

**REPORT OF THE FRENCH ENERGY REGULATOR
ON ELECTRICITY INTERCONNECTION
MANAGEMENT AND USE IN 2006**

Paris, 12 May 2007

Foreword

The aim of this report is, on the one hand, to evaluate the congestion management methods applied by the French Transmission System Operator RTE, as required by Article 1.10¹ of the guidelines of European Regulation 1228, and, on the other hand, to share CRE's opinions on the management and use of electricity interconnections with other regulators and also with all the stakeholders involved in the implementation of an European electricity market.

This report is the first of its type. The next report, concerning interconnection management and use in 2007, is likely to require fine-tuning and enhancement and thus any response to the analyses contained herein will be taken into account by CRE.

¹ Article 1.10 of the guidelines: *"The national Regulatory Authorities shall regularly evaluate the congestion management methods, paying particular attention to compliance with the principles and rules established in the present Regulation and Guidelines and with the terms and conditions set by the Regulatory Authorities themselves under these principles and rules. Such evaluation shall include consultation of all market players and dedicated studies."*

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Introduction: 2005-2006, the turning point for congestion management

a. Background

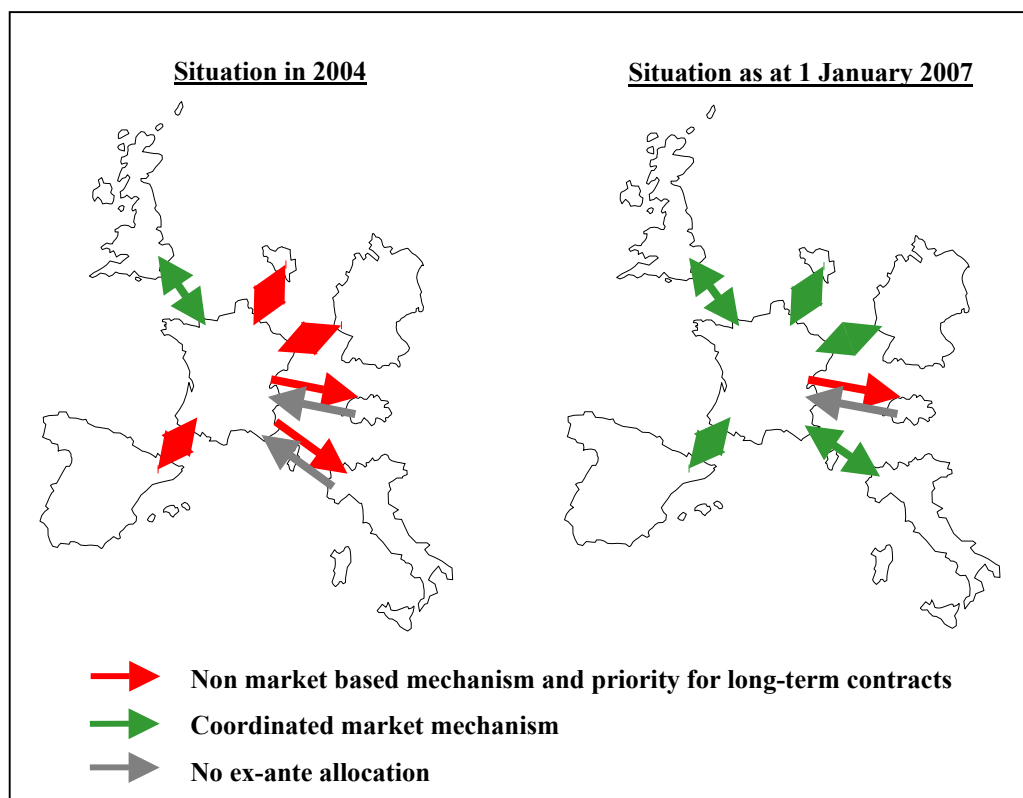
Until 2004, interconnection capacities between France and its European continental neighbours were managed using administrative mechanisms: priority lists and pro rata mechanisms. These congestion management systems originated from the period when interconnections were mainly used, in addition to their role of grid safety, to export surplus nuclear generated electricity in France, based on long-term contracts.

With a view to building a European electricity market, these mechanisms had to develop so as to enable the various European operators to exchange electricity in a more flexible way.

Article 6 of European Regulation 1228 of 26 June 2003 stipulates the general principles of congestion management: *“Network congestion problems shall be addressed with non-discriminatory market based solutions which give efficient economic signals to the market participants and transmission system operators involved. Network congestion problems shall preferentially be solved with non transaction based methods, i.e. methods that do not involve a selection between the contracts of individual market participants.”*

On the other hand, the European Court of Justice judgement of 7 June 2005 ordered the end of interconnection access priority previously granted to original contracts concluded between the major European operators prior to enforcement of the European Directive of 19 December 2004.

Figure 1 – Changes in mechanisms for managing interconnection capacities from 2004 to the beginning of 2007



b. Implementation of new mechanisms

CRE, working together with the regulators in neighbouring European Member States and receptive to the market players' opinions, embarked on fulfilling these legal requirements:

- In December 2004, CRE decided that RTE would allocate 50% of the export capacity to Italy using an explicit auction mechanism, with the rest of the capacity being allocated by its Italian counterpart;
- In November 2005, the France –Germany and France – Italy – Austria Roadmaps laid down the framework for setting up explicit auctions at these borders with annual, monthly and daily timeframes;
- In December 2005, the France – Belgium – Netherlands Roadmap did the same by further encouraging daily coupling² to these three markets;
- In December 2005, CRE decided, in compliance with the ruling issued by the European Court of Justice, to no longer grant access priority to original contracts between France and the other Member States;
- In May 2006, the joint decision made by CRE and the Spanish Department of Trade, Industry and Tourism launched a mechanism for coordinated explicit auctions at the Spanish border as from June 2006;
- In November 2006, CRE authorised market coupling between France, Belgium and the Netherlands.

Inset 1 below provides an overview of the characteristics of the auctions held in France.

c. New context and forthcoming objectives

European context profoundly evolved in 2006.

In February 2006, ERGEG³ launched the Regional Electricity Initiatives with the aim of speeding up market integration at a regional level so as to end up with a single European Union market. France belongs to four of the seven regions defined by ERGEG:

- Central-West (with Germany, Belgium, Luxembourg and the Netherlands),
- Central-South (with Germany, Austria, Greece, Italy and Slovenia),
- South-West (with Spain and Portugal),
- United Kingdom and Ireland.

Furthermore, since 1 December 2006, the new guidelines for Regulation 1228/2003 have been enforced. Whereas Regulation 1228 stipulated the general principles of congestion management, its new guidelines precisely set out the changes to be made to the mechanisms in force. They especially require a coordinated approach at the regional level for the calculation and allocation of interconnection capacities.

In each region where France is involved, new developments in the congestion management mechanism must thus be made.

In December 2006, for the Central-South region, CRE's actions resulted in the setting up of an explicit auction mechanism jointly coordinated by the two TSOs for the entire export capacity to Italy.

In the region with the United Kingdom and Ireland, CRE chairs a work stream to develop the rules governing the France-England interconnection.

² Daily interconnection capacities allocated at the same time as energy transactions.

³ ERGEG: European Energy Regulators Group for Electricity and Gas

In February 2007, CRE, together with the other four regulators involved⁴, published an extensive regional action plan for the Central-West region, including concrete stages for the next two years in order to speed up regional integration of electricity markets in this region.

Moreover, in compliance with Article 23 of European Directive 2003/54, the standard specifications for the public electricity transmission grid, approved by French Decree 2006-1731, reinforce CRE's powers: CRE is now in charge of approving interconnection capacity calculation and allocation rules.

d. Report objectives

This report has two main objectives, which would be facilitated by the application of European regulations, in particular of the guidelines of Regulation 1228/2003.

Its first objective is to review the decisions made in 2005-2006 and the ensuing changes in mechanisms for allocating interconnection capacities, in accordance with Article 1.10 of the guidelines of Regulation 1228/2003. Three types of advantages are thus identified in Part 1:

- New economic signals resulting from the auctions enable capacity value to be estimated.
- Congestion income is now shared by all grid users.
- Congestion management methods are more transparent (capacities are now shared amongst a greater number of participants), and more efficient (use of capacities is better correlated to price differentials).

Its second objective is to propose potential areas for improvement in congestion management which could be used as a basis for discussion with the various participants. In Part 2, three types of essential improvements are identified:

- The quantity of capacities available should be increased (for example, through greater coordination by TSOs in their electricity exchange forecasts), along with improved quality (for example, through the improved level of compensation in the event of curtailment of capacity and, in more general terms, harmonisation of auction rules).
- The use of capacities must be better correlated to the market price differential. With this aim in mind, the setting up of implicit mechanisms should be encouraged for short timeframes (of D-1 in real time), and flexibility of use of long-term rights should be increased.
- The use of incentive methods applied to TSOs by regulators would speed up the implementation of the requirements of European law.

As can be seen in the conclusion, these improvements mainly constitute the objectives set out by the regulators in action plans drawn up for the Central-West, Central-South and United Kingdom and Ireland regions.

⁴ Bundesnetzagentur (BNA) for Germany, la Commission de régulation de l'électricité et du gaz (CREG) for Belgium, l'Institut luxembourgeois de régulation (ILR) for Luxemburg, Directie Toezicht Energie (DTe) for The Netherlands.

Inset 1: Characteristics of auctions held by RTE as at 1 January 2006

Explicit auctions set up by RTE and RWE Transportnetz Strom GmbH in 2006 for import from Germany have the following characteristics:

- Products sold are physical rights to use interconnection capacity with annual (except for Spain), monthly and daily timeframes;
- One single auction session is organised for each type of product (single-round auctions);
- Each participant submits its bids without any information on the other participants' bids (closed auctions or sealed bids);
- The price of the last bid is the price paid by all the participants selected (uniform auctions or known as the marginal price).

The following Table presents the average capacity allocated by these auctions along with the number of participants.

Table 1 – Participation in capacity auctions in 2006

			Average capacity sold at auction (MW)	Average number of participants	Average number of participants awarded capacity
Germany	Export	Annual	900	36	13
		Monthly	366	25	6
		Daily	1,280	12	7
	Import	Annual	1,500	31	16
		Monthly	1,075	23	13
		Daily	3,699	17	14
Belgium	Export	Annual	1,300	22	17
		Monthly	662	16	10
		Daily	840	8	7
	Import	Annual	800	20	9
		Monthly	151	12	5
		Daily	1,091	8	8
Spain	Export	Monthly	708	11	8
		Daily	724	6	4
	Import	Monthly	296	10	6
		Daily	389	5	3
Italy	Export	Annual	400	19	10
		Monthly	721	17	10
		Daily	160	6	3

Source: RTE – Analysed by CRE

Part 1: Consequences of changes occurring in 2005-2006

New congestion management mechanisms were implemented during this period. In addition to compliance with European community law, the main benefit expected from the setting up of these new mechanisms is a tendency to efficiently use interconnection capacities, thus taking advantage of the complementary nature of national generation capacities and evening out consumption peaks.

a. An economic signal for interconnection capacity value

Without market-based allocation mechanisms, the value that the market assigns to interconnection capacities could not be estimated in a reliable manner.

The average hourly price revealed by the auction for each interconnection MW, irrespective of timeframes, constitutes an element of comparison between the different interconnections at the French borders. This can especially be used for investments in new lines and to modify the distribution factor of commercial capacities based on physical capacities between the eastern France borders.

Table 2 – Comparative interconnection capacity values at the French borders in 2006

	Export		Import		Total
	€/MWh	€/MW	€/MWh	€/MW	€/MW
Germany	1.22	10,695	1.32	11,558	22,253
England	13.42	117,564	0.68	5,986	123,550
Belgium	1.93	16,926	0.12	1,091	18,016
Spain	3.23	28,287	4.30	37,682	65,969
Italy	12.53	109,803	-	-	109,803

Source: RTE – Analysed by CRE

b. An economic signal for market failure

The previous indicator provides an element for comparison between the different French interconnections, and of the market players' inclination to pay for cross-border capacities. It has been decided here to highlight the real congestion income (i.e. auction revenue), which reflects this inclination to pay, along with an indicator on the theoretical congestion income, whose calculation is based on ex-post hourly price differentials between the national markets.

Ideally, the real congestion income should be equal to the theoretical congestion income, however, in practice this is not the case due to:

- Difficulty encountered by the market players with the forecast of day-ahead price differentials, and all the more so, for one month or one year ahead;
- Market players' preference for exchange of longer-term products (such as baseload and peakload products of a day), along with the difficulty or even impossibility for the market players to carry out arbitrage for hourly steps;
- Failures in the interconnected markets (small number of players, information asymmetry, size differences).

Nevertheless, inter-temporal monitoring of the ratio between the real income revealed by market mechanisms and this theoretical congestion income is deemed useful to reveal congestion management mechanisms failures, incompatibility between market designs, or lack of competition at the interconnection.

It could also evaluate the impact of the modification to interconnection access rules and changes in national market designs and assess, whether, and to what extent, proper market operations are being achieved.

In the future, this indicator could be fine-tuned in order to take into account the three types of bias listed above.

Table 3 – Auction revenue and theoretical congestion income (million euros)⁵

		2005			2006		
		Auction revenue	Theoretical congestion income	Ratio	Auction revenue	Theoretical congestion income	Ratio
Germany	Export	0	34	0%	21	75	28%
	Import ⁶	15	171	9%	53	158	34%
England	Export	136	-	-	221	-	-
	Import	8	-	-	11	-	-
Belgium	Export	0	-	-	41	-	-
	Import	0	-	-	2	-	-
Spain⁷	Export	0	90	0%	35	90	39%
	Import	0	12	0%	17	19	92%
Italy⁸	Export	65	160	40%	134	261	51%

Source: RTE, Powernext, EEX, Belpex, OMEL and IPEX – Analysed by CRE

c. Transfer of congestion income to grid users

With capacity allocation that is free of charge (pro rata and priority list), the entire congestion income is seized by interconnection users (cf. Table 2) but with auction revenue part of this income is transferred to grid users.

Auction revenue for 2006 amounted to 331 million euros net for the French share after distribution of the income amongst the neighbouring countries. It is used in compliance with article 6.6 of Regulation 1228/2003 as income which is deducted from the charges to be covered by the grid utilisation tariff.

⁵ For England and Belgium, theoretical congestion income has not been calculated due to the absence of an hourly price defined on these two markets (until 21 November for Belgium with the start-up of Belpex).

⁶ The values calculated here for 2005 are those from 5 April to 31 December 2005 (with auctions).

⁷ Intraday auction revenue is not taken into account here since intraday capacities are not meant to be linked to price differentials set on D-1.

