times of difficulties in both? Should gas arrangements be driven by power system reliability?

Gas can play a significant role in long-term security of supply of electricity. As gas is cheaper to store than electricity, the amount of energy stored in gas storages is much higher than the amount of energy stored in electricity storage (see Figure 3). Similarly, energy can be transferred between two countries through cross-border gas transmission or electricity transmission.

However, there might be some tensions in case of **difficulties in gas or electricity or both**. What would the status of GFPP electricity producers then be compared to the other gas consumers: should the gas flow to generate electricity or for more specific gas uses? What if long-term contracts to supply GFPPs are disturbed due to political choices restraining the use of gas?

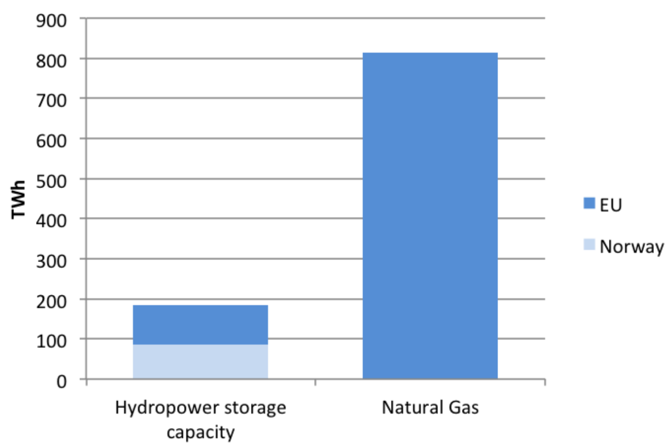


Figure 3: Energy Storage capacities in Europe (source: Energinet)

Issue 7: Will new kinds of gas supply contracts emerge when needed or are there any barriers to their development? Does the lack of adequate gas supply contracts constitute a barrier to entry in the generation sector?

Gas supply contracts may have many dimensions, such as firm versus interruptible, rigid versus flexible, short term versus long term, etc. An important issue is the need for **gas contracts that are both long-term and flexible** for GFPPs operating as back-up units. The existing supply contracts have not been designed for flexible power production. However, flexible contracts may allow consuming a maximum amount of energy per year without any constraint on the consumption pattern.

Moreover, it is worth underlining that the incompatibility between gas and electricity usages and arrangements may appear with transmission contracts. While cross-border gas supply is based on long-term network contracting, power markets do not allow **long-term reservation of capacity**. In case of cross-border paths, both the gas and the electricity interconnections should be explicitly taken into account in long-term contracts and left to short-term implicit allocation.

Chapter III

EU Energy Policy

Toward a Smart EU Energy Policy: Rationale and 22 Recommendations[1]

Authors: Jean-Michel Glachant, Robert Grant, Manfred Hafner and Jacques de Jong
Editors: Jean-Michel Glachant and Emanuela Michetti

2010

Highlights

- In the spring of 2007, the European Council agreed on a policy vision with three components: the green component (to promote a sustainable energy economy), the market component (to enhance efficiency and competition) and the security of supply component (to secure the EU's energy supply).
- With regard to these three components, distinct implementing paths and action lines were developed. The existence of separate implementing paths entails some coordination issues. Coordition is necessary here to guarantee that the three action lines are integrated into a consistent EU Energy Policy.
- EU Energy policy needs to get smarter and align the incentives deriving from the three components to produce an integrated vision that moves beyond 2020. 22 policy recommendations can then be formulated for the most relevant energy-related issues which the EU is facing nowadays.

1. This PB is based on the Working Paper Toward a Smart EU Energy Policy: Rationale and 22 Recommendations by Jean-Michel Glachant, Robert Grant, Manfred Hafner and Jacques de Jong.

Background

The EU is in desperate need of an Energy Policy. But first and foremost: do we really have to start from scratch? Or does this policy already exist? In the spring of 2007, the European Council agreed on a policy vision with three components: the **green component** (to promote a sustainable energy economy), the **market component** (to enhance efficiency and competition) and the **security of supply component** (to secure the EU's energy supply). It gave us three "mantras" as a basis for a variety of policy and regulatory proposals and actions: Kyoto, Lisbon and Moscow (Box 1).

Separated action lines

What we call "EU energy policy" is basically a basket of a number of policies linked to energy issues. **Distinct implementing paths** and action lines were developed after the 2007 European council: the green component was mainly dealt with by Green Package; the market component by the 3rd Energy market package; while the security of supply component was addressed by the 2nd Strategic Energy review and gas new regulation. Each of these action line is facing several challenges. What makes grids smart?

Kyoto: The CO_2 market needs to be tightened and harmonised across the EU to be effective. This calls for a strong and centrally regulated EC role, including effective monitoring and a centralised auctioning process. Further calls for a carbon tax or even emission performance standards are adding to the debate. On the road towards 2050 strong innovation push and pull programmes are necessary, requiring not only massive investments but also more stable and effective regulatory regimes as well as a European level playing field for technology deployment.


