



10  
EDITION

Update of the  
**GENERATION  
ADEQUACY REPORT**

on the electricity supply – demand  
balance in France

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# 1 FOREWORD

Under the terms of the Law of February 10, 2000, RTE (Réseau de Transport d'Électricité), working under the aegis of the Public Authorities, establishes every two years a multi-annual forecast report on the balance of electricity supply and demand in France, known as "Generation Adequacy Report".

The last Generation Adequacy Report<sup>1</sup>, looking ahead up to 2025, was published in July 2009. It concluded that security of supply in France was reasonably ensured through 2013. It also warned that supply might fall short of demand by 2015, considering: i) decommissioning of numerous old plants that are not in compliance with environment standards established in the "Large Combustion Plants" Directive, and ii) a slow down in commissioning of new plants, due to the recent tendency of producers to postpone go ahead decisions in the wake of the economic and financial crisis.

Decree No. 2006-1170 issued on September 20, 2006, requires that an annual update of this forecast be prepared over the next five years. Thus, the main purpose of the present update is to verify the ability of the power system in continental France, operating in close interaction with neighbouring systems, to properly satisfy demand through 2015.

This update incorporates supplementary information obtained during the course of last year:

- With regard to consumption, forecasts are based on actual consumption figures for 2009. Statistical data over one more year-long period are available on many consumption drivers, such as new building and housing units, along with actual electrical space heating and the sales of many electric appliances. More accurate data from the macro-economic outlook on the recovery from the present crisis were also made available. Such information is helpful in determining the most relevant and probable scenario amongst the set of scenarios developed in the 2009 Generation Adequacy Report.
- With regard to generating capacity, the most probable trajectory through 2015 is derived from information concerning intended commissioning and decommissioning schedules provided by producers up to early June 2010.

This update also incorporates findings from operational conditions experienced over the past winter, combining numerous demand spikes due to cold weather, poor nuclear generation availability and high imports. In addition, it takes into consideration recommendations issued last April by a working group convened by Members of French Parliament dedicated to peak demand control.

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The 2009 Report  
may be downloaded  
at [http://www.rte-  
france.com](http://www.rte-france.com)

# 1



## 2 CONSUMPTION

### 2.1 RECENT TRENDS

Instantaneous power demand can be voluntarily reduced by consumers, either by delaying use of some appliances (which is neutral on annual energy consumption), or by temporarily switching to alternative fuels for the same energy end-use (dual energy schemes – which lower electricity consumption compared to pure electricity use).

# 2

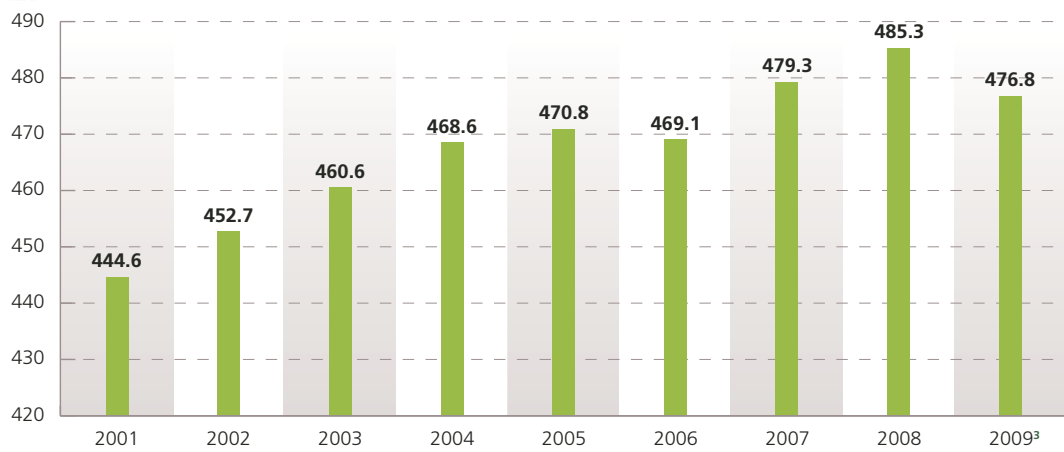
Provisional data.

