



Réseau de transport d'électricité

FORECAST ANALYSIS SUMMER 2011

JUNE 2011

Forecast analysis of the electricity supply - demand balance in France for summer 2011

The forecast supply-demand balance for electricity in mainland France presents a low risk throughout summer 2011.

A significant and sustained deterioration in the current hydrological situation could lead to substantial reductions in generation output. But, in such a scenario, and for temperatures close to seasonal norms, RTE foresees no major constraints. It may be necessary for electricity suppliers to obtain additional supply from the European markets throughout the summer period.

A sustained heatwave with temperatures 7°C above seasonal norms, would see both lower generation output and higher demand. In this scenario, which entails more serious constraints than the previous one, electricity suppliers could need to obtain also additional supply from the European markets, in particular from mid-August onwards. However, import levels would remain compatible with cross-border exchange capacities.

A heatwave combined with an unfavourable hydrological situation would require vigilance, while the implications for the availability of the French generating fleet would need to be monitored closely and appropriate measures identified. Current information shows, in such a scenario, some constraints but compatible with cross-border exchange capacities for the first half of the summer. The study will be updated in July if necessary.

I. Background

The real time management of the electricity supply-demand balance in mainland France is the responsibility of RTE, the French transmission system operator. Based on information supplied by all players involved in the French power network and in accordance with the government's "Heatwave Plan", RTE draws up a forecast study of the supply-demand balance during the summer period, in order to anticipate any difficulties that might affect French power system operation.

This document presents a summary of the work carried out by RTE in preparation for summer 2011.

II. Methodological approach

RTE conducts a technical analysis of forecast operating reserves on the French power system, for the period between mid-June and late September. 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 summer 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.

During the initial phase of the study, RTE carries out a probability assessment, to determine the physical risk that supply will be insufficient to cover demand on the French power system, based on a technical criterion: [the "1% risk"¹](#). This represents operating reserves corresponding to a probability of 1% that "exceptional" measures will be required.

These exceptional measures are as follows: [exceptional offers on the balancing mechanism²](#), very rapid increases in the power produced by certain generation units (conventional thermal and hydro-electric), decreases in voltage, and as a last resort if these measures prove insufficient, power cuts.

¹ Read Appendix 1 *"The Basics of System Operation / A.1.5.1 Reserves and operating margins"* to the Power System Reliability Memento –2004 edition (p214)

² Read Appendix 1 *"The Basics of System Operation / A.1.5.2 The Balancing Mechanism"* to the Power System Reliability Memento –2004 edition (p215)

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

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

During the second phase of study, RTE evaluates the consequences of a heatwave, characterized by a sustained period of high temperatures, under a "stress" scenario. This involves looking at the impact of such a situation on the level of demand (which rises due to the intensive use of air-conditioning), and also the supply of electricity (which falls due to limitations on certain nuclear and conventional thermal generating facilities to comply with environmental requirements, reductions in hydro-electric and wind generation).

For each weekly demand peak during the period studied, RTE determines the balance of exchanges on borders needed to satisfy network reliability criteria.

III. Forecast situation for reference scenario

This scenario is built on a probabilistic study.

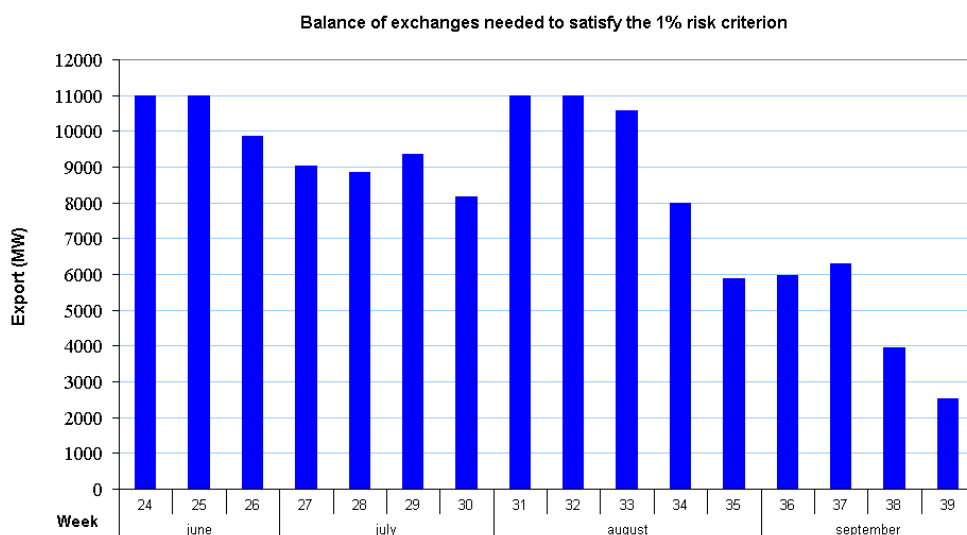
Based on information supplied by generators in spring 2011, the forecast availability of the French generating fleet from July onwards should be lower than the forecasts established last year for summer 2010.

