

## **Analysis for the electricity supply-demand balance over the winter period 2010-2011**

**The outlook broadly more favourable than last winter,  
until the end of January 2011.**

**The risk of an interruption in supply is moderate.**

**For temperatures close to seasonal norms, the forecast outlook for the electricity supply-demand balance in mainland France appears more favourable than last winter until the end of January 2011. Imports could become necessary between the end of November 2010 and the end of January 2011, to meet the demand for electricity in France and comply with security criteria. To do this, suppliers would have to look to the European markets, in addition to invoking demand response (load reduction) agreements with their customers. In the event of a sustained spell of intense cold weather, the import levels required should remain compatible with the technical limits of the French power network.**

Every year, RTE conducts a prospective study of the balance between supply and demand for electricity for the coming winter period, covering the whole of mainland France. This period of the year is looked at closely, primarily due to the high levels of electricity demand seen during cold snaps.

The study by RTE is used to identify periods where the supply-demand balance comes under strain; it explores the measures that can be taken by electricity market players and RTE to avoid any interruption in supply during peak demand periods in France.

RTE is responsible for managing the balance between supply and demand for electricity in mainland France, in real time. To do this, it anticipates potential risks that supply may come under strain - well in advance - and informs market players.

If periods are identified where the supply-demand balance comes under strain, RTE works with the electricity generators to look at possible ways of altering the schedules for shutting down generating units, and takes account of the possibilities for demand response (load reduction) reported by suppliers.

As a last resort, if these pre-emptive measures prove insufficient and the situation becomes critical, RTE alerts the government of the risk that supply will be interrupted, and takes action in real time to limit the impact on the power system.

## 1- RTE's methodological approach

RTE conducts a technical analysis of forecast operating reserves on the French power system, for the period between mid-November and late March. This involves a study of the physical risk that the supply of power will be insufficient to fully satisfy demand. The extent to which this physical risk is covered is examined in terms of power levels, which are calculated at the demand peak for each week of the winter period.

RTE uses the information sent by all French market players (availability of generating plants, load reduction possibilities as set down in contracts between suppliers and their customers) and compares it with its own demand forecasts, based on statistical models.

For temperatures close to seasonal norms, RTE assesses the physical risk that supply will be insufficient to cover demand on the French power system, based on a technical criterion: the "1% risk margin"<sup>1</sup>. This equates to reserves corresponding to a probability of 1% that "exceptional" measures will be required.

These exceptional measures are as follows, activated in decreasing order of priority: exceptional offers on the balancing mechanism<sup>2</sup>, very rapid increases (even temporary overloading) in the power produced by certain generating units (conventional thermal and hydro-electric), decreases in voltage, and lastly, load shedding.

Forecast reserves are assessed in a probabilistic way, based on several hundred different scenarios, combining contingencies affecting generating facilities (rates of unavailability of various generating units, records of water stocks), with those affecting demand (temperature records).

The average reserve resulting from these scenarios, compared with the "1% risk margin", is then used to determine the "maximum" balance of cross-border exchanges (maximum exports or minimum imports) required to satisfy that criterion.

RTE also establishes a stress scenario, to assess the consequences of a cold snap, during which temperatures fall well below seasonal norms for a sustained period of time.

## 2- Demand forecasts

For the winter period 2010-2011, it is estimated that demand will peak at 85,700 MW during the first week of January. This estimate is based on temperature levels corresponding to the norm for the time of year. This forecast is higher than the demand actually recorded last winter, adjusted for normal temperatures (particularly so during the two weeks of the festive period, when the impact of the crisis was very marked last year).

Figure 1 shows the weekly forecast for the electricity demand peak in mainland France, at temperatures close to the seasonal norm, along with the consumption recorded last winter and adjusted to take account of the effects of weather patterns and load reductions.

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<sup>1</sup> Read Appendix 1 "*The Basics of System Operation / A.1.5 Operating margins and the balancing mechanism*" in [Power System Reliability Memento – 2005 Version](#) (page 214)

<sup>2</sup> Read Appendix 1 "*The Basics of System Operation / A.1.5.2 The Balancing Mechanism*" in [Power System Reliability Memento – 2005 Version](#) (page 215)