EUI Working Papers
RSCAS 2010/52
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
Florence School of Regulation
TOWARD A SMART EU ENERGY POLICY: RATIONALE AND 22 RECOMMENDATIONS

Toward a Smart EU Energy Policy: Rationale and 22 Recommendations

WORKING PAPER
by *Jean-Michel Glachant, Robert Grant, Manfred Hafner and Jacques de Jong*

Lisbon: By definition, a competitive energy market requires pro-competitive regulation and pro-competitive industry structures. Which are not so easyto achieve at EU-level, though. On the one side, National Regulatory Authorities have a national focus that does not always allow looking at cross-border issues in the wider EU interest, while, on the other side, the EU Directives and detailed regulation, including the most concrete actions for crossing borders, are still submitted to the willingness of the Member States to cooperate. Finally, industry restructuring can only take place in the context of the EU's Competition Policy when mergers and acquisitions are on the table or when competition cases are at stake ("smoking guns").

Box 1 - The three "mantras" of the EU Energy Policy

- **Kyoto**, *the green issue*: In the late 1980's energy related environmental issues became a truly European domain and Kyoto was immediately adopted by the EU. The EU's leadership in this respect brought to the translation of Kyoto into a market based mechanism, the Emission Trading Scheme (ETS). Moreover, Kyoto is at the base of the "triple twenties" political targets for 2020.

- **Lisbon**, *the market issue*: Lisbon was born in 1986 when the European Comm nity enacted its project to create a Common Market by 1992. The goal was to have market based economies with no internal barriers to trade, and a centralised monitoring system to review progress and to solve internal discrepancies. Energy markets liberalisation gained momentum with three successive packages: in 1996, 2003 and 2009, respectively.

- **Moscow**, *the security of supply issue*: Russian gas supplies played an increasingly important role for the EU since the early 1980's. Starting before the first oil crisis in the 70's, the Commission was willing to define an external Community policy for energy supply. Nevertheless, this objective has never been achieved, as several energy crises (such as the 2006 and 2008 Ukrainian gas crisis) showed.

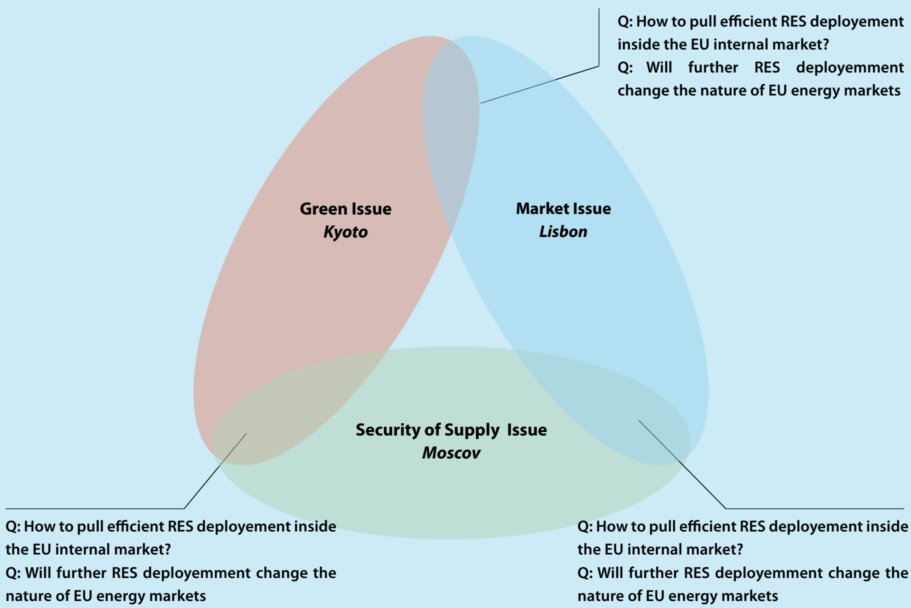
Moscow: EU external SoS policy has no infrastructure development plan and no energy long term contracting framework to make deals with foreigners. The competence European Commission has on external trade (see our "open sky" policy with the USA) has not produced yet any common frame for energy external trade. We still lack concrete means and instruments to put the EU external energy policy into practice.

The existence of these separate implementing paths entails some coordination issues. Coordination is necessary here to guarantee that the three action lines are integrated into a consistent EU Energy P olicy. To what extent these three action lines are coordinated? Are there conflicting relationships among the three separated action lines? The figure in Box 2 illustrates how coordination issues may lead to questions about the consistency of the EU Energy Policy.

Policy recommendations

The three components of the EU energy policy influence each other leading to significant policy trade-offs and calling for greater coordination. Generally speaking, the EU Energy policy needs to get smarter and align the incentives deriv-

Box 2 - The interaction of the three implementing paths



ing from the three components to produce an **integrated vision that moves beyond 2020**. 22 policy recommendations can thenbe formulated for the most relevant energy-related issues which the EU is facing nowadays: governance, energy efficiency, decarbonisation, infrastructures, single market and the e ternal dimension.