The reduced availability of the generating fleet is due to the generally less favourable maintenance schedule for power plants in 2011 as compared with 2010, despite the arrival of new generation units (conventional thermal, wind, solar).

On the demand side, RTE has realigned its forecasts to incorporate a new [temperature reference system](#), with reference temperatures more representative of the current climate, and also consumption trends in the energy sector (specifically uranium enrichment). Under normal conditions, forecast demand for summer 2011 is lower than that for summer 2010.

For information, demand is lower in summer than in winter. This is why the summer period is the best time for scheduling maintenance work at many power plants.

The figure below shows the maximum balance of cross-border exchanges needed to satisfy the 1% risk criterion at the weekly demand peak, for every week of the summer 2011 period³ :



³ The values on the graph are intentionally limited to 11,000 MW, which represents the maximum value of export capacities estimated for this summer.

Over the entire period studied, forecast generation capacities should be sufficient not just to cover demand in mainland France, but also to give French generators the option of exporting energy on the European markets.

The forecast outlook for summer 2011 is significantly better than that for the previous summer, with the exception of the end of September.

IV. Heatwave hypothesis

To assess the consequences of a heatwave, RTE has developed a "stress" scenario, in which demand and generating facilities are affected in a similar way to that observed in August 2003 and July 2006. The scenario is based on information supplied by all generators. It identifies the sites at which generation was reduced to comply with legislation on the temperature of the cooling water released by plants.

The rest of the document focuses on the results obtained from the study of a specific "Heatwave" scenario, which entails the following factors:

- demand estimated for temperatures 7°C above reference temperatures;
- reductions in generation at nuclear and conventional thermal sites to comply with environmental requirements;
- reduction in available capacity of hydro-electric units (drought) and reduction in wind generation.

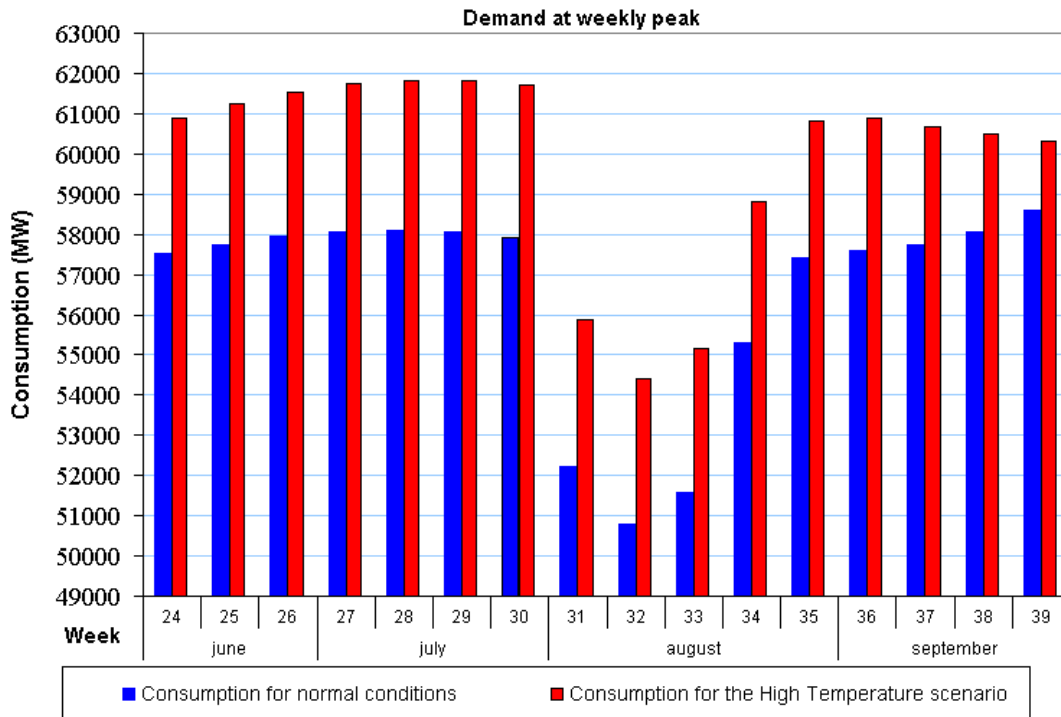
Impact on demand

Electricity demand is sensitive to temperatures (due to the use of air-conditioning and ventilation equipment), and so heatwaves lead to a rise in electricity demand. Consequently, at the daily demand peak around 1pm, a rise in temperature of 1°C causes demand to rise by approximately 500 MW (this value – gradient - is estimated on the basis of records from past summers).

The value of the gradient has increased compared with last summer. This reflects the continued or even increased use of air-conditioning and ventilation equipment during the afternoon.

Demand side management measures to curb electricity use throughout the year, will serve to limit the increase in demand and the use of additional generating facilities. They offer a potentially useful means of managing demand in the event of electricity supply-demand balance constraints, notably at the demand peak.