⁸ The auction revenue and theoretical congestion income at the Italian border only take into account half the interconnection capacity since explicit auctions were only held by RTE on 50% of the capacity. The indicator for 2007 can be calculated on 100% of the capacity since coordinated explicit auctions have since been held for the entire capacity.

When the tariff for utilisation of public transmission grids was being drawn up for 2006 and 2007 (TURPE2), the auction revenue was estimated based on price indexes available at that time. This estimate which did not take into account the suppression of long-term priority access contracts, or auctions at the borders with Germany, Belgium and Spain, only amounted to an average of 103 M€ for 2006 and 2007. Additional revenue earned in 2006 (228 M€) was paid into the “expenses and revenues clawback account” to be deducted from the next tariff coming into force on 1 January 2008 (TURPE3).

If financial obstacles to new interconnections were encountered by RTE, CRE could consider the creation of a fund assigned to new infrastructure investment using part of the auction revenue. This would thus resolve the lack of funds assigned to interconnection infrastructures in 2007, observed by CRE in its deliberations of 21 December 2006.

d. More widely shared interconnection capacities

Transition from administrative congestion management mechanisms (pro rata and priority lists), with access priority for original contracts, to non-discriminatory auction mechanisms, fostered greater competition at all France’s interconnections. Apart from the Spanish border, there was a sharp rise in the number of operators using the interconnection (Table 4). On the other hand, at the Spanish border their number declined, as in 2005 a large number of operators were involved in a very low share of the exchanges (mainly intraday capacities, allocated pro rata). The operators with more than 1% of the exchanges at the Spanish interconnection went up for export from 9 in 2005 to 16 in 2006, and for import, from 13 in 2005 to 16 in 2006.

Table 4 – Market concentration indexes

		2005			2006		
		<i>Number of operators</i>	<i>Largest share</i>	<i>HHI</i>	<i>Number of operators</i>	<i>Largest share</i>	<i>HHI</i>
Germany ⁹	Export	24	90%	8088	39	23%	895
	Import	27	28%	1259	36	20%	796
Belgium	Export	24	58%	3498	26	26%	1081
	Import	13	35%	2081	21	35%	1934
Spain	Export	27	55%	3319	22	33%	1869
	Import	26	20%	1202	23	30%	1566
Italy	Export	22	67%	4664	23	47%	2477

Source: RTE – Analysed by CRE

e. Greater consistency between interconnection capacity use and price differentials

Use of each interconnection, fully in keeping with market prices would provide:

- Maximum net export flow¹⁰ (net rate equal to 1), as soon as the price in the neighbouring country is higher than the French price;

⁹ In April 2005, the allocation mechanism for import from Germany changed over from pro rata to explicit auctions. The figures provided here were therefore calculated from January to April 2005, then from April 2005 to December 2006.

- Minimum net export flow (net rate equal to -1), as soon as the French price is higher than the price in the neighbouring country.

So as to avoid bias incurred by transaction costs, it is considered here in an arbitrary manner that price differentials foster interconnection use if they are greater than 2 €/MWh.

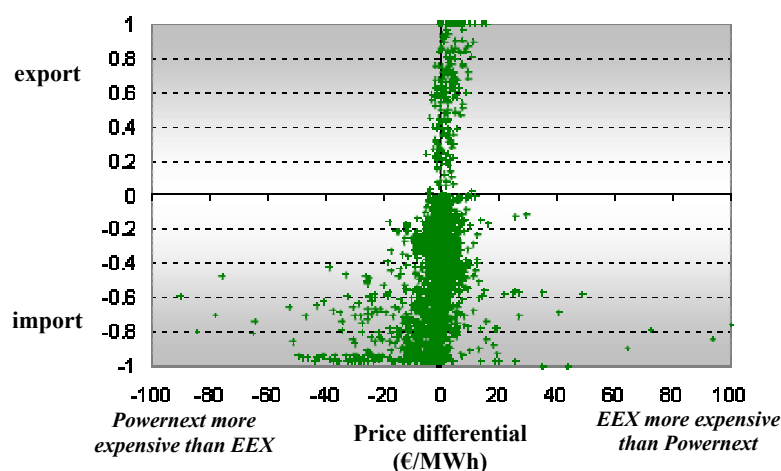
This optimum use of interconnections would result in S-shaped plots in Figures 2 to 7.

• Interconnection with Germany

A very clear relationship was established between flow consistency compared to organised market price differentials and development of congestion management mechanisms at this border in 2005 and 2006 (Figures 2, 3 and 4).

In the first part of 2005 (Figure 2), when congestion management mechanisms were purely administrative (pro rata and priority lists), and long-term contracts enjoyed priority access rights, the net flow followed a “business as usual” logic, with constant imports from Germany. When the EEX price was higher than the Powernext price for 37% of the time, the net flow was in the import direction from Germany for 90% of the time.

Figure 2 – Net rate of capacity use (excluding intraday and balancing transactions), compared to the price differential between EEX and Powernext (€/MWh), from January 2005 to 4 April 2005

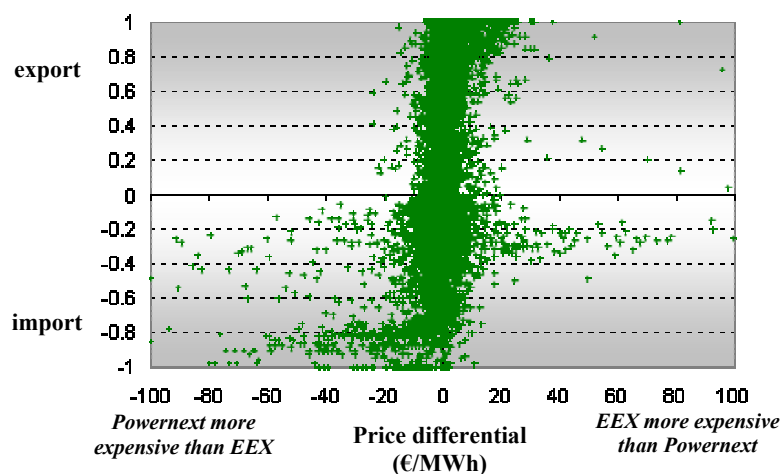


Source: RTE, Powernext and EEX – Analysed by CRE

During the second part of 2005 (Figure 3), when auctions were set up in the import direction, the flow direction was more balanced compared to the price gradient. When EEX was more expensive than Powernext, the net flow followed this price differential for 59% of the time (as opposed to 24% during the first part of the year).

¹⁰ Net export flow is the difference between export nominations and import nominations. The net rate of capacity use, between -1 and 1, is net export flow divided by NTC for export if the net flow is positive and by NTC for import if the net flow is negative.

Figure 3 – Net rate of capacity use (excluding intraday and balancing transactions), compared to the price differential between EEX and Powernext (€/MWh), from 5 January 2005 to December 2005



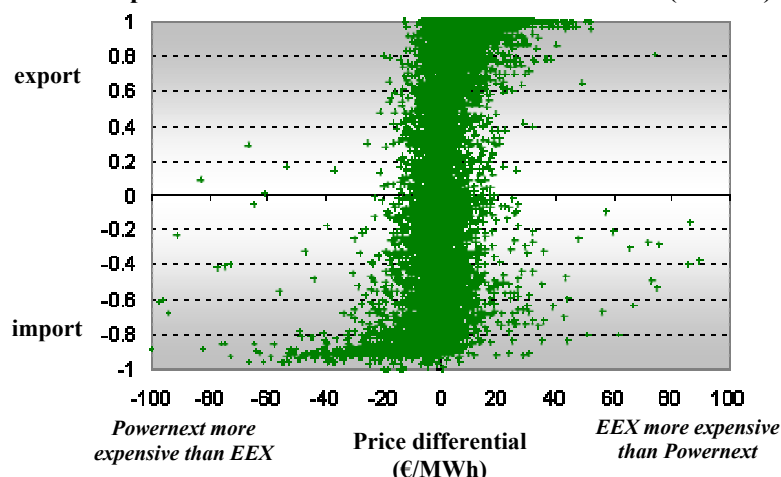
Source: RTE, Powernext and EEX – Analysed by CRE

In 2006, with auctions in the export direction, interconnection use was better related to the price differential (Figure 4). When EEX was more expensive than Powernext, the net flow went from France to Germany for 70% of the time and when Powernext was more expensive than EEX, the net flow followed the prices for 77% of the time.

Although interconnection use compared to the organised market price differential was still below the optimum in 2006, the “business as usual” logic seems to have been abandoned in favour of more reactive behaviour to price differentials.

Furthermore, in 2006, interconnection was used at higher levels than in 2005: the net flow exceeded 90% of the net transfer capacity, in one of the two directions for 26% of the time, whereas in 2005, this was not the case for 13% of the time.

Figure 4 – Net rate of capacity use (excluding intraday and balancing transactions), compared to the price differential between EEX and Powernext (€/MWh) in 2006



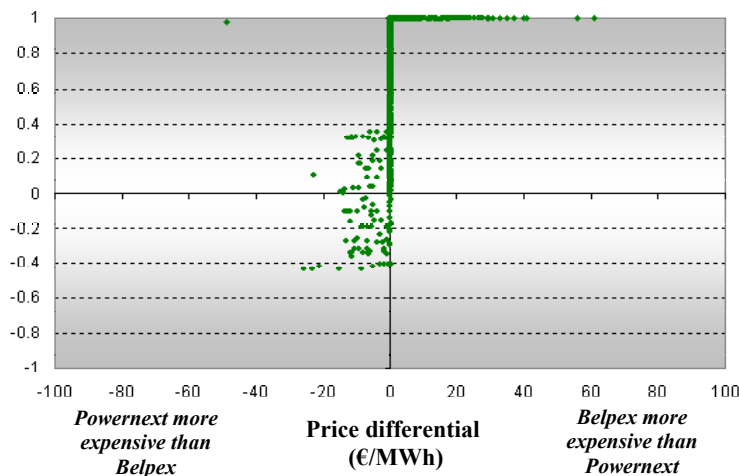
Source: RTE, Powernext and EEX – Analysed by CRE

- **Interconnection with Belgium**

Until November 2006, the absence of an hourly price reference in Belgium did not make it possible to search for a relationship between interconnection use and the price differential on an hourly basis. However, based on daily OTC prices¹¹ and the daily average flow observed at the interconnection, there was low reactivity of interconnection use to prices, since the net flow was only in the import direction for 2 days out of the 690 days under consideration (from 1 January 2005 to 21 November 2006), whereas the Belgian price was lower than the French price for 80 days.

However, as from 22 November, the coupling of the Belgian, French and Dutch markets fostered maximum use of daily exchanges of capacity made available to the market, compared to the hourly price differential between Belpex and Powernext (Figure 5).¹²

Figure 5 – Net rate of capacity use since the start-up of market coupling, compared to the price differential between Belpex and Powernext (€/MWh)



Source: RTE, Powernext and Belpex – Analysed by CRE

- **Interconnection with Spain**

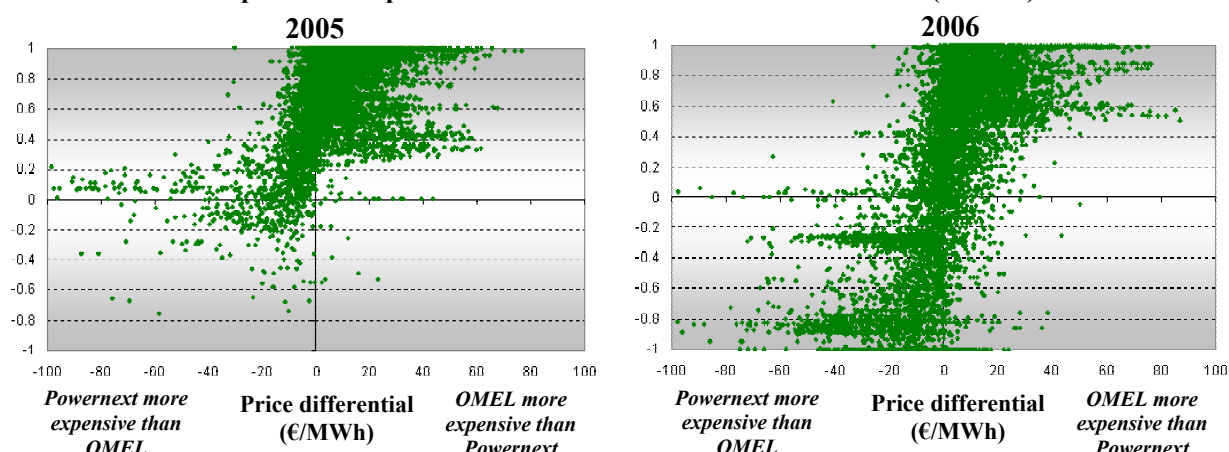
After the introduction of auctions and suppression of priority access rights for long-term contracts, the use of commercial capacities at the Spanish border was far better correlated to the price differential between the two organised markets (Figure 6).

Apart from very short-term exchanges (intraday and balancing), which have no link to exchange price differentials (set on D-1), in 2006, there was a more symmetrical interconnection use than in 2005, with import capacities being better used when the French price was higher than the Spanish price. Thus, when prices were conducive to imports from Spain by more than 2 €/MWh, exports in the opposite direction to the price differential fell from an average of 340 MW in 2005 to 89 MW in 2006.

¹¹ Over-The-Counter (OTC) prices considered in this report are those provided by the Platts index.

¹² It is worth mentioning that in the absence of “netting” of periodic capacities, the use of import capacities is not optimal and this is one of the improvements to be made to the mechanism, as presented in the next part.

Figure 6 – Net rate of capacity use (excluding intraday and balancing transactions), compared to the price differential between Omel and Pownertex (€/MWh)



Source: RTE, Pownertex and OMEL – Analysed by CRE

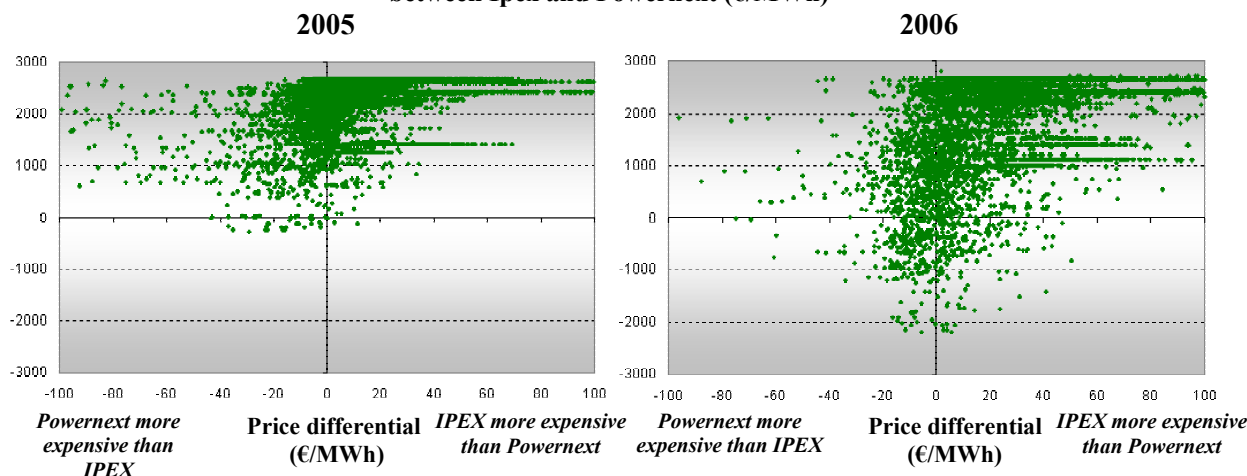
• **Interconnection with Italy**

Due to the very structure of its generation park, Italy is traditionally a large-scale importer of electricity from France. Without any doubt being cast on this overall trend, since 2005, there have been regular inversions in the price differential between the two countries.