General

1. Enhance internal policy coordination and consistency between the decarbonisation process, the internal market and the external supply demand
2. Develop a comprehensive overall Energy Market monitoring system in cooperation with the IEA
3. Develop a systematic review process for supply security standards

Governance

4. Make adequate use of the new legal basis (directives and regulations plus Lisbon treaty) for comprehensive and integrated EU energy policymaking
5. Allow willing Member States to carry out regional European energy policy making an initiatives, while still preserving the overall EU consistency *Energy efficiency*

6. Continue EU Action Plans and make them binding whenever effective
7. Consider the development of white certificate market models at regional to EU-levels
8. Consider the need for an EU policy approach to the deployment of smart metering and otherdemand side management measures for gas and electricity
9. Develop a coherent strategy and vision for the transportation sector

Decarbonisation

10. Strengthen the effectiveness of carbon emission mitigation mechanisms
11. Create a level playing field for all relevant low or zero carbon technology options for power generation
12. Develop a more pro-active EU-role with regard to the particularities of nuclear energy in the fuel mix
13. Develop a view on the EU fuel mix

Infrastructures

14. Properly regulate key internal cross border infrastructures (gas and electricity) and create incentives for new investment
15. Develop a clear vision and road mapfor large-scale infrastructure expansion to accommodate large RES generation, coupled with a further expansion of demand side management comprehending smart metering and smart grid devices

Single-market

16. Coordinate regional market integration and develop an effective EU mechanism to ensure coherency and consistency; monitor the PXs' consolidation in a single pan-European trade platform
17. Be more explicit and robust on the agenda, tasks and resources of the new Agency for the Cooperation of Energy Regulators (ACER)

External dimension

18. Develop a consistent vision vis-à-vis external energy suppliers
19. Be smart with Russia
20. Be smart on single voices inside the European Council as inside the European Commissio
21. Take care of external gas supplies both at regional and EU levels
22. Seek global gas and coal energy dialogues in the G20 style such as with US, Canada, Brazil, South Africa, Australia, China, and so on.

EU Energy Policy in 2030?

INTERVIEW
with *Philip Lowe*

Legal Feasibility of Schengen-like Agreements in European Energy Policy: The Cases of Nuclear Cooperation and Gas Security of Supply[1]

Authors: Nicole Ahner, Jean-Michel Glachant and Adrien de Hauteclocque
Editors : Jean-Michel Glachant and Emanuela Michetti

2010

Highlights

- The recent declarations of some European leaders demonstrated a new political impetus towards the Europeanisation of energy policy. Nevertheless, the complex allocation of regulatory competences between the EU and its Member States works against coordination and harmonisation
- A possible solution could entail some Member States to promote ad hoc common policies through Schengen-like agreements, i.e., binding international law agreements outside the EU legal framework and thus escaping its formal and procedural requirements
- Schengen-like agreements must however comply with the principle of supremacy of Union Law in order to be legally feasible
- The compliance with the supremacy principle can be assessed on the grounds of three operational criteria: pre-emption, primacy of EU law and subsidiarity
- The legal feasibility assessment conducted in the two areas of nuclear policy and security of gas supply shows that in the former area several of the most important licensing issues could be fruitfully integrated in a Schengen-like agreement

1. This PB is based on the Working Paper Legal Feasibility of Schengen-like Agreements in European Energy Policy: The Cases of Nuclear Cooperation and Gas Security of Supply by Nicole Ahner, Jean-Michel Glachant and Adrien de Hauteclocque.

Background

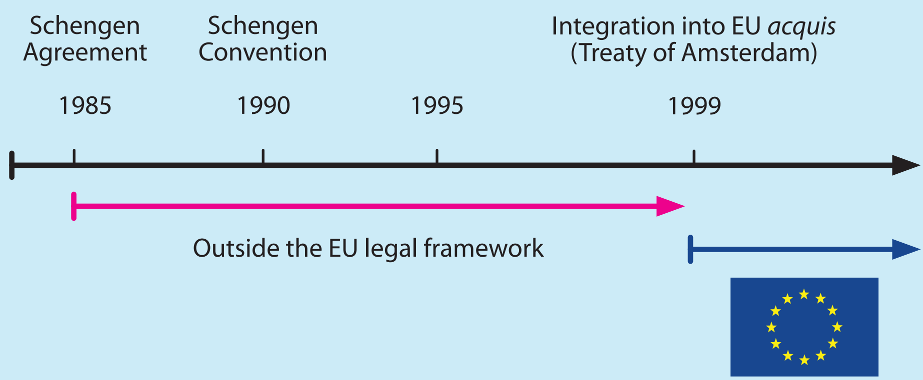
The recent declarations of some European leaders demonstrated a new political impetus towards the **Europeanisation of energy policy**. Nevertheless, the complex allocation of authority and regulatory competences between the EU and its Member States works against coordination and harmonisation. Institutional paralysis, low reactivity to events as well as political horse-trading are calling for an alternative legal framework for cooperation.

