# Cost of Non-Europe
## in the Single Market for Energy

## ANNEX I

# A cost estimation of existing gaps and barriers

**Research paper**
**by the IEEP**

**Abstract**

This document aims to identify, analyse and weigh gaps and barriers to the completion of the internal energy market. It focuses on a selection of specific cases, and includes an estimation – as far as possible – of the associated costs of 'Non-Europe' in the energy market for households and industries.

The analysis is not exhaustive, but focused on concrete examples from various areas, of the costs of 'Non-Europe' incurred and their wider impacts on the functioning of the internal energy market. To the extent possible, gaps and barriers are addressed in a targeted manner, identifying specific barriers, and impacts, as well as options on how to address these barriers.

**AUTHORS**

This research paper has been written by **Timme van Melle, Raphael Sauter, Axel Volkery** and **Christina Beestermoeller,** of **Ecofys** and the **Institute for European Environmental Policy**, at the request of the European Added Value Unit of the Directorate for Impact Assessment and European Added Value, within the Directorate General for Internal Policies (DG IPOL) of the General Secretariat of the European Parliament.

**RESPONSIBLE ADMINISTRATOR**

Micaela Del Monte, European Added Value Unit

To contact the Unit, please e-mail eava-secretariat@europarl.europa.eu

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**LINGUISTIC VERSIONS**

Original: EN

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ISBN: 978-92-823-4358-6

DOI: 10.2861/19974

CAT: BA-32-13-348-EN-N

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# 1 Introduction

Many important steps have been taken to realise the European internal energy market. The last major step was the third energy package and complementary legislation. However, the process towards the completion of the internal market is not yet complete (EC 2012a). This document reports the findings of a study to identify, analyse and weigh gaps and barriers to completion of the internal energy market. It focuses on a selection of specific cases, and includes estimation – as far as possible – of the associated costs of 'Non-Europe' in the energy market for households and industries.

The analysis is not exhaustive, but focused on concrete examples from various areas, of the costs of 'Non-Europe' incurred and their wider impacts on the functioning of the internal energy market. To the extent possible gaps and barriers are addressed in a targeted manner, identifying specific barriers, and impacts, as well as options on how to address the barriers.

The purpose of the research was to gain insight in the causality of market inefficiencies and thereby provide direction for new policy initiatives.

## 1.1 Methodology

Data and information from secondary sources has been used. This was complemented by targeted interviews where possible. Quantitative work is based on publically available data. Existing studies with modelling and scenario results have been drawn upon for the quantitative aspects of the research. Case study analysis (in a descriptive manner) has been used to illuminate the nature and costs of the identified gaps and barriers.

## 1.2 Study phases and tools

The study consisted of the following phases. These phases were not strictly sequential.


The initial step of the study was data collection and literature review to map the current state of knowledge on gaps and barriers and to identify cases for further analysis. These case studies have then been assessed in section 2.

# 2 Literature review

The project team started by collecting relevant data and literature related to internal energy markets. Subsequently the project team analysed the collection to make an inventory of identified gaps and barriers to the internal energy market. The result of this review can be found in Table 1. The sources have been assessed as to their relevance to this study, in other words, according to the extent to which the focus on gaps and barriers to market integration, give reasons for gaps and barriers as well as provide quantifications on the benefits of market integration, which can be called the 'Cost of Non-Europe'.

**Table 1: Literature review and identified gaps and barriers**

| Document/ Source | Identifies: gaps/ barriers? | Costs? | Suggests actions? | Analysis of distributional impacts? | Energy scenarios? | Overall relevance (high, moderate, low) |
|---|---|---|---|---|---|---|
| **ACER 2012:** Regional Initiatives Status Review Report 2012 | **Barrier:**<br>• Diverging views on flow-based methods | No | Yes | No | No | Moderate |
| **ACER/CEER 2012:** Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2011 | **Barriers**:<br>• Differences in retail prices (p. 54)<br>• Differences in retail prices between households and industry (gas) (p.119)<br>• Diverging market liquidities in the EU (p. 61)<br>• Regulated prices (p.48)<br>• Low switching rates (p. 24, p. 119)<br>• Smart meters: entities responsible for data collection and management do not foster active competition<br>• Missing cross-border transmission infrastructure (p.69)<br>• Reduced cross-border capacities made available due to unplanned electricity flows<br>**Gaps**:<br>• Higher transparency for tariff methodologies necessary | No | Yes | No | Yes | High |

| Document/ Source | Identifies: gaps/ barriers? | Costs? | Suggests actions? | Analysis of distributional impacts? | Energy scenarios? | Overall relevance (high, moderate, low) |
|---|---|---|---|---|---|---|
| **CEER 2012a**: Status Review of Customer and Retail Market Provisions from 3rd Package 2012 | **Barrier:**<br>• Gap between legal and practical implementation of 3rd package | No | No | No | No | Low |
| **CEER 2012b**: Benchmarking Report on Meter Data Management | **Barriers**:<br>• Divergence of policy designs on smart meters | No | No | No | No | Low |
| **EC 2010:** SWD, SEC 1409: Functioning of the retail electricity market | **Barriers**:<br>• High market concentration<br>• Regulated prices | No | No | No | No | Moderate |
| **EC 2011:** SWD, 2009-2010 report on progress in creating the internal gas and electricity market | **Barriers**:<br>• Disharmony of market rules<br>• High market concentration<br>• Differences in retail prices<br>• Disparities in switching rates in MS in energy retail markets<br>• Cross-border transmission infrastructure | No, quantification of benefits | Outlines some | No | No | Low |
| **EC DG Energy 2012:** Quarterly Report on Gas Markets Q3-4 2012 | **Barrier**:<br>• Differences in retail prices | No | No | No | No | Moderate |
| **EP DG Int. Pol 2010:** EU Energy Markets in Electricity and Gas | **Barriers**:<br>• Differences in wholesale prices<br>• Different trading regimes<br>• Insufficient unbundling of TSOs (p. 12)<br>• Cross-border transmission infrastructure (p.12) | No | No | No | No | Moderate |
| **Gawlikowska-Fyk 2012**: Fragmented Energy Market in the EU | **Barriers**:<br>• Diverging funding schemes for construction of new power plants and renewable energies<br>• Conflicts of interests for MS and delays in implementing 3rd Package | No | No | No | No | Low |

| Document/ Source | Identifies: gaps/ barriers? | Costs? | Suggests actions? | Analysis of distributional impacts? | Energy scenarios? | Overall relevance (high, moderate, low) |
|---|---|---|---|---|---|---|
| Internal Energy Market – Non-Paper 2010 | **Barriers**:<br>• Disharmony of market rules<br>• High market concentration<br>• Differences in wholesale (gas) and retail (gas & electricity) prices within Europe (p.2)<br>• Regulated prices<br>• Insufficient powers of national regulators to implement rules<br>• Cross-border transmission infrastructure<br>• Inefficient use of available transmission capacity | No | Yes | No | No | High |
| **Ipek, William 2010**: Firms Strategic Preferences, National Institutions and the European Union's Internal Energy Market: A Challenge to European Integration | **Barrier**:<br>• Traditional and national approach to businesses of market participants (p. 26) | No | No | No | No | Moderate |
| **Jacottet 2012**: Cross-border Interconnections for a Well-functioning Internal electricity Market | **Barriers**:<br>• Insufficient power to ACER (p. 15)No incentives for grid companies to invest in cross-border transmission infrastructure (p.14/15) | Yes (cost-benefit analysis) | Yes | Yes (welfare) | No | High |
| **Pellini 2012** | **Barriers:**<br>• Disharmony of market rules<br>• Cross-border transmission infrastructure<br>• Inefficient use of available transmission capacity | Yes (benefits/welfare) | No | Yes (welfare) | Yes | High |

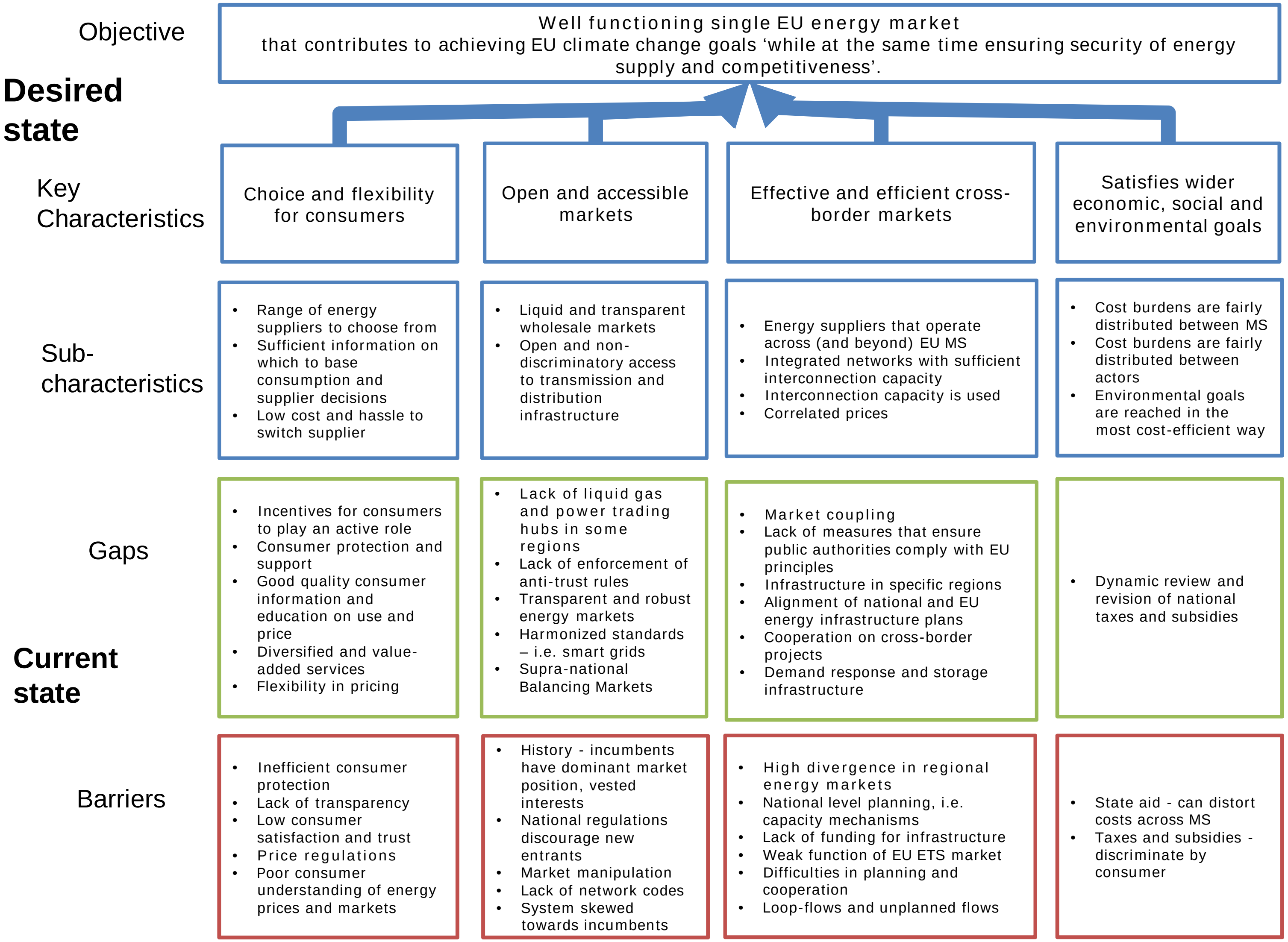
| Document/ Source | Identifies: gaps/ barriers? | Costs? | Suggests actions? | Analysis of distributional impacts? | Energy scenarios? | Overall relevance (high, moderate, low) |
|---|---|---|---|---|---|---|
| **Van Der Veen et al. 2010:** Harmonization and Integration of National Balancing Markets in Europe | **Barrier:**<br>• Balancing regimes not yet sufficiently harmonised and integrated<br><br>**Gaps**:<br>• Harmonization as a regulatory challenge (p. 5,7) | No | Yes | No | No | High |
| **Zachmann 2013:** Electricity Infrastructure: More Border Crossings for a Borderless Europe? | **Barriers**:<br>• Diverging funding schemes for infrastructure investments (p.4)<br>• Non-binding infrastructure planning process (p.8)<br>• Uncertain policy making, conflict of interests among stakeholders and countries → Great uncertainties of investment in transmission assets (p. 3/4)<br><br>**Gaps:**<br>• Harmonisation of rules (in terms of network congestion discrimination, cross-border trade etc.)<br>• Insufficient unbundling of TSOs (p.9)<br>• Missing European system management layer (p.10)<br>• Insufficient capacity transmission network (p.6) | No | Yes | No | No | High |

The gaps and barriers are summarized in Figure 1 below. Broadly, the figure is divided in a description of the 'Desired state' of the single EU energy market (top part) and its current state (lower part). From top to bottom, the figure shows the following:

- **Objective –** The overall objective of pursuing a Single EU Energy Market is to create security of supply, competitiveness through efficiency and to facilitate reaching environmental goals (EC 2006a). EU policy should help reach one or more of these goals based on a coherent policy mix.
- **Key characteristics –** From the literature review, a number of key characteristics of a Single EU Energy Market can be derived. The key characteristics more concretely indicate what constitutes a Single EU Market and what will bring the objectives closer. EU legislation and documentation (mostly from the Third Energy Package) also contributed to the determination of those characteristics.
- **Sub characteristics –** In the boxes with sub characteristics the key characteristics are further defined.
- **Gaps –** Gaps indicate what is missing in the current situation that makes it different from the key characteristics of the Single EU Energy Market as described under 'desired state'. These gaps have been derived from the reviewed literature.
- **Barriers –** Barriers indicate, in reverse, what characteristics of the current state prevent the development of the Single EU Market as described under the key characteristics. Again, these barriers have been derived from the reviewed literature.

We grouped the identified gaps and barriers to the associated key characteristics of a well-functioning single EU energy market. Some gaps and barriers will be further discussed. Firstly, the most important 9 barriers and gaps (indicated in italics and bold in the figure below) will be discussed briefly in the paragraph below. Subsequently, 4 of these (those indicated in bold) will be further elaborated on in specific cases.

**Figure 1: Gaps and Barriers in the EU energy market**



From the identified gaps and barriers, some were identified to be further investigated, worked out into case studies, as a part of which the costs of not addressing them is quantified as the 'Cost of Non-Europe'.

These case studies were chosen on the basis of their assessed relevance as presented in Table 2 below. As part of this, the identified gaps and barriers were assigned to one of the market or policy segments listed below. The relevant segments are listed in the following together with the market effect of overcoming a gap or barrier within the according segment.