# 3

Consumption across continental France was recorded at 486.4 TWh in 2009. Weather conditions in 2009 were generally colder than normal during winter periods (especially during the month of January 2009, which at the time was the coldest January since 1987 – although January 2010 eventually turned

out to be even colder) and slightly hotter than normal during summer. After being adjusted to smoothen climate induced fluctuations and the effects of Demand Response measures<sup>2</sup>, consumption stood at 476.8 TWh<sup>3</sup> in 2009, 1.8% lower than the previous year (2008), and even 0.5% lower than in 2007.

Electricity demand in continental France adjusted for weather contingencies, demand response and leap years (TWh)



Industrial consumption, especially in large consuming factories, fell by 8.6% in 2009 compared to 2008. The year on year decline apparently came to a halt during the fourth quarter with consumption stabilising at the previous year's level, but this level was more than 12% less than in the fourth quarter of 2007. Conversely, consumption in the residential and commercial sectors continued to grow, despite

the effects of the crisis (+2% for adjusted consumption from 2008 to 2009).

Regarding instantaneous power consumption, a new all time high was recorded on February 11, 2010 at 7 p.m. reaching 93,080 MW. On that day, outdoor temperatures (averaged across all of France and throughout the day) went down to -2°C, whereas demand control measures were activated.

Yearly consumption peaks

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Day	17-dec	10-dec	09-jan	22-dec	28-feb	27-jan	17-dec	15-dec	07-jan	11-feb
Hour	7:00 pm	7:00 pm	7:00 pm	7:15 pm	7:15 pm	7:00 pm	7:00 pm	7:00 pm	7:00 pm	7:00 pm
Peak load (GW)	79.6	79.7	83.5	81.4	86.0	86.3	89.0	84.4	92.3	93.1
Mean temperature France (°C)	-1.2	+3.6	-2.4	+2.3	-3.0	-1.1	-0.8	+3.9	-3.0	-2.0
Deviation to standard temperature (°C)	-6.4	-2.1	-7.3	-2.7	-10.6	-6.7	-6.0	-1.4	-7.8	-8.5

Winter peaks are connected to the widespread use of electric space heating in France, making consumption highly sensitive to outdoor temperatures: currently, a drop of one degree Celsius induces a

2,100 MW<sup>4</sup> burst of demand. This figure rises over time with the increasing number of housing units using electricity for space heating, through either resistance heaters or heat pumps.

## 2.2 ANALYSIS BY SECTOR

Consumption forecasts made for the 2009 edition of the Generation Adequacy Report are updated taking into account the most recent information: actual (although still provisional) demand in 2009, fresh economic statistics (new building activity, sales of electrical appliances), and new or updated economic forecasts. The most noticeable changes occur in the Industry sector.

### 2.2.1. Industry

#### • *A decline in 2008 and 2009*

The economic crisis which began in the fourth quarter of 2008 resulted in a sharp fall in the demand for industrial goods and therefore in the electricity consumption of the manufacturing sector. After falling to a low point during the first half of 2009, electricity demand slightly recovered thereafter. On a yearly basis, figures show a 2.8% decline from 2007 to 2008, and 12.3% from 2008 to 2009: it is estimated that the economic crisis resulted in a 4 TWh reduction in electricity demand in 2008, and a 16 TWh reduction in 2009.

The impact of the economic crisis unfolded in a similar manner across all European countries<sup>5</sup>:

- a reduction in household investment, inducing a decline in housing construction,
- a reduction in corporate investment, affecting civil engineering and machinery and equipment,
- a reduction in household consumption, notably with regard to durable goods (such as furniture, etc)
- the impact of all of these reductions in downstream sectors seeped through to intermediate

goods (steel, aluminium, cement, glass, etc) whose production is generally highly energy intensive.

Consequently, in France during 2009, corporate investment shrank by 20%, automotive industry output by 20%, durable goods (excluding cars) by 15%, and non-residential building by 20%. It should be noted that final household consumption, where the decline was limited to a mere 3%, proved more resilient in France than in most neighbouring countries.

#### • *Short term recovery*

The lowest level of industrial production was experienced in the first half of 2009. At that time, the effects of weakening demand for manufactured goods was further amplified by the reduction in inventories. Industrial production began its gradual recovery during the second half of 2009, thanks in part to various governmental economic stimulus plans to support the recovery, and due to the mechanical effect of inventory withdrawals coming to an end. The effects of these developments should continue through 2010.

Exports of manufactured goods also recovered somewhat in early 2010, reversing the 2009 decline which also contributed to the recession.

#### • *A weak growth forecast for the medium term*

In France, overall investment spending has been forecast to continue its downward trend in 2010. New

More details are contained in chapter 3 of the 2009 Generation Adequacy Report.