Differentiated integration in energy policy

A possible solution to enhance harmonisation in the area of energy could entail some pioneering Member States to promote ad hoc common policies escaping the formal and procedural requirements of EU law. In this case, **some** Member States could reach common positions and proceed faster on a specific energy policy area whilst others are unwilling or unable to do so. Such **differentiation allows for** a more flexible form of integration.

Differentiation has always been a reality of the European integration process. Certain well-known successes like the Schengen Agreement have allowed progress without shaking the constitutional order of the Union. Box 1 illustrates the development of the Schengen Agreement,

Box 1 - The Schengen Agreement



Today the provisions of the Schengen acquis are fully applied by 22 EU countries (**Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden**), plus **Norway**, **Iceland** and **Switzerland**.

Box 2 - Three case studies

The enhanced cooperation regime is a form of differentiated integration introduced by the Treaty of Amsterdam. Remarkably, there has not been a single instance so far where this mechanism has been used in practice, mainly due to the rigidity of the procedural requirements. Strict conditions apply, from the number of Member States required (nine) to the qualified majority needed to enact the initial authorisation.

established initially by 5 EU Countries (Belgium, Germany, France, Luxembourg and the Netherlands) in 1985, when a more general consensus on abolishing the passport controls at the intra-Community borders could not be reached.

Even though the Schengen regulation was integrated into the EU acquis in 1999, the agreement represents the archetype of closer cooperation between a number of Member States that started entirely outside the EU framework.

An alternative, Treaty-based means of differentiation is the "enhanced cooperation" - described in Box 2 -, which however, has not proved very successful so far.

Conversely, Schengen-like agreements can be concluded by some Member States under international law, so-called "*inter se* agreements". In practical terms, such agreements imply that the Member States abandon the narrow framework of EU Law and act under the broader framework of international law, where they preserve treaty-making powers.

The legal conditions for Schengen-like agreements are less onerous than the conditions set for the enhanced cooperation mechanism. Nevertheless, they are also subject to important legal limits and in particular, they must fully comply with the principle of **supremacy of Union Law**. Broadly speaking, the principle of supremacy of Union law means that an inter se agreement cannot be concluded where there is a risk of (actual of potential) interference with Union law. However, this principle is complicated to apply in practice.

Legal feasibility assessment

The assessment of the compliance of an agreement with the supremacy principle is a very complex matter and requires a case-by-case analysis on the grounds of more operational criteria, namely pre-emption, primacy of EU law and subsidiarity, which all need to be fulfilled. Box 3 illustrates the three assessment criteria.

Two potential areas of application

Schengen-like agreements are not legally feasible in every area of EU energy policy. The actual legal feasibility depends on the development of Union law which in turn often depends on the willingness of Member States to transfer competences at the Union level. In what follows a feasibility assessment for Schengen-like agreements is conducted in two areas: nuclear policy and security of gas supply.

Box 3 – The assessment criteria

1st criterion: Pre-emption
Areas of exclusive Union competence: *inter se* agreements are illegal even if the Union law has not occupied the field yet.
Areas of shared competence and extensive occupation by Union law: *inter se* agreements are illegal in both cases where Union legislation exists (actual occupation) and where no legislation exists but the Union has a duty to fill the gap (potential occupation).
Areas of shared competence and non-extensive occupation by Union law: *inter se* agreements are illegal if a case-by-case assessment on the substantive compatibility reveals a direct, non-minor and non-temporary conflict; *inter se* agreements are illegal also in absence of conflict if they interfere with the proper functioning of the Union system, the integrity of the Union legal order and the common organisation of the markets.

2nd criterion: Primacy of EU law
According to Member States' duty of sincere cooperation, the principle of primacy of EU law requires inter se agreements not to conflict in substance with general principles of Union law, e.g., non-discrimination on grounds of nationality. To fulfil this 2nd criterion, a safeguard clause in the Schengen Agreement was introduced. It clearly stated that "*The provisions of this convention shall apply only in so far they are compatible with Community law*".

3rd criterion: Subsidiarity
Given the special qualities of Union law (certainty, enforcement, etc.), in fields of shared competence Union law should generally be preferred to inter se agreements as long as they do not create clear benefits compared with action at the Union level.

A. Nuclear policy

While some Member States (such as the UK, Italy and Romania) are today implementing or considering a long-term growth in nuclear capacity, several others (such as Ireland and Austria) remain resolutely opposed. It is unlikely that Europe will ever speak with one voice on matters of electricity generation mix and nuclear power, which is an exclusive competence of Member States. Moreover, Member States are subject to EU law and must comply with the Directives and Regulations made under the EURATOM Treaty. ***The feasibility assessment on 3 possible areas of cooperation shows that inter se agreements could fruitfully integrate several important licensing issues concerning reactor design certification and the disposal of radioactive waste and spent nuclear fuel.***

I. Market Rules

Why cooperate? An *inter se* agreement could clarify market rules for nuclear investors and operators on the design and use of long-term contracts and on the creation of joint ventures, open seasons and investment in merchant lines.