- **Efficiency of market performance**: Does the gap/barrier impede the demand with the largest value creation being met with the most cost-effective supply?
- **Efficiency of system operation**: Does the gap/barrier impede power plant dispatch and energy flows from being economically optimised, decreasing operational costs?
- **Protection of consumers**: Does the gap/barrier impede market prices being set at a level that allows competitive pressure to minimize consumers' prices?
- **Competition performance**: Does the gap/barrier impede newcomers from entering the market?
- **Security of investment**: Does the gap/barrier impede market actors from investing and can it be solved with a more static policy approach to increase trust?

Subsequently, it is outlined in Table 2 whether improvements in this segment have a direct or indirect impact on social welfare. For example, increasing the efficiency of market performance directly leads to lower costs of supply which is followed by lower prices and higher consumers' surplus. Also a more efficient system operation decreases system costs which decreases the costs of energy delivery for end-consumers. Such effects will be explained in detail within the assessed cases later in this study. An example of indirect impact of social welfare is increasing competition performance or security of investment, which only indirectly improved consumers' surplus. Namely, there will be more suppliers entering the market competing with each other can prevent the abuse of market dominant positions and may lead to lower prices that would otherwise occur, a higher level of service, and hence better customer satisfaction. Security of investment also has indirect impact: it leads to increased investments, which, in turn, increase supply and meet demand more efficiently. Subsequently, prices decrease, the market result becomes more efficient and the welfare increases.

The gaps/barriers that directly affect the welfare were chosen for further assessment. Here, political measures to overcome the gap or barrier can improve welfare directly.

**Table 2: Relevance of the identified gaps and barriers for the EU**

| Gap/Barrier | | Market/ policy segment mostly affected | Direct/ indirect impact on welfare | Derived relevance for EU |
|---|---|---|---|---|
| **1** | Gas and power trading hubs in some regions | Efficiency of market performance and system operation | Direct | Very high |
| **2** | Price regulations | Protection of consumers and competitors | Direct | Very high |
| **3** | Market coupling | Efficiency of market performance and system operation | Direct | Very high |
| **4** | Supra-National Balancing Markets | Efficiency of market performance and system operation | Direct | Very high |
| **5** | High divergence in regional energy markets | Competition performance | Indirect | High |
| **6** | History – incumbents have dominant market position, vested interests | Competition performance and protection of consumers | Indirect | High |
| **7** | Loop flows and unplanned flows | Efficiency of system operation | Direct | Very high |
| **8** | Dynamic review and revision of national taxes and subsidies | Securities of investment | Indirect | High |

The remaining gaps and barriers should not be classified as unimportant. They also have very relevant effects for achieving an integrated market – it merely requires more time after removing the gap/barrier for end-customers to benefit. A more detailed analysis how to overcome best the other gaps and barriers could be the focus of further research activities. The limited scope of the study also explains why the case of loop flows and unplanned flows that is classified with a very high relevance for the EU could not be considered.

Still, the chosen cases being analysed in the study can convey a broad picture of the existing challenges in the European market and help to quantify the current Cost of Non-Europe.

## 2.1 Gaps

**Liquid gas and power trading hubs**

To have an open and accessible energy market, it must be possible for energy producers and consumers to find each other in a market place. This is only possible with a liquid wholesale market, which facilitates the buying or selling of a desired commodity or financial instrument quickly, without causing a significant change in its price and without incurring significant transaction costs. A liquid market is less prone to market manipulation, and contributes to sound and transparent prices. The latter increases confidence for market participants when they make decisions, for instance, on investments, risk management and potential market entry.

While most EU countries have hubs and exchanges in place that facilitate trading, there is not always sufficient demand and supply to characterise them as 'liquid'. This means that players in those markets cannot rely on the market to provide them with energy at any given time, or to sell their surplus energy at a reasonable price if they have a surplus. This mostly affects new competitors in the markets, as these often do not have sufficient assets or flexible long-term contracts to make them independent from the market.

If market liquidity improves, making it less risky for new competitors to enter the markets, large end-users of energy are likely to benefit first. These have a strong incentive to find a new supplier with a competitive price, have the volume to merit the transaction costs involved with changing energy suppliers, and operate in a relatively unregulated environment. Also, these companies are the most likely to have the in-house expertise to trade directly on the wholesale markets.

As an additional benefit, liquid gas trading hubs that handle a substantial share of the physical gas flow help in delinking gas prices from oil prices, as buyers and sellers will only accept an alternative pricing index if this is based on a large market that cannot be manipulated by either side.

Overcoming this gap means direct impact on welfare and a good effectiveness of according policy measures. As shown in Table 2 this gap will be assessed further within the chosen case studies. We can typify this gap as an regulatory and administrative gap – standardisation and coordination on an EU level are required.

**Market Coupling**

Trading between member states normally takes place based on price differences between trading points. Trading parties monitor market prices on both sides of the border, reserve capacity based on the expectation of future difference and subsequently buy against a low price on one side of the border, transport the commodity across the border and sell at a higher price on the other side of the border. Market Coupling streamlines this process as market operators allocate across borders directly based on bids and offers. This increases the correlation between prices on either side of the border. Which benefits end-users in the market that was higher priced before coupling (as prices move down towards the coupled market) and producers in the market that was lower before coupling (as the price moves up towards the coupled market).

This gap will also be investigated more in detail as one of the chosen case studies. It can be typified as an administrative gap – enforcement and implementation of existing standards and regulations are required.

**Dynamic review and revision of national taxes and subsidies**

Taxes and subsidies are necessary to raise public funds and to correct market failures. However, these have a potential distorting effect on the level playing field and the achievement of environmental goals. The level playing field is endangered if taxes and subsidies do not (legally and effectively) benefit potential new competitors as much as incumbent companies. They might endanger environmental interests if they are not carefully designed to compensate for externalities.

Taxes (in particular exemptions thereof) and subsidies have also an important impact on technological innovation, both in terms of drivers for R&D of new technologies and their market deployment and diffusion. Due to factors such as path-dependency and externalities, the development and diffusion of (new) low carbon technologies such as renewable energy or energy efficiency technologies depends on an appropriate tax and subsidies regime. Such a system needs to be carefully designed to ensure overall cost efficiency and effectiveness in view of the environmental goals to be reached. It should account for the role and interests of incumbents and stimulate the entry of new players in the market such as new energy generators or suppliers in the case of renewable energy and energy service companies in the case of energy efficiency. This is a regulatory gap.

## 2.2 Barriers

**Price Regulations**

In some countries in the EU end-user energy prices are regulated. While price regulations can be justified to protect certain consumer groups or encourage competition in case of insufficient market players to stimulate competition, it can at the same time impede new competitors from entering the market, especially if prices are set at a level that do not reflect costs. This may ultimately lead to lower customer service and hence lower customer satisfaction. Moreover prices that are set at a level that do not reflect costs may not send a price signal that could stimulate investments both on the supply and demand side. This barrier is further investigated in one of the case studies. It can be typified as a regulatory barrier – both in terms or removing regulation at a national level and adding regulation at the EU level.

**System skewed toward incumbents – for example balancing regimes**

National energy market models have often been shaped in a non-liberalised environment, where energy companies were highly enmeshed with other functions that are now unbundled, such as transmission services. This means that in many cases energy market models have evolved in a way that suits these incumbent companies best. This is exacerbated by the fact that often the incumbents have close links with government and regulatory institutions, which allows them to safeguard their interests in future policy through effective lobbying. Governments are likely to take the interests of national energy companies into account as they provide significant employment.

An example of this is the balancing market. Balancing regimes can be quite severe, heavily penalizing any divergence from forecasted supply and demand by balance responsible parties. This affects new competitors more than incumbents for a number of reasons. The first reason for this is that new competitors have fewer customers, making it more difficult to forecast demand – statistically it is easier to forecast the behaviour of a large group. Also, they have less historical data of the customers and less experience with local demand behaviour. And finally, new competitors often do not have generation assets in the geographical area they are entering – this leaves them without means to correct any imbalances as they occur.

For the reasons above, gaps and barriers in the balancing markets will be looked at more closely in one of the case studies. This is a regulatory and administrative barrier – EU standards for security of supply must be introduced, and EU institutions must be created to realise a full European balancing market.

**High divergence in regional energy markets**

Uniformity is beneficial for international trade. It increases transparency and allows for better and quicker decision making by energy traders. Also it limits additional requirements for the implementation of operational procedures and systems when entering into business in a new member state. Within the EU there is still a high divergence between regional energy markets. This is true for contractual arrangements around grid access, for permit requirements, balancing requirements and subsidies and taxes. Beneficiaries of more uniformity between systems would be energy traders, entrants in the retail markets, and subsequently end-users due to a pressure on margins of incumbents. This is partly a regulatory and partly an administrative barrier – new EU regulations might be required as well as enforcement of existing regulations.

**Loop-flows and unplanned flows**

With increasing interconnection, the phenomenons of 'loop-flows' and 'unplanned flows' increase. These are flows of electricity that choose the way of least resistance between supply and demand, which does not always coincide with the administrative or 'planned' route. These flows make it necessary for system operators to take corrective measures to avoid diminishment of the system integrity. As these corrective measures come at a cost, system operators are not always keen to increase cross-border capacity. This is an administrative barrier – it requires coordination between TSOs.

**Lack of a supranational regulator**

Currently there is no European regulator. Regulators act at the national level. The ACER can help national regulators to find consensus, but has merely an advisory role. Any action has to be undertaken by the Commission. It would help the unification of the European energy market if ACER would be given more authority. This will help supplier of energy throughout Europe to find an nation-independent regulator that paves the way towards a level playing field throughout the EU. This is an administrative barrier.

# 3 Case studies

**Selection**

We have used our analysis of the main gaps and barriers above and the available literature to choose four case studies. Besides the earlier mentioned determination of relevance the following criteria were also taken into account in the choice of the cases:

- No overlap with concurrent or completed studies by European Parliament[1].
- The frequency with which the barrier/gap is mentioned in the analysed sources.
- Case studies should have a good spread over the EU and the various energy markets to ensure a good geographical and market type coverage.

As outlined above the following cases were chosen:

- **Regulated prices -** What kind of regulations related to end-user pricing is preventing the development of a competitive internal market?
- **Development of hubs and exchanges -** What is currently holding back the development of trading hubs and exchanges for gas and electricity?
- **Lack of coupling between markets -** What procedures in the operations of transnational infrastructure are impeding the internal energy market? Quantifying the cost of Non-Europe market coupling between the French and Italian electricity markets is being simulated.
- **Lack of balancing markets -** What is holding back the development of an internal market for balancing services?

The case studies each illustrate one of the identified gaps or barriers, particularly in providing evidence of barriers and gaps in practice, estimates of actual costs and estimates of the perceived benefits of further market integration. Case studies were used to verify the relevance of different barriers for costs to different stakeholders, i.e. consumers, enterprises (across a few sectors) and utilities, where feasible.

**Purpose and method**

The case studies are not intended to be exhaustive, but illustrative, focusing on concrete examples of costs and benefits. They are based on a few interviews with key utilities or interest organisations as well as consumer organisations. Per case, the following topics are touched upon:

- What is the rationale for looking into the case study
- What is the definition of the gap/barrier?
- What are the root causes for the gap/barrier?
- What is the estimated cost of such gap/barrier?
- How can the gap/barrier be overcome?
- What is existing EU policy addressing the issue?
- What could the additional role of the EU be to address the issue?

[1] This means topics like the development of physical infrastructure and price transparency

## 3.1 Case study: Regulated prices

The first case study addresses the barrier of regulated end-user prices in EU member states. A regulated price can be defined as a price which is subject to regulation by a public authority, as opposed to a price set exclusively by supply and demand and hence has an impact on competition on the market (Energy Community 2012).

### 3.1.1 Rationale for case study

Phasing-out of price regulation in energy markets is a key policy objective under EU law. However, regulated end-user prices persist in various formats in around half of the Member States, with underlying political or regulatory objectives varying among Member States (ERGEG 2007a).

The aim of internal electricity market is *'to deliver real choice for all consumers of the European Union, be they citizens or businesses, new business opportunities and more cross-border trade, so as to achieve efficiency gains, competitive prices, and higher standards of service, and to contribute to security of supply and sustainability (EC 2009, pp55-93).*

Achieving competitive prices is an integral part of an integrated market, and in sufficiently competitive markets price development should be borne by market interaction. Only a fully integrated market will allow real choice for all consumers and hence to choose the most competitive offer with the highest level of service.

Regulated end-user prices can have important negative impacts on the energy market. In the case of prices that do not reflect actual costs there are insufficient economic incentives for investments in new and existing generation capacities and demand reduction measures[2]. This has negative impacts on the overall level of competition and may affect energy security. Most importantly, costs not fully reflected in the energy prices need to be covered somehow. These uncovered costs are ultimately borne by energy consumers or taxpayers. Price regulation should be accepted in well-defined cases only, e.g. where the necessary protection of final energy consumers is concerned and to an adequate degree only. The degree to which price regulation is justified needs to be assessed against clearly defined criteria.

The European Court Justice has made a first step by ruling accordingly that the determination of the price level for the supply of gas, e.g. by setting a 'reference price' is possible as long as a general economic interest is pursued 'consisting in maintaining the price of the supply of natural gas to final consumers at a reasonable level' taking account of the objective of liberalisation and the protection of final consumers. Such an intervention in the market should be limited in time and be 'clearly defined, transparent,

[2] Unless the deficit is compensated by subsidies.

non-discriminatory and verifiable and guarantees equal access for EU gas companies to consumers (ECJ 2008).

Still, there is a perceived lack of progress with giving up price regulation. This case study looks at the potential consequences of regulated end-user prices in EU Member States and how these can be overcome.

### 3.1.2 Definition

As stated earlier, a regulated price can be defined as a price which is subject to regulation by a public authority, as opposed to a price set exclusively by supply and demand and hence has an impact on competition on the market (Energy Community 2012). Price regulation can occur in different forms, including the setting or approval of prices, price caps or combinations thereof.

Energy price regulation refers to the 'energy' component of the price only, excluding costs of transport/distribution, taxes, other levies and VAT (ERGEG 2007a). This component is also the element which should be determined by market demand and supply in a fully liberalised energy market. By contrast, the other elements that influence the end-use electricity price are subject to other regulation and legislation including network regulation, taxes and levies/support schemes for energy efficiency and renewable energy sources.

### 3.1.3 Where do regulated end user prices still exist?

In late 2012 CEER published a report on the status of customer and retail market provisions under the third energy package based on input from all 27 National Regulatory Authorities (NRAs) except for Malta and Cyprus. The main findings of this report are as follows (CEER 2012a):

- In around half of the countries covered in the study, regulated end-user prices existed;
- The highest number of eligible customers for regulated end-user prices was in the household sector followed by the small businesses sector;
- Regulated prices for medium and large businesses as well as for energy intensive industries were less frequent;
- While plans to abandon regulated electricity prices existed in a large number of CEER member countries, gas prices were likely to stay regulated in most cases in the near future.