# 4

Source: INSEE, BIPE, media.

# 5



building construction is expected to further decrease while the decline in corporate investments and capital expenditures is also expected to continue, owing to the build up of global surplus capacity over the past years and given the limited growth prospects.

Electricity consumption in the industrial sector is expected to rebound by 2.6% in 2010, followed thereafter by a steady 1.4% annual growth rate through 2015. At first glance, these figures may seem to reflect a more dynamic growth than in the last years, but it should not be forgotten that electricity consumption retreated by 20 TWh between 2007 and 2009. Therefore, electricity consumption in the industrial sector is now expected to be lower in 2015 than it was in 2007. Growth in consumption is now expected to develop along a path which is below the "Low" demand scenario drawn up in the 2009 Generation Adequacy Report.

### 2.2.2. Tertiary sector

Floor space is the most meaningful factor indicative of electricity consumption in the Tertiary sector. New building construction has retreated notably during the last few years: -14% in 2007, -25% in 2008; 11 million square metres were built in 2008.

With the exception of community housing (where new building remained steady), all sub-sectors have been affected. The decline was noted to be most significant in the services sector including "Cafes, Hotels, Restaurants", shops, sports.

Electricity is the most common energy source chosen for space heating in new Tertiary buildings: in 2008, it even expanded its market share by 3 percentage points, continuing a move that started in 2006. Electricity consumption for space heating purposes in the Tertiary sector is actually growing faster than was anticipated in the "Baseline" demand scenario developed in the 2009 Generation Adequacy Report.

Non-competing uses of electricity (i.e.: uses other than space heating, water heating and cooking) still make up nearly 70% of the overall electricity consumption of the Tertiary sector. Consumption in these areas grew by 1.5% from 2007 to 2008, in line

with the "Baseline" demand scenario developed in the 2009 Generation Adequacy Report.

For the future, the overall consumption growth rate is expected to ease slightly from its current rate of 2% per year (although some sub-sectors may prove more dynamic<sup>6</sup>), primarily due to three reasons: the downturn in new building activity, which registered a slowdown in 2009 that is highly likely to continue into 2010; stores and office spaces lying vacant as a consequence of the economic crisis; enforcement of the new "RT 2012" thermal regulation (as early as summer 2011 for permitting of new buildings).

In the "Baseline" demand scenario of the 2009 Generation Adequacy Report, the overall growth rate for Tertiary sector demand was expected to remain at 1.3% on average through 2015. Hence, this scenario is maintained for the present forecast update.

### 2.2.3. Residential sector

In 2009, overall electricity demand in the Residential sector continued to grow at a 2% annual rate (adjusted for climatic conditions). The main reasons to which this growth may be attributed, the sustained demand for electric space heating, and electrical appliances, apparently proved insensitive to the effects of the economic crisis. However, although consumption growth in this sector remains strong, it is expected to be gradually tempered by the demand side management measures, implemented both at the level of Europe and France.

As regards space heating, the actual consumption trend is clearly positioned above the trend expected in the "Baseline" demand scenario of the 2009 Generation Adequacy Report: close to 70% of newly built housing units opted for electric space heating (either conventional electric heaters or heat pumps), more than offsetting a slightly steeper than expected decline in the number of new housing units; moreover, switching from oil boilers to heat pumps in older housing units continued at a steady pace. However, according to suppliers, the heat pump market in France should stabilise, or even contract, in 2010: energy bill savings look less impressive than in 2008 due to lower fuel-oil

Notably data centres.

# 6

prices; a decrease in fiscal incentives and the reduction of household incomes as a consequence of the economic crisis create barriers to increased spending on heat pumps. In the medium term, the new "RT 2012" thermal regulation, while still in the preparation stage is intended for application in January 2012, and is expected to place a significantly more stringent cap on energy consumption of all new buildings. Energy efficiency is also expected to improve in existing buildings given the encouragement provided by governmental measures<sup>7</sup>. For all these reasons, it is believed that space heating consumption will be curbed downwards in the years to come, and that the 2015 target set in the "Baseline" scenario of the 2009 Generation Adequacy Report is still relevant.