Inter se agreement legally feasible? No.

Why? Pre-emption: Most market frame issues (such as long-term energy contracts and joint ventures) are under the jurisdiction of competition rules where the Commission enjoys exclusive competence. Generally, to the extent that nuclear energy competes on an equal footing with other energy sources in liberalized markets, an inter se agreement distorting competition among producers cannot fulfil the pre-emption criterion.

II. Disposal of Radioactive Waste and Spent Nuclear Fuel

Why cooperate? Nuclear power raises important issues regarding waste: an *inter se* agreement could include provisions on disposal of high-level radio-active waste and spent nuclear fuel as well as the setting-up of regional centres of disposal.

Inter se agreement legally feasible? Yes, provided compliance is ensured with Directives on nuclear safety.

Why? i) Pre-emption: The Court of Justice recognised a shared competence in matter of nuclear safety, but at present waste management remains a national responsibility with Community legislation mainly covering safety issues; ii) Primacy: As long as foreign undertakings operating in one of the contracting Member States would not be precluded to use the new regional centre for disposal, the non-discrimination principle would be respected; iii) Subsidiarity: EU law explicitly states that regional cooperation could constitute an interim step to a Union-wide legislation in this area.

III. Reactors Design

Why cooperate? The standardisation of reactor design would contribute to make the licensing process more effective, stabilise the regulatory framework as well as increase international cooperation.

Inter se agreement legally feasible? Yes.

[Differentiated Integration Revisited: EU Energy Policy as Experimental Ground for a Schengen Successor?]

JOURNAL ARTICLE
by *Nicole Ahner, Adrien de Hauteclocque and Jean-Michel Glachant*

Why? i) Pre-emption: Reactor design is only subject to the common safety requirements. Union legislation does not go further with harmonisation and does not include any reciprocity mechanism for design approval. There is movement towards harmonisation in licensing, but reactor design certification is done nationally; ii) Primacy: An agreement on common licensing requirements would contribute to create a level-playing field among nuclear operators of different nationality; iii) Subsidiarity: Union law could be better used to consolidate the future *acquis* of an *inter se* agreement rather than initiate the harmonization of reactor design assessment itself.

B. Security of gas supply

High energy prices, the occurrence of regional supply shortfalls and above all, the increasing reliance on imports from third countries are reasons for unsettling concern for the security of gas supply. Nevertheless, security of gas supply policy basically happens at the national level and it is unlikely that the EU will be able to develop a coherent common policy on obtaining secure energy supplies in the short-term. The main challenges to a supply security policy at European level are political, both internally and externally. ***The feasibility assessment on 3 possible areas of cooperation shows that Schengen-like agreements are not well-suited. Internally, the Member States are pre-empted by the comprehensive regulation at EU level, while externally, a Schengen-like agreement is not possible as the objectives to be regulated touch upon areas of exclusive Union competence.***

I. Transparency

Why cooperate? An *inter se* agreement could contain requirements for aggregating data at regional level, releasing information and enhancing the relevance of the released information for regulators and market participants.

Inter se agreement legally feasible? No.

Why? Pre-emption: Transparency understood in the above falls under shared competence but occupation of the field by Union law is already very broad. The powers of ACER (Agency for the Cooperation of Energy Regulators) introduced by the 3rd package include network codes on these issues: a preliminary agreement on transparency will be therefore provided by ACER soon or later. Finally, the Commission itself is considering a possible future legislative initiative in this area.

II. Emergency

Why cooperate? An *inter se* agreement would allow a minimum level of harmonisation among countries, regulators, hubs and Transmission System Operators with regard to the different emergency plans defined by the Member States.

Inter se agreement legally feasible? No.

Why? Pre-emption: The issue falls under shared competence but there is a broad occupation of the field by EU law: Member States treaty-making competence is limited.

III. External Supply Framework

Why cooperate? An *inter se* agreement would allow coordination and information mechanisms for bilateral actions, arrangements and contracts based on a high level of transparency.

Inter se agreement legally feasible? No.

Why? Pre-emption: At least some of the aspects covered by the usual bilateral energy agreements concluded between Member States and third countries are in the exclusive competence of the EU. In addition, the EU possesses an exclusive, implied external power relevant for the regulation of the EU external energy relations.

A New EU Gas Security of Supply Architecture?