Fourteen NRAs responded that regulated end-user prices exist in the electricity sector. These countries are: Belgium, Bulgaria, Denmark, Estonia, France, Greece, Hungary, Italy, Lithuania, Poland, Portugal, Romania, Slovakia and Spain. Cyprus and Malta as well as Northern Ireland also have regulated prices.

The CEER survey showed that the household sector was subject to regulated prices in all of the 14 countries where regulated end-user prices exist. Almost all examined countries with the exception of a few (Belgium, Poland, and Slovakia) also regulated prices for small businesses. Moreover, there was a small group of countries (Denmark, Estonia, France, and Romania) which also regulated prices for medium & large businesses and energy intensive industries in addition to households and small businesses. If regulated prices existed for households, they applied to most households, with the exception of Belgium where only 7.7% of households (vulnerable customers) received regulated prices. Among the non EU-15 Member States the Czech Republic, Latvia and Slovenia are the only ones without regulated prices for household customers. In 2011 among the EU-15 Member States regulated prices for household customers are still in place in Belgium, Denmark, France, Greece, Ireland, Italy, Portugal and Spain, most of them with increasing prices since 2005 with the highest increases, up to 80%, in Spain and Greece, while in 2011, Italian prices were at the same level as in 2005 (ACER/CEER 2012). This shows some trend for regulated prices to move towards full cost-recovery.

Indeed this is consistent with stated intentions, with the majority of relevant CEER member countries reported to have intentions to phase-out regulated end-user prices (Bulgaria, Denmark, Estonia, France, Greece, Italy, Lithuania, Poland, Portugal, Romania, and Slovakia). However, only some of these countries reported very concrete to moderately concrete phase-out plans (Estonia, France, Greece, Lithuania, Poland, Portugal, and Romania). France has set phase-out dates for medium & large businesses and energy intensive industries but not for households and small businesses). The CEER survey suggests that the overall trend in the electricity sector is to phase out regulated prices (CEER 2012a).

More recent evidence suggests actual progress has been more limited. In 2012 the Commission noted that generally lower electricity retail prices in the EU-12 might be ‘due to the widespread practice of regulated prices and to the incorporation of socio-politically motivated price subsidies in the electricity tariffs’(EC 2012b). It also concluded that ‘significant differences remain in the retail electricity prices paid by household and industrial consumers in different Member States. Particularly large differences in prices continue to be observed between Member States among low consumption bands, primarily owing to price regulation (EC 2012c).’ According to the Commission, currently only 9 Member States (Austria, Czech Republic, Germany, Finland, Luxembourg, Netherlands, Slovenia, Sweden, and UK) do not have regulated retail energy prices in place (EC 2012a).

Table 3 provides an overview of the retail price regulation in Europe.

**Table 3: Retail electricity price regulation in Europe (2011)**

| Country | Household regulated prices | % of household customers under regulated prices |
|---|---|---|
| Austria | No | |
| Belgium | Yes | 7.7% |
| Bulgaria | Yes | 100.0% |
| Cyprus | Yes | 100.0% |
| Czech Republic | No | |
| Denmark | Yes | 85.0% |
| Estonia | Yes | 100.0% |
| Finland | No | |
| France | Yes | 94.0% |
| Germany | No | |
| Great Britain | No | |
| Greece | Yes | 98.7% |
| Hungary | Yes | 99.6% |
| Ireland | Yes (until April 2011) | 63.3% |
| Italy | Yes | 83.3% |
| Latvia | No | |
| Lithuania | Yes | 100.0% |
| Luxembourg | No | |
| Malta | Yes | 100.0% |
| Netherlands | No | |
| Northern Ireland | Yes | 89.9% |
| Norway | No | |
| Poland | Yes | 99.9% |
| Portugal | Yes | 94.5% |
| Romania | Yes | 100.0% |
| Slovakia | Yes | 100.0% |
| Slovenia | No | |
| Spain | Yes | 74.4% |
| Sweden | No | |

Source: ACER (2012), p.24

### 3.1.4 Root causes for regulating prices in energy markets

The political or regulatory objectives for applying end-user energy price regulation vary among Member States, as shown by a survey by the European Regulators' Group for Electricity and Gas (ERGEG) in 2007 (ERGEG 2007a). Three main threads can be detected:

- *Consumer protection*, which is the main reason in a majority of Member States, including by limiting the profits of low cost incumbent suppliers.
- Encourage *competition in markets* that are characterised by strong concentration of market actors and hence overall high entry barriers for market entry of new actors.
- *Support energy-intensive industries* by providing electricity at prices regulated below market price.

*Consumer protection:* Consumer protection applies mainly to protecting the interests of consumers in final energy markets which are deemed to be strongly vulnerable to potential price changes, which is an established objective under EU law. Due to low price and income elasticity vulnerable consumers are particularly affected by price changes:

low-income households, for example, spend a higher share of their income on energy compared to other households.[3]

There is no concluding definition under EU law what constitutes a 'vulnerable consumer'. Member States have discretion to set up definitions, scope and related approaches to protect vulnerable consumers.[4] Assistance to vulnerable consumers can be provided by means of targeted financial support schemes to afford energy, financial or informational assistance with measures to improve energy efficiency in housing or through regulation aimed at lowering prices.[5]

According to a recent CEER report, Belgium France, Italy, Spain and Portugal had social electricity tariffs for vulnerable consumers (ie regulated prices) in place (status 2012) which apply under certain conditions. Belgium, France, Italy and Portugal also had social tariffs for vulnerable consumers in the gas market (CEER 2012). The European Court of Justice has confirmed that Member States are allowed - under specific restrictive conditions – can make use of end-user price regulation for a temporary period as summarised above.

*Maintaining framework conditions for competition:* In case of insufficient competition and in particular in case of a situation with a high market concentration, public authorities may seek to use regulated prices to prohibit market actors from abusing their dominant market position. Prices set at levels which do not distort or hinder competition[6] might help to avoid that incumbents use their price monopoly to keep newcomers out of the market.[7] 'Regulated prices, if set appropriately and competitively, are estimated to play a key role in encouraging competition'. This is a key argument brought forward by the Citizens' Energy Forum. Regulated tariffs can serve as a benchmark for a 'fair' and transparent energy price. Any phase out of regulated end user prices needs therefore to be implemented hand in hand with better clarity, comparability and transparency of

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[3] Analysis of the distributional impacts of the UK liberalisation package for residential utilities markets found that some vulnerable households and particularly pensioners were adversely affected by the market liberalisation (Waddams Price /Hancock 1998). Later assessments for the UK, however, did not confirm the fear about higher prices for vulnerable consumers, but underlined that market concentration in the downstream sector can adversely affect all consumers (Waddams Price 2005).

[4] Article 3, paragraph 7 and 8 of Directive 2009/72/EC and article 3, paragraph 3 and 4 of Directive 2009/73/EC require Member States to define and adapt a concept of 'vulnerable consumers' which should link both to energy poverty and prohibition of disconnection of electricity. This can hence include a wider range of people including people of pensionable age, disabled or chronically sick people; people with defined low incomes or people living in remote area with insufficient access to grids. The practice in Member States varies widely, including approaches to define the group and measures taken to protect vulnerable consumers (see CEER 2012a).

[5] For a detailed review of policies to target fuel poverty, see Hills (2012)

[6] The appropriate benchmark level can be determined at a price per unit of energy level that allows the dominant market player to keep a reasonable rate of return after paying the total costs of energy production, transmission, flexibility and administration. A similar system is broadly applied to determine the regulated tariff of distribution and transmission system operators.

[7] Hall, (2012)

tariffs in retail energy markets' (EC WG 2012). The phase of out of regulated end-user electricity prices in Ireland provides an example on how this can be implemented in practice (see section 3.1.6).

*State aid for energy-intensive companies:* price regulation can imply aid to energy-resource industries when electricity is supply at prices regulated below market prices. Several examples exist in the EU where low-regulated prices apply to large- or medium-scaled companies (ERGEG 2012).

### 3.1.5 Relevant costs and benefits

Regulated end user prices can have important negative consequences for both consumers and (potential) suppliers. These consequences include (ERGEG 2007b):

- Regulated prices for end-users may prevent market prices reflecting market supply and demand and do not incentivise the most efficient investments.
- Regulated end-user prices may prevent new suppliers from entering the retail market if regulated end-users prices are lower than wholesale market conditions and suppliers are not able to cover their costs, unless they have access to grandfathered generation capacities or non-market based long term contracts. A lack of competition in the retail markets keeps liquidity in the market low, and therefore in turn causes a low level of competition in the wholesale markets and may result in lower price pressure.

The public budget can cover the financial gap caused by regulated end-user prices, but ultimately taxpayers have to pay for this (Oettinger 2013). The Commission's Energy Sector Inquiry published in early 2007 (EC 2006b) argued that regulated supply tariffs below market prices lead to debt for the future due to delayed investments.

However, there are situations, where regulating end user prices may be justified and even required to protect certain customers at a time. Particularly in situations of high market concentration a risk of abusing a dominant market position might result in higher rather than lower prices for end-consumers. For example, for the UK Thomas (2005, pg. 8) argues that after liberalisation of retail markets for small consumers "*wholesale prices went down by 35 per cent from January 1999 to January 2002. But the price paid by large consumers for their generation and retail elements of their bill had gone down by only 22 per cent, while the amount paid by small consumers had actually gone up by 5 per cent. It would appear that the retail companies kept these cost reductions as extra, unearned profit*."

The legitimate concern of protecting specifically vulnerable consumers should not be confused with a need for end-price regulation for all consumer classes. Price regulation can only be a temporary means to address unsatisfactory market conditions. It will not address the main root causes. Criteria and policies for transparency and equal access are needed to achieve this. It is also a key question whether regulatory measures are needed and effective to ensure adequate protection of vulnerable consumers in liberalised markets in terms of affordability of energy, or whether the same means can be reached by other means of non-distortive support, including tax discrimination, subsidies or other social benefits. Erecting a social tariff is at least meeting a number of difficult questions, including determination of beneficiaries, communication and monitoring. Any complementary measures to help final consumers to cope with energy prices should include the support for the implementation of energy savings measures that reduce final energy consumption.

Following we provide further detail on the consequences of price regulation.

#### *3.1.5.1 Insufficient price signal for investments in energy efficiency measures*

Regulated prices that are not cost-reflective lead to a situation of underinvestment on the demand side, too. In theory, the lower the electricity prices are, the lower the economic reward for implementing demand reduction measures. The non-implementation of the economic potential for energy savings measures can have several negative consequences (or costs) for the electricity system. More generation capacity (and hence more investment) is required than would be needed if cost-effective energy savings measures were implemented. While this can be beneficial for the income of the energy sector itself, it has more negative wider economic effects.

Exploiting the economic energy savings potential in businesses increases their competitiveness. Moreover, investments in energy savings measures provide an important economic stimulus to firms in the energy efficiency sector. Costs/benefits of the insufficient price signal for investments in energy savings measures could be quantified as follows:

- Investment costs for generation capacity that could be avoided in case of lower (peak) demand;
- Benefits for consumers in terms of reduced energy consumption and bills;

However, although insufficient price signals are an important economic barrier for the implementation of energy savings measures on the demand side, many other important barriers to the implementation of such measures in the buildings and industrial sectors persist. These include financial barriers such as lack of access to capital and (perceived) high upfront costs as well as institutional barriers such as split incentives between owners and tenants (IEA 2010). It therefore would appear misleading to imply that higher (non-regulated) end-user prices would (automatically) result in the implementation of energy savings measures.

#### *3.1.5.2 Underinvestment in capacity / delays in investments*

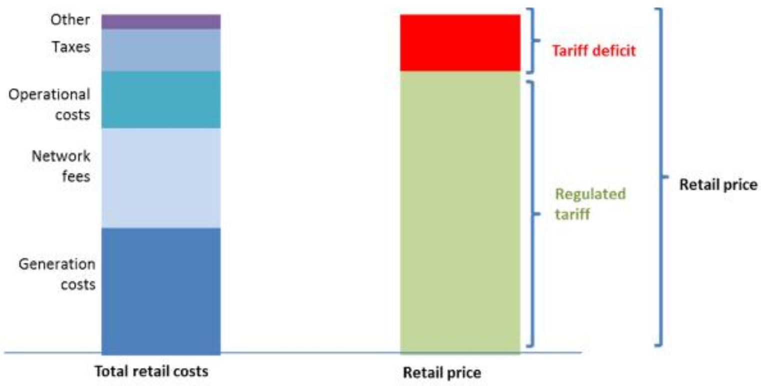
If suppliers cannot fully recover their costs due to prices being regulated at a level which is not cost-reflective, incumbent economic operators may be able to continue their operations based on existing written off/low cost generation capacity but are unlikely to make (sufficient) profit to invest in upgrading existing generation capacity or in new generation capacity. Also it does not provide economic incentives for new players to enter the market and invest in new generation capacity. The lack of investments in generation capacity by incumbents or new entrants limits liquidity in the electricity market and hampers competition at wholesale and retail level. At the latest when the existing generation capacity has reached the end of its technical life-time, it will be necessary to invest in new generation capacity.[8] The investment gap accumulated over time will then have to be borne by consumers and/or taxpayers. This may have re-distributional effects across different consumer groups.

**Illustrative example: A tariff deficit and underinvestment in supply and demand**

If no other supporting policy and regulatory measures are in place to generate income for the generation and supply of electricity, the price generated at the retail market is the only income for the operator. As a consequence the retail price needs to cover the full retail costs consisting of the generation costs, network fees, taxes and any other levies.

If regulated end-user prices are fixed below the total retail cost a tariff deficit occurs (see Figure 2). This deficit can either be borne by an economic operator in the generation/supply chain at the costs of incurring losses or by the electricity 'system' which ultimately means by the taxpayer or the final consumer.

**Figure 2: Illustration of tariff deficit**




Source: own elaboration

The tariff deficit is accumulated for each kWh of electricity supplied at the regulated tariff. In a country where the electricity retail market price is EUR 0.20 per kWh for domestic consumers and the regulated tariff is set at EUR 0.18 per kWh, the tariff deficit would be EUR 0.02 per kWh. If there are 15 million domestic consumers with an average

[8] There is an obvious link to security of supply and the adequacy of generation capacity as discussed in the context of capacity markets. It is outside the scope of this research paper to determine generation adequacy and how to achieve it. Here the focus is on how non-cost-reflective pricing prevents investments in new generation capacity and relevant costs over time.

annual electricity consumption of 3,000 kWh of which 80 per cent are supplied at the regulated tariff, it would result in a total tariff deficit of EUR 720 million per year.