Growth in other uses of electricity also continued in 2008 and 2009. For instance:

- sales of TV sets amounted to close to 6 million units both in 2008 and 2009, which historically is a very high level. Since current TV models tend to be larger in size than older ones, although technical improvements have lowered their consumption for similar screen sizes, new sets by and large tend

to consume increasingly more energy. Digital terrestrial television, the deployment of which began in November 2009, will fully supplant analogue broadcasting by late 2011, which would mean that likely almost all French dwellings will be equipped with decoders by then. Electricity consumption by "brown products" is thus forecast to keep on growing over the next five years.

- sales of personal computers also grew by 3% from 2008 to 2009. However, this growth was largely driven by laptop units, which consume less, with sales of desktop units actually falling. Accordingly, electricity consumption of "grey products" is expected to moderately increase.

Hence, with regard to the overall consumption of the Residential sector, although in 2009 the actual trend looked to be closely resembling the trend anticipated in the "High" demand scenario of the 2009 Generation Adequacy Report, many determining factors, such as the number of new housing units built, the softening of fiscal incentives, etc. will drive the trend closer to the one forecast in the "Baseline" demand scenario up to 2015.

Notably offering interest-free loans for thermal upgrading of buildings (known as "Eco-PTZ" – Zero Rate Loan for ecological purposes).

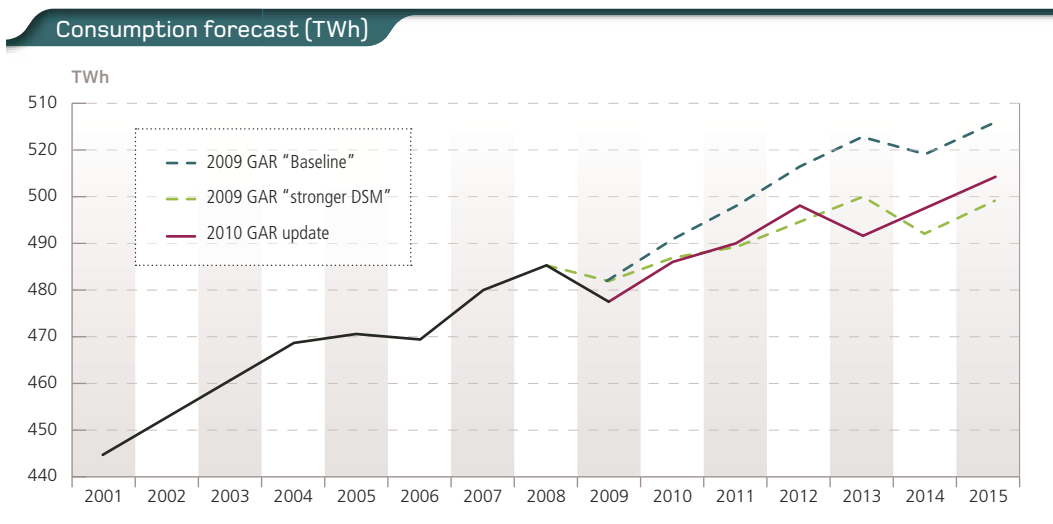
# 7

## 2.3 SYNTHESIS

Based on these sector-specific forecasts, the overall consumption trend projected through 2015 is presented in the graph below.

NB: the graph includes consumption of the energy sector; this latter will undergo a major shift due to

the change in the uranium enrichment process; as the date of change is still not exactly known, it has been assumed to take place between 2012 and 2013.





Forecast for electricity consumption in France in 2015 now stands at 506 TWh. This figure is 10 TWh lower than that of the “Baseline” scenario provided in the 2009 Generation Adequacy Report. The steeper than expected drop in 2009 is the main source for this decrease.

Regarding peak load, two representative values are used to characterise both its level and its volatility: i) peak under normal temperature and ii) the “one in ten” peak, which would be reached under climatic conditions that only occur on average once every ten years:

Compared to the 2009 Generation Adequacy Report and its “Baseline” demand scenario, the “one in ten” peak forecast has been lowered by 1000 MW for winter 2012/13, and by 600 MW for winter 2014/15. These figures result from two opposing changes: first, the downwards revision in industrial consumption; second, a slight upwards revision in space heating consumption (both resistance heaters and heat pumps) over the upcoming years in the Residential sector.

Peak load forecasts (GW)

	2012-13	2014-15
Peak at normal temperature	85.4	87.2
“One in ten” peak	101.0	103.2

Consumption forecast update

With regard to consumption, information gathered over the past year leads to the following conclusions:

- for Residential and Tertiary sectors, the most plausible trajectory through 2015 remains close to the one presented in the “Baseline” demand scenario of the 2009 Generation Adequacy Report
- for Industry, the most plausible trajectory is lower than the one presented in the “Low” demand scenario of the 2009 Generation Adequacy Report, mainly due to the steeper than expected drop in 2009.