Authors: Jacques de Jong , Jean-Michel Glachant , Manfred Hafner , Nicole Ahner and Simone Tagliapietra
Editor: Nicole Ahner

2012

Highlights

- The EU gas security of supply architecture has had some impressive developments. Today, security of energy supply as a goal in itself is not only enshrined in the European Treaties. Rather, it is also addressed directly and indirectly by various hard and soft law measures that tackle it from several complementary angles.
- However, judging from the lessons learned during past supply crises and the results obtained so far, the inevitable conclusion is that we have not yet achieved a European approach to ensuring gas security of supply within the EU.
- A new EU gas security of supply architecture should distinguish between a long-term dimension, i.e. the post-2020 period and a short-term dimension, i.e. the period up to 2020.
- For both periods it is recommended to define a clear and articulated policy vision, long-term focusing on i) the (re-)definition of the role of gas in the EU energy fuel mix and energy system, ii) the EU external energy policy and iii) the achievement of the internal gas market; short-term focusing on i) the speedy implementation of the Third Energy Package, ii) the European Energy Infrastructure Package and iii) the EU energy solidarity concept.
- The Clingendael International Energy Programme (CIEP), together with the Fondazione Eni Enrico Mattei (FEEM), the Loyola de Palacio Chair at the Robert Schuman Centre of Advanced Studies, European University Institute (EUI) and Wilton Park have organized a series of workshops in order to take stock and discuss a possible new architecture for EU gas security. Discussions and reflections reported from the workshops held under this project have developed into the following recommendations for a new EU gas security of supply architecture that are synchronized in this policy brief.[1]

1. The deliberations at the four workshops greatly informed the views expressed in this policy brief, but those views belong to the authors only and do not necessarily represent those of individual participants at the workshops or of the four supporting organisations.

Background

The future role of natural gas in the European energy system is highly uncertain. Several scenarios, however, anticipate an increase of import dependence up to 80% by 2030. Notwithstanding such anticipation, a European approach to ensuring gas security of supply within the EU has not been achieved yet.

Only very recently, some instruments addressing short- and long-term security of supply have been introduced at EU level. These include the Infrastructure Package or Regulation (EU) No 994/2010. In 2011, the Commission presented the long awaited Communication on the external dimension of energy policy, which identified ways to reinforce the efficiency of EU policies with regard to external energy relations. Is the EU on the right track to meet its stated objective, i.e. a European supply security policy? Is the current architecture on which the EU gas security of supply strategy is built able to deliver those responses needed to meet growing risks and changing realities? How should institutions and regulation adapt and respond?

The Clingendael International Energy Programme (CIEP), together with the Fondazione Eni Enrico Mattei (FEEM), the Loyola de Palacio Chair at the Robert Schuman Centre of Advanced Studies, European University Institute (EUI), and Wilton Park have organized a series of workshops in order to take stock and discuss a possible new architecture for EU gas supply security. Discussions and reflections reported from these workshops have developed into the following concluding ideas and recommendations for a new EU gas security of supply architecture.

The long-term vision

The long-term vision should cover three specific policy chapters: the role of gas in the energy fuel mix and energy system, the EU external energy policy focus and the EU internal gas market.

The role of gas

Security of supply and security of demand are two sides of the same coin. Building market confidence in the long-term is essential for both upstream and downstream investments and market signals. The EU should therefore develop a clear vision of the role it sees for gas in its global energy mix as part of the 2050 Roadmap. A choice should be made whether gas will (again) be a "*fuel of destination*", i.e. the fuel that gives in the medium and longer-term the most cost-effective and sustainable solution? Or will gas rather be considered as a "*fuel of transition*", i.e. the primary fuel that would help the EU on its road towards the carbon-free energy economy? Or, finally, will gas be considered as a "*fuel of consequence*", i.e. the fallback option should other options fail to deliver at the necessary times?

In any possible scenario on the role of gas in the energy system the interaction between the gas and power sectors will need to grow dramatically. That would mean that gas demand would become more and more a function of the power generating systems, due to its large advantages as a flexible fuel. In addition, new innovative concepts of gas-to-power and power-to-gas interactions, including the application of electrolysis and storage technologies, will bring further options for the use of gas in the energy system. This changing role of gas will have without any doubt dramatic consequences for the use of the gas infrastructures (transmission and storage), with changing business models and increasing spot-oriented intra-EU trade. Market designs and regulatory designs will have to be reconsidered and the interaction between the power market and the various fuel markets, including the carbon market, will increase as well. If Carbon Capture and Storage (CCS) is to be applied at larger scales, fine-tuning between the gas and power chains with the carbon chain would become a further challenge. A new gas security of supply architecture should reflect on these developments in order to enhance supplier confidence and consumer needs.

The external energy policy focus

External energy relations at the EU level, especially when external gas supplies are involved, should be built upon the vision mentioned above and should lead to specific strategies for the EU's main suppliers. Taking due account of the developing global gas markets, focus should be put on, respectively, Norway, Russia, the Mediterranean region and the Caspian Basin. For each of these, it would be appropriate to create a specific mechanism for periodic discussion, review and institutionalized approaches regarding gas supplies and related relevant policy issues.