The tariff deficit is likely to be compensated for by degrading the quality of goods and services offered, as this would provide a viable option to achieve higher returns, whereas capacity investments would be constrained. The market would be characterised by excess demand and limited willingness to invest in existing or new generation capacity (Roques/Savva 2006).

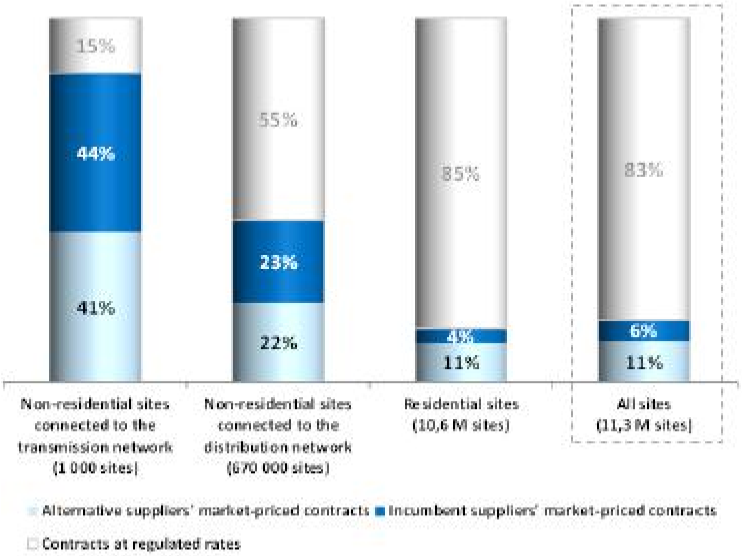
Abolishing the tariff deficit by either setting the regulated tariff at retail market price level or by removing the regulated tariff altogether would result in an increase of the average household electricity bill under the regulated tariff regime by EUR 60 per year, assuming a competitive market structure. Such an increase of the electricity bill could be addressed by implementing energy savings that reduce annual energy consumption by around 10 per cent or 333 kWh. These required savings compare to estimated standby electricity consumption of 305 kWh per year in EU-12 Member States or potential savings from switching from present state to best available technology of about 1 300 kWh/year/household in EU12 Member States (Almeida et al. 2009). It has been well documented in the literature that price signal alone is unlikely to trigger energy efficiency among households due to a number of other market barriers, but it can be an important driver. Complementary measures such as information campaigns are therefore essential to help households to better understand and exploit the considerable electricity savings potentials (see also 3.1.5.1).

**Case study I: French gas retail market – regulated end-user tariffs as the main reason for the non-functioning of the French gas market**

A recent assessment of the French gas retail market by the French competition authority (Autorité de la concurrence) (Autorité 2013) highlights several negative consequences of regulated end-user prices. While the French gas market was gradually opened to full competition for all gas consumers in 2004, the French authorities have maintained regulated end-user tariffs for all consumer groups in the French gas retail market. This has been justified on the basis of competition being considered as too low. The regulated end-user tariffs are applicable to incumbent natural gas suppliers that were present in the French gas retail market before market opening, mainly GDF Suez.

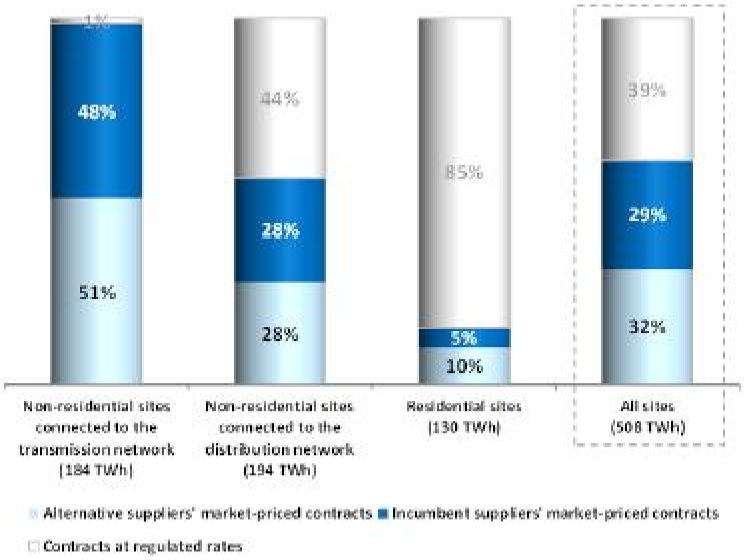
After more than 5 years of full market opening, as of 30 September 2012, the incumbents had still a market share of around 90 per cent (in relation to number of sites delivered) and 68 per cent (in relation to consumption volume). Among the three largest industrial consumption sites incumbents have a market share of 49 per cent, among SME the market share is 72 per cent and among residential customers the market share is 90 per cent (see Figures 3 and 4).

**Figure 3: Share of sites for each type of contract on September 30th, 2012**




Source: CRE (2012, p.40)

**Figure 4: Share of annualized consumption for each type of contract on 30 September 2012**



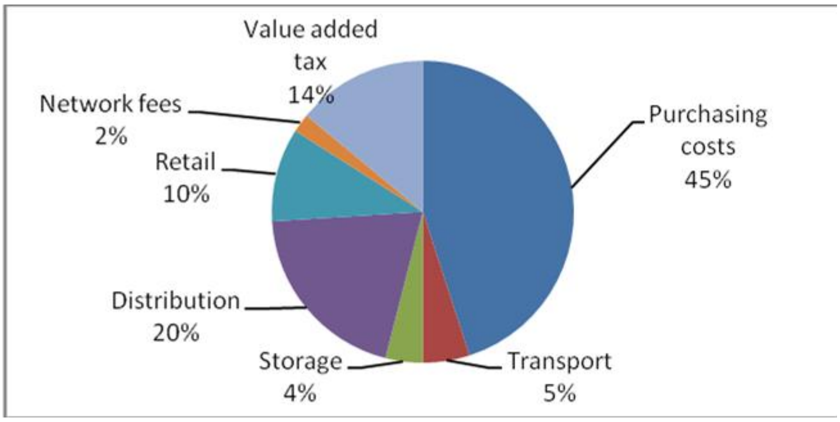

Source: CRE (2012, p. 40)

Non-incumbent gas suppliers have therefore a relatively low market share, although they can offer end-user prices that are up to 15 per cent lower than the regulated tariff according the French competition authority's assessment.

A price comparison of the French competition authority in March 2013 showed that a household could have saved up to EUR 450 per year on its natural gas bill if he had switched to best price offer.[9] In its market observatory of the 4th quarter 2012, CRE notes that a household could save up to EUR 117 if it switched from the regulated tariff to best market officer.[10] Despite this considerable economic benefit the low switching are due to low level of information about competitive offers and the possibility to switch as well as the perception of regulated tariffs as being the best offer. In France around 40 per cent of the 27 million households use gas for central heating[11] and around 9 million of these households use the regulated gas tariff[12]. If only half of these 9 million households switched to the best market offer, total annual savings of between EUR 500 million and EUR 2 billion could be realised, based on possible savings per household of between EUR 117 and EUR 450.[13]

The French competition authority notes that new suppliers can offer lower tariffs because of lower purchasing costs and lower administrative costs as compared to incumbents. The regulated end-user tariff consists of the following elements building on the cost structure of incumbent operators: purchasing costs, transport, storage, distribution, retail, network fees and value added tax (see Figure 5).

**Figure 5: Elements of regulated natural gas tariff for consumers with natural gas heating system**




Source: Autorité (2013)

While overall the regulated tariffs seem to cover underlying costs of the contracts, there are important differences among the different consumer groups. The smaller the consumption, the higher the tariff deficit which is estimated to be as a high as 29.6 per

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9 Based on an annual consumption for a household with natural gas based heating system for a surface of more than 200 m2.
10 CRE (2013): Electricity and gas market observatory 4th quarter of 2012
11 Commissariat Général au développement durable (2010) : Le budget « énergie du logement » : les déterminants des écarts entre les ménages, bulletin n°56, June 2010 ; INSEE (no date): Ménages selon la structure familiale, http://www.insee.fr/fr/themes/tableau.asp?reg_id=0&ref_id=AMFd2
12 CRE (2013): Electricity and gas market observatory 4th quarter of 2012
13 In 2013 there are around 5.4 million B1 tariff customers in France (personal communication).

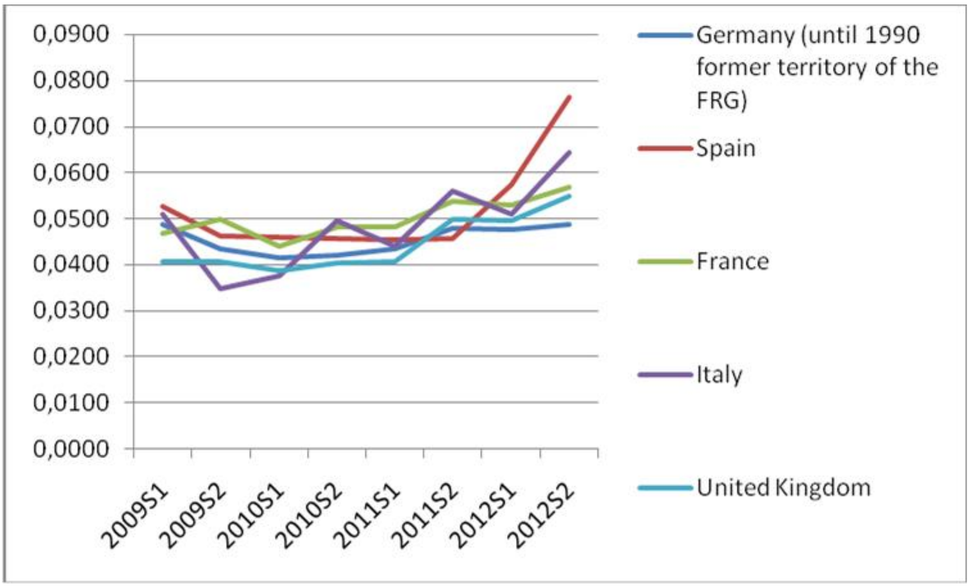
cent for customers using the basic tariff ('base') which makes it impossible for non-incumbents to enter this market. While consumers eligible for this specific tariff benefit from the regulated tariff, the tariff deficit needs to be borne by the other consumers.

The report by the French competition authority notes that despite increased costs of purchasing natural gas due to the long-term contracts indexed to the development of oil prices, the regulated end-user tariffs have not been increased recently. Since 2009 the government has not approved any increase but preferred to keep the tariff constant. This practice has been questioned several times by the 'Conseil d'Etat'. This practice has led to scepticism among non-incumbent suppliers on the long-term perspectives of the market and made them reluctant to be more active in the market. On the other hand, the non-increase of the regulated tariff may have reinforced the perception that regulated tariffs are more favourable than alternative non-regulated tariffs at market prices.

The French competition authority concludes in their assessment that the regulated end-user tariff is the main reason for the non-functioning of the French gas market.

In addition to the assessment of the dynamics of the French gas retail market, the French competition authority also compares the situation on the French market with other major markets in Europe (Great Britain, Germany, Italy, and Spain). The analysis shows that in countries with no regulated tariffs (Great Britain and Germany) natural gas prices have been constantly lower than in those countries with regulated tariffs (France, Italy and Spain) (see Figure 6).

**Figure 6: Gas prices - domestic consumers - bi-annual prices (EUR/kWh)**




Source: Eurostat (2013)

### 3.1.6 How to make more progress with phasing out of price regulation?

In principle terms, there is a comprehensive and adequate policy framework in place in the EU that foresees the abolishment of price regulation where it still exists. Better implementation is a key need, and the Commission is already taking infringement procedures as a tool to speed up process. Beyond that it is relevant to focus on the needed interplay of different policy instruments to help structure a transition process:

- Develop comprehensive phase-out plans to provide overall orientation and certainty to all market actors
- Establish clear criteria where price regulation is deemed necessary to protect vulnerable end-users (ie consumer protection) and enforce these criteria.
- Define standards for regulatory processes (e.g. transparency, equal access) and ensure competition in markets, coupled with a clear signal to the market on the regulatory fall back option in case competition in the market ceases to exist.

In the following we illustrate the effectiveness of such an approach based on the example of the Irish Roadmap to phase out regulated end-user electricity prices.

**Case study II: The Irish Roadmap to phase out regulated end-user electricity prices**

In April 2010 the Irish Commission for Energy Regulation (CER) published a Roadmap to Deregulation (CER 2010). This Roadmap provides a good example on how the phase out of regulated end-use prices on the electricity market can be phased out based on clear criteria and hence providing transparency and predictability to market participants.

In the past the Irish electricity market was dominated by the Electricity Supply Board (ESB) which was at the same time the incumbent generator and supplier of electricity to all consumers. Whilst price regulation on generation was removed in 2007, the retail market continued to be subject to price regulation. In 2009 a consultation on proposals on a Roadmap for Deregulation was carried out (CER 2009). One of the main objectives of the consultation was to agree on a suitable definition of relevant retail markets and how to assess the level of competition in its market in order to be able to judge whether price deregulation is appropriate or not.

Based on the consultation process the CER published the Roadmap to Deregulation in 2010 which determined the following criteria to decide on the removal of price regulation in the relevant market segment:

- There are at least three suppliers active in the relevant market; and
- There is a minimum of 2 independent suppliers, each of which has at least 10% share of load (GWh) in the relevant market; and
- Electricity Supply Board Public Electricity Supply (ESB PES) and Electricity Supply Board Independent Energy (ESBIE) combined serves or will serve within a specified period a defined percentage of consumption market share in a

relevant market. For each of the Business markets, the percentage market share is 50% or less. In the Domestic market, the percentage market share is 60% or less.

In addition, for the domestic market, the following two requirements were set out:

- Switching rates must be greater than 10%.
- ESB must provide the Commission with a satisfactory commitment for the rebranding of ESB supply companies prior to the deregulation of the domestic market. Thus de-regulation at a market share of 60% is conditional on ESB undertaking to remove the ESB brand from the retail market.

The rebranding of the ESB supply arm was considered as important to avoid confusion among customers between ESB as the independent operator of Ireland’s distribution network and its separate activities as supplier.

As soon as these criteria were met price regulation was to be abolished. However, the regulator made it clear that if any of these criteria are not met anymore, correcting measures would be undertaken which may include the re-introduction of price regulation and hence providing a strong signal to all market participants. It also underlined the need to keep in mind the need for customer protection including the treatment of vulnerable customers.