However, in 2005, inversions in the price differential occurring for 2066 hours (i.e. a quarter of the year) only resulted in an inversion in the net flow transiting between the two countries for 30 hours. The rest of the time, the export balance was normally at a maximum, with an average of 2305 MW (Figure 7).

However, in 2006, the flow was better correlated to the price differential, especially for the part of the capacity managed by RTE through explicit auctions. When the Italian prices were over 2 €/MWh lower than the French prices (10% of the year), only 624 MW was used in the opposite direction (export to Italy) for the capacities managed by RTE, against 855 MW for capacities managed by Terna.

Figure 7 – Net export balance (MW), compared to the price differential between IpeX and Pownertex (€/MWh)¹³



Source: RTE, Pownertex and IPEX – Analysed by CRE

¹³ The fact that TSOs did not publish the value of the import capacity from Italy to France in 2006 means that it is not possible to calculate a net rate of capacity use at this border.

Conclusion on the advantages of the new congestion management mechanisms

As stated above, the implementation of auction mechanisms has resulted in several types of advantages:

New economic signals: existence of the two signals that have already been explained (comparative values of interconnection capacities and auction revenue ratio to the theoretical congestion income) is a direct consequence of the implementation of auctions. These indicators constitute a considerable tool for regulators to assess the need for investments in cross-border grids and to check the efficiency of allocation mechanisms deployed.

Congestion income transfer: thanks to auction revenue, which is deducted from the charges to be covered by the grid utilisation tariff, in compliance with article 6.6 of European Regulation 1228/2003, part of the theoretical congestion income is transferred to grid users.

New distribution of capacities: implementation of transparent, non-discriminatory market-based mechanisms fosters competition by enabling new operators to take part in cross-border electricity exchanges.

More efficient use of interconnection capacities: the better correlation between capacity use and organised market price differentials results from better merit order of generation means in Europe which should lead to an overall drop in costs and an increase in social welfare.

Part 2: Further improvements required

In addition to the advantages created by changes made to the mechanisms in 2005-2006, this second part highlights the progress still to be made to change over to fully efficient congestion management mechanisms. Four types of improvement have thus been identified concerning:

- *Well-functioning of the mechanisms*: explicit auction mechanisms, for both physical and financial rights, oblige regulators to monitor the willingness of the market players to pay for these rights. Therefore, monitoring the type of products and the way in which they are valued is necessary in order to identify imbalances and gaming likely to impede efficiency of the mechanisms.
- *Use of auctioned capacities compared to the market price differential*: proper correlation between cross-border flows and national market price differentials is a crucial issue for taking advantage of the complementary nature of generation capacities and demand. If such a correlation is high, it should eventually drive electricity prices down, especially during market price peaks.
- *Use of capacities for short-term exchanges*: intraday and balancing exchanges are crucial to guarantee security of supply at the lowest cost.
- *Management of the capacities by TSOs*: in compliance with European regulations and especially with the new guidelines for Regulation 1228/2003, CRE checks compliance with the interconnection access rules and quality of information published by TSOs.

a. In terms of well-functioning of the mechanisms

For each product (annual – monthly– daily), the marginal auction price is to be compared to the capacity value calculated based on the price differential between the two countries. The prices considered here are those of the organised markets, since prices are calculated in the most transparent and universal way. For forward products, the prices considered for the English, Belgian and Spanish markets are those provided by Platts, because these products are not quoted on organised markets.

• Periodic auctions

Periodic capacities constitute a means for the market players to exchange long-term products (annual and monthly) on the various markets and to hedge their risks on each market. As for any commodity, the price that the market players are willing to pay to obtain this commodity depends on the intrinsic characteristics of the product sold: the more reliable the product sold is (firmness, compensation in the event of curtailment, etc) and easy-to-use (existence of a secondary market, nomination procedure, financial/physical nature, etc), the more valuable it is.

Market players wishing to participate in periodic auctions can consider two price references in order to determine their willingness to pay for the capacity. On the one hand, if they are involved in long-term arbitrages, they can consider the price differential of forward products, available the day of the auction. On the other hand, if they are interested in shorter-term arbitrages, this initial value has to be supplemented by their estimate, for the period in question, of price differential volatility on an hourly, (or daily, weekly, etc) basis.

As CRE does not have access to these estimates, which differ for every market player, this report considers the theoretical value of capacities calculated ex-post, based on volatility of hourly price differentials. When the operators' forecasts do not materialise, typically in the case of unexpected weather conditions (heat wave, very cold spell, etc), this value may be lower than the marginal auction price. However, in principle, the marginal price revealed by annual (or monthly) auctions must be:

- At least the same order of magnitude as the price differential of annual forward (or monthly) products, observed on the date the auction is held,

- Lower than the theoretical capacity value, calculated ex-post based on the hourly price differential between the organised markets throughout the year (or month).
 - o *Annual capacities*

Observation of the results of annual auctions (Table 5) highlights the following facts:

- The price assigned to capacities at the borders with Germany and Spain was far higher than the price differential for annual forward products. This tends to prove that annual capacities are not purchased for annual arbitrages between the markets but rather for shorter-term arbitrages. However, the marginal price of annual auctions remains much lower than the theoretical value of the annual product calculated ex-post at these two borders.
- On the other hand, the price of the annual export capacity at the Belgian and English borders was low, since it was even lower than the price differential for forward products. This can be explained at the English border by the especially high level of forward price differentials which did not necessarily reflect the market player's forecasts. Furthermore, spot prices in Great Britain and France in 2006, proved to be far closer than the forecast based on forward product prices. Low capacity valuation at the Belgian border compared to the price differential for forward products could be attributed to the relatively high annual capacity available between France and Belgium, mainly concerning the annual capacity available between Belgium and the Netherlands.

Table 5 – Annual capacity valuation in 2006 and 2007

		2006				2007		
		Capacity sold (MW)	Price (€/MWh)	Forward differential (€/MWh)	Option value (€/MWh)	Capacity sold (MW)	Price (€/MWh)	Forward differential (€/MWh)
Germany	Export	900	0.61	-0.70	5.84	800	3.03	0.65
	Import	1500	1.01	0.70	4.34	1200	2.22	-0.65
England ¹⁴	Export	500	19.48	21.13	-	500	7.74	4.62
	Import	500	0.44	-21.13	-	500	1.95	-4.62
Belgium	Export	1300	0.76	0.80	-	1300	2.06	2.73
	Import	800	0.11	-0.80	-	400	0.25	-2.73
Spain	Export	-	-	-2.75 ¹⁵	8.98	150	5.17	-3.40
	Import	-	-	2.75	7.58	100	8.46	3.40
Italy	Export	400	7.68	-	27.40	1550	15.60	-
	Import	-	-	-	1.94	-	-	-

Source: RTE, Powernext, EEX, IPEX, OMEL and Platts – Analysed by CRE

- Prices revealed by annual auctions at all the continental borders rose between 2006 and 2007, for import and export alike. This comparison cannot be made at the Spanish border as no annual auction was held for 2006. However, if the price of annual capacities for 2007 is compared to the average price of monthly capacities in 2006 (Figure 11 below), the same trend is observed. The increased price assigned to annual capacities may be interpreted as:
 - The sign of greater competition at interconnections,
 - The sign of growing market confidence in the allocation mechanisms in force,
 - A consequence of the introduction of secondary capacity markets.

¹⁴ This involves the auction of capacities for the calendar year (as an auction for the financial year also exists at the interconnection with England).

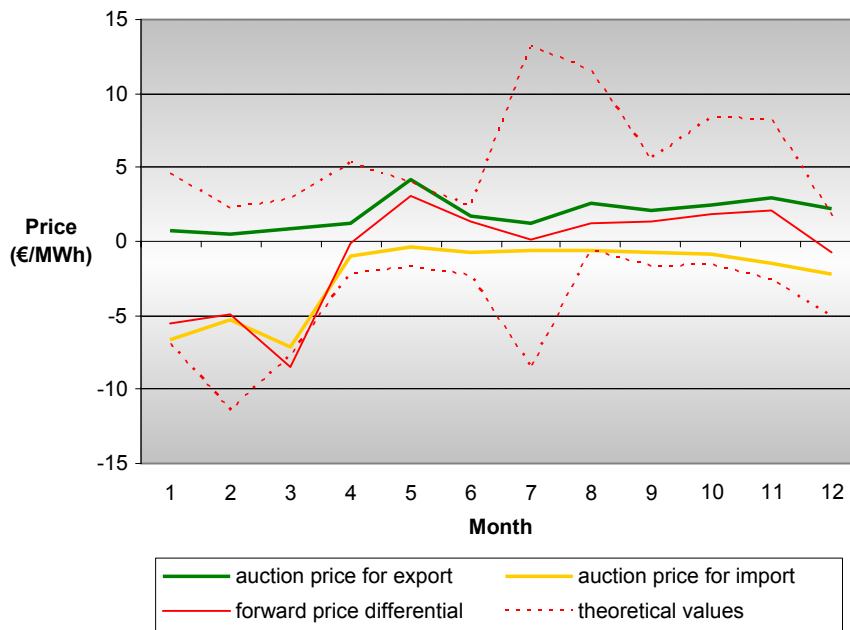
¹⁵ The annual forward price differential for Spain in 2006 is provided for information purposes only, since no annual auction was held at the France-Spain interconnection for 2006. The date of this price differential is 15 December 2005.

- *Monthly capacities*

Monthly capacity valuation differed according to the border in question.

First of all, the maximum theoretical value of capacities at the German border (Figure 8) virtually always remained higher than the price differential for monthly forward products. This tends to show that price differentials forecast from one month to another are revealed as being correct on the whole. Furthermore, the price assigned to monthly capacities, for export and import alike, generally remained between these two limits. This means that operators do base their bids on these two price references. Lastly, in general terms, prices revealed by the auctions are very low compared to the maximum theoretical value of capacities.

Figure 8 – Prices assigned to monthly capacities at the border with Germany for 2006, compared to the forward price differential and the theoretical value of capacities (€/MWh)

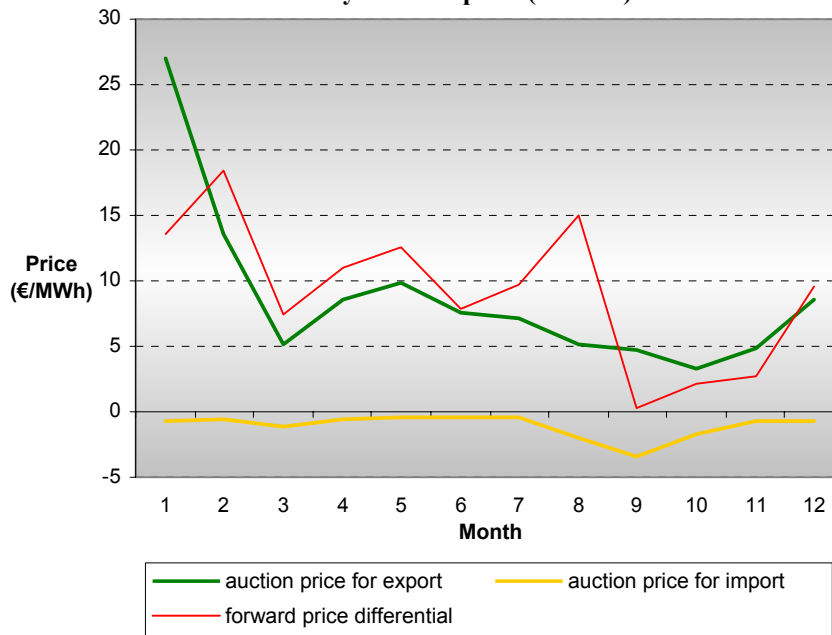


Source: RTE, Powernext and EEX – Analysed by CRE

However, the price of monthly auctions at the borders with England and Belgium (Figures 9 and 10), was lower than the forward price.

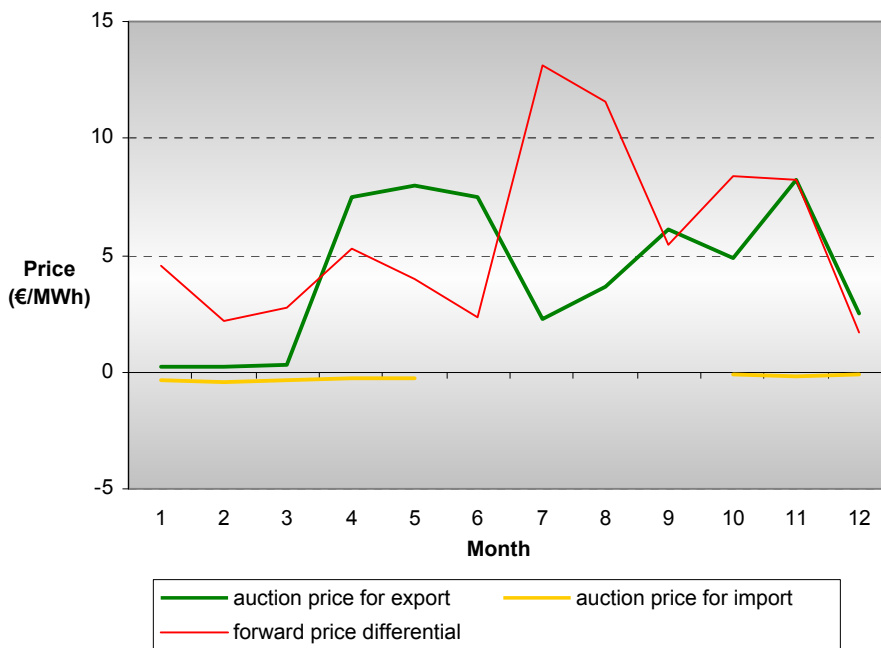
Due to the absence of a well defined hourly price in England, and the total lack of an hourly price in Belgium, before the launch of Belpex in November 2006, it is not possible to establish any correlation between monthly auction prices and the theoretical capacity value, as previously defined.