As examples, the northern dimension could include the development of market structures and business models and could also give due account on the role of hydro as a storage option for managing intermittent energy sources, as well as the schemes for deploying large scale CCS. The eastern dimension should focus on the issue of mutual "win-win" schemes for applying

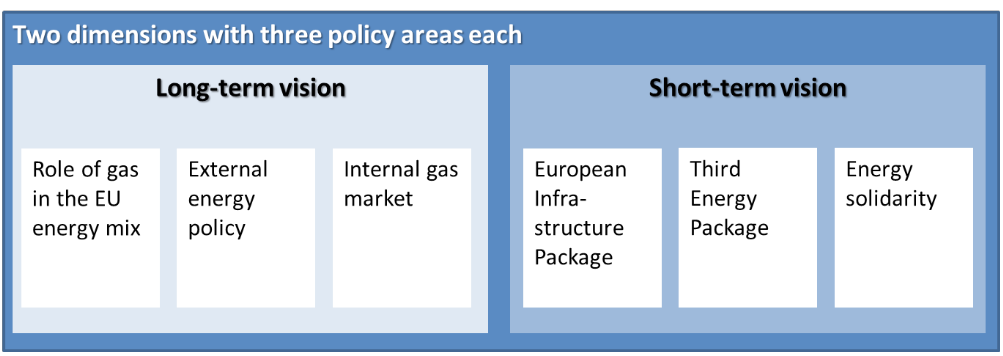


Figure 1: An EU gas security of supply architecture

reciprocity criteria in both the upstream and downstream segments of the value-chain. Equally important would be the issues regarding East-West transit-lines on the way to and through EU-markets, and eventually, the enhancement of the early warning systems in the case of supply interruptions. The southern dimension could focus in a broader way on economic cooperation, including energy issues. Changing geo-political structures in the region might bring new opportunities for using the wide variety of EU instruments. Global political cooperation in the Mediterranean region, including on renewable energy such as the Desertec project and the relating Medgrid or Medreg initiatives might bring new momentum. The SE-EU dimension and its strategic energy pathways between the East and the South would bring further options for the EU, building, where necessary, on the Energy Community Treaty framework, and could also include the ways and means of innovative gas purchasing schemes.

The internal gas market

The EU should strive to remain, for all external suppliers and for all of the three possible visions on the role of gas, an attractive market for suppliers. The internal market model should reflect, therefore, the changing market structures and conditions that will need to develop from the broader vision of the role of gas. For instance, the emergence of gas as a fuel for delivering flexibility and back-up in the increasingly RES-dominated power systems may have serious consequences for the prevailing gas market and regulatory designs. As part of the architecture, the EU should consider redefining its vision on the internal gas market, and remaining open to suggestions from its main external suppliers.

A New Architecture for EU Gas Security of Supply

BOOK
by *Jean-Michel Glachant, Manfred Hafner, Jacques De Jong, Nicole Ahner and Simone Tagliapietra*

This changing role of gas will have a particularly precise and challenging impact regarding issues that go beyond national authorities and policy-making: short-term and spot trades will need to increase to manage flexible market demand; cross-border exchanges will further develop; and cross-border arbitrages in the gas/electricity/carbon market dimensions will have to develop (relying more frequently on short-term capacity requirements in pipelines and interconnections, with resulting capacity (under)use and allocations). Transits will be an expanded, normal way of moving gas through EU markets, and infrastructure access and pricing will need to accommodate these flows. Storage will become more important, managing seasonal variations as well as much shorter-term daily or weekly variations.

For these and other issues, effective cross-border regulatory oversight and designs will need to be developed further, perhaps more on regional levels than for the EU as a whole. A more articulated and defined view on the post-2020 EU gas market should be an essential element of

A New Architecture for Gas Supply Security

WEBINAR
by *Jacques de Jong*

the EU's security of supply architecture regardless of whether gas stays in the fuel mix for the next two to three generations or whether it is used solely as a back-up fuel in case other generating technologies do not deliver.

The short-term vision

The short-term vision should equally cover three policy chapters: the Infrastructure Package implementation, the (expedited) implementation of the Third Energy Market Package, and the fine-tuning of the concept of solidarity. The implementation of these two Packages requires timely decision-making for full application since the window-of-opportunity for the cost-effective transition to a low carbon energy economy is anticipated to close around 2018. The long-term vision for the role of gas could be less meaningful if not supported by the short-term actions that are required. Short-term actions are therefore considered as the first step to moving beyond 2020. In addition, a further enhancement of the existing emergency mechanism would result in a strengthening of solidarity within the EU and, thus, contribute to global supply security.

The European Energy Infrastructure Package

New investments in long-haul and cross-border pipelines for gas are critical components of any supply architecture. The Infrastructure Package covers a number of issues that call for timely implementation: enhancing the Project of Common Interest (PCI) process; streamlining the Cross-Border Cost-Benefit Analysis (CB-CBA) approach; expediting efficient CB-licensing and permitting; and specifying the role of public money versus private money. The three EU institutions should therefore work expeditiously on a decision on the Regulation, allowing it to enter into force as early as 2013. In addition, the various implementing devices, such as CBA-methodologies and arrangements for CB-regulatory decisions could start as soon as 2012 if prioritization by ACER is allowed and facilitated.