As a result, overall energy consumption in 2015 is forecast at 506 TWh. This is 10 TWh lower than in the “Baseline” demand scenario of the 2009 Generation Adequacy Report.

The updated forecast for industry points to a 1500 MW reduction in winter 2012-2013, and 1000 MW in winter 2014-2015, compared to the “Baseline” scenario of the 2009 Generation Adequacy Report. However, the updated forecast marks a slight upwards revision for space heating in Residential and Tertiary sectors (both resistance heaters and heat pumps). As a result, the overall “one in ten” peak demand is only reduced by 1000 MW in 2012-2013 and 600 MW in 2014-2015.

The decline of the rather even consumption in industry coupled with the growing Residential and Tertiary sector consumption tend to amplify the difference between peak and off-peak loads.



# 3 GENERATION

Security of supply will be assessed taking into account the most probable trajectory of installed generating capacity in France through 2015 (corresponding to the "Launched Projects" supply scenario presented in the 2009 Generation Adequacy Report). It includes all generating units presently in operation, while withdrawing those which are expected to be decommissioned over the five year timeframe, and adding new units either under construction (with strong certainty of commissioning at a reasonably certain date) or for which commissioning is deemed highly probable (notably projects already having administrative permits and with relatively short construction lead times, such as wind turbines or photovoltaic cells).

## Renewable and embedded thermal generation

- Hydropower: the guidelines of concession renewal under a competing process were unveiled in late 2009. At the same time, the government produced the list of 10 concessions (5,300 MW cumulative power) to be renewed between 2010 and 2015. New concession holders are expected to undertake refurbishment or upgrading works, however 2015 appears to be too short a timeframe for them to be completed. As well, no significant new project is expected to be connected to the grid at that time. So hydro generation is expected to remain generally unchanged through 2015.
- Wind power: as of January 1, 2010, 4,555 MW of wind turbines were installed in France, of which 1,247 MW were newly connected during the year 2009. The regulatory context is evolving, but the 1000 MW/year increment of installed wind power projected in the 2009 Generation Adequacy Report still looks to be the most probable trajectory.
- Photovoltaic solar power: not only have connections to the grid increased in 2009 (from 48 to 189 MW between January 1 and December 31), but in the present regulatory framework, new applications have also increased. It now seems highly probable that the 5,400 MW target set for

2020 in the "Grenelle I" Bill would be reached earlier than expected, with a 3,000 MW milestone being reached in 2015.

- Biomass: like in the 2009 Generation Adequacy Report, 200 MW are expected to be added, mainly as a result of the calls for tenders launched by the Minister in charge of Energy.
- Combined Heat and Power (CHP) generation: without any decisive change in the regulatory framework since last year, the 2 GW decline between 2009 and 2015 projected in the 2009 Generation Adequacy Report has been maintained (this decline actually began in 2009).

## Conventional thermal generation

- Coal-fired facilities: out of the present total of 6,900 MW, 3,600 MW do not comply with pollutant emission limits set in the "Large Combustion Plant Directive"<sup>8</sup>. These units are allowed to run 20,000 hours from January 1<sup>st</sup>, 2008, and have to be shut down at the latest by December 31, 2015. They will be gradually decommissioned between 2013 and 2015.
- Fuel oil fired facilities: one 250 MW unit was decommissioned in 2009, decommissioning of two others will follow in 2011 and 2012, to be replaced shortly thereafter by CCGTs. All other units (5,100 MW) will be kept in operation until 2015.
- Combined Cycle Gas Turbines (CCGT): out of the eleven CCGTs included in the "Launched Projects" supply scenario of the 2009 Generation Adequacy Report, six facilities have been put in operation prior to June 2010. Five others are under construction, with expected first generation activity occurring between late 2010 and 2013. It should be noted that since summer 2008, construction work has been started only at one site: commitments have come to a pause, in France as well as elsewhere in Europe, in the wake of uncertainties surrounding electricity demand recovery and price evolution. Nevertheless, several projects have

.....  
Directive 2001/80/EC.



continued to progress through the administrative procedures stage with some of them already being granted all the required administrative consents. Although a large portfolio of projects that could possibly be commissioned in 2015 has built up, as a matter of prudence, the present adequacy assessment does not consider the likelihood of any of them being commissioned (which means that for CCGTs, the “Launched Projects” supply scenario of the 2009 Generation Adequacy Report still remains accurate).