Figure 9 – Prices assigned to monthly capacities at the border with England for 2006, compared to the monthly forward price (€/MWh)



Source: RTE, Powernext and Platts – Analysed by CRE

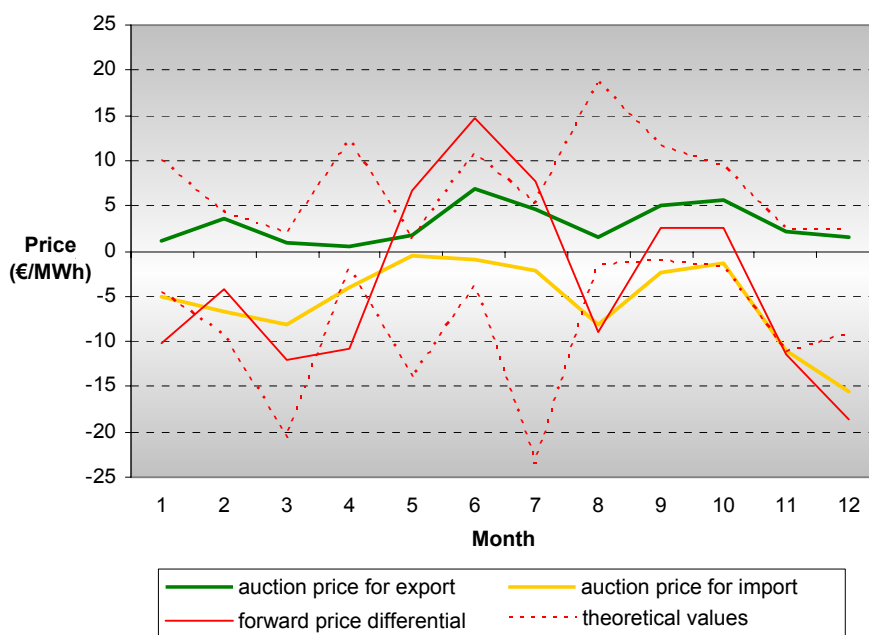
Figure 10 – Prices assigned to monthly capacities at the border with Belgium for 2006, compared to the monthly forward price differential (€/MWh)



Source: RTE, Powernext and Platts – Analysed by CRE

Prices assigned to monthly capacities at the Spanish border (Figure 11) were very close to the theoretical values. As is shown later, the flows at this border are more reactive to hourly price variations, which is why the operators base their bids for capacity on their estimate of hourly capacity value rather than on the forward price differential.

Figure 11 – Prices assigned to monthly capacities at the border with Spain for 2006, compared to the monthly forward price and the theoretical value of capacities (€/MWh)

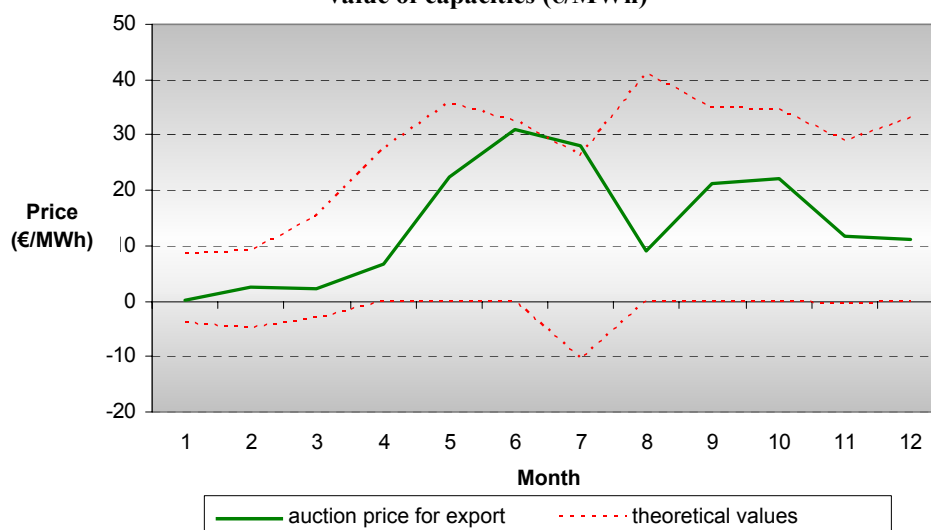


Source: RTE, Powernext, OMEL and Platts – Analysed by CRE

The price revealed by monthly auctions of export capacity at the Italian border was low, compared to the high theoretical capacity value and predictability of the price differential between France and Italy. The auction price only matched the capacity value during the very hot months (June and July) (Figure 12).

The absence of a forward price on the Italian market prevents any other analysis from being made.

Figure 12 – Price assigned to monthly export capacities to Italy for 2006, compared to the theoretical value of capacities (€/MWh)



Source: RTE, Powernext and IPEX – Analysed by CRE

Possible improvements in the well-functioning of periodic auctions

For introductory purposes, it should be recalled that as for any commodity, interconnection capacity valuation depends on the type of product allocated by the grid operators: the more reliable the product sold is, the more valuable it is.

In the case of these periodic products keeping their nature of physical rights (i.e. options or obligations to nominate the energy corresponding to the capacity held), the five areas for improvement described below would make allocated capacity valuation more accurate.

Harmonisation: a set of rules governing periodic auctions, and completely harmonised at all France's borders if not the whole of Europe, with ideally a single TSO-user interface would considerably facilitate cross-border exchanges for market operators, which would therefore be more inclined to increase their willingness to pay for these capacities.

Ease-of-use: a single nomination interface, user-friendly and practical (with, for example, the possibility of nominating periodic capacities with a lower frequency than the current daily frequency), instead of nomination to each TSO currently in force would also result in increased capacity value.

Secondary markets: capacity rights transfer and resale mechanisms provide a higher flexibility to market players for the use of these rights, and therefore raise their value. The fact that these mechanisms have been set up at the borders of Eastern France for 2007 is undoubtedly one of the factors causing the increased price of annual capacities between 2006 and 2007. Improvement in existing transfer and resale mechanisms through, for example, the setting up an exchange platform would constitute a means of substantial improvement, once a single interface has been created for primary products.

UIOSI: in the same way, if periodic capacities were automatically reallocated on a daily basis, with the initial holder receiving the daily auction price in exchange (explicit or implicit depending on the mechanism in force for this timeframe) via the "Use-It-Or-Sell-It" system, their value would shoot up.

Firmness: allocated capacities should be as firm as possible in financial terms so as to lessen the risks incurred by market players.

It should be pointed out that in keeping with the hypothesis that the products would be transformed into purely financial rights (rights to be recovered the daily price differential), only harmonisation of allocation rules at the different borders and improvement in secondary markets could affect the valuation of products allocated.

In all cases, the cost of resolving the various areas for improvement identified above should be properly assessed and compared against the expected benefits.

In addition, it is worth mentioning that monitoring the well-functioning of allocation mechanisms for periodic products and their valuation requires access to sufficiently liquid and transparent price references.

- **Daily auctions**

In theory, the daily auction price should be equal to the price differential for D-1 markets. However, in reality, the marginal price of daily auctions is normally lower than the D-1 price differential due to the separation of energy and transmission markets, which incurs a risk for operators (as daily auctions take place before the organised market fixing).

Therefore, apart from the French-Belgian border, where there has been an implicit mechanism for allocating capacity since November 2006, daily auctions generally reveal relatively low prices compared to the market price differential.

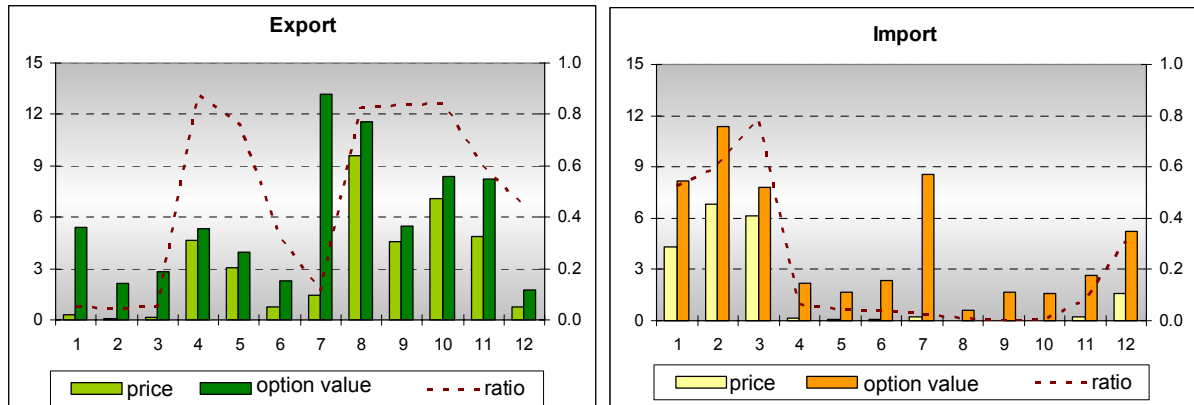
○ *Interconnection with Germany*

In 2006, there was great irregularity in the valuation of daily export capacities at the border with Germany.

As for import capacities, their valuation was particularly low, whereas the price differential between the two countries was regularly conducive to imports (Figure 13).

In 2006, daily auctions at this border generated less than 25 M€, whereas the theoretical daily income was almost 145 M€. ¹⁶ This difference of nearly 120 M€, is rather high due to the very large daily capacity on offer for import from Germany (around 3,700 MW on average).

Figure 13 – Average monthly price assigned to daily capacities between France and Germany in 2006, compared to the theoretical average monthly value of these capacities (€/MWh)

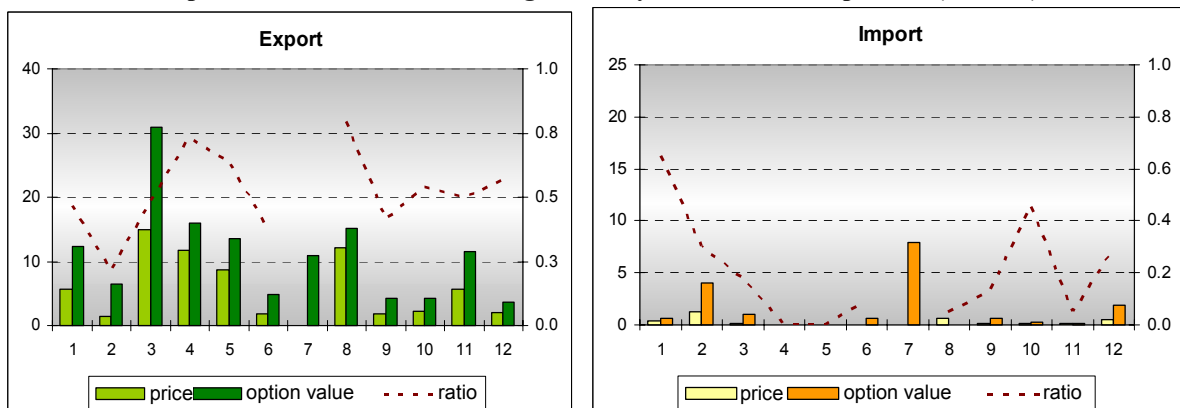


Source: RTE, Powernext and EEX – Analysed by CRE

○ *Interconnection with England*

It should be pointed out that products offered at this border come in bands of 24 hours, whereas the capacity proposed at the other borders is on an hour-by-hour basis. The specificity of the product allocated at this interconnection is especially inappropriate to the use which is made of it insofar as this follows a peak/off-peak logic. Even if there is an overall export trend at this interconnection, there are often particularly high amounts of exports at night with import peaks during the day.

Figure 14 – Average monthly price assigned to daily capacities between France and England in 2006, compared to the theoretical average monthly value of these capacities (€/MWh) ¹⁷



Source: RTE and Platts – Analysed by CRE

¹⁶ For reminder purposes, this theoretical income is calculated without taking into account market resilience.

¹⁷ In July, no daily auction was held at the France-England interconnection, due to a technical problem restricting interconnection capacity.

Even by comparing the average price paid for daily capacities to the average daily price differential (and not hourly, since hourly prices on the English market are not clearly defined), there is a relatively low capacity valuation (Figure 14).

○ *Interconnection with Belgium*

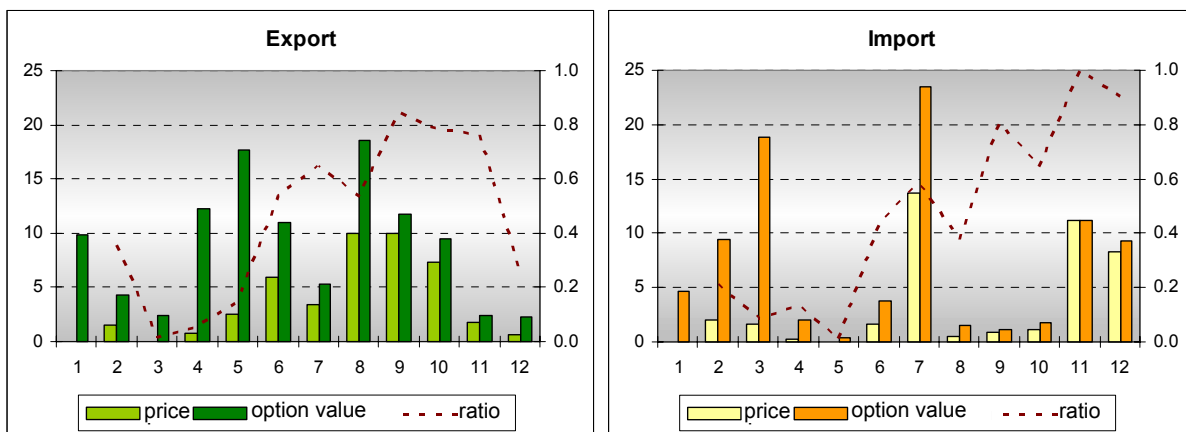
Up to 21 November 2006, daily capacities at the Belgian border were allocated by explicit auctions on an hourly basis. The absence of hourly price references in Belgium makes it impossible to compare auction revenue to maximum theoretical income. However, the low explicit auction revenue can be assessed by comparing it to that of market coupling. From 6 January 2006 (launch date of daily explicit auctions) to 21 November 2006, for 320 days, daily explicit auctions generated around 12.4 million euros for export and less than 300,000 euros for import. With market coupling from 22 November to 31 December, for 40 days, the revenue from these implicit auctions amounted to 2.6 million euros for export and nearly 700,000 euros for import. Calculated against the period of use of each mechanism, the revenue generated by market coupling was double that from explicit auctions.