Based on the above criteria, in a first step electricity price regulation was abolished for business customers in October 2010. In a second step, as of 4 April 2011, electricity price regulation for the domestic market was removed. ESB’s rebranding of its supply activities resulted in the establishment of Electric Ireland in December 2010. After complete removal of price regulation in the Irish electricity market CER underlined that customer protection remains of ‘paramount importance’ (CER 2011). The importance of customer protection is addressed by complementary measures such as customer education campaigns, the provision of detailed consumption information and tariff comparison facilities. While price reductions may be expected as a result of deregulated electricity markets, other innovations such as improved choice and better service are considered equally important. This is particularly relevant in Ireland where international fuels costs are the main factor in electricity prices.

### 3.1.7 What is existing policy addressing these issues?

The Commission uses both political and legal instruments against regulated end user prices.

In its communication of November 2012 on the internal energy market the Commission argues that Member States should phase out regulated end-user prices for all consumers and that all elements of the retail price should be clearly communicated to consumers. The Commission intends to insist on phase-out timetables and push for market-based price formation including through infringement cases if price regulation is not compliant with existing EU legislation (EC 2012a).

In April 2011 the Commission pursued infringement procedures against Italy (electricity prices), Poland (gas prices) and Romania (electricity and gas prices) by sending reasoned options requesting these Member States to align their legislation so that prices are primarily set by supply and demand and hence remove obstacles for new market entrants and allow consumers to choose the best offer available on the market. In the Italian case it is argued that the regulated prices do not have a clear end and go beyond what is necessary to protect customers and prevent access of new entrants to the Italian market. In Romania, regulated prices apply to all consumers that have not yet switched supplier (EC 2011a).

The EU's Agency for the Cooperation of Energy Regulators (ACER) established by Regulation (EC) No 713/2009 is tasked to monitor *inter alia* the retail prices of electricity and natural gas and shall publish the results in an annual report (Article 11 of Regulation (EC) No 713/2009).

#### 3.1.8 Role of the EU

- Continuation of infringements and monitoring
- Phase-out of price regulation as part of the Europe 2020 strategy and National Reform Programmes
- Methodology to set 'fair' regulated prices in case of insufficient competition in the energy market
- Support transparency and trust among all market players

## 3.2 Case study: Hubs & Exchanges

This cases study focuses on what is currently holding back the development of trading hubs and exchanges for gas and electricity.

#### 3.2.1 Rationale of the case study

Generally, the availability of a liquid hubs & exchanges[14] in an area has a number of advantages. It brings together supply and demand in a certain region, allowing the most cost-efficient source to be used to meet the demand that creates the largest value. In addition, it creates a price signal that allows consumers and producers to make decisions about their optimal level of production and consumption, and to make decisions about investments in for example generation capacity or efficiency measures. As liquidity of a market increases, it reduces the possibilities of market player to manipulate prices, and thereby increases the soundness of market results as a reference price.

[14] A liquid wholesale market 'facilitates the buying or selling of a desired commodity or financial instrument quickly, without causing a significant change in its price and without incurring significant transaction costs' (ACER/CEER 2012).

In addition to these and other general advantages, liquid hubs and exchanges also play an important role in the creation of an internal energy market. Firstly, it allows new entrants to buy or sell electricity at any time, reducing volume and sales risk, and providing a source of flexibility for unexpected fluctuations in demand. Secondly, the price signal that was mentioned above allows potential new entrants to assess the business case of entering a certain market. Thirdly, the element of liquidity is important as it reduced the risk of price manipulation by incumbent parties, which can be used to harm the interest of new competitors.

Not all EU member states have liquid hubs & exchanges. Regarding electricity, countries like Estonia, Hungary, Slovenia have low liquidity, while also Poland, Romania, Austria and France lag behind[15]. The Nordic countries are leading in liquidity[16]. The development of liquid gas hubs stays behind, with liquidity and availability of trading places gradually reducing when moving from the North-West of Europe towards the South-East. (ACER/CEER 2012)

### 3.2.2 Definition

There are many types of energy markets: there are real-time, day-ahead and forward markets.

The real-time market is usually referred to as the 'balancing market'. This market will be discussed later in this report. The real-time market is not an exchange but is organised as a 'single-buyer' market, where the TSO acts as the buyer. This is because the required response time is not sufficient to have a bidding process between the forecast and the delivery. Therefore this part of the market is out of scope of this case study.

Because their timing is close to real-time and their liquidity is very high, day-ahead markets are considered to be most important for market development: these are the markets where products are traded for delivery on the next day. At this point, time to delivery is sufficiently short to have knowledge about actual demand to be reflected in the pricing (elements like weather and unplanned outages), while at the same time the time to delivery is sufficiently long to for the market operators to process bids and offers, notify market players of the results and for the market players to plan the entire generation portfolio for dispatch based on the actual outcome of the markets[17]. For this reason, day-ahead markets are the focus of this cases study.

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15 If expressed as the traded volumes compared to national demand, liquidity number of these particular countries are: Estonia (0,01%), Hungary (10%), Slovenia (11%), Poland (13%), Romania (16%), Austria (12%), France (13%).

16 Denmark has a liquidity of 94%.

17 To make decisions for trading on the future markets, forecasts must be made. These forecasts become more precise, and more granular as the delivery date nears. Linked to this, the granularity of the markets also increases as delivery of the energy nears. For multiple years ahead, trades are commonly only made in blocks of an entire year. As delivery nears, trades move into quarters, months, weeks, days, and finally hours for the day-ahead and intra-day markets. This way the purchasers can continuously sculpt and improve the 'shape' of their net purchases to match their

Bases on day-ahead markets, forward and future markets can develop. These provide an opportunity for market players to reduce risk, as they can plan for the future: it allows purchasers to hedge against future price changes. For sellers it does the same, albeit against the risk of an opposite (downward) price movement. These markets allow stability and planning of costs on the demand side and profits on the supply side. In its turn however, forward and future markets are not possible without day-ahead markets – trading decisions are mostly taken on the basis of what is expected to be the day-ahead (and ultimately the real-time) price. This is why our case study focuses on the creation of day-ahead markets.

Energy can be traded either bilaterally (also known as 'Over-The-Counter' ('OTC')) or on an exchange. In the OTC market player trade directly with each other and establish a deal. An exchange is a marketplace where bids and offers are collected centrally and matched by a market operator. This results in a clearing price that balances supply and demand. Besides an increased transparency in trade, a centralized setting of matching bids and offers can lead to a more efficient allocation of energy. Advantages of an exchange are that they provide more transparency of prices (the same, published price for all trades) and that there is less need for credit management as there is only a single counterparty (the exchange).

### 3.2.3 Root causes of the gap/barrier

Various factors in the current design of European markets impede the development of energy exchanges. There are differences between electricity and gas markets and a lack of liquidity is more of a barrier in electricity markets than in gas markets. Accordingly, the identified root causes are separated between the markets.
Electricity Markets:

- **Different designs of wholesale markets** – Different levels of liquidity in European power exchanges can in part be explained by different designs of wholesale markets (ACER/CEER 2012, p. 63).[18] In some countries it is compulsory to offer any uncommitted capacity in the day-ahead markets (Spain), in other countries it is compulsory to trade cross-border through the exchange (Nordic countries), and in many countries there is no obligation to trade.
- **No consensus** – Establishing a common trading platform for the European exchange of gas and/or electricity requires a consensus on the selection of one of the existing platforms. Here, no consensus can be found yet (ACER 2012, p. 35).
- **Current cash out arrangements are not strictly cost-based** – Regarding equal treatments of market participants still some arrangements are found that are disadvantageous for new entrants. For example, current cash-out-arrangements for forecast deviations in the UK that have to be paid by traders are not strictly

demand. For most players the day-ahead exchanges are an important step to match their sales and purchases with the most recent day-ahead forecast of demand.

cost-based[19]. This means that the reward for reducing imbalance (intentionally or unintentionally) is less than increasing imbalance is penalised. This means that smaller parties, who have relatively more inaccuracy in their forecasts[20], have higher overall balancing costs.

- **High market concentration** – High market concentration and still existing vertical integration is a barrier (OFGEM 2009, p. 26). This means a small part of the flow of energy is traded on the hubs, while the vertically integrated companies at the same time have a dominant market position, which makes trading for entrants riskier as prices can be manipulated to their disadvantage.
- **High volumes being traded OTC** (DG Int Pol 2010, p. 66) – For traders it can be beneficial to trade on the bilateral markets (Over-The-Counter, or OTC markets). This is because in those markets they can make a profit by using price differentials due to opaqueness of the markets. Also, bilateral markets give traders more flexibility as they are not bound to the procedures of exchanges and have lower transaction costs.

Gas Markets:

- **Lack of information** – There is insufficient information being made available by the TSO. In particular, sufficient historical data on capacities, nominations and flows, interruptions and information relating to secondary markets and balancing are not available to market participants (ACER/CEER 2012, p. 144)
- **Lack of standardisation** – Large diversity of products and of data formats which leads to a lack of standardisation (ACER/CEER 2012, p. 144).
- **Capacity hoarding or withholding interconnection** – Due to still existing market concentration further problems like capacity hoarding or withholding interconnection can be identified (ACER/CEER 2012, p. 126).
- **Lack of access to hubs and intraday trading** – Presumably also connected to high market concentration a lack of access to hubs and intraday trading can prevent the market from developing liquidity.
- **Insufficient information –** Insufficient information, in particular in gas hubs, increases insecurity of trading and transaction costs.

### 3.2.4 Costs and benefits

The general benefits of bringing markets together through increased trading cooperation will be presented in this paragraph. Subsequently the particular advantages of trading on exchanges compared to OTC will be pointed out which supports the EU's intention to focus on a further development of exchanges.

19 http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/CashoutRev/Documents1/Electricity%20cash-out%20issues%20paper.pdf

20 This is due to having a smaller and therefore less predictable portfolio, and having less knowledge of their customer base as they have less historical data.

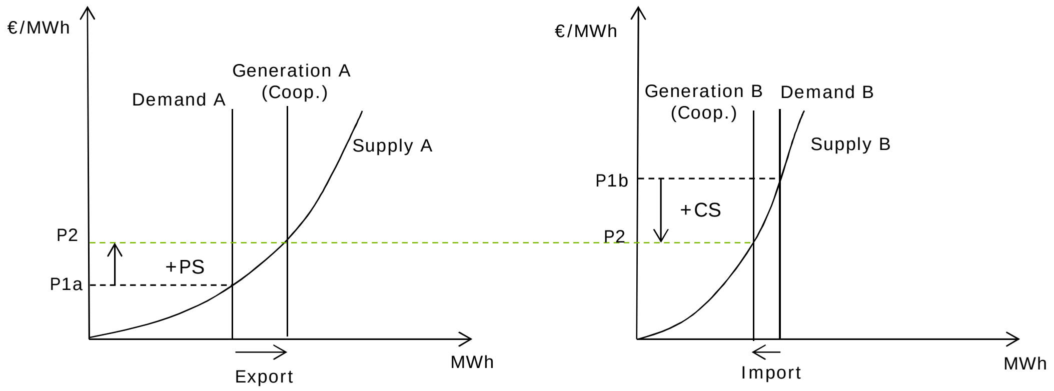
This case looks at liquid hubs & exchanges as a means to bringing separate EU member state markets together[21]. Increased cooperation in trading between countries can have significant economic impacts. The cost of Non-Europe in this case is defined as the loss of social welfare due to the continued separation of supply and demand curves, which continues due to a lack of liquid exchanges on either side of an EU internal border.

For this purpose, social welfare is defined with the following formula:

$$Social\ Welfare = Consumers'Surplus + Producers'Surplus + Congestion\ Rent$$

As illustrated in Figure 7, before cooperation, countries show a typical market clearing with equal demand and supply. With increased trading (cooperation) generation in the low-price country A increases since there is more cheap generation available. The excess power produced will be exported to the high-price country B. Here, generation decreases which leads to significant cost savings. The missing amount for satisfying the demand can be imported from country A. Overall, price converges to p2, country A shows additional producers' surplus (+PS) and country B additional consumers' surplus (+CS).

**Figure 7: Benefits of international trade, Source: Own Illustration**




Also, generally, grouping demand together lowers the overall capacity that is required to meet peak demand: individual peak uses do not occur simultaneously and therefore show a 'flatter' profile if joined together. This means that a lower generation capacity is required to provide the same volume of energy. This lowers the cost per unit of energy.

**Case study: Combining demand and thereby lowering the peak demand**

Unfortunately, it is very difficult to quantify the benefit of bringing together supply and demand in a national market, as in countries without liquid markets transparency and availability of information is low.

To none-the-less illustrate what the costs are of having non-integrated generation portfolios might be, we looked at the case of bringing together the demand portfolios of Germany, France, Luxemburg, Netherlands, Belgium and Austria, as studied by Hasche et al. (Hasche, 2012). This allows a comparison between a 'non-Europe' situation, and a

[21] This assumes that interconnection capacity is available between markets.

situation whereby the above-mentioned countries are well integrated through physical intermission capacity, the use of which is optimised by liquid market places in the countries included in the area.[22] A similar effect happens when liquid exchanges connect different portfolios within a country.

The study compares the capacity that is required to meet reliability requirements, on the one hand in the case of separated systems, and on the other hand in the case of an integrated system. To do this, the study first added together their separate maximum loads – the highest demand of the year, regardless of its timing. Subsequently, it looked at the level of the *simultaneous residual maximum load.* This is done in two steps. Firstly the *simultaneous maximum load* was determined. This is the highest combined demand at any time of the three countries together. Because the separate peaks do not occur at the same time, the simultaneous maximum load is lower than the separate maximum loads added together. After this, the study subtracts the minimum of intermittent Renewable Energy Supply. Spread over a larger area, even intermittent Renewable Energy Supply has a minimum production, as there is always wind or solar irradiation somewhere in the large area.[23]

As a result, the study finds that in the integrated situation, over the whole area, 16,5 GW less generation capacity is required. This is roughly 8% less than would be required in separate portfolios.

To determine the yearly associated costs, we have looked at the avoided capital costs, and the avoided fixed operational costs.

For the yearly avoided **capital costs** we can use the following formula:

*Avoided peak capacity (GW) * construction costs (€/GW) * Weighted average costs of capital*

Assuming that this peak capacity consists of large Open Cycle Gas Turbines (which cost around 900 euro/kW to construct (DEA, 2012), and assuming a weighted average costs of capital of 8%, the yearly capital costs of non-integrated markets in this case would be:

$$16{,}5 * 900 * 10^6 * 8\% = € \ 1{,}19 \text{ billion per year}$$

For the yearly avoided **fixed operational costs** we can use this formula:

*Avoided peak capacity (GW) * fixed operational costs (€/GW/year)*

[22] This case is used as an illustration of the value of the Integrated Energy Market. As it is, the studied region is already well connected, meaning that a good share of the benefits as calculated have already been captured by the efforts to integrate the EU energy markets.