- Open Cycle Gas Turbines (OCGT): two new units (360 MW) are expected to be commissioned by December 2010.

**Nuclear generation**

- The 58 units already in operation will remain in operation, with unchanged rated output, through 2015.
- The new 1600 MW EPR under construction at Flamanville will be connected to the grid, with first marketable electric generation expected in 2013.

Thus, the main changes from the “Launched Projects” supply scenario of the 2009 Generation Adequacy Report are as follows:

- the first marketable electric generation from Flamanville EPR expected in 2013,
- a slightly delayed timeframe scheduled for LCP-related decommissioning of coal-fired units
- more rapid growth of solar PV projected for the upcoming years.

Installed and operated capacity by technology (GW)

Day	Actual	Forecasts		
		GAR 2009	2010 Update	2010 Update
	January 1 <sup>st</sup> 2010	January 1 <sup>st</sup> 2014	January 1 <sup>st</sup> 2014	January 1 <sup>st</sup> 2015
Nuclear	63.1	64.7	64.7	64.7
Coal-fired	6.8	4.9	5.6	4.1
CCGT	1.5	5.9	5.9	5.9
Fuel oil fired	7.1	7.0	7.0	7.0
Embedded thermal	8.5	7.2	7.2	6.8
Hydropower	25.2	25.2	25.2	25.2
Wind power	4.6	8.5	8.5	9.5
Photovoltaic solar	0.2	0.9	2.0	3.0

### Lower than expected availability of nuclear units in 2009

One of the main features characterising the year 2009 was the relatively low availability factor registered by the nuclear fleet: the French electric system got on average 4 to 5 GW less nuclear power than in previous years. Such poor availability, especially in summer, resulted in immediate consequences for the energy balance sheet: at 390 TWh, nuclear generation fell by nearly 30 TWh below 2007 and 2008 levels, and even came close to dropping 40 TWh below 2005 and 2006 levels. Indirectly, it was also one of the main causes behind the dip in exports to 25.7 TWh in 2009, hardly more than one half of the export volume achieved in 2008.

The availability factor of thermal units, especially nuclear units since they account for the major portion of the French generating fleet, is of utmost importance in assessing the supply – demand balance for electricity. The experience of 2009 obviously calls into question the projections concerning the availability factor for

the years to come, both in terms of the average expected level, and the range of possible deviations from this average.

Information available to date shows no evidence of the problems encountered in 2009 stubbornly persisting over the longer term. It should be stressed that sudden drops in availability that have already occurred in the past (albeit to a lesser degree), have all been followed by a subsequent recovery within a one or two year time frame.

A recovery from present situation is expected to materialise prior to 2013.

Therefore, for the medium term, the experience of 2009 does not fundamentally alter the assumptions regarding availability of thermal units which were made in previous Generation Adequacy Reports.

## 4 THE SUPPLY – DEMAND BALANCE

A situation where all available generation capacity is insufficient to meet demand, forcing curtailment of customers.

# 9

Studies on supply – demand balance are carried out in a probabilistic manner to take account of contingencies affecting both demand (outdoor temperature) and supply (forced outages of plants, river flows, wind speeds). In this manner, the probability and duration of shortfall occurrence may be estimated.

# 10

European Network of Transmission System Operators for Electricity – [www.entsoe.eu](http://www.entsoe.eu)

# 11

The amount of supply must be such that the risk of a shortfall<sup>9</sup> occurring can be kept to a socially and economically acceptable level. In accordance with the Decree of September 20, 2006 (Article 11) concerning Generation Adequacy Reports, the criterion used to measure the security of supply is the loss of load expectation (LOLE – i.e.: the average duration of shortfall situations), which must not exceed three hours per year<sup>10</sup>.

Along with generation and consumption, two other parameters are to be considered to assess the supply demand – balance: demand response and imports, which can be used to achieve the same level of security of supply (the same LOLE) with less installed generating capacity in France.