○ *Interconnection with Spain*

Daily capacity valuation at the French-Spanish border, for export and import alike, was very low at the beginning of the year then soared in the second half of the year (Figure 15). The setting up of a coordinated auction mechanism between RTE and the Spanish TSO REE, as from June was certainly behind this better valuation.

For the whole year, the difference between daily theoretical congestion income and daily auction revenues amounted to nearly 27 M€.

Figure 15 – Average monthly price assigned to daily export capacities between France and Spain in 2006, compared to the theoretical average monthly value of these capacities (€/MWh)

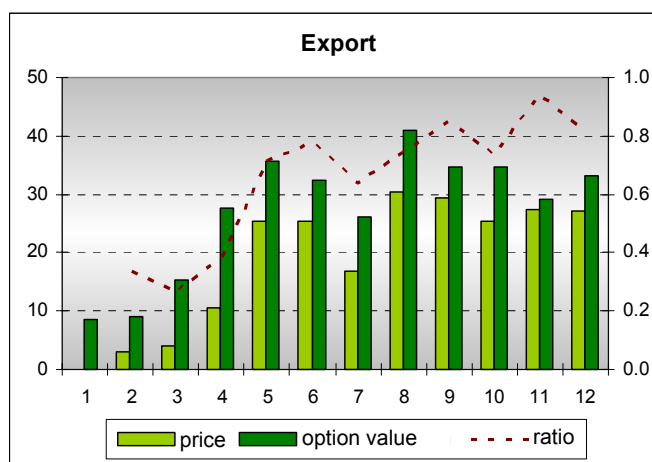


Source: RTE, Powernext and OMEL – Analysed by CRE

○ *Interconnection with Italy*

Valuation of the export capacity proposed for daily auctions at the Italian border went from strength to strength during 2006 (Figure 16). Even so, the difference between daily auction revenue and theoretical congestion income amounted to almost 10 M€.

Figure 16 – Average monthly price assigned to daily capacities between France and Italy in 2006, compared to the theoretical average monthly value of these capacities (€/MWh)



Source: RTE, Powernext and IPEX – Analysed by CRE

Possible improvements in daily capacity valuation

The spread observed between the marginal price of daily auction, on the one hand, and the theoretical value of daily capacities, on the other hand, is intrinsic to explicit auction mechanisms (separation of energy and transmission markets). With implicit auctions, daily allocation revenue would automatically equal theoretical congestion income.

In the specific case of the border with England, due to the lack of organised market which would enable implicit mechanisms, allocation of hourly products could, for the very least, better fit with the market's needs, and therefore, vastly improve valuation of daily capacities. Furthermore, harmonisation of the capacity firmness of daily capacities with the other French interconnections would also provide better capacity valuation at this interconnection (the capacities at the other French borders made available to the market on a daily basis are firm, apart from *Force Majeure* events).

b. In terms of use of capacities acquired at auctions

Ideal use of capacities acquired at auctions, would correspond for each hour in the year to:

- Maximum use in the direction of the price differential: the rate of use of these capacities (nominated capacities divided by available capacities) should be equal to 1;
- No use in the opposite direction to the price differential: the rate of use should be zero.

This ideal use would result in two S-shaped plots in the following figures.

So as to avoid bias incurred by transaction costs (for example, exchange commission), it is considered here in an arbitrary manner that price differentials foster interconnection use if they are greater than 2 €/MWh.

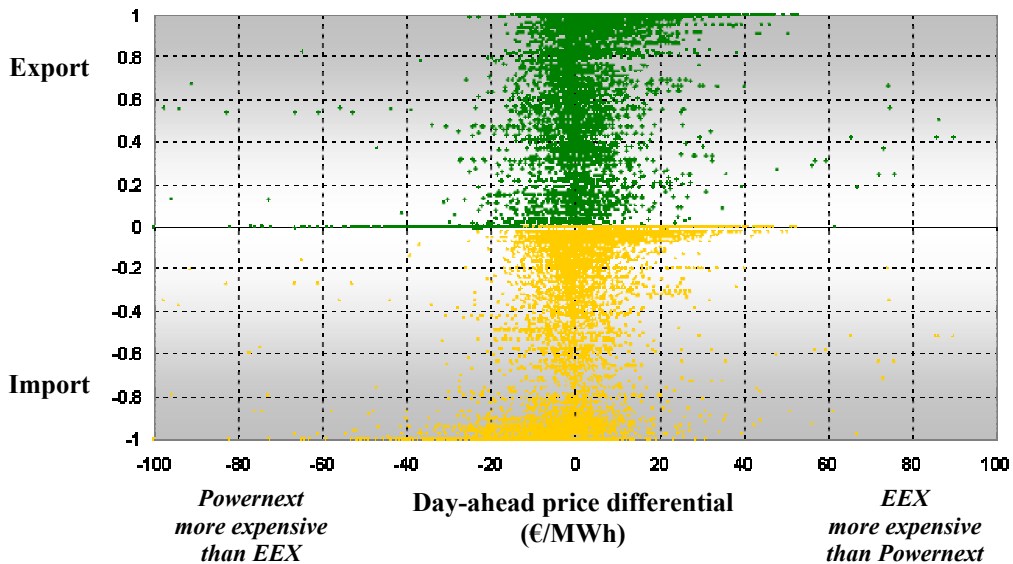
• Periodic capacities

The use of periodic capacities (annual and monthly) in 2006 was very different from ideal utilisation. Overall, the flows were very slightly reactive to the hourly variations in price differentials and followed a seasonal or peak/off-peak logic instead.

- *Interconnection with Germany*

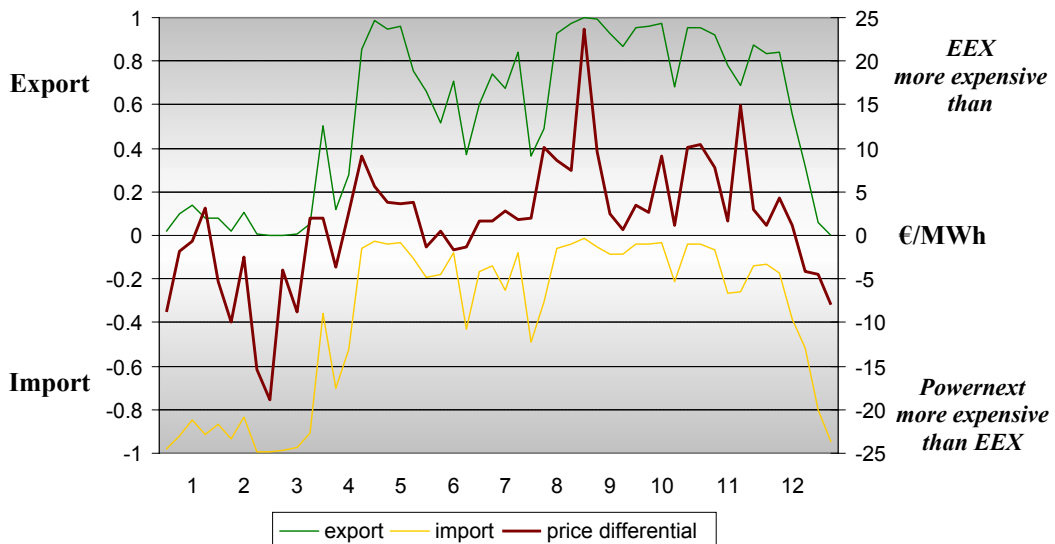
Figure 17 shows the use of periodic capacities compared to the price differential between the two organised markets, on an hourly basis. As can be seen, it only slightly reflects the ideal use described above. The capacities were only fully used for 77 hours (less than 1% of the time) in the import direction and for 764 hours (9% of the time) in the export direction. For 60% of the year, nominations were made inversely to the price differential.

Figure 17 - Correlation between the use of periodic capacities and organised market price differentials between France and Germany (2006)



Source: RTE, Powernext and EEX – Analysed by CRE

Figure 18 – Average weekly rate of use of periodic capacities and organised market price differentials between France and Germany (2006)



Source: RTE, Powernext and EEX – Analysed by CRE

It seems that periodic capacities are not used on an hourly basis, but for longer-term arbitrages. As shown by Figure 18, the weekly averages highlight better correlation between nominations and prices:

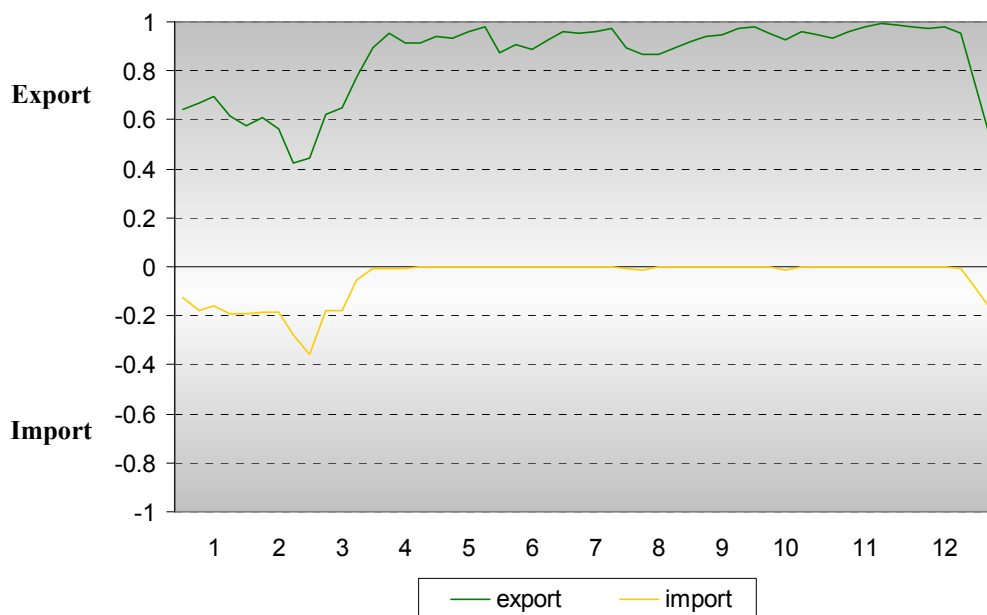
- In winter, (January, February, March and December), German prices were generally lower than French prices and the flows on the whole followed this price gradient. The nominations were close to their maximum in the import direction, and were low in the export direction.
- Along similar lines, in summer and mid-season (April to November), periodic nominations were virtually at the maximum for export (except in June and July, when temperatures were far higher than normal for the season) and were low in the import direction.

○ *Interconnection with Belgium*

The absence of an hourly price reference in Belgium, prior to the launch of Belpex on 21 November 2006, prevents the study of correlation between interconnection use and the price differential between the two markets on an hourly basis. Use of hourly prices on APX (organised market in the Netherlands), generally considered to be the best price reference for the Belgian market, cannot identify any link between long-term use of capacities at the France-Belgium interconnection and the price differential.

Observation of nominated capacities shows, however, that permanent use of long-term capacities in the export direction, with nonetheless seasonal variations (Figure 19). During cold periods, around half of the export capacity was used, and around 20% of import capacities. In summer and mid-season, the export capacity was virtually permanently saturated and import capacities were only slightly used.

Figure 19 – Weekly average rate of use of periodic capacities at the border with Belgium (2006)



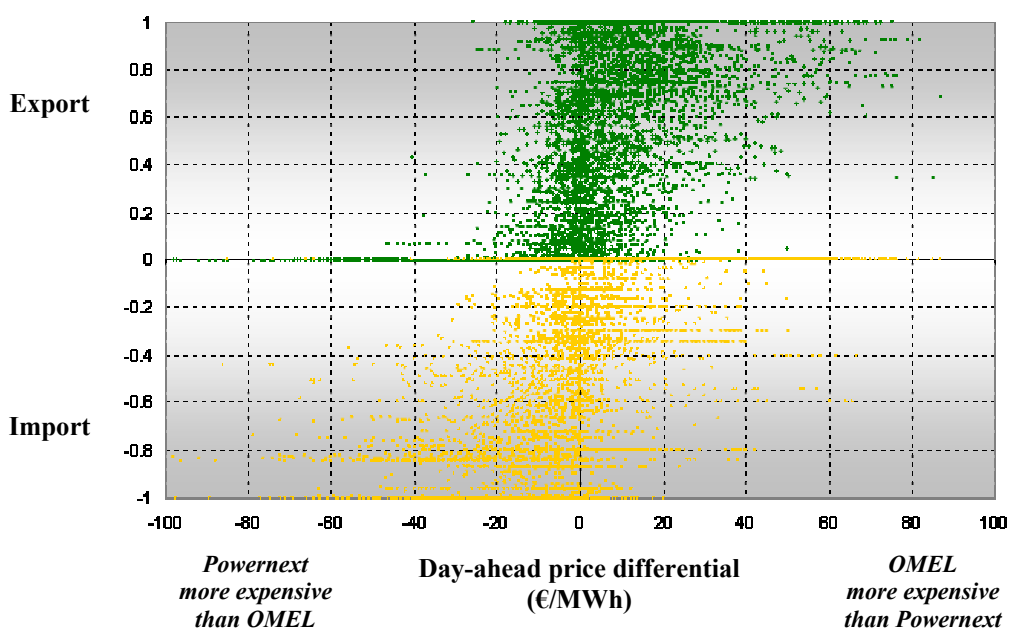
Source: RTE – Analysed by CRE

○ *Interconnection with Spain*

The use of monthly capacities¹⁸ at the Spanish border is the best related to the price differential between the two organised markets (Figure 20). These capacities were used in the opposite direction to the price differential for at least a quarter of the year. For the rest of the time, monthly capacities used in the direction of the price differential accounted for more than 70% of capacities available in the export direction, and more than 60% in the import direction.

¹⁸ For reminder purposes, no annual auction was held at the Spanish border in 2006.

Figure 20 - Correlation between the use of monthly capacities and organised market price differentials between France and Spain (2006)



Source: RTE, Powernext and OMEL – Analysed by CRE

On the other hand, there was no significant seasonal variation at this border, neither for prices nor for flows. However, the price differential between the Spanish organised market (OMEL) and Powernext and periodic capacity nominations followed a very clear peak/off-peak strategy. During peak times (from Monday to Friday, from 8 am to 8 pm), the prices were generally conducive to import from Spain, whereas off-peak, the prices were generally conducive to export (Table 6).