[23] This international case is used to show the value of connecting of generation portfolios within a strongly interconnected area. Within countries this level of interconnectivity is often higher than between countries, as national networks were designed with the ambition to provide optimal security of supply.

Assuming that the fixed operational cost are similar to Combined Cycle Power Plants, being €32/kW/year, the yearly operational costs of non-integrated markets would be:

$$14 * 32 * 10^6 = € 448 \textit{ million per year}$$

These two costs add up to € 1,64 billion per year as an indication of the Cost of Non-Europe.

This reduction in costs will be reflected in lower electricity prices for end-users. In turn, it will also mean a downsizing of generation portfolios, reducing turnover for energy producers.

### 3.2.5 How to overcome this barrier?

These types of welfare effects of cooperating markets should be achieved, among other things, with a further development of European exchanges. For this, both non-discrimination and equal access to market information needs to be guaranteed.

However, the current development of European exchanges shows that many factors necessary for positive welfare effects are not completely fulfilled and are impeding the integration of European markets. The levels of liquidity in European power exchanges differ significantly. In particular, liquidity on cross-border intraday trading is at a low level. The explicit measures to solve the problems are pointed out in the following paragraph.

According to the identified root causes in both markets the following measures result as potential remedies against the barrier of illiquid hubs and exchanges.

- The different levels of liquidity being explained by different market designs require a **harmonisation of European wholesale market designs**.
- A main challenge will be the **selection of a common platform** for trading through a tender process (ACER 2012, p. 35): Establishment of the European gas capacity trading platform PRISMA in April 2013 was a valuable first step towards more EU-wide harmonisation. Further regulation[24] to **better harmonise and standardise** capacity allocation methods and congestion procedure as well as trading products, both for power and gas, is still required (Fluxys 2013)[25].
- Increasing **monitoring activities and sanctions** by NRAs in order to improve the level of compliance by TSOs (ACER/CEER 2012, p.144).
- Establishing **one single Supervisory Authority for Energy and Emissions trading** at national level (DG Int Pol 2010, p.78)
- Involving **financial markets** can increase liquidity by the simple presence of more market participants (DG Int Pol 2010, p. 78).

[24] Advanced steps are already being made under the Capacity Allocation and Congestion Management (CACM) guidelines as are being designed by ENTSO-E
[25] http://www.fluxys.com/tenp/de/NewsAndPress/2013/20130314_News_PRISMA

### 3.2.6 What is existing EU policy addressing these issues?

The following directives and regulation are the current EU policies addressing the establishment of the internal market in general:

- Directives 2009/72/EC and 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and natural gas
- Regulation (EC) No 715/2009 and 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and to the network for cross-border exchanges in electricity
- ACER Regulation No 713/2009
- Florence Forum being set up in 1998 for innovating the regulation of the Electricity Market
- ENTSO-E Network codes regulating technical but also administrative aspects of grid operation

Regarding hubs and exchanges, the Directives determine as a duty of the national regulatory authorities the monitoring of a sufficient level of market opening and competition on electricity exchanges (Art. 37, 1 (j)). Also, the regulators should promote the creation of joint exchanges and the allocation of cross-border capacities (Art. 38, 2 (a) 2009/72/EC and Art. 42, 2 (a) 2009/73/EC).

Ten Regional Initiatives were set up to accelerate the market integration process (ACER 2012, p. 18). They bring together all relevant stakeholders, including exchanges to identify and overcome barriers to trade and competition. Since it was identified above there are further challenges to manage within the Regional Initiatives (e.g. finding consensus on a common platform). For this, no further explicit rules or regulations exist.

### 3.2.7 Role of the EU

The role of the EU in this paragraph will point out fields of action where and to what extent policy measures help to overcome the barrier. To help accelerating the process towards an integrated energy market in Europe, the following explicit measures are derived from the analysis and will have to be taken into account:

- **Harmonisation** – In the process of increasing liquidity to hubs and exchanges the EU should be responsible for the harmonisation of diverging European designs of wholesale markets. Hence, the existing network code process being supervised by ACER (Regulation 713/2009) should be enforced and monitored further.
- **EU level policies** – Policies on access to information and standardisation on both trading products and capacity allocation methods need to be established on a European level. As above, already existing policies should be enforced and monitored further. The EU will have to implement an EU-wide wholesale market design.

- **Monitoring activities** – For the realisation of this, monitoring activities have to be decentralised. National regulators might have to get more power and should be considered to sanction in case of non-compliances. This was started with the REMIT guidelines of ACER and should further be encouraged and enforced by the EU.

## 3.3 Case study: Market Coupling

How can the deployment of existing physical capacity be optimised and be made available to a wide array of market players?

### 3.3.1 Rationale for the case study

Coupling European Energy Markets is an essential part of the establishment of an internal European energy market following the EU's 3rd Energy Package in 2009 and the EU Target Model. Market coupling has only been implemented at about half of the cross-border auctions in the EU (ACER/CEER 2012).

Market coupling builds on top of a situation where two market places are already connected, physically as well as commercially. As will be explained in more detail, market coupling means a different way of allocating the capacity between these markets.

Market coupling has the advantage of lowering the transaction costs for energy traders. While it is also possible for traders to bid in different markets without market coupling, this requires reservation of cross-border transmission capacity for every individual party and extensive market analysis for parties to construct bidding and offering curves for separate markets. Market coupling simplifies this process by allowing parties to only look at a single exchange to define their bidding strategy. Price convergence of coupled markets reduces the arbitrage opportunities for traders.

Market coupling ensures

- that the highest bids and lowest offers are matched *automatically,* which reduces transaction costs and market imperfections;
- that profits from arbitrage are left with primary market players on either side of the interconnection;
- that reserved capacity cannot be used for gaming.

Market Coupling can help convergence of prices or an improved allocation of cross-border transmission capacity resulting in an increase of welfare (ACER/CEER 2012, p. 49 ff.). However, it is still far from being completed and poses further challenges to policy.

This barrier is the focus of this case study.

### 3.3.2 Definition

Market coupling means that cross-border transmission capacity allocation is based on the bids and offers submitted in energy markets (ACER/CEER 2012, p. 51). This means that market participants do not receive cross-border capacity allocation directly, but bid for their energy in one of the coupled exchanges ('markets') (Mahuet 2012). A subsequent process within this **implicit auction**, managed by the 'coupled' exchanges, ensures that the available cross-border transmission capacity is allocated in a way that minimizes the price difference between two or more areas (ACER/CEER 2012, p. 51). Social welfare can be increased and any artificial splitting of markets is avoided.

It should be emphasised that markets are not necessarily disconnected if market coupling does not exist. With two exchanges being connected via **explicit auctions**, a trading party can purchase capacity on a cross-border connection, and subsequently buy on one exchange, transport the electricity and sell on another. This is called arbitrage, which provides a business model for the trading party, while it brings the differences between markets down (increasing demand in low priced areas while increasing supply in high prices areas). In theory, the price difference between the countries is equal to the price for transmission capacity the traders have to pay. They reflect the congestion rent of cross-border lines and result from explicit cross-border capacity auctions.

According to the ACER (2009) implicit auctions are to be established extensively until 2014, the aimed completion of the integrated energy market. To show the current Cost of Non-Europe in this case study a comparison will be made between the market results of explicit auctions and those of implicit auctions. The difference discovers costs and benefits of a perfect market coupling.

### 3.3.3 Root causes of the gap/barrier

While market coupling is increasingly applied, especially in North-West Europe, there are still many opportunities for increased coupling. There are a number of barriers that currently prevent this:

**Insufficient trans-border capacity -** Market coupling is not possible without physical and contractual capacity being available. This is not always the case. Even with sufficient physical capacity[26], further advancement of market coupling can be impeded by differing transmission capacity calculation methods between TSOs. This means the available capacity is set at the lowest common level which leads to an inefficient allocation of the cross-border transmission capacities (ACER/CEER 2012, p. 69).

Also, TSOs are reluctant to allow further market coupling because increased cross-border flows imply increased unplanned cross-border flows. Unplanned flows can affect system

[26] Development of physical capacity is discussed in a different report

security and stability which results in preventive measures by the TSOs like the reduction of cross-border capacities made available (ACER/CEER 2012,p. 71). On the other hand, a coupled market can increase the use of cross-border capacity by efficiently managing unplanned flows and prevent the TSOs from making less capacity available.

A remaining price difference between the countries results from various interdependencies and factors of influence.

**Lack of liquid exchanges –** A prerequisite of market coupling is that there are liquid markets, i.e. day-ahead exchanges, to couple. This is not always the case, for example in hubs further away for North-Western Europe, like the PSV in Italy. This particular root cause is discussed as a specific barrier in paragraph 3.2 above.

**Administrative barriers** - Market coupling requires close cooperation between market operators and TSOs. In a situation where TSOs on either side of the border have little history of working together, and are in some cases still holding separate explicit auctions, harvesting their revenues separately, there might not be sufficient desire to give up independency and work together. Market coupling also requires that clearing procedures are sufficiently aligned between exchanges.

**Distributional effects –** Not all stakeholders benefit from market coupling. Distributional effects mean that traders lose business opportunities, capacity owners lose revenues from capacity auctions that reap a large part of the congestion rent, and with prices converging, on one side of the border prices will in fact increase.

### 3.3.4 Costs and benefits

Establishing implicit auctions brings changes to the market efficiency. The change in costs is expected to be the following:

**Automatic matching drives down transaction costs –** In uncoupled markets electricity flows take place because of arbitrage. This requires extensive analysis by trading parties to determine the prices to bid for the purchase of capacity, the purchase of energy and what to ask for the energy at the selling point. Subsequently, all these trades need to be executed, administered and settled. This increases transaction costs.

**Automatic matching increases transparency –** Market coupling ensures that the highest bid in the coupled market regions area is automatically matched with the lowest offer in the coupled market region. This eliminates the market imperfections caused by trading parties not having perfect insight into the market value of energy at any point in time.

**Automatic matching applies flow-netting**: Cross-border flows between two countries being requested in both directions can be cancelled-out by a central match of bids. This increases the interconnector capacity usage and avoids transmission capacity reserved for the ‘wrong’ direction.

**Potential excessive profits are reduced –** In uncoupled markets (with explicit auctions) trading parties can potentially make large profits if they have a dominant position in the capacity between the markets. With market coupling (and implicit auctions) this is no longer possible, as capacity is now assigned based on the bids and offers of all parties on both exchanges. This means that – if there is no dominance in the overall market – trading parties can no longer make excessive profits, which is another market imperfection that can be removed.

The mentioned benefits, being the removal of market imperfections will be quantified below as Cost of Non-Europe. The methodology is also explained below.

**The Cost of Non-Europe variation: Literature review**

<u>Benefits of market coupling in Pellini (2012):</u>
Pellini (2012) simulated market coupling of Italy with its neighbouring countries. Applying a production cost-based model the outcomes of the Italian electricity market including the day ahead market price is calculated and forecasted for one year. Assumptions have been made on the market price of Italy's neighbouring countries. Alike the definition of social welfare in the underlying report welfare indicators are producers' and consumers' surplus as well as congestion rent. Social welfare is the sum of the three indicators.

As a result of the reference scenario market coupling at the Italian borders leads to welfare gains of Italy of **between € 33 million and € 396 million per year**.

<u>Pellini (2012) in the context of the Cost of Non-Europe:</u>
Pellini's analysis delivers a profound idea of quantified benefits of market coupling. However, since it considers Italy as the only country for an isolated welfare analysis it cannot be transferred to the Cost of Non-Europe.

The methodology of the underlying report presented above considers a market coupling case between two countries in Europe. The welfare changes will be applied to both countries affected and can be transferred to the Cost of Non-Europe.

<u>Benefits of market integration by ACER/CEER 2012:</u>
Another quantification of the benefits of market integration has been done by ACER/CEER 2012. Here, welfare is measured as the difference between the bid prices and the obtained matched prices (ACER/CEER 2012, p. 65 ff). Calculations always refer to two countries, resp. one specific interconnector line. Alike the applied methodology in the underlying report, gross welfare benefits include consumers' and producers' surplus as well as congestion rent. Three scenarios were simulated:

1) Historical scenario: calculation is based on detailed historical information such as network constraints, the exchange participants' order books and available cross-border capacity.

2) Zero scenario: The difference to the historical scenario is the reduction of available cross-border capacity to zero (no cross-border trade)
3) Incremental scenario: Cross-border trade is increased by 100 MW compared to the historical scenario.

One example of a potential resulting welfare gain (difference between historical and zero scenario) per border, has been quantified. The highest potential welfare gain is on the SE-FI border, estimated at **250 M€** per year. The incremental gain (difference between the historical and incremental scenario) per border can be as high as **19M€** (on the IT-FR border) per year and per additional 100 MW interconnector capacity

**The Cost of Non-Europe variation: Analysis of cross-border trade**

In explicit auctions there are two different prices determined on two different markets. We assume that there is a player that holds capacity that can be used for arbitrage. Market participants pay for transmission capacities although the final market clearing levels out physical flows in opposite directions. This means, they pay for capacity that is not used in the end. In a perfect market coupling with implicit auctions traders would only pay for the net flows. This will result in welfare gains.

For the calculations, the auction results of two decoupled markets using explicit auctions, over a year namely France and Italy have been analysed. For this, an overview of the allocation mechanism that can be applied to most markets with explicit auctions in Europe is essential:

For the cross-border capacity allocation there are currently four auction periods available: yearly, monthly, daily and intraday. In case allocated capacity is not used after the nomination deadline there are resale options for traders afterwards. The design of those resale options is relevant for the efficiency of the market result and is described as follows:

<u>Resale options and financial compensation (CASC.EU 2012)</u>
Traders have the option to resell the unused capacity of the yearly auction to the monthly auction. The resale of capacity coming from yearly and/or monthly auctions on the *daily auction* is not possible for traders. Here, unused capacity for yearly and monthly periods is *automatically* resold to the daily auction without giving an option to the traders. This is the principle of 'Use-it-or-sell-it'. As a consequence, the affected participants are being financially compensated. The compensation is equal to the automatic resale of this capacity on the relevant daily allocation and thus, to the according market clearing price on the daily auction.

Accordingly, unused capacity of daily auctions can be resold in the according intraday auction. But there is *no financial compensation* for the resale of the daily capacity ('Use-it-or-lose-it').

Implications for the market efficiency

The principle of explicit auctions means the separate acquisition of power and transmission capacity. Each explicit auction (yearly, monthly, daily, intraday) causes costs being defined as the product of the market price and the allocated capacity, since this is the total amount of money market participants pay for the transmission capacity.[27]
As pointed out above, there is not always a financial compensation for unused and resold capacity in place. This means, unused capacity being sold double without corrective financial arrangements is also paid for double. This presents an inefficiency that increases the total costs of the market. In our case study, the unused capacity of the daily auctions that can be resold intraday is paid for double since there are no financial arrangements in place.