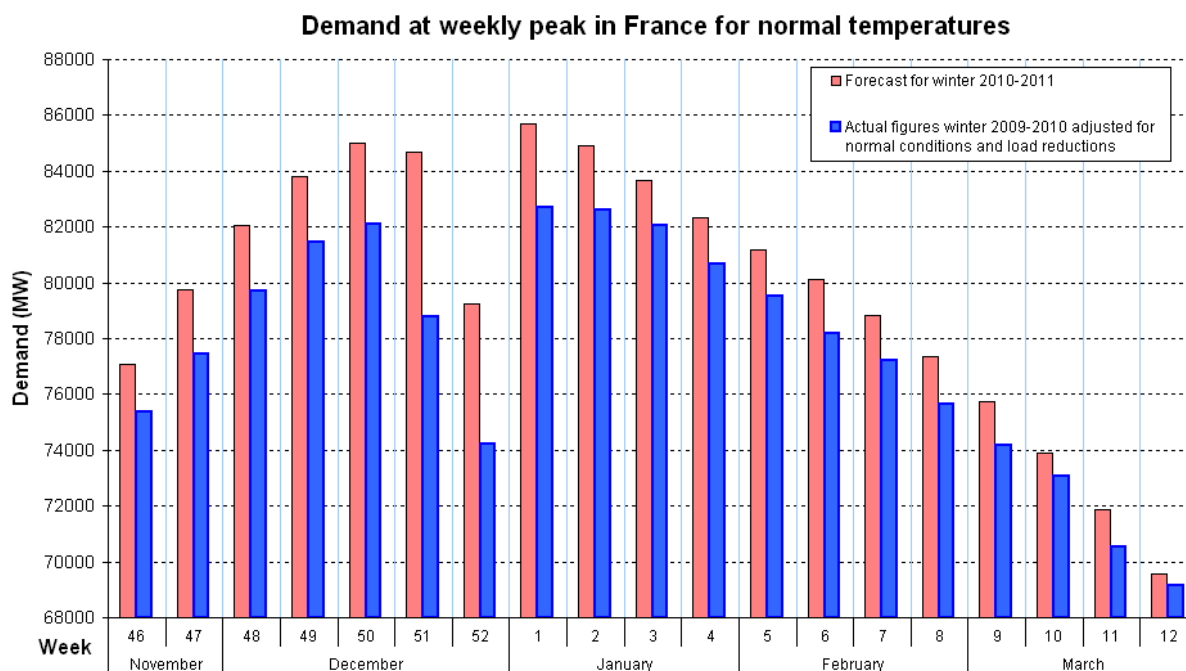


Figure 1: Electricity demand forecasts for mainland France at normal temperatures

For information, the level of demand<sup>3</sup> varies significantly in winter when temperatures drop. During the cold snap observed in France in February 2010, the level of electricity demand reached almost 93,100 MW on Thursday, February 11th 2010 (8.4°C below the normal temperature for the time of year).

For the coming winter 2010-2011, it is estimated that a 1°C drop in the average temperature could raise the 7pm electricity demand peak by up to around 2,300 MW.

### 3- Availability of generating facilities

Based on information provided by the generators at the end of September 2010, the availability of the French generating fleet over the winter period 2010-2011 is expected to be significantly higher than last winter during the months from November to January.

From February onwards, the overall availability of generating facilities is expected to be lower during this period than last winter. The arrival of new generating facilities (mainly wind farms and conventional thermal power plants) will be insufficient to compensate for the less favourable generating fleet availability rates expected during the second part of the winter.

National water reserves are at levels close to the average seen in recent years.

For the coming months, available hydro-electric capacity is expected to be slightly lower than last winter, taking into account the schedule for shutting down generating units.

### 4- Moderate risk of interrupted supply

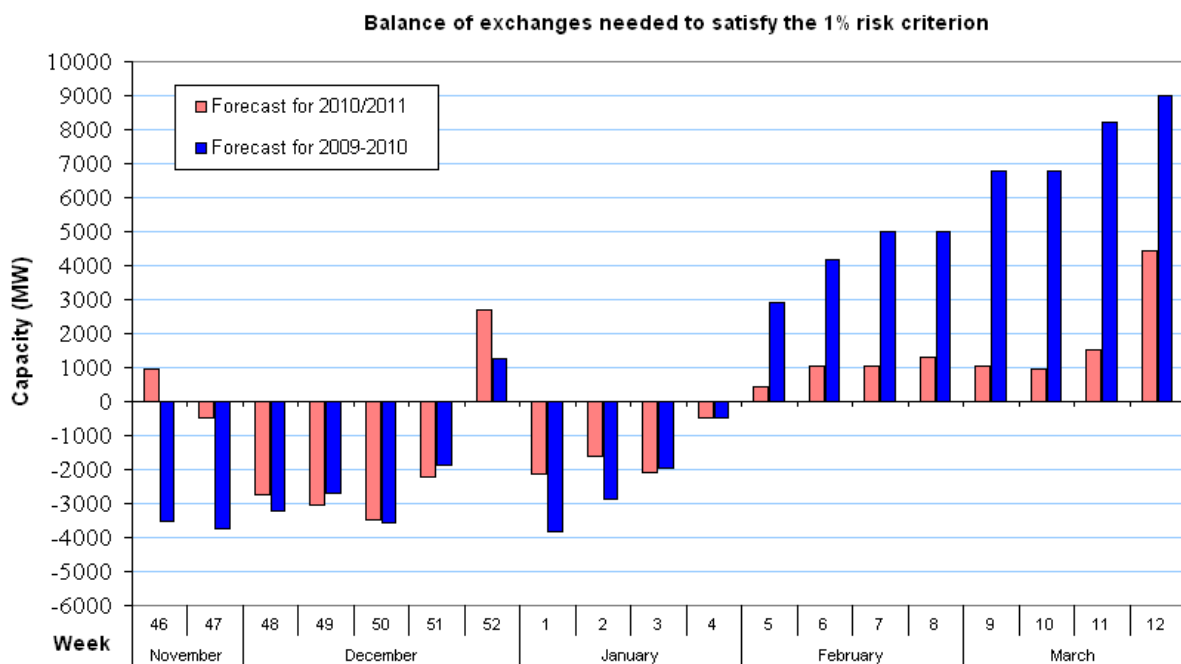
Figure 2 shows the maximum probabilized balance of cross-border exchanges needed to satisfy the 1% risk margin criterion for every week of the winter period. This balance represents the maximum value of generation that could be exported whilst satisfying the technical criterion, or the minimum additional value that would need to be imported in order to satisfy the criterion.