Table 6 – Average rate of peak and off-peak use of periodic capacities between France and Spain (2006)

	Average price differential OMEL – Powernext (€/MWh)	Average rate of use of monthly export capacities	Average rate of use of monthly import capacities
Peak	-8.12	29%	50%
Off-peak	7.14	58%	20%

Source: RTE, Powernext and OMEL – Analysed by CRE

○ *Interconnection with Italy*

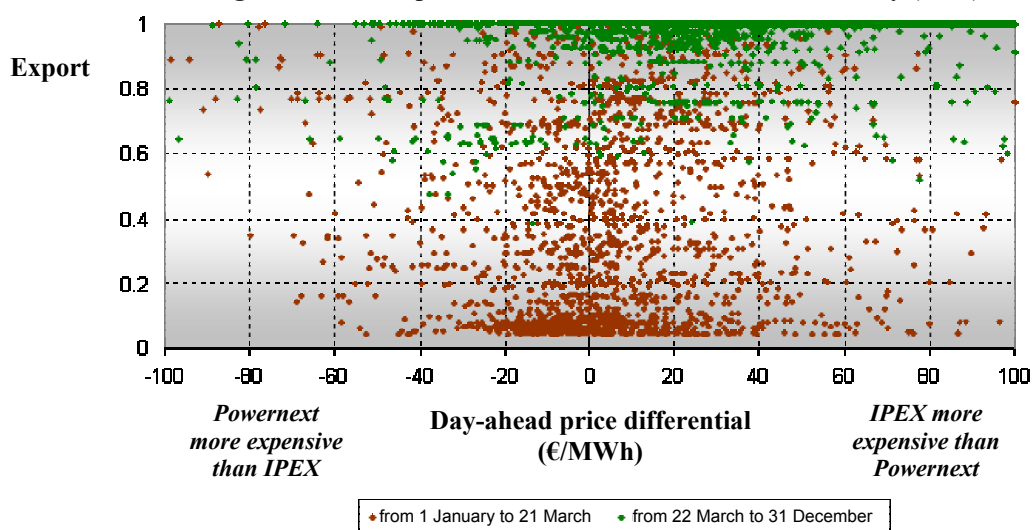
For reminder purposes, in 2006, half of the export capacities to Italy was allocated by RTE using explicit auctions (annual, monthly and daily), whereas the other half was allocated by Terna in keeping with the method known as S1. In the import direction from Italy, no allocation method was applied in 2006.

Two distinct periods marked the use of periodic capacities allocated by RTE at this border.

First of all, at the beginning of the year, when an intense cold spell affected France with temperatures constantly lower than normal for the season (until about 21 March), the price differential, between the Italian power exchange IPEX, and Powernext, constantly changed signs. Around 40% of the periodic capacities was then used on average, without any hourly correlation being detected between the variations in price differentials and the rate of capacity use (Figure 21).

For the rest of the year, prices on IPEX were more than 2 €/MWh higher than prices on Powernext for more than 90% of the hours and an average of 98% of the periodic capacities was used.

Figure 21 – Correlation between the use of monthly export capacities and the organised market price differential between France and Italy (2006)



Source: RTE, Powernext and IPEX – Analysed by CRE

Possible improvements in the use of periodic capacities

Hourly analysis of correlation between prices and nominations does not seem appropriate for periodic capacities, undoubtedly because of the generators and consumers' need to exchange energy in the long term. This observation tends to encourage grid operators from offering market players the possibility of nominating their periodic products with a weaker frequency (weekly, monthly or even annual) than that which is currently proposed (daily nomination).

This simplicity offered to market players to nominate their products should not affect overall capacity use. If the "netting" and "Use-It-Or-Lose-It" systems were properly applied to periodic nominations, and if an efficient method (for example implicit) was applied on a daily basis, then the total flow resulting from the various nomination stages would be fully in keeping with the hourly price differential and the use of each interconnection would be optimum.

Lastly, in keeping with the hypothesis that the type of periodic products would change over to purely financial rights, nominations for periodic products against the direction of the hourly price differential would automatically vanish (since the nomination stage for periodic products would no longer exist). Furthermore, suppression of this nomination stage would considerably lighten the grid operators' workload along with their operating costs.

• Daily capacities

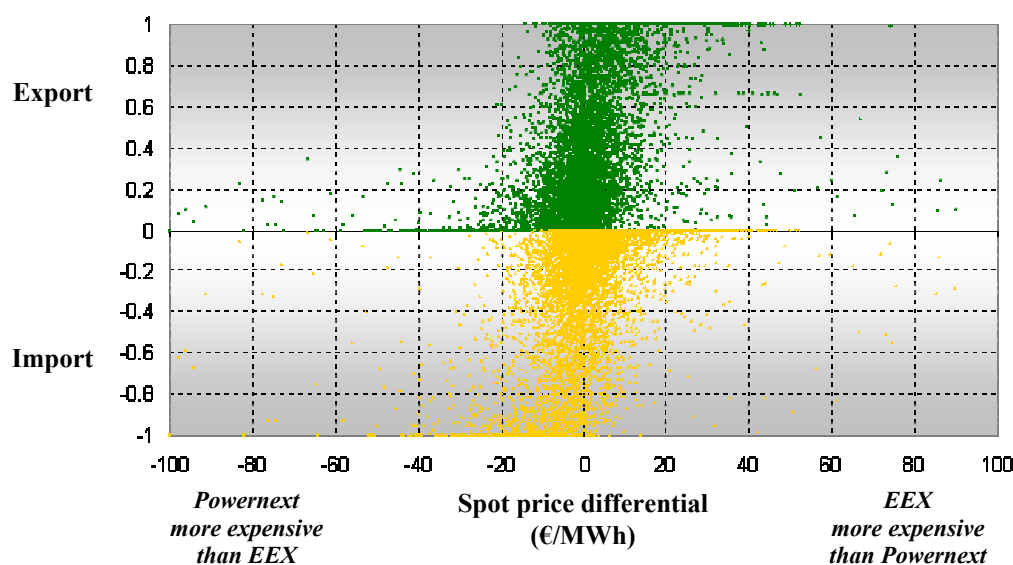
Inefficient use of periodic capacities, in terms of correlation with market price differentials on an hourly basis, did not have any impact on the overall efficiency of interconnection use providing the daily capacities were well used.

As will be shown later, explicit auction allocation methods currently used on D-1 do not guarantee efficient use of French interconnections

- *Interconnection with Germany*

As demonstrated in Figure 22, the use of daily capacities at the German border only slightly reflects the ideal utilisation described on page 24.

Figure 22 - Correlation between the use of daily capacities and organised market price differentials between France and Germany (2006)



Source: RTE, Pownertex and EEX – Analysed by CRE

The rate of use of daily capacities was at a maximum for import for only 588 hours in the year, whereas prices were conducive to imports for 3,723 hours. Likewise, the export capacity was saturated for 1,402 hours, whereas German prices were higher than French prices for 3,107 hours.

Furthermore, for half of the year, the daily capacity was nominated against the price differential. For two-thirds of the year, daily capacities were used at the same time in both directions.

Lastly, it is especially surprising that the same market player used daily capacities in the both directions at the same time. Such behaviour is incomprehensible, since opposite flows cancel each other out. Nine operators behaved in this way at this border at least once and one of them in particular acted in such a way for more than a quarter of the year.

○ *Interconnection with England*

At the France-England interconnection, there is no specific nomination stage for each type of product allocated. All the products acquired with different timeframes can be nominated until the last intraday gate closure. This specificity of the France-England interconnection does not therefore enable the use of periodic products to be separated from that of daily products.

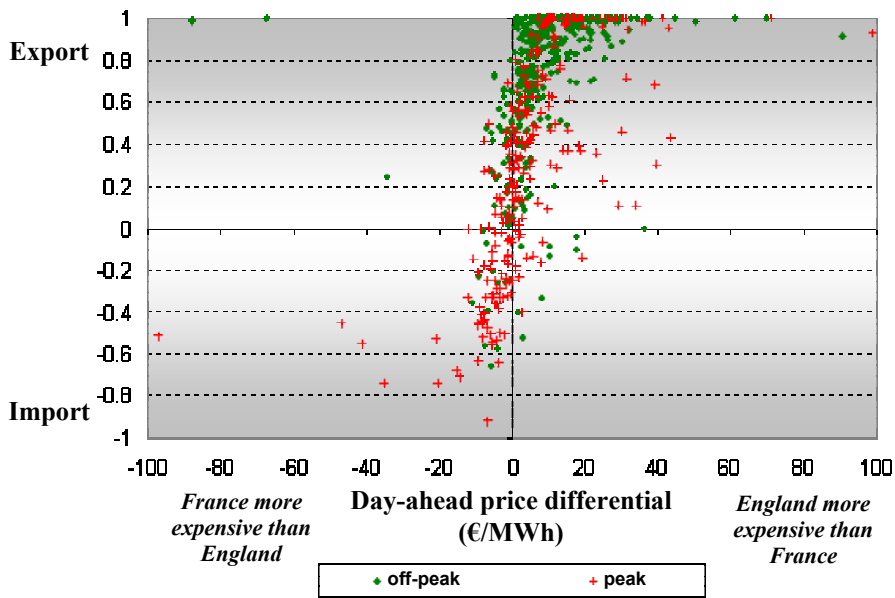
In addition, the absence of a well defined hourly price on the English market does not enable correlation of flows and hourly price to be studied. Thus, peak OTC prices (half-days from 8 am to 8 pm, weekdays) and off-peak (half-days from 8pm to 8 am and weekends) have been adopted to study the link between interconnection use and the price differential between the two markets.

On the other hand, partial application of the “Use-It-Or-Lose-It” rule and use of capacity resale mechanisms, the results of which are not communicated to CRE, do not enable the total capacity proposed in each direction to be calculated. The net rate of capacity use (ratio of the net export flow and the NTC¹⁹) are considered here.

As can be seen in Figure 23, the prices are more often conducive to export to England. This is especially true for off-peak, with 83% of the conditions beneficial to export, as opposed to 52% during peak. The flows follow this price gradient on the whole. However, despite the stability of the price differential sign (mainly off-peak), the interconnection is very rarely saturated for export, with the net flow saturating the interconnection capacity for only 36% of the hours (including 46% of off-peak hours). The interconnection was only saturated in the import direction for a single hour throughout 2006, in spite of significant reversals in the price differential.

¹⁹ NTC: Net Transfer Capacity

Figure 23 – Peak and off-peak correlation between the net rate of use of capacities and price differentials on the OTC markets between France and England (2006)



Source: RTE and Platts – Analysed by CRE

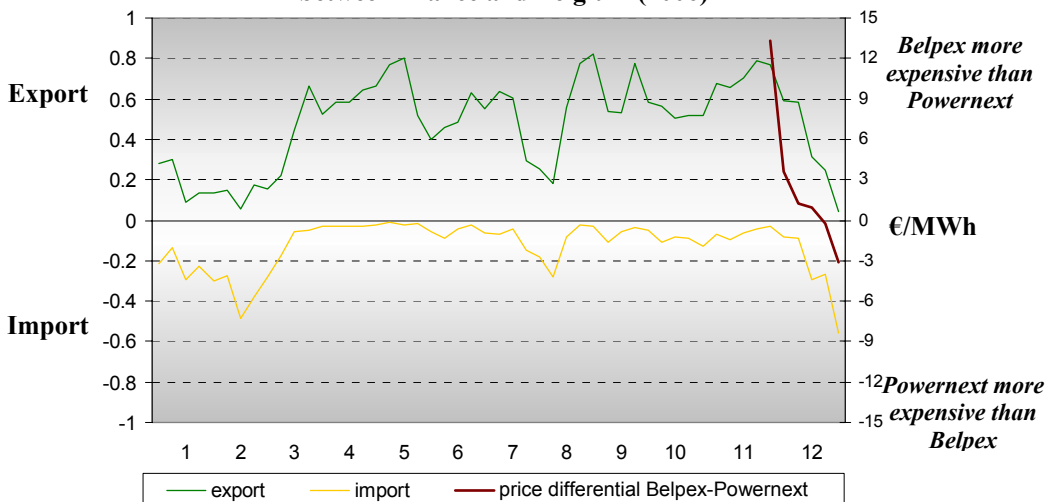
o *Interconnection with Belgium*

Daily capacities at the France-Belgium interconnection followed the same seasonal variations as periodic capacities (Figure 24). However, before the launch of market coupling on 21 November 2006, the daily export capacity was only saturated for 17% of the time and this was never the case for import.

With the introduction of market coupling, correlation between the use of daily capacities and organised market price differentials was spot on: either the interconnection was saturated (for 18% of the time for export and 10% for import) or the prices converged the (72% of the time). Thus, great progress was made at this interconnection due to market coupling since it made it possible to saturate capacities proposed which rarely (for export) or never (for import) happened using explicit auctions.

On the other hand, as will be shown later on, the daily capacities proposed were not maximised due to the absence of netting at this border.

Figure 24 – Average weekly rate of use of daily capacities and organised market price differentials between France and Belgium (2006)



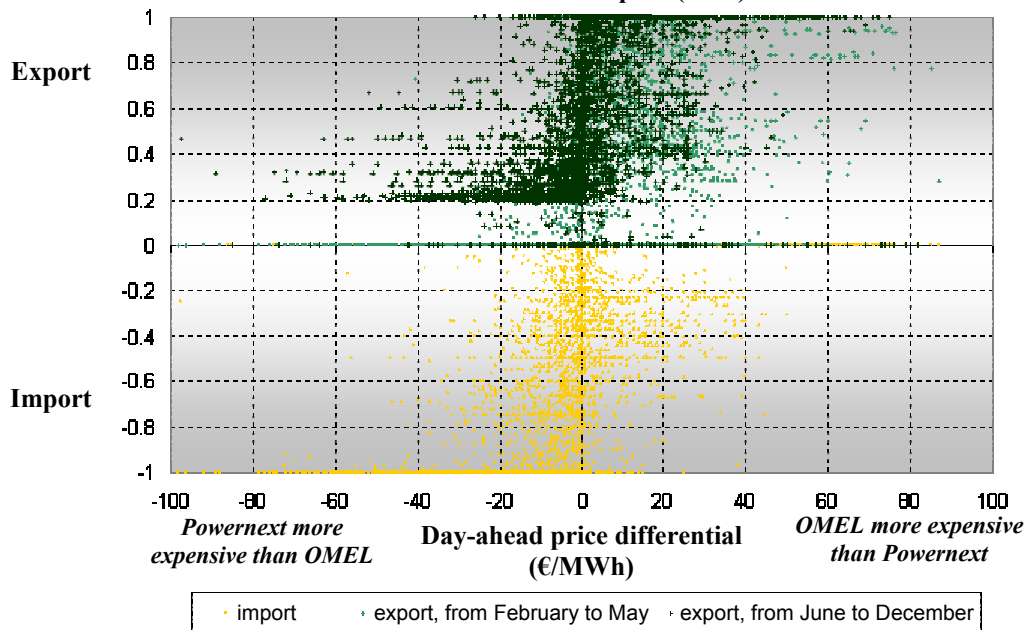
Source: RTE, Pownert next and Belpex – Analysed by CRE

- *Interconnection with Spain*

As previously described for the use of periodic capacities, daily capacities are the best used in line with the price differential at the border between France and Spain.