Demand Response shall be understood as mechanisms to manage final consumption of electricity in response to supply conditions, either by delaying the use of electrical appliances, or by substituting an alternative fuel for electricity in dual energy schemes. The working group dedicated to reviewing peak demand control issues set up by the Minister in charge of Energy, and led by Members of Parliament Poignant and Sido, with the participation of all stakeholders, issued its recommendations on April 2, 2010. Many of these recommendations seek to promote Demand Response. However, the precise volume of demand response that may realistically be called upon in 2015 as a direct consequence of these recommendations cannot be assessed with certainty. As a matter of prudence though, it is assumed that Demand Response potential will remain at 3 GW, a level that is closely comparable to the present capacity, and similar to that assumed in the 2009 Generation Adequacy Report.

With regard to imports, since the French electric system is strongly interconnected with neighbouring systems, opportunities exist to fill any possible gaps between French demand and supply with generation located abroad. However, imports can contribute to avoiding shortfall situations in France only if two necessary conditions are fulfilled:

- first, the network must be able to transmit the required power; at present, the upper limit of imports is close to 9 GW; the capacity will be enhanced to 10 GW by 2013-2014 when the new DC link between Spain and France is expected to enter into service;
- second, spare generation capacity must be available abroad at the same time that it is needed in France.

During winter 2009-2010, on several occasions, the French system imported more than 7 GW (with a 7.8 GW maximum reached on January 6, 2010, at 9 a. m.): the experience proved that spare capacity abroad did exist. However, the availability of spare capacity mainly resulted from the economic crisis affecting Europe as a whole: demand, especially in the industry sector, actually fell, with the decline generally being deeper than in France; new generating capacity committed a few months or years before the crisis broke out, has been connected; the combination of both these circumstances lead to the build up of surplus capacity abroad, which eventually became available for French imports. Looking ahead a few years, there is no certainty that this surplus capacity will persist. A thorough analysis of its evolution is clearly beyond the scope of a nationally undertaken study such as the French Generation Adequacy Report, and instead, needs to rely on an approach which is adopted Europe-wide or is at least regional in scope – like the “System Adequacy Forecast” developed by ENTSO-E<sup>11</sup> to which RTE actively contribute.

Normative assumptions used for the purposes of the present update are the same as those used in the earlier Generation Adequacy Reports: import capability at times when supply demand balance is tight in France is set at zero – meaning that security of supply in France should not be dependent upon available generating capacity located abroad, in which regard, neither the existence nor the magnitude of such capacity may be estimated with any degree of certainty. While this normative approach may look conservative, it undoubtedly is a prudent one for ensuing future years<sup>11</sup>. However, maintaining this approach allows for easier comparison of generation shortfall estimates with those contained

in past Generation Adequacy Reports. Moreover, sensitivity to import capability can easily be tested.

### Assessment of the shortfall risk within the next five years

The results of simulations matching supply and demand as outlined in chapters 2 and 3 are shown

in the table below. It should be noted that results presented for year “N” are related to the period extending from September N-1 through August N, with almost all of the risk arising during the winter sub-period. Winter 2010/11 will be subject to a more refined overview to be published by late October (as is the case every year for the ensuing winter) and is therefore not presented here.

#### Shortfall risk

	2012	2013	2014	2015
<b>Loss of Load Expectation (LOLE)</b>	<b>2h39</b>	<b>3h24</b>	<b>4h59</b>	<b>8h01</b>
<b>Shortfall probability</b>	8.6 %	10.5 %	14.5 %	21.6 %
<b>Unsupplied energy expectation</b>	5.5 GWh	8.2 GWh	12.5 GWh	22.7 GWh
<b>Capacity shortfall</b>	-	0.4 GW	1.4 GW	3.0 GW

Supply appears to be adequate until 2012. Loss of load duration is shown to be slightly exceeding the permissible threshold in 2013 and more markedly in 2014. For the five-year timeframe, the additional capacity needed to keep the generation shortfall risk to an acceptable level stands at 3,000 MW. These results are quite similar to those presented in the 2009 Generation Adequacy Report.

### Ever faster growing peak demand

For the ensuing five year period, the “one-in-ten” peak load forecasts remain very close to those made in the 2009 Generation Adequacy Report, despite a noticeable drop in power consumed in the Industry sector. On average, this peak load is projected to grow by 1 GW each year. Drivers of this peak consumption increase remain (see §2). Public authorities are elaborating mechanisms to insure electricity providers are able to supply their customers.