The following graph shows weekly peak* demand forecasts for 2011 under normal conditions, and also at 7°C above reference temperatures, corresponding to the "Heatwave" scenario:



* maximum demand value forecast for the week

Impact on supply

In the event of a heatwave, output by certain thermal generating plants may be reduced to comply with local environmental requirements. Similarly, hydro-electric and wind generation may also be affected by drought or anticyclonic conditions. RTE has therefore put together hypotheses for drops in generation based on risk data provided by generators for their different sites.

On average, generation drops under the "Heatwave" scenario are estimated at 11,300 MW.

Impact on the balance of exchanges

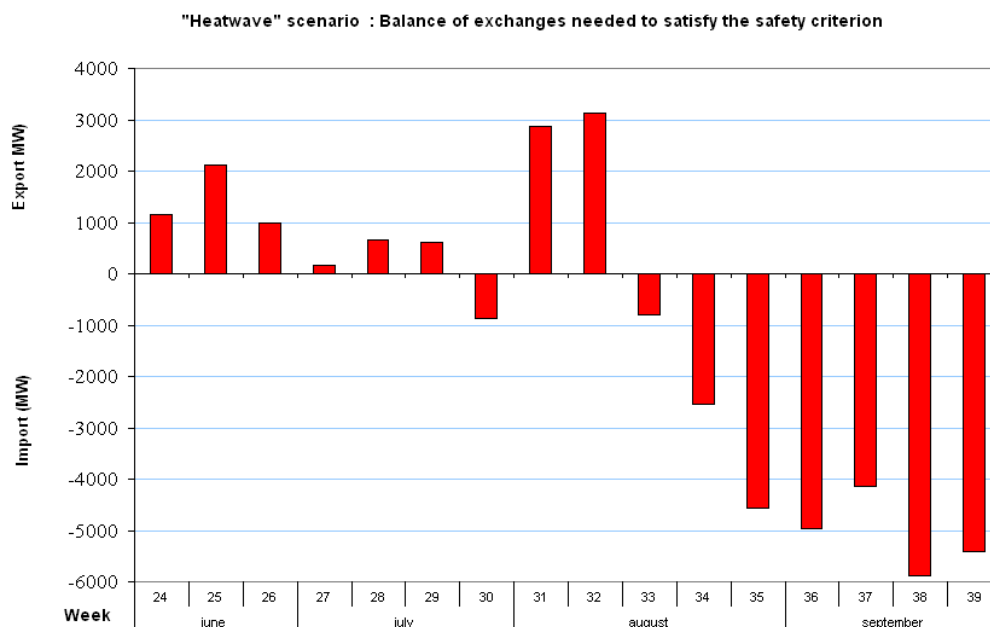
Based on these forecast hypotheses for demand and availability of the generating fleet in mainland France for summer 2011, RTE determines the

"maximum" balance of exchanges with neighbouring countries needed to stay within supply-demand balance security criteria.

This power level, presented for every week of the period concerned, represents the difference between the available capacity of the French generating fleet - including any restrictions, and total demand, taking into account the [capacity reserves](#)⁴, contractually agreed by RTE with French electricity generators, needed to operate the power system securely.

The following graph illustrates the results obtained under the determinist study for the "Heatwave" scenario. In this case, to guarantee that supply is sufficient to cover demand across mainland France, it could be necessary to import up to approximately 6,000 MW at the end of September (as compared with 4,000 for summer 2010).

These import levels are compatible with cross-border exchange capacities.



In the event of a heatwave, the forecast situation for summer 2011 is significantly more favourable than the previous summer until mid-August, and less favourable at the end of the study period.

⁴ Read Appendix 1 "The Basics of System Operation: A.1.5.1 Reserves and operating margins" to the Power System Reliability Memento – 2004 edition

V. 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 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 were put in place at the beginning of 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 bids 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.

VI. Managing tight situations

During periods of tightness in the supply-demand balance, during which France is forced to import energy from neighbouring countries, French market suppliers could also invoke demand response agreements, asking their customers to reduce their electricity consumption further, in addition to making purchases on the European markets. At this stage, only demand response possibilities disclosed by suppliers have been taken into account by RTE. In addition, generators based in France could also alter maintenance schedules for their generating units to increase their availability if possible.

Finally, before taking exceptional measures, RTE could also draw on the following provisions: accepting demand response offers made by French consumers or by international consumers via the balancing mechanism to reduce their consumption, and activating backup contracts signed with other European TSOs.

If these preventive measures nonetheless proved insufficient, RTE would alert the government of the risk that supply will be interrupted, and would take exceptional operational actions in real time to limit the impact on the power system.

VII. European situation

Since the European power system is 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.

A study similar to the present document is produced by all the transmission system operators for Europe. Through the "Summer Outlook Report", RTE and its European counterparts will, in mid-June, provide all the players in the European electricity market with a forecast analysis of the supply-demand balance for the coming summer, with particular attention paid to the availability of generating installations in Germany and across Europe.

This summer 2011, unless a heatwave occurs, the overall supply-demand balance for electricity will be respected in Europe. In the event of a severe heatwave and drought, the situation may become more strained, particularly if such a situation were to occur simultaneously in several neighbouring countries. The results of that study are published by [ENTSO-E](#) ("Summer Outlook Report").