However, two periods can be clearly distinguished for export (Figure 25). First of all, from February to May, capacities used in the opposite direction to the price differential were very low. When Powernext was more than 2 €/MWh more expensive than OMEL, daily export capacity to Spain was only used for 159 hours – 13% of the time and average capacity thus nominated in the opposite direction was 136 MW. On the other hand, as from 1 June (date when auctions were jointly coordinated by RTE and REE), capacity used in the opposite direction soared. When Powernext was more than 2 €/MWh more expensive than OMEL, daily exports were nominated for 1644 hours (93% of the time), for an average of 320 MW. This deterioration in correlation between daily nominations and the price differential was due to the changeover of certain transactions to a daily basis previously carried out as intraday capacities allocated free of charge until 1 June .

Figure 25 - Correlation between the use of daily capacities and organised market price differential between France and Spain (2006)

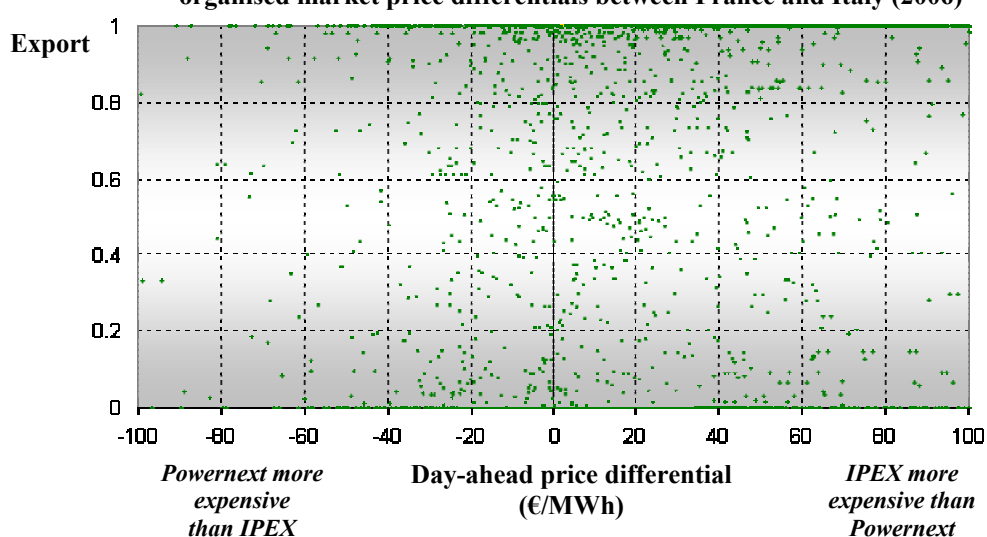


Source: RTE, Powernext and OMEL – Analysed by CRE

- *Interconnection with Italy*

Daily export capacities to Italy were fully used and the rate of use of these capacities was 90% as an average for the year (Figure 26). It was especially during times of strain on the French system (first quarter with an intense cold spell and at the end of July, with an intense heat wave) that the capacities were hardly used.

Figure 26 - Correlation between the use of daily capacities and organised market price differentials between France and Italy (2006)



Source: RTE, Pownertx and IPEX – Analysed by CRE

Possible improvements in the use of daily capacities

Since the launch of market coupling between France, Belgium and The Netherlands (implicit capacity allocation method following price differentials), daily capacities are used in an optimal way. By contrast, daily explicit mechanisms in force on the other French interconnections show a wide underuse, leading to an important loss in social welfare (Table 7).

Table 7 – Daily capacities underused and loss in social welfare in 2006²⁰

	Average export capacity underused (MW)	Average import capacity underused (MW)	Loss in social welfare estimated (M€)
Germany	925	2 125	113
Belgium (with market coupling)	0	0	0
Spain	201	282	21
Italy	104	-	22

Source : RTE, Pownertx, EEX, Belpex, OMEL and IPEX – Analysed by CRE

These observations argue in favour of generalisation of implicit allocation mechanisms on all French interconnections. Incentive mechanisms, such as bonus and penalties, could be drawn up and proposed to TSOs in order to speed up this generalisation.

Concerning the France-England interconnection, given the absence of the organised market with fixing on D-1 in Great Britain, implicit auctions are not relevant. However, changes in the design of

²⁰ Capacity underused, in a given direction, is the difference between available capacity in this direction and the net flow on the interconnection. Here, the average value is calculated in the situations where prices are conducive to interconnection use by more than 2 €/MWh. The corresponding loss in social welfare is the product of the capacity underused by the price differential. This calculation does not take into account markets' resilience.

explicit auctions would increase the efficiency of capacity use:

- If hourly products replacing bands of 24 hours were proposed at daily auctions as at the other French borders, the operators would be more motivated to carry out hourly arbitrages between the two countries.
- Implementation of a firm nomination stage for periodic products enabling TSOs to apply the “netting” and “Use-It-Or-Lose-It” systems, would raise the capacities available to the market on D-1.

These improvements are handled within the context of a specific working group chaired by CRE, within the France – United Kingdom – Ireland Regional Initiative.

c. In terms of use of capacities for short term exchanges

• **Intraday exchanges**

Cross-border exchanges on an intraday basis are crucial to security of supply and constitute an indispensable tool for electricity operators to be in the best balanced position possible before balancing operations.

In 2006, three different methods for allocating intraday capacities existed side-by-side at the French interconnections:

- Allocation of options to be nominated by an “improved” pro rata type mechanism fostering low capacity demand, used by RTE at the France-Germany border (in both directions), for export to Switzerland and also at the Spanish interconnection until the month of May (in both directions).
- Allocation of options to be nominated using an explicit auction mechanism implemented at the Spanish border on 12 July.²¹
- Lastly, allocation of obligations to be nominated by a “first come first served” based mechanism, used by German TSOs at the France-Germany border (in both directions) which is therefore overlapping with RTE’s allocation method.

Table 8 – Use of intraday capacities in 2006

	Export			Import		
	Capacity available (MW)	Capacity used (MW)	Ratio	Capacity available (MW)	Capacity used (MW)	Ratio
Germany	936	65	6.9%	2880	68	2.4%
Switzerland	412	17	4.1%	-	20	-
Spain:						
From January to May	448	209	46.7%	772	110	14.3%
From July to December	541	34	6.4%	782	103	13.2%

Source: RTE – Analysed by CRE

²¹ These explicit intraday auctions should be implemented on 1 June at the same time as the monthly and daily coordinated auctions. Some technical issues with the Spanish system have delayed this start-up until 12 July.

No intraday allocation method was applied at the other borders, because there was no congestion (import from Italy and Switzerland), or because nominations of daily capacities could be amended right up to the hour before delivery (interconnection with England), or because no mechanism however desirable had been implemented yet (interconnection with Belgium, and export to Italy).

As can be seen from Table 8, quite low levels of intraday capacities were used. It should be pointed out that high use of intraday capacities at the Spanish border before the implementation of intraday auctions (January to May) only resulted from certain transactions, which were not necessarily expected to be made on an intraday basis and which, after the implementation of auctions, were carried out using daily capacities.

Possible improvement in the development of intraday exchanges

Volumes exchanged on an intraday basis could be increased if an efficient and harmonised allocation method were applied to all the French interconnections, or better still to a European zone as far-reaching as possible. In order to do so, the mechanism whose principles have been identified as the target, especially within the framework of the Central-West Regional Initiative consists of a continuous capacity platform allocating intraday capacities on a continual and implicit basis.

• Balancing exchanges

None of France's neighbouring countries allow French operators to effectively take part in their balancing mechanism. This situation results from:

- Regulatory blockage in Spain (only sites directly connected to the Spanish grid are able to submit balancing offers);
- Management of the balance between supply and demand mainly based on contractual reserves in Germany (requirement of 100% availability of time is incompatible with European Regulation 1228/2003);
- Absence of intent by TSOs to allow such balancing exchanges and the existence of works deemed to be of a higher priority.

In theory, the French balancing market has been open to:

- Swiss operators, since April 2003 (date of implementation),
- English and Spanish operators, since October 2004,
- German operators, since October 2005,
- And lastly to Italian operators, since April 2006.

In reality, only Swiss and German operators actively participate in the French balancing system. Since September 2006, balancing actions aiming at ensuring the balance between injections and withdrawals are exclusively taken on an intraday basis for reasons of cost-efficiency. Participation of English, Spanish and Italian operators is thus restricted by the fact that generation scheduling rules in these countries and rules for access to the French interconnection capacity are incompatible with this requirement.

On the other hand, Swiss and German operators greatly participate in the system as demonstrated in Table 9.

Table 9 – Foreign operators’ participation in the French balancing mechanism in 2006

	Upward offers accepted	Downward offers accepted
Average capacity activated in the balancing mechanism	449 MW	448 MW
Average participation by foreign operators ²²	98 MW (21.7%)	39 MW (8.8%)
Average participation by Swiss operators	84 MW (18.8%)	22 MW (5.0%)
Average participation by German operators	12 MW (2.7%)	17 MW (3.7%)

Source: RTE – Analysed by CRE

Possible improvements in the development of balancing exchanges

Balancing exchanges with foreign countries represent the main source of competition in the French balancing mechanism and as they ensure better security of supply, they must be encouraged in keeping with the principle of reciprocity. Furthermore, the single electricity market could not be achieved without integration of balancing mechanisms as was concluded by the 13th Florence Forum.

The purpose of work underway within the Regional Initiatives is to identify the areas for improvement in the development of balancing exchanges. Possible implementation of a continuous platform to allocate intraday capacities in the Central-West region could represent an opportunity for developing balancing exchanges.

At present, the “TSO-TSO” model (submission of adjustment offers to the neighbouring TSO through the TSO in the original zone, and no direct submission of offers by market players corresponding to the “operator-TSO” model) seems to be the most appropriate means of improvement but nevertheless needs further development.

d. In terms of capacity management in compliance with European community law

In addition to the checking of the valuation and use of capacities, CRE is in charge of monitoring compliance of mechanisms in place and information published by RTE with European community law.

The non compliance of congestion management methods with European law is a breach by TSOs of legally binding rules. Due to this breach TSOs are likely to be subject to legal actions taken by market players or proceedings taken by regulators.

This breach exposes them to legal actions taken by market players or proceedings taken by regulators.

²² An upward offer accepted corresponds for a foreign operator to import into France and a downward offer to export from France.

The following points were closely monitored in 2006.

- **Calculation of capacities made available to the market**

In compliance with Regulation 1228/2003 and its new guidelines enforced on 1 December 2006, TSOs must work closely together, from the calculation of capacities right up to grid operations and publish all relevant data on cross-border exchanges. The general plan for calculating interconnection capacities, as well as the way related information is published, must be subject to regulator review (articles 5.2 and 5.5 of the guidelines).

In 2006, CRE especially focussed on the proper application of the “netting” and “Use-It-Or-Lose-It” (UIOLI) systems. The capacity available to the market for every timeframe must include the capacity unused after the previous deadline (UIOLI), as well as the capacity used in the opposite direction after the previous deadline (netting). Consequently, the capacity proposed by TSOs on a daily (or intraday) basis must be equal to the difference between the NTC calculated on D-2 (or on D-1) and the net balance of periodic nominations (or periodic and daily nominations).

Although these formulas were generally applied by TSOs, CRE has observed numerous exceptions:

- *Daily capacities at the Belgian border*: the netting of nominated periodic capacities is not carried out, neither in the export nor import direction, contrary to what is required by article 6.5 of Regulation 1228 and article 4.2 of its new guidelines. Daily capacities for market coupling are therefore not maximised at this border. At the end of December 2006, the Powernext price was higher than the Belpex price for 97 hours without net import capacity being saturated. Netting of periodic capacities during these hours would have provided an average of an additional 1,200 MW for import, which would have fostered convergence of the prices on these two markets.
- *Intraday export capacities to Germany*: if the base case used by TSOs to calculate total capacities indicates a high commercial flow from Germany to France (common situation in winter), the general formula is not applied to the calculation of intraday export capacities to Germany. If France imports from Germany, it generally exports to the other countries in the eastern region (Belgium, Switzerland and Italy). Even though, in commercial terms, France imports from Germany, the physical flow is thus generally in the export direction. Grid constraints could therefore occur if the commercial import flow is too low. Consequently, it is not possible to propose, on an intraday basis, the capacity which has already been nominated for import in addition to the NTC for export, even if the latter is zero. In order to calculate the capacity which could be made available to the market, TSOs use the real limit of the net export flow which is then negative. This negative limit is not published or transmitted to CRE.
- *Intraday import capacities from Germany*: on the other hand, if the basic case indicates a high flow from France to Germany, the general formula cannot be applied to calculate intraday import capacities from Germany. If the net export flow to Germany is estimated at 1,500 MW (maximum value) and the NTC for export is 4,500 MW (average value), then the import capacity proposed on a daily basis should be 6,000 MW. According to the explanations provided by RTE, such a high amount cannot be proposed on an intraday basis, as, if all the capacity proposed was used, insurmountable grid constraints could occur. Such variations in commercial flow would have an adverse effect on the generation plans defined the day before, and would thus make it difficult to forecast physical flows.
- *Poor TSO coordination (all interconnections)*: sporadic defects in coordination between TSOs, for example a delay in transmitting information, could also impede proper application of the general calculation. As daily auctions are only held one hour after the nomination of periodic capacities, a delay of only several minutes in the communication between TSOs could force the auction operator to hold daily auctions without netting.
- *Case of interconnection with England*: there is no allocation of intraday capacity at this interconnection, but the nominations of capacities acquired at periodic and daily auctions can be amended up to three or four hours before delivery, depending on gate closures. However,

these modifications can only be made within a certain limit, less than the maximum interconnection capacity (Intraday Transfer Limit or ITL). This limit is published by RTE but the calculation basis is not and nor is it communicated to CRE.

Possible improvements in the calculation of available capacities

Coordination: in compliance with article 3.5 of the guidelines for Regulation 1228/2003, CRE would like to see better coordination between TSOs. A common grid model should be used by RTE and its neighbours. Furthermore, implementation of a common nomination interface should be planned so as to facilitate systematic application of netting. Finally, a “flow-based” method could only be applied in the event of closer coordination between TSOs.

Transparency: RTE must be more transparent, especially concerning the rule for calculating intraday capacities at the German border, as well as intraday limits at the France-England interconnection so as to comply with article 5 of the guidelines and nurture market confidence.

Incentive scheme: application of these principles would be facilitated by the implementation of an incentive method applied to TSOs, so as to maximise capacities available to the market, without neglecting the safety rules. This constitutes one of the main projects of CRE and the other regulators for the coming months.