The Third Energy Package

The Third Energy Package is a solid basis for organizing the EU gas market and the TSO industry. Implementation does not yet have the proper priority at the national level, which influences the work at EU level. The process of establishing the Network Codes and the supporting Framework Guidelines should further facilitate a timely completion with some further political guidance, if necessary, by the Council. Refraining from addressing minutiae would streamline this process.

The ongoing cross-border restructuring process in the TSO sector, which could be considered as a positive step towards further market integration, may require additional attention in order to manage an effective and supportive TSO certification process. Once again, ACER plays an important preparatory role, especially when it comes to further strengthening the cooperation of NRAs.

Securing regulatory stability to allow the necessary market dynamics deserves continued attention by all stakeholders and authorities. The ongoing Regional Gas Initiatives (RGI) and other informal discussion platforms have roles to play in seeking specific solutions for regionally specific issues. If these mechanisms are working effectively, an EU-wide model for an internal gas market would become less urgent.

High-level attention is needed and should be given to the two issues that are of significant concern to some of the EU's external suppliers. The relevant conditions in the Third Package, i.e. on non-EU ownership in infrastructures and on efficient cross-border transiting of gas flows, should be further articulated and discussed with external suppliers at the proper levels. These issues can, and should, be solved over the course of the next year.

The building of energy solidarity in the EU

The EU is on a promising path towards the building of an EU energy solidarity both *ex ante*, when it comes to institution building for crisis prevention, and on the spot, in terms of crisis management in a spirit of solidarity.

Regulation (EU) No 994/2010 concerning measures to safeguard security of gas supply is the EU's key solidarity instrument providing a solid basis for the management of unforeseen supply interruptions on a short-term basis. Certain issues that still need to be resolved or are missing can be overcome based on the experiences from past crises. The transposition of the lessons learnt into the existing framework can further refine and improve the procedure in place.

Ultimately, the prerequisite to solidarity is transparency. In this respect the increased efforts in the area of foreign energy relations with supplier countries play an important role. Following the long awaited Communication of the European Commission in September 2011 here especially the proposal for a Decision setting up an information exchange mechanism with regard to intergovernmental agreements between Member States and third countries in the field of energy is a promising step in the right direction.

FSR Energy Encyclopedia

The following links will give you access a body of knowledge on EU energy regulation and policy by Florence School of Regulation. The FSR Energy Encyclopedia is organized around 50 topics providing short definitions and giving access to more than 500 publications and media files produced or edited by the Florence School of Regulation.

Electricity

- Electricity Generation
- Electricity Transmission
- Electricity Distribution
- Electricity Wholesale Market
- Electricity Retail Market

Gas

- Gas Transport
- Gas Distribution
- Gas Storage
- Gas Wholesale Market
- Liquefied Natural Gas (LNG)

Grids

- Natural Monopoly
- Third Party Access (TPA)
- Transmission Grid
- Distribution Grid
- Interconnection
- Metering
- Congestion
- Smart Grids

EU Energy Policy

- EU Legislation Packages
- Energy Efficiency
- Internal Energy Market
- Three Pillars
- Competition Policy
- Technology Innovation Policy
- Fuel Poverty
- Unbundling

Climate Change

- Sustainable Development
- 20-20-20
- Decarbonisation
- Demand Side Management (DSM)
- EU Emissions Trading System
- Carbon Pricing
- Kyoto Protocol

Security of supply

- EU Dependence
- Black Out
- Energy Mix
- Generation Adequacy

Renewables

- EU Green Package
- Renewables Support Mechanisms
- Distributed Generation

Regulation

- National Regulatory Authorities (NRAs)
- ACER
- CEER
- Incentive Regulation
- Price Regulation
- Quality Regulation
- EU Energy Sector Inquiry 2007
- EU Third Energy Package 2009
- Wholesale Market Transparency

Learn more on EU Energy Regulation and Policy with the **Fsr-Encyclopedia**

Subscribe to our **YouTube channel**

Follow us on **Twitter**, on **Facebook** and **Flickr**

Follow Jean-Michel Glachant (Director FSR) on **Twitter:** **@JMGlachant**

Florence School of Regulation
Loyola de Palacio Chair
http://fsr.eui.eu/

HOW TO OBTAIN EU PUBLICATIONS

Free publications:

- via EU Bookshop (http://bookshop.europa.eu)
- at the European Union's representations and delegations. You can obtain their contact details on the Internet (http://ec.europa.eu) or by sending a fax to +352 2929-42758

Priced publications:

- via EU Bookshop (http://bookshop.europa.eu)

Priced subscriptions (e.g. annual series of the *Official Journal of the European Union* and reports of cases before the Court of Justice of the European Union):

- via one of the sales agents of the Publications Office of the European Union (http://publications.europa.eu/others/agents/index_en.htm)

QM-31-12-166-EN-N

Publications Office

ISBN 978-92-9084-096-1
9 789290 840961
doi:10.2870/53290