As implication for the calculation of costs of explicit auctions the costs of the intraday auctions are added to the costs of the daily auctions.

At a later stage these costs are compared with the situation of implicit auctions where only the net flows have to be paid for (net flows are derived by levelling out the opposite auctioned capacities). The price for the net flows is assumed to equal the market price differential between the countries.[28]

The cost-difference resulting from this comparison represents the final market imperfection that is removed by the establishment of implicit auctions and the furtherance of market integration of France and Italy.

Methodology

The applied methodology is explained as follows:

As indicated above the costs of explicit auctions between France and Italy are derived by the product of the auction price [€/MW] and the capacity being allocated [MW]. This is done for both the day-ahead and the intraday auction results. Also, both directions are being considered in the calculation.
The results of the monthly and yearly auctions are left out since the unused capacity is being resold at a later stage with according financial compensation. As a consequence, those auctions have no further relevance for the market efficiency.

In formulas the costs of explicit auctions can be expressed as follows:

$$Explicit\ Auction_{ij}[€] = \sum_{2012} auction\ price\ per\ hour\ \left[\frac{€}{MW}\right] * auctioned\ capacity\ per\ hour\ [MW]$$

[27] Example: The costs of a daily explicit auction is accordingly defined as: Market clearing price per hour [€/MW]* Allocated capacity per hour [MW]

[28] The price differential represents a hypothetic auction price and is thus written in the below standing formula with the unit [€/MW]

with $i = direction\ IT - FR, direction\ FR - IT$
and $j = intraday,\ day\ ahead$

Deriving the total costs (TC) of explicit auctions:

$$TC_{expl}[€] = \sum_j \sum_i Explicit\ Auction_{ij} \quad [€]$$

As a next step, the costs of implicit auctions have to be derived. For this, the according market result is defined as the product between the allocated capacity [MW] and the spot price differential. It is assumed, that in implicit auctions the price for transmission capacity is zero except for hours of congestion. Congestion is defined as the finally utilised capacity (as bought by traders) being larger than the NTC value. Subsequently, an important feature is that cross-border transmission capacity only has a positive price (instead of zero) when the line is congested. As a consequence, only in times of congestion the market result is of relevance.

To derive congested hours (cong.) the (daily) hourly net transfer capacity (NTC) of the interconnector is compared to the hourly amount of utilised capacity. Subsequently, only in hours of congestion (cong.), the *day-ahead allocated capacity* is multiplied with the spot price differential in the according congested hour. This presents the costs of implicit auctions.

In formulas it can be expressed as follows:

Presumption:
If $hourly\ utilised\ capacity\ (MW) > corresponding\ NTC\ value$ (MW)
$\rightarrow congestion\ rent > 0,\ otherwise\ congestion\ rent = 0$

Total costs (TC) of implicit auctions:

$$TC_{impl.}[€] = \sum_{year} allocated\ capacity_{cong.}[MW] * price\ differential_{cong.}\left[\frac{€}{MW}\right]$$

As a next step the calculated costs for explicit and implicit auctions can be compared to derive the cost difference. This presents the benefits of market coupling and a potential gain in market efficiency.

$$Benefits\ of\ Market\ Coupling\ [€] = TC_{expl}[€] - TC_{impl}[€]$$

The result of the calculation for the French and Italy electricity cross-border trade is presented in Table 4:

**Table 4: Benefits of Market Coupling, own calculations**

| | Costs for explicit auctions [€] | Costs for implicit auctions [€] | Benefits of Market Coupling [€] |
|---|---|---|---|
| 2012 | 85.154.113,28 | 6.748.052,26 | 78.406.061,02 |

Following from our analysis, implicit auctions between France and Italy would lead to an efficiency gain of the market by 78,4 Mio. EUR. This is a reduction in costs of 92%. Apparently, when looking at net flows the interconnector is not congested very often, but market participants pay too much for a separate purchase of transmission capacity and energy.

Another way to show existing inefficiencies in the market is to compare the hourly spot price differential with the actual price of the explicit day-ahead auction. In a perfect market, this should be equal since arbitrage as there is an incentive for participants to enter and to trade until the point is reached where no profit is made. This is the point where the auction price and the price differential are equal.

However, if we compare the spot prices and the auction prices at the French-Italian cross-border, we see that auction prices are actually lower than the price differential between spot prices. This means that the capacity is sold for less than it is worth. This market imperfections can be explained by the small amount of players in the trading market at French and North-Italian border. A possible reason for this is the high risk of trading. Volatility of the spot prices, in particular in Italy, is rather high and also the price differential is high: the French spot price ranges between 40 and 50 €/MWh and the Italian price between 60 and 70 €/MWh. Market coupling would reduce this risk as it means that traders do not have to buy capacity in advance that might be worth less or even nothing after closure of the day-ahead markets. With a likely increase of liquidity that leads to reduced market power implicit auctions could also help reducing the detected inefficiencies

The size of efficiency loss is derived by subtracting the auction price in hours of congestion from the according spot price differential. The numbers outlined are the extent to which market players pay less for the transmission capacity than the actual value showing the imperfection on both sides of the border. It also becomes obvious that most of the times France is exporting power to Italy which leads to clearly larger imperfections on the French side of the border.

**Table 5: Imperfections in the cross-border trade between France and Italy, own calculations**

| | Market imperfection IT [€] | Market imperfection FR [€] |
|---|---|---|
| 2012 | 58.052,23 € | 256.413,71 € |

As we assume that the situation whereby market coupling is in place, this market imperfection is removed, the quantified market imperfection represents the Cost of Non-Europe.

A caveat underlying this simulation is the fact that the used dataset comprises day-ahead prices on the exchanges and excludes OTC trade.

#### 3.3.5 How to overcome this barrier

Since conservative approaches to capacity allocation were identified as one of the root causes of the barrier the implementation of common rules and guidelines on capacity allocation could help the development of market coupling. Corresponding network codes guidelines are currently being developed (as of April 2013). That is, with the Guidelines on Capacity Allocation and Congestion Management for Electricity (CACM) developed by ACER and, building on this, a Network Code with capacity calculation and allocation method has been developed by ENTSO-E that remains to be approved by the European government, the EU Target Model can be realised.[29] In particular, following this a full coordination and optimisation of capacity calculation within regions, the use of flow-based capacity allocation methods in highly meshed networks can be realised. (ACER/CEER 2012, p.69)

For implementation of market coupling a large coordination and adaptation effort is required by TSOs and market operators. TSOs need to accept different a different revenue as they no longer sell their capacity to market players, but to market operators. This requires willingness to engage in dialogue with other TSOs, mutual trust and investments.in adjusting procedures and ICT systems. It has to be ensured that the ENTSO-E is designed in the appropriate way to entice the national TSOs to carry this through. The fact that these same TSOs fund and govern the ENTSO-E is a risk in this respect.

#### 3.3.6 What is existing EU policy addressing these issues?

Similar to the case study of hubs and exchanges, the following policies that concern the functioning of an internal market in Europe are currently in place (as of April 2013):

- Directives 2009/72/EC and 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and natural gas
- Regulation (EC) No 715/2009 and 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and to the network for cross-border exchanges in electricity
- ACER Regulation No 713/2009

[29] https://www.entsoe.eu/major-projects/network-code-development/capacity-allocation-and-congestion-management/)

- Florence Forum being set up in 1998 for innovating the regulation of the Electricity Market
- ENTSO-E Network codes regulating technical but also administrative aspects of grid operation

To conclude, there are currently no binding or explicit rules on cross-border trade in place. Binding rules for Europe can eliminate conservative approaches to capacity allocation on cross-border trade and achieve increased efficiency. The above mentioned network code developed by ENTSO-E is currently consulted and needs be approved to be transferred to binding law (as of April 2013).

#### 3.3.7 Role of the EU

The market integration process needs to be coordinated and accelerated which the EU can contribute to by **developing a roadmap** including:

- The implementation of a single capacity allocation platform (ACER 2012, p. 40).
- Capacity calculation method for the development of a common grid model (ACER 2012, p. 41). For this, the developed grid code by ENTSO-E presents a profound basis. The administrative process of implementation should be accelerated.
- Several impacts of existing and upcoming capacity remuneration mechanisms (CRM) on the functioning of the target model to be taken into account (CEER 2013, p. 7).
- The implementation of a flow-based market coupling for the CEE region (ACER 2012, p. 45).

### 3.4 Case study: Balancing markets

This case will focus on the development of supra-national balancing markets.

#### 3.4.1 Rationale for case study

After the closing of the day-ahead market, usually 16-40 hours ahead of delivery, and the subsequent intra-day markets, the markets close 1 or 2 hours before delivery. This moment is called 'gate-closure'. After this moment, generally the Transmission System Operator (TSO) starts managing supply and demand in a single-buyer system. This is usually called the 'balancing market'.

ENTSO-E describes balancing as 'the process through which TSOs manage the physical equilibrium between injections (generation) and withdrawals (consumption) on the grid' (ENTSO-E 2011). It entails two key activities:

- **Ensuring sufficient reserves** – Ahead of real time (i.e. before the gate closure time of the last market in which participants can trade energy), TSOs secure access to power capacity for control purposes in their control area.
- **Managing balancing energy** – Close to and in real time, the TSOs activate these reserves or other available resources to maintain the balance within their control area. This may happen automatically or manually by the TSOs.

It is important to highlight some differences in the characteristics of balancing and longer term markets:

- **Balancing markets are more driven by capacity costs than longer term markets** – While most forward markets are pure energy markets, the requirement for reserves means that in balancing markets the TSO pays a price for having capacity available, to be used at their discretion. This means that portfolio advantages that allow lower available capacity have a larger impact.
- **Capacity in the balancing market must meet stricter requirements –** The capacity that is required to serve the balancing markets has stricter requirements for its ability to adjust quickly to changing demand. This means it must have a higher 'ramping speed'. This is the speed with which the production of electricity can be adjusted up- or downwards. This means that the capacity for the balancing market is not necessarily interchangeable with the capacity that serves the day-ahead markets.

The development of effective cross-border balancing schemes can increase social welfare and can help support the cost-effective integration of renewable energy into the European electricity system, in line with energy and climate policy goals. Cross-border balancing can also enhance competition in markets for reserves and balancing energy (ENTSO-E 2011, p. 2).
Compared to day-ahead markets, the intra-day and balancing markets lag behind in the level of integration . This case will discuss the specific gaps and barriers related to the intra-day and balancing markets.

### 3.4.2 Definition of the gap

Balancing markets are mostly organised in national or even sub-national systems. These largely operate separately. This means that each balancing region sources available capacity and balancing power within that region. Generally, there are a number of barriers that can explain this lack of interchange between balancing zones.

- **Mandatory offerings of reserve capacity and regulated prices –** Some TSOs apply mandatory reservations of capacity for all generation that is online in their balancing area. Also, some balancing regimes pay regulated prices to providers of balancing power. Both arrangements distort the market and impede the formation of commercial and market based pricing (EFET 2012, Van der Veen et al. 2010). This is a similar effect as is described in the case study on regulated prices.

- **Differences between balancing regimes –** Differences between balancing regimes impede the materialisation of a transparent market for balancing services. For example, gate closure times are different between regimes. Removing the differences will allow providers to compare different markets and make their bids and offers in the markets where they have the most value.

- **Disagreement about level of optimal reservation of transfer capacity** – If reserve capacity for one country is located in another country, it must be possible for the balancing energy to be transported across the border when needed. This means there must be 'firm'[30] cross-border capacity available to connect the generation to the load. There is currently no agreement on the appropriate levels of capacity reservation.

### 3.4.3 What are the root causes?

What are the root causes of the lack of integration of balancing markets?

- **Historical development –** Electricity networks were developed at the national level. For this reason, balancing areas have long been defined based on country-borders, or in larger countries on intra-country administrative borders.

- **Nationalized security requirements –** When two TSOs start sharing balancing responsibilities, a joint reserve of capacity and balancing power, there must be agreement on the requirements of the system for security of supply. These requirements differ between different countries and balancing zones and are difficult to agree, multilaterally even more than bilaterally.

- **Balancing costs are not always isolated from transmission costs –** To keep the balancing market clearly delineated, it is important that balancing costs are isolated from other costs, like re-despatching costs to solve grid constraints. This is because the management of the grid constrains the physical location of the real-time delivery which is critically important (and therefore less open to wider geographical competition), while for balancing power this is not relevant – as long as there are no grid constraints. This separation of balancing costs and transmission costs is not always in place.

- **Level of trust between TSOs –** Integration of balancing zones means loss control and potential loss of reserve power by the TSO. Loss of control is linked to the fact that capacity within the zone for which the TSO is responsible will potentially be dedicated to ensure security of supply in the zone of another TSO. Also, having reserve power in the area of another TSO means that that TSO must be trusted to deliver that power to the contracting TSO at the critical moment.

30 Firm means capacity that is guaranteed to be available and uninterruptable. This is a contractual rather than a physical term, but it does strongly interact with the level to which physical capacity can be guaranteed.

### 3.4.4 Cost & Benefits

This paragraph lists the benefits of merging balancing regimes, and how they will be quantified if possible. Also, it will touch upon the disadvantages of integrating balancing regimes.

- **Lower reserve cost** - Capacity reserves for balancing purposes are unused a significant share of the time. When sharing these between TSOs, the overall requirement for reserve capacity can be lowered, as there is an overlap in as far as it is statistically not to be expected that both TSO will require the reserve capacity at the same time. In addition, in some cases the imbalance in one system can be offset by an opposite imbalance in the other. This will lower the costs to be paid for reserve capacity per end-user. This effect will be increased by the fact that the most expensive capacity reserve will be avoided.

- **Lower energy balancing costs -** Not all balancing power is provided by contracted reserve capacity. Generation capacity and other sources of flexibility are also tapped into through online pricing signals. This allows market players to provide balancing power without contractual relation with the TSO. Enlarging the pool of potential providers of this will allow the lowest-cost providers over the whole region to respond first.

**Associated benefit: facilitation of renewable energy**
Keeping balancing costs as low as possible will limit the costs of the transition towards a sustainable energy supply. Larger amounts of intermittent sources will increase the demand for balancing services, potentially driving up the costs of ancillary services. A joint EU-wide system will allow these services to be provided at the lowest possible costs, while increasing security of supply[31].