Weather sensitivity of demand is by far the major factor in determining the appropriate and adequate size of supply. Its influence on the supply-demand balance may be illustrated as follows: a temperature decrease by 1°C in winter has the equivalent effect as that of

consumption being advanced by 2 years, or of a 3 percentage point reduction in nuclear fleet availability.

### A less dynamic supply outlook

On the supply side, the wave of commitments in new facilities which began in 2006 came to a halt by mid 2008. However, many CCGT projects are now in advanced stages, both in terms of administrative procedures and in technical matters, allowing them to be commissioned prior to 2015 in the event go ahead decisions are taken in a timely fashion. It is useful to be reminded that construction lead-times for CCGTs are close to three years. Uncertainties over the economic recovery and therefore over electricity demand growth and project profitability may lead to the postponement of such decisions.

### Import capability

In neighbouring countries, a significant drop in consumption induced by the economic crisis combined with the influx of new facilities being commissioned lead to the build up of surplus supply capacity which could potentially last for a few years. Therefore, taking no account of import capability actually is a

conservative approach. With a 2 GW import capability considered during periods where the French supply – demand balance were to be under stress, security of supply measured by the LOLE of 3 hours per year would be assured until 2014.

In the longer term, the availability of such an import capability would only become increasingly uncertain. Elsewhere in Europe like in France, commitment of new generating facilities has dropped to a low for the past two years. 2015 is also the last year of the permissible operational period beyond which, all over Europe, plants not complying with emissions limits set in the LCP Directive would no longer be allowed to operate. The existing surplus capacity may well be further squeezed between the resumption of demand and declining generation capacity.

#### **2015 still at risk**

In light of all of the foregoing comments, no warning signals seem necessary with regard to security of supply in France through to 2013. However, by 2015, capacity requirements become substantial, in excess of 3 GW, coming at a time where surplus capacity abroad may well have disappeared. Taking into account the construction lead-times for thermal generating units, commitments to construct these units would have to be made in the coming months in order for them to be commissioned in due course. Beyond this time horizon, the supply – demand balance would have to be assessed on a Europe-wide basis, in order to promote appropriate and coordinated solutions.

## 5 CONCLUSION

Demand forecasts developed in the 2009 Generation Adequacy Report have been revised in accordance with information obtained during the past year. In the Residential and Tertiary sectors, updated forecasts remain close to those of the "Baseline" demand scenario outlined one year ago. Conversely, in the Industry sector, demand is now projected to develop along a trend line situated below the one representing the "Low" demand scenario.

**As a result, the forecast for annual energy consumption in 2015 now stands at 506 TWh, which is 10 TWh lower than the forecast made in the "Baseline" demand scenario outlined in the 2009 Generation Adequacy Report.**

The reduction in Industry consumption leads to a 1,500 MW downwards revision in winter 2012-2013, and 1,000 MW in winter 2014-2015, at peak times. The overall "one in ten" peak demand is however only reduced by 1,000 MW in winter 2012-2013 and by 600 MW in winter 2014-2015, primarily due to the greater than expected growth in consumption of electric space heating, in the form of resistance heaters or heat pumps.

With regard to supply capacity, generation from Renewable Energies continues to grow at a steady pace. Prospects for growth in solar photovoltaic look even brighter than one year ago. Conversely, project commitments related to centralised thermal generation seem to have come to a pause, in the wake of uncertainty concerning their profitability. By 2015, the commissioning of CCGTs and of the Flamanville

EPR will merely offset the impact of decommissioning of coal-fired units and the CHP fleet erosion.

In light of the new forecasts for consumption and generation, security of supply looks reasonably assured through to the 2013 timeframe.

**By 2015, however, there is a projected widening of the capacity shortfall** in excess of 3 GW. At the same time, there appears to be no certainty that the surplus capacity presently existing in neighbouring systems will persist. Taking into account the construction lead-times for thermal generating units, commitments to construct these units would have to be made in the coming months in order for them to be commissioned in a timely fashion in due course. Beyond this time horizon, the supply-demand balance would have to be assessed on a Europe-wide basis, in order to promote appropriate and coordinated solutions.

Finally, whereas overall security of supply looks to be reasonably assured on a national scale, it should be reiterated that at the local level, risks are presently higher in the Brittany and Cote d'Azur regions. RTE is already committed to developing network solutions to mitigate these risks. However, upgrading the security of supply in these regions in a sustainable manner calls for a global approach that addresses the following issues: demand management (notably peak demand), development of generation facilities (including from renewable energy technologies), and strengthening and enhancing the network.

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