<sup>3</sup> Read [presentation of demand forecasting methods](#) (available in french).

It should be noted that the mean values displayed are obtained from simulations involving a large number of different scenarios for climate conditions and the availability of generating units. They do not in any way represent a forecast of real time cross-border exchanges, which may differ considerably from this balance, due to a number of factors

- actual meteorological conditions, the actual availability of generating facilities,
- on-the-spot decisions made by the various players, in particular between the options of requesting more power from French generating facilities, invoking demand response load reduction and obtaining supplies on the international markets via the capacities offered by RTE on interconnectors.

The forecast outlook for the probabilized balance of cross-border exchanges is compared with that taken from last winter's equivalent study.



*Figure 2: Probabilized balance of exchanges needed to satisfy the "1% risk margin" criterion, taking into account suppliers' possibilities for demand response (load reduction) on their customer portfolios, as reported to RTE.*

Until the end of January, imports could be required to meet electricity demand in France and satisfy the technical security margin stipulated by RTE. To do this, suppliers would have to look to the European markets, in addition to invoking demand response (load reduction) agreements with their customers. The estimated level of imports could therefore reach around 3,500 MW during the month of December 2010.

From February, although down compared with last winter due to the lower availability of the French generating fleet, the balance of exchanges should remain positive (i.e. France should remain a net exporter).

If the availability of the French generating fleet proves lower than expected, forecast margins would be reduced.

In the event of a sustained and intense spell of cold weather, forecast margins will fall due to the increased demand for electricity and the reduction of water reserves, which are used intensively in this type of situation.

To maintain their balance, French market suppliers could apply extra load reduction measures, and ensure their supply commitments are fully covered by purchasing electricity on the European markets, thereby leading to a substantial rise in imports.

In the event of a sustained and intense spell of cold weather with temperatures 8°C below the seasonal norm, in order to maintain equilibrium and guarantee the margin needed to cover contingencies, the level of imports could reach 8,500 MW. That value is within the acceptable forecast limit for the French system under the most favourable conditions. In the event of further significant and sustained contingencies affecting the French generating fleet, this maximum import limit would be reached at lower temperatures.

The value of the maximum import capacity is recalculated daily. It depends on power system conditions in France and other countries. It will be higher if imports are spread across all France's borders.

Should the supply-demand balance in mainland France become extremely tight, and once French market suppliers have taken all the measures open to them, RTE may if necessary be forced to activate exceptional measures and initiate actions to safeguard the system (voltage reduction of 5%, or even load shedding as a last resort).

In winter, the daily peaks usually occur at around 7pm. All other things being equal, the rise in the demand peak acts to reduce the power system's operating security margins.

As a result, demand side management actions taken to control or reduce electric loads at peak demand times, will help to improve the state of the electricity supply-demand balance and thus strengthen security of supply for the country.

## **5- European situation**

Since the European power system is heavily interconnected, the supply-demand balance needs to be examined not just in terms of each individual country, but also in terms of the wider European network. Using electric interconnectors to pool supply is a big advantage for ensuring demand is satisfied on an international scale, insofar as the French network's maximum imports capacities are not reached.

A study similar to the present document is produced by all the transmission system operators for Europe. Through the Winter Outlook Report, RTE and its European counterparts provide all players in the European electricity market with the forecast analysis of the supply-demand balance for the coming winter.

The results of that study are published by [ENTSO-E](#)<sup>4</sup> ("Winter Outlook Report").

## **6- Real time balancing mechanism for electricity supply and demand**

In the event of contingencies affecting demand or generation, RTE calls on the balancing mechanism.

RTE can call for bids, to enable it to maintain the balance between supply and demand for electricity at all times, and to reconstitute the emergency margins needed to operate the power system in complete security.