**Disadvantages of integrating balancing regimes**
There are some general disadvantages to the integration of balancing regimes:

- **Less capacity available for trading –** A reservation of capacity for reserve power means that it cannot be used for forward trading. The allocation of capacity must be optimal between these value creators.
- **Loss of national security of supply** – While formerly controlled at the national level, the control over the security of supply is handed over to the European level if reserves are shared. This requires confidence that other TSOs are diligent keeping networks in good order and follow procedures as agreed, and trust them to provide balancing power also in situations where multiple TSOs are reaching critical situations.
- **Potential concentration of reserves** – Increasing the size of the zone for balancing, and sourcing cost-efficient balancing services, increases the potential of a spatial concentration of balancing reserves. This reduces the redundancy of

[31] Assuming sufficient interconnection capacity is available

supply in case the region where the concentration takes place, and the diversification potential for increasing vulnerability for net constraints for balancing power.

### 3.4.5 How to overcome this barrier?

All parties should **agree on and work towards a target model for cross-border balancing** in order to stimulate the on-going integration of balancing mechanisms at a European level. This target model should be consistent with other areas of market development (such as intra-day markets) (ENTSO-E Balancing Position Paper 2/15). As we noted above, levels of harmonisation of national balancing schemes vary markedly.

In several markets developments are currently taking place towards new mechanisms to refine existing -border balancing schemes. The key benefit of a target model lies in allowing these developments to take place with a final target in mind. This is likely to prevent divergence of approaches, promote natural harmonisation and reduce the longer-term obstacles to harmonisation. (ENTSO-E PPB, 11/15).To address concerns about loss of national security of supply and a potential concentration of reserves, some pre-requisites must be met:

- Cross-border balancing should, at a minimum, preserve the consistently high levels of security of supply enjoyed to date. Thus, future pan-European standards will have to define requirements for the size and the geographical distribution of reserves.

- All parties should agree on and work towards a target model for balancing systems in order to facilitate and stimulate the integration of balancing mechanisms at a European level. This target model should be consistent with other areas of market development (such as intra-day markets). Consequently, it should include prescriptive gate-closure times (ENTSO-E PPB 13/15) and must include **prescriptive guidelines on reserves procurement schemes**, to increase transparency for providers of reserve capacity and facilitate price and operational optimisation.

**Demonstrate increase of social welfare.** In ENTSO-E's view, the reservation of transfer capacity for balancing purposes should only be carried out if an increase in social welfare can be demonstrated. The Commission should initiate the development of a standard calculation methodology and endorse this. ENTSO-E has recommended principles for such a calculation (ENTSO-E 2011).

Cross-border **intra-day arrangements must improve –** The intra-day market is the market where traders can buy and sell energy in response to improving forecasts as real-time delivery nears. This market ends at the moment of gate closure, where the TSO takes control as a single buyer. To work towards an Internal Energy Market for balancing power, it is necessary to also improve possibilities for intra-day trading, as the processes going from day-ahead, to intra-day trading to balancing are strongly interlinked. An example of this is the gate-closure that was mentioned earlier. Liquid intra-day markets also provide price signals for the balancing market that will allow balancing power providers to make better decisions about their actions in the balancing market.

### 3.4.6 Existing policy

The following regulation is in place to address the issue of intra-communal balancing markets.

- Under of the 'Electricity Directive' and the 'Gas Directive' (2009/73/EC),32 it is stated that the National Regulatory Authority must be responsible for fixing or approving sufficiently in advance of their entry into force at least the methodologies used to calculate or establish the terms and conditions for connection and access to national networks, provision of balancing services and access to cross-border infrastructures. ACER can propose increasing cooperation in the field of balancing, which it has acted on as shown in the referenced working group papers.
- In the Directive on Electricity Security of Supply and Infrastructure 2005/89/EC it is required of Member States to ensure that require transmission system operators to ensure that an 'appropriate level of generation reserve capacity is available for balancing purposes and/or to adopt equivalent market based measures'. (*Article 5)* Importantly, the Directive emphasises that any policies, procedures and measures should be transparent and non-discriminatory to avoid distortion of competition.

### 3.4.7 Role of the EU

The EU could play the following role in the development of balancing markets:

- Based on the work of ACER, the commission could take a leading role in endorsing en and enforcing target models for balancing markets. Part of this process could be the re-assessment of the governance structure of ENTSO-E and the manoeuvrability this organisation has to drive TSOs towards implementation of the guidelines.
- Through ACER, initiate a study on the optimal level of cross-border capacity reservation to create maximum welfare, and create agreement on the basic assumptions for such a study. This will be a first step towards an accepted methodology to allocate cross-border capacity, for balancing services and will create a common ground for TSOs to set these levels at specific cross-border connections.

### 3.4.8 Scenarios for level of integration

Below, a description will follow of different possible levels of integration, and the associated requirements and benefits. Possible scenarios are:

[32] Article 37(6)-(7) of the 'Electricity Directive' (2009/72/EC) and Article 41(6)-(7) of the 'Gas Directive' (2009/73/EC),

- **Netting** – two balancing regions 'net' their imbalances. This means that in case of a counter-imbalance (one region has a surplus while another has a shortage) this is netted by sending the surplus over the border to compensate for the shortage. This prevents both TSOs from calling upon their balancing power in many cases. It does not however diminish the need for reserve capacity – if action is needed both systems still rely on their own reserve capacity.
- **Intraregional trading in balancing services** – This means it is possible for *balancing services providers* not only to sell balancing energy to the TSO in their own area, but also to the TSOs in other areas.[33]
- **Common merit order list** – This entails the creation of a single balancing market, where providers from the whole region can offer bids for balancing energy and capacity, and downward regulation, while a common control area is created that is balanced centrally.
  This results in a 'common merit order', which means that dispatch of reserve capacity will take place in order of marginal cost, disregarding the location of the specific asset – of course dependent on available cross-border capacity.

This paragraph will discuss the different levels of integration in more detail.

**Scenario: Netting**

*What is required?*
Requirements for the implementation of 'netting' are relatively limited. It does not require balancing markets to be changed – merely to cancel out opposite balancing requirements by transmitting electricity from the control area that has a surplus to the control area that has a shortage. After this, the respective balancing markets will handle imbalance separately based on their own available capacity and balancing energy. As reserve capacity is not exchanged across the border, no dedicated cross-border capacity needs to be reserved – if capacity is unavailable the TSOs can fall back on their mutual balancing markets.
In all, it is likely that netting can be widely implemented across the EU before 2025 (Van der Veen et al 2010).

*Quantification*
Netting is being applied in the International Grid Control Cooperation (IGCC), which has Germany at its centre. On the website of TenneT, it is mentioned that the IGCC is saving around €300 million per year (Tennet 2012). This value is created by netting the imbalances of 6 cooperating TSOs. This is the first step as described above towards integrating balancing regimes, as each balancing zone still has its separate balancing reserves, and still despatches these independently. This means that additional benefits can be expected when further steps are taken towards balancing market integration.
The value of netting is not necessary distributed equally between balancing zones.

[33] See for example ACER, France-UK-Ireland Electricity Regional Initiative Work Plan 2011-2014

*Distribution*
Overall, balancing costs in the zone with the steepest merit order will go down most. In the target model for balancing markets, balancing costs are passed-on, at cost, to the balance responsible parties. These will therefore benefit the most. In addition, because newcomers in the markets often have relatively high balancing costs due to their small portfolios and limited historic information about their customers, these are likely to benefit the most from the lower balancing costs. This will help competition.

**Scenario: Intraregional trading in balancing services**

*What is required?*
For balance service providers to be able to bid in control areas that are not their own, additional requirements exist.

For reserve capacity to be offered cross-border, matching cross-border capacity must be reserved to allow the balancing energy to flow across the border at the critical moment when it is needed.

For intraregional trading to be unimpeded, the Mandatory offerings of reserve capacity and regulated prices must be abolished (see also 3.4.3).

Other requirements would be the following:

- **Transparency** - TSOs should provide detailed information on the amount of *reserve capacity* products bought. Transparency is needed to create competition between providers and to promote efficiency in the procurement process of TSOs.
- **Harmonization** - Harmonization of products and processes is essential to develop an efficient and liquid platform that will attract providers and, as consequence, reduce the overall costs paid by the TSOs.
- **Consistency -** The introduction of such market for *reserve capacity* products must be consistent with the development of other European electricity market (day-ahead, ID). In any case, this new market/platform should not distort the correct functioning of other markets or have negative directly or indirectly (cross border capacity reservation) effects on them.

*Advantages*
The advantage of having cross-border provision of balancing services is that providers in low-cost balancing zones can benefit from higher prices in other zones – bringing down the overall level of balancing costs.

It is not possible to provide a quantification of these costs, due to the wide array of possible implementation modalities, and the difficulty of creating a complete overview of bids and offers in the separate and combined market.

A qualitative assessment have however suggested that the additional price efficiency would be limited – due to potential sub-optimal allocation of cross-border capacity, lack of transparency due to a multitude of markets for balance service providers to bid into, and the possibilities for gaming[34].

*Disadvantages*

- This brings opportunity costs, as this capacity can no longer be used for longer term (for example day-ahead and intra-day) trading. To set the level of capacity reservation, the TSOs must agree on the optimal allocation (see also 3.4.5).
- It is possible that costs in low-cost balancing zones actually go up.

**Common balancing market**

*Requirements*

In addition to the requirements for the scenarios described above, a common balancing market would involve the following:

**Single System Operator -** A European wide balancing market would involve the centralisation of the balancing market in a Single System Operator that activates bids to balance the overall EU-network. This would mean that the responsibility for the security of supply of electricity is lifted from the national to the European level. This will require agreement on the definition of security of supply (level of reserve capacities).

In addition, it will require the creation of a new European System Operator, which will have to earn a high level of trust for national government for them to give up control over their balancing regimes.

*Advantages*

A common balancing market would create large efficiency gains as at all times, the lowest-cost capacity and balancing energy will be used. This is estimated to be 2 to 3 times the value of netting (Van der Veen et al. 2010). This would bring the amount to 600-900 million euros per year.

*Disadvantages*

One-off integration costs will be substantial. Also, it is not necessarily true that security of supply increases in every balancing zone - balancing zones with weak balancing discipline will diminish overall stability, and security of supply requirements will be set at an average level – bringing cost down but also the security in some areas.

[34] If balancing markets are badly harmonized, it is possible that balance service providers sell balancing energy in a higher priced balancing zone, and subsequently do not deliver the energy, which will merely incur the costs of their own, lower priced, balancing zone.

# 4 Conclusions

From the literature review that was carried out, it shows that a range of gaps and barriers for the internal energy markets still exists. As part of this study, we looked more closely at four of these gaps or barriers:

- Regulated prices
- Liquid hubs & exchanges
- Market coupling
- Balancing markets

Generally, when studying specific cases in terms of gaps and barriers in the internal energy markets, it becomes clear that every case is connected to other cases. This makes it difficult to delineate a single case, even more so when attempting to quantify the associated costs. The effects of removing a single specific barrier or filling single specific gap will depend on other related measures that are taken.

Also, the quantification of the cases to gain insight in the Cost of Non-Europe is highly dependent on assumptions that necessarily have to be made. It is therefore important to see the qualitative explanation of the quantifications as leading when using the results of this report in further analysis. It is also important to note that it was not possible to take account of costs related to the removal of the identified barriers and the quantification provided does therefore not reflect the net costs of non-Europe.

**Regulated prices:**

The analysis has shown that regulated end-user prices set below market levels reflecting the actual retail costs constitute a key challenge. They may prevent sufficient investment both on the supply and demand side. The tariff deficit, which is the difference between the regulated end-user price and the actual retail costs and which is accumulated over time, ultimately needs to be paid by taxpayers or final consumers. In an illustrative case study it has been shown that in a country with 15 million final consumers the annual tariff deficit could be as high as EUR 720 million.

The legitimate concern of protecting specifically vulnerable consumers should not be confused with a need for end-price regulation for all consumer classes. Price regulation can only be a temporary means to address unsatisfactory market conditions. Criteria and policies for transparency and equal access are needed to achieve this. In this context it needs to be addressed whether regulatory measures are required and effective to ensure adequate protection of vulnerable consumers in liberalised markets in terms of affordability of energy, or whether the same objectives can be reached by other means of non-distortive support, including tax discrimination, subsidies or other social benefits. Any complementary measures to help final consumers to cope with energy prices should include support for the implementation of energy savings measures that reduce final energy consumption and are the most effective means to keep energy costs under control.

However, in case of insufficient competition, regulated end-user prices can encourage competition.

**Liquid hubs & exchanges**

Our study of hubs & exchange showed that there is a great divergence within the EU of level of liquidity of gas hubs & electricity exchanges – especially in South-Eastern Europe the liquidity stays behind. A liquid market place allows the supply with the lowest cost to be matched with the demand that adds most value. Also, it allows the sharing of generation capacity, because peak demands do not necessarily coincide in every country. To illustrate its value, we have taken a study of the area of Germany, France, Netherlands, Belgium, Luxemburg and Austria, and compared a situation of trading with a situation of no trading between generation portfolios. The difference was estimated to be 7% less requirement for capacity. Taking into account capital and operational costs of generation, this represents a cost of EUR 1,64 billion per year in this particular case.

**Market Coupling**

In a situation where two market places are already connected, physically as well as commercially, market coupling increases the efficiency of capacity allocation. It does this by having capacity allocated based on supply and demand in two 'coupled' markets. This has the advantage that market players do have to book capacity that they might not use, increasing efficiency.
A case study was made on the border between France and Italy, comparing the cost of capacity bookings to the value of the capacity – the difference indicating the efficiency loss. The efficiency loss is estimated to be EUR 78 million per year on the border of Italy and France.

**Supra-national balancing markets**

There is a lot to be gained in the further integration of balancing markets. TSOs, whose area of responsibility is usually defined along national borders, largely still manage their balancing operations separately. Working together reduces required back-up capacity and the amounts of balancing energy used.

From experience, it has been shown that EUR 300 million can be saved if 5 countries work together in their balancing effort – merely by allowing offsetting of each other's imbalances. A single balance responsible party over a similar amount of countries could save up to 2 or 3 times more on balancing costs.

While removing each of these gaps/barriers requires specific measures as described in this report, some recurring themes can be identified.

- **Requirement for additional regulations –** Generally, from the cases studied in this report, the requirement for additional regulation is limited. In most cases, the required regulation is in place and implementation is what is required.
- **TSOs are heavily burdened –** Often EU regulation and agreement on ACER guidelines is in place, leaving implementation. This implementation requires a significant effort from the TSOs. This seems likely to create a bottleneck. Within these individual TSOs, there needs to be sufficient knowledge, budget, willingness and priority to carry out the implementation of an internal energy market. It is therefore important that the ENTSO-E is a strong entity with a governance structure that is fit for its role.

## Acknowledgements

The writers would like to thank Peter Styles, Laure Lamoureux, Raymond Kok, Elisabetta Pellini, Colin Lyle and Patricia de Suzzoni, for their valuable contributions to the case studies. Special thanks go out to Jacques de Jong, Kerstin Tews and Klaus Jacob for providing overall feedback on this report.

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