Netting at the Belgian border: the two TSOs, ELIA and RTE, must apply netting at this interconnection in compliance with European community law in keeping with what is done by RTE at the other continental interconnections.

- **Allocation and nomination process at the France-England border**

As previously stated, periodic and daily capacities at the France-England border can be nominated up to the last intraday gate closure preceding the transaction period. From then on, the “netting” and “Use-It-Or-Lose-It” rules cannot be applied for the calculation of daily capacity. This is contrary to articles 2.11 and 4.2 of the new guidelines for Regulation 1228/2003, which especially ask TSOs to reallocate unused capacities with the aim of fresh assignment in the next timeframe, and to account for nominations on a net basis so as to ensure efficient use of the interconnection.

Furthermore, as has already been demonstrated, there is no intraday allocation mechanism in place at this interconnection. This will no longer be in compliance with the guidelines for Regulation 1228 as from 1 January 2008, when mechanisms for allocating intraday capacities must be implemented (articles 1.9 and 4.3).

Possible improvements in mechanisms at the France-England interconnection

Within the framework of the France – United Kingdom – Ireland Regional Initiative, the role of a work stream chaired by CRE is to propose solutions to these problems of non-compliance with European regulations, working closely together with TSOs and receptive to opinions expressed by market players.

- **Distribution of capacities for different timeframes**

In compliance with article 2.6 of the new guidelines for Regulation 1228/2003, *“TSOs shall define an appropriate structure for the allocation of capacity between different timeframes. [...] This allocation structure shall be subject to review by the respective Regulatory Authorities.”*

As regards the capacities for 2007, RTE has not submitted this allocation structure to CRE, although the distribution of capacities between different timeframes adopted for 2006 was significantly changed at the Belgian border as from January 2007.

Possible improvements in the allocation structure between different timeframes

Every year and for every interconnection, on a defined deadline, grid operators shall submit to regulators a proposal for the minimum capacity available for the following year, as well as how this capacity would be split between different timeframes. This proposal would then be subject to a public consultation before final decision by the regulators.

• Curtailment of capacity and cancellation of auctions

In compliance with the new guidelines for Regulation 1228/2003, TSOs must optimise the degree to which capacity is firm (article 2.4). Furthermore, in the case of curtailment of capacity, excluding acts of God, operators losing their rights acquired at auction must be compensated by TSOs (article 6.2 of the Regulation).

At present, the compensation rule applied by RTE in the event of curtailment of periodic capacity at all interconnections apart from the France-England interconnection, consists of paying the operators, whose rights have been curtailed, 10% of the value at which these rights were purchased, in addition to reimbursement of the rights (the so-called 110% rule).²³ In the event of curtailment resulting from an event constituting *Force Majeure* only reimbursement applies.

Capacities allocated at the France-England interconnection are matched with a rate of target availability. If the actual availability of capacities is deemed to be less than the target, the capacity holders are reimbursed by TSOs for the capacity curtailed beyond what was stated, based on the prices they paid for the capacity. In the absence of firm nomination by operators on D-1, they can, in theory, re-nominate their acquired capacity at different intraday gate closures. In practice, if operators do not nominate their entire capacity a day ahead, they run the risk of being restricted afterwards in the intraday re-nomination by ITLs which restrict the use that operators can make of their capacity. However, ITLs are not considered as curtailment of capacity by TSOs and do not give rise to any reimbursement.

Table 10 assesses the extent of curtailment of capacities and cancellation of auctions in 2006 (apart from the France-England interconnection).

As can be seen, curtailments of capacity only concerned the Spanish border (a reduction of one hour only occurred at the Italian border and none whatsoever at the German and Belgian borders). Curtailments of capacity mainly took place at the Spanish border during two periods:

- Throughout the month of January, curtailments occurred on a daily basis: as daily auctions had not yet been implemented at this border, the entire capacity was allocated at the monthly auction (1400 MW for export and 600 MW for import). As the Spanish grid operator REE did not recognise the allocation made by RTE, the capacity could not be fully used – neither for import nor for export.
- At the end of July and the beginning of August, due to an intense heat wave and environmental restrictions which resulted in certain nuclear power plants, especially in the southwest, not being able to operate their cooling systems, the French electricity system was under great strain. In the same way, the Spanish system experienced similar difficulties. TSOs therefore took the decision to make the interconnection capacities zero so as to minimise the risks of large-scale load shedding. Monthly capacities were therefore reduced, mainly at peakload, for 91 hours for export and 28 hours for import.

²³ Only periodic capacities can be curtailed at all French interconnections whereas daily capacities are firm (except in an event constituting *Force Majeure*).

However, it was largely at the Spanish border (during the first half of the year) that daily auctions were not held on a daily basis. Even though auctions are in principle cancelled due to sudden technical problems (incidents on the information systems or grid), it was the absence of netting between periodic and daily capacities that prevented the capacity which would have been available for import at this border from being systematically proposed on a daily basis. This poor interconnection management ceased to exist with the implementation of coordinated auctions on 1 June 2006.

Table 10 – Cancellation of auctions and curtailment of capacities in 2006 (excluding the France-England interconnection)

		Number of daily auctions not held or cancelled	Number of hours concerned by curtailment of capacity	Average extent of curtailment of capacities (MW)	Cost of curtailments borne by RTE with the 110% rule	Estimated cost of curtailments borne by RTE with compensation scheme I	Estimated cost of curtailments borne by RTE with compensation scheme II
Germany	Export	3	0	-	0	0	0
	Import	0	0	-	0	0	0
Belgium	Export	3	0	-	0	0	0
	Import	3	0	-	0	0	0
Spain	Export	3	649 <i>(excluding January: 146)</i>	503	0.29 M€	1.3 M€	1.45 M€
	Import	23	1128 <i>(excluding January: 384)</i>	319	0.64 M€	1.01 M€	1.50 M€
Italy	Export	1	1	195	3300 €	0	0
Total:					0.94 M€	2.38 M€	2.96 M€
Total excluding January:					0.22 M€	0.85 M€	0.99 M€

Source: RTE, Pownext and OMEL – Analysed by CRE

Table 10 also compares the costs borne by RTE in application of the 110% rule to the cost of possible refund “at full market price” requested by market players. Such a compensation scheme could consist of refunding the organised market price differential, without any reimbursement of capacities if the price differential is less than the corresponding marginal auction price (scheme I), or with reimbursement (scheme II).

In both cases, this involves transfer to TSOs of the risk currently borne by market players. The more beneficial the compensation scheme is for operators (as the 110% is mainly less beneficial, and scheme II more beneficial), the higher the costs borne by TSOs, but also the higher the price assigned to capacities by operators, and therefore auction revenue would be high.

Possible improvements in curtailment of capacity and cancellation of auctions

As TSOs are in charge of allocating maximum interconnection capacity, in the event of the auction being cancelled they should at least publish the precise reason for the cancellation.

Application of incentive measures should be studied for cancellation of auctions and curtailment of capacity. Such a scheme would enable TSOs to carry out better arbitrages between, on the one hand,

the cost of changing generation plans and counter-flow scheduling, and on the other hand, costs incurred by curtailment of capacity. Furthermore, it would encourage TSOs to better manage grid maintenance programmes.

However, cost-profit analysis of the application of compensation based on the market price differential must be carried out.

• **Auction platforms**

Several auction platforms are currently in use at the French borders:

- The LOGICA platform at the France-England interconnection, since 2004;
- For import from Germany, a platform managed by RWE, since 2005;
- For other periodic and daily auctions, the ARIBA platform, since January 2006;
- For daily auctions at the Spanish border, a platform managed by REE, since July 2006.

During the launch of periodic and daily auctions at all French Borders using the ARIBA platform, market players expressed many a criticism, mainly as to the slowness and lack of flexibility of the interface. RTE reacted very promptly and made several improvements to the platform. However, the operators wish to see further improvements, on the lines of the model “TSO Auction Office bv”, which operates auctions at the Dutch borders.

Possible improvements in auction platforms

In general terms, the use of a single platform managing the allocation and nomination stages at the same time, at least within the framework of each Regional Initiative, would facilitate coordination between TSOs in compliance with article 3.5 of the guidelines for Regulation 1228. Furthermore, that would provide other advantages:

- Netting of opposite flows would be systematically carried out,
- It would be less expensive at least in the long run for TSOs but also for market players,
- Cross-border exchanges (especially between two countries which are not directly interconnected) would be facilitated.

• **Exchange capacities with Switzerland**

No allocation mechanism is implemented in the import direction as the interconnection is only slightly used.

Original contracts still enjoy priority access rights in the export direction and generally take up all the available capacity. If there is any spare capacity, on an intraday basis only, then the interconnection is accessible to market players.

Possible improvements in management of capacities at the Swiss border

Draft rules for explicit auctions, which would provide for D-1 allocation of the capacity still available after nomination of long-term contracts, are currently being written by the TSOs. However, it should be recognised that the level of capacity likely to be made available to the market within the context of these daily auctions risks being zero for most of the time.

Conclusion: An indispensable regional approach

The important work carried out by regulators and TSOs, especially within the framework of roadmaps, has greatly improved congestion management, as demonstrated by Part 1. New economic signals estimating capacity value, calculated based on auction results, came to light. Moreover, congestion income is now shared out amongst all grid users, through a drop in tariff. Lastly, thanks to transparent and non-discriminatory congestion management mechanisms, capacities are now more widely shared out amongst operators and are used more consistently with price differentials.

However, great inefficiency is still to be found in congestion management methods, as shown in Part 2. In order to resolve this inefficiency and fine-tune the mechanisms already in use, a regional approach, as required by the new guidelines for Regulation 1228, is indispensable.

The launch of the ERGEG's Regional Electricity Initiatives provides the framework for integrated electricity markets on a regional scale. Achievement of this objective depends, in each region, on the level of coordination between all the parties concerned: regulators, Ministries, grid operators, electricity exchanges and market players. At present, this level already differs from region to region.

a. Central-West region

The five regulators in this region actively work together to define target congestion management mechanisms. The regional action plan published by regulators in February 2007 defined eight priorities for improvement in existing mechanisms within this region. These priorities are in keeping with the areas for improvement identified in Part 2:

- *Harmonisation and improvement of explicit auction mechanisms*: as has been described in Part 2.a, harmonisation of auction rules at the regional level (possibly along with the creation of a single auction platform), and improvement in long-term capacity firmness would facilitate the work of the market players who would thus be inclined to pay the right price for capacities. Along the same lines, implementation of a common nomination interface, which would make it possible to apply netting without exception, could be envisaged.
- *Implementation of a day-ahead flow-based market coupling*: this is the main target for this region. As already stated in Part 2.b, implementation of market coupling would result in maximum use of capacities available at each interconnection compared to the organised market price differential. Moreover, a flow-based approach rather than the current "NTC-based" approach would enable capacities to be better used at the regional level.
- *Implementation of cross-border intraday and balancing trade*: intraday and balancing exchanges must be encouraged, as concluded in Part 2.c. Within the framework of the France – Germany and France – Belgium – Netherlands roadmaps, TSOs have submitted proposals along these lines. On this basis, regulators have requested more in-depth studies in quest of a regional solution, which could also integrate balancing exchanges. Such a solution could consist of a platform through which capacities would be continuously allocated.
- *Common calculation of cross-border capacities*: as already mentioned in Part 2.d, application of a transparent method for calculating capacities common to TSOs is required by the new guidelines for Regulation 1228.
- *Maximisation of the amount and of the utilisation of cross-border capacities*: as stated in Part 2.d, application of an incentive scheme for TSOs would maximise available capacities and implement efficient congestion management methods more rapidly.
- *Regional capacity investment plan*: as the transmission grids within the Central-West region are very densely meshed, an investment plan must be designed for the regional level. Due to regulators having very different competencies in terms of investments, political support from

Ministries is indispensable for this matter. This support could be materialised through the “Pentalateral Energy Forum” organised by the five Ministries in the region.

- *Market and TSOs transparency*: compliance with article 5 of the new guidelines for Regulation 1228 is the strict minimum in the short term. The target proposed by ERGEG’s “Guidelines for Good Practice on Information Management and Transparency” could be broached in the long term.
- *Regional market monitoring*: CRE’s report on the use and management of interconnections in 2007 will be supplemented with a common report of the five regulators in the Central-West region.

b. France, United Kingdom and Ireland region

The main challenge in terms of congestion management within this region is improvement in mechanisms at the France-England interconnection. The other two interconnections in this region have special status limiting possible actions:

- The “Moyle” line, connecting Scotland to Northern Ireland is not really an interconnection, since the two zones that it connects are part of the same Member State;
- The “North-South” line, connecting Northern Ireland to the Republic of Ireland, will have special status as from November 2007, within the framework of the setting up of a single market in the Irish Isle.

The TSOs have thus proposed a programme in several phases for the France-England interconnection to be in compliance with the guidelines for Regulation 1228 on 1 January 2008.

The first stage stipulates compliance with the mechanism for allocating long-term capacities (annual, seasonal, quarterly and monthly). Improvements to existing mechanisms would mainly consist of:

- Application of the “Use-It-Or-Lose-It” (UIOLI) or “Use-It-Or-Sell-It” (UIOSI) rule and of netting, for the calculation of capacities available on a daily basis,
- Improvement in the secondary capacity market,
- Suppression of the reserve price.

The second stage plans for full compliance and development of mechanisms for allocating short-term capacities (daily and intraday), such as:

- Allocation of hourly products on a daily basis, replacing the band of 24 hours currently proposed,
- Setting up of a mechanism for allocating intraday capacities,
- Application of a UIOLI rule for calculating intraday capacities available.

c. Central-South region

At the end of 2006, tremendous progress was made, since the interconnections between Italy and France, Austria and Greece are now managed in a coordinated manner by the TSOs using explicit auction mechanisms.

However, these mechanisms must be improved and extended to Slovenia, that, by way of derogation, does not apply yet European community law, and to Switzerland, that is not subject to European community law.

The regional regulators have thus jointly defined priority actions to be carried out at the regional level:

- Harmonisation and improvement of explicit auction rules to be applied at the end of 2007; for example, the current auction design for import capacities from Italy into France, which consists of obligations to use the capacity, sold two days ahead of the day of delivery must be changed.
- Strengthened coordination of methods for calculating capacities in 2007;
- Implementation of allocation mechanisms at all interconnections by 1 January 2008, in compliance with the guidelines for Regulation 1228;
- Study of pre-requisites necessary for regional implementation of flow-based market coupling, which constitutes the target mechanism for allocating capacities on D-1.

d. South-West region

In this region with Spain and Portugal, it is necessary to obtain the same type of improvements as in the other regions:

- Harmonisation of explicit auction rules,
- Development of more efficient intraday mechanisms, including access to balancing mechanisms,
- Strengthened coordination for the calculation of capacities,
- Analysis of possible implicit mechanisms for allocating capacities on D-1.