The balancing mechanism, which was launched in April 2003, is governed by a set of rules approved by the French Energy Regulator (CRE) and has already shown itself to be effective. In accordance with legal requirements, the power available from technically operational generating facilities, which generators are not using for their own purposes, must be made available to RTE via the balancing mechanism.

In addition, RTE has given consumers the option of using the balancing mechanism to offer to reduce demand by their sites (demand response), thereby taking advantage of their flexibility. In 2008, RTE

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<sup>4</sup> ENTSO-E website : [www.entsoe.eu](http://www.entsoe.eu)

launched an experimental consultation of industrial consumers connected to the public transmission system, in order to guarantee the availability of demand response offers to reduce loads. The experiment was renewed in 2009, and RTE invited market participants to make the approach permanent by launching annual calls for tender. Following a deliberation by CRE, new contracts are due to be put in place for January 1<sup>st</sup> 2011.

Lastly, the system used in France is open to balancing offers from neighbouring countries. Following Switzerland and Germany, this possibility was extended in 2009 to include offers from the UK, thereby boosting the emergency reserves that RTE can potentially call upon if needed.

Nonetheless, it is worth bearing in mind that reserves are intended to cover contingencies that occur in real time or close to real time.

Consequently, the balancing mechanism, which is a pool of bids that can be used to establish operating reserves for dealing with short term demand or generation contingencies, is not intended to cover imbalances within the scope of responsibility of commercial players.

## **7- Situation in the Brittany and Provence-Alps-Côte d'Azur (PACA) regions**

These two geographic zones consume more electricity than they generate. Both are electric "peninsulas", supplied by the national power network. In addition, they are both experiencing rapid growth in demand for electricity, which is quickly saturating the capacities of existing network infrastructures, with the serious risk that demand may no longer be met if a network facility or generation unit should become unavailable. As things currently stand, these two characteristics mean that the capacities and availability of the transmission system are hugely important factors in guaranteeing the security of supply.

In partnership with regional stakeholders, RTE is focusing efforts to develop the network, accommodate new local generating facilities and promote demand side management measures.

### **Brittany**

Brittany is an "electric peninsula", which generates only 8% of the electricity it uses. It is supplied by generating facilities located some distance away.

In addition to measures already taken in past years to reinforce the network, and awaiting the materialization of projects designed to provide a long-term solution to the fragile electricity supply situation in Brittany, RTE has undertaken to strengthen the network for this winter:

- by creating a new 400,000/225,000 volt transforming substation in Calan (near Lorient). This will help to relieve pressure on the 225,000 volt network, which is close to saturation point in southern Brittany.
- by reinforcing 225,000/63,000 volt transforming capabilities at three substations in northern Brittany, effectively providing an additional 240 MW of capacity.
- by installing capacitor banks in substations, intended to ensure better voltage control.

The new 450 MW Combined Cycle Gas (CCG) unit at Montoir de Bretagne, which is due to come on stream at the end of 2010, will also help ease limitations on supply from the national grid.

Alongside these measures, RTE is forging ahead with efforts to promote improved demand side management through its Ecowatt eco-awareness initiative, which aims to encourage people living in Brittany to moderate their electricity use during peak periods in winter. An appeal to reduce electricity consumption will be launched from the Ecowatt Brittany information website. The appeal will be based on day-ahead forecasts for the status of the Breton power network, and will include two alert levels (orange and red).

## **The Provence–Alps–Côte d’Azur (PACA) region**

Having relied heavily on imports for some time, the PACA region is developing its electricity generating capacity, particularly at Fos sur Mer. However, the imbalance remains significant in the Var and Alpes-Maritimes *départements*, which are supplied exclusively by a single 400,000 volt link in the south of the region, connecting the western and eastern parts of PACA. To counter this structural weakness, and with no possibility of completing this 400,000 volt loop to the north, a decision was taken in 2008 to establish a 225,000 volt "safety net". It is expected to enter service in 2015.

In the meantime, between 2007 and 2010, RTE moved to strengthen the existing 400,000 volt link in the south:

- by building new 400,000/225,000 volt transforming substations in Trans (near Draguignan) and Biançon (near Cannes), to relieve pressure on the 225,000 volt network;
- by increasing the voltage of the existing link's second circuit from 225,000 to 400,000 volts;
- by installing capacitor banks in substations, intended to ensure better voltage control.

Alongside these measures, RTE is forging ahead with efforts to promote improved demand side management through its Ecowatt eco-awareness initiative, which aims to encourage people living in the Côte d'Azur to moderate their electricity use during peak periods in winter. An appeal to reduce electricity consumption will be launched from the Ecowatt Côte d'Azur information website. The appeal will be based on day-ahead forecasts for the status of the Côte d'Azur's power network, and will include two alert levels (orange and red).