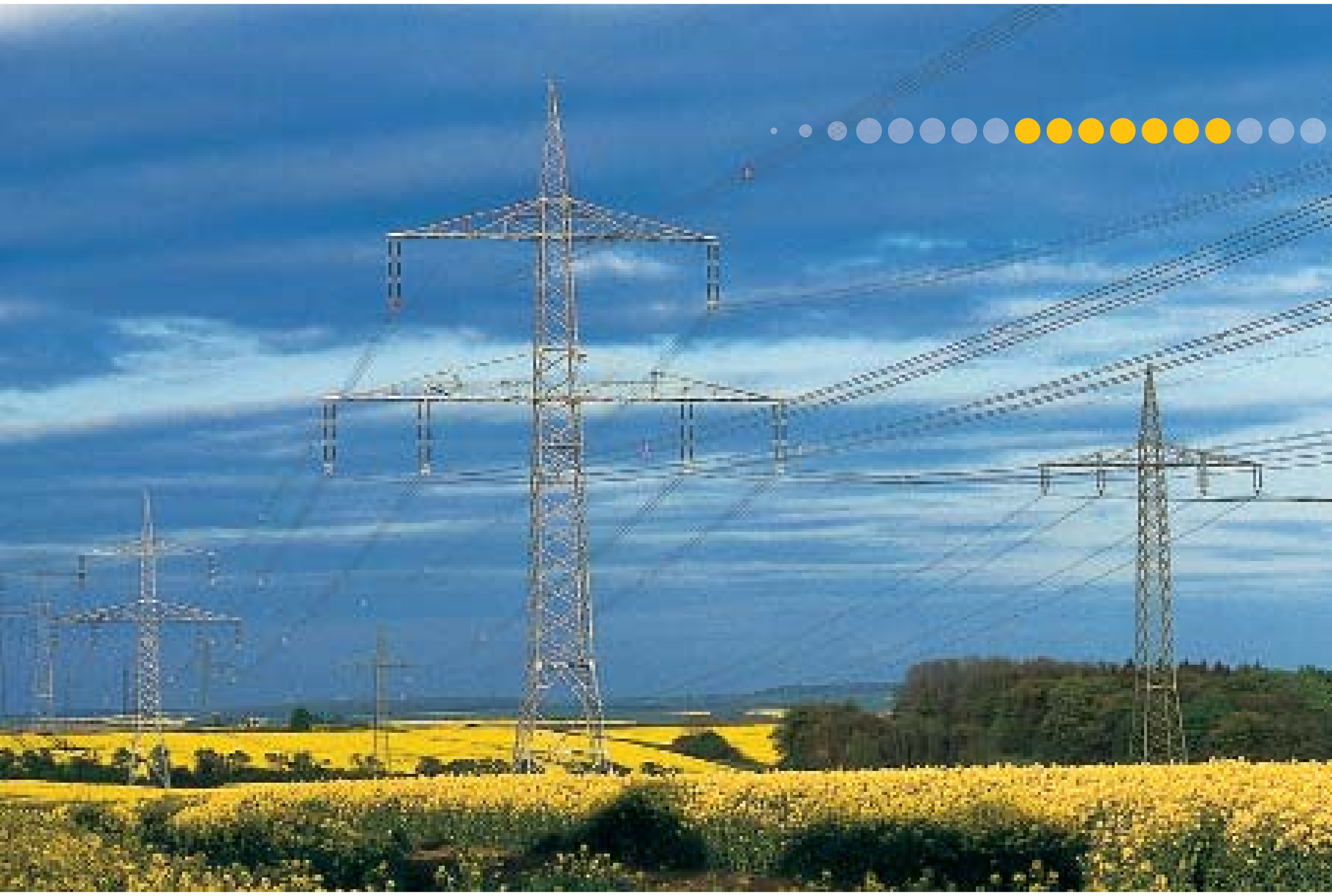


System Adequacy Forecast 2009 – 2020

union for the co-ordination of transmission of electricity

UCTE

EXECUTIVE SUMMARY

Executive Summary

Aims and Methodology

This UCTE System Adequacy Forecast report aims at providing all players of the European power market with an overview of:

- Generation and demand in the UCTE system in 2009, 2010, 2013, 2015 and 2020,
- Generation Adequacy analysis for overall UCTE and for main regional blocks over 2009 – 2020,
- Role of transmission capacities.

The adequacy analysis is based on the comparison between available generation and load at three given reference time points of the year.

The difference between available generating capacity and load at reference time point is called "Remaining Capacity" (RC) calculated under normal conditions including the effects of "Load Management". To assess adequacy, Remaining Capacity is compared to a given "Adequacy Reference Margin" (ARM) accounting for unexpected events affecting load and generation. The ARM is calculated for each country, for the regional blocks and for overall UCTE in order to cover the increase of load from the reference time point to the peak load (called "margin against peak load"), and demand variations or longer term generation outages not covered by operational reserves.

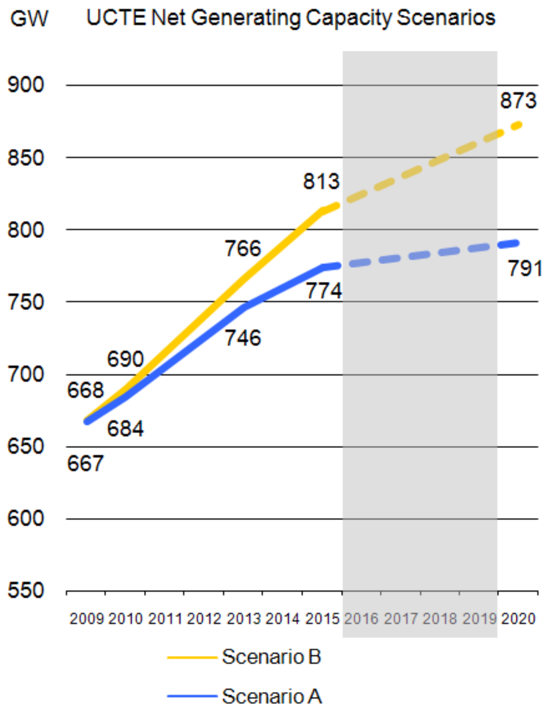
For the global overview of adequacy at UCTE level, the ARM is calculated as 5% of the UCTE total Net Generating Capacity plus the sum of individual margins against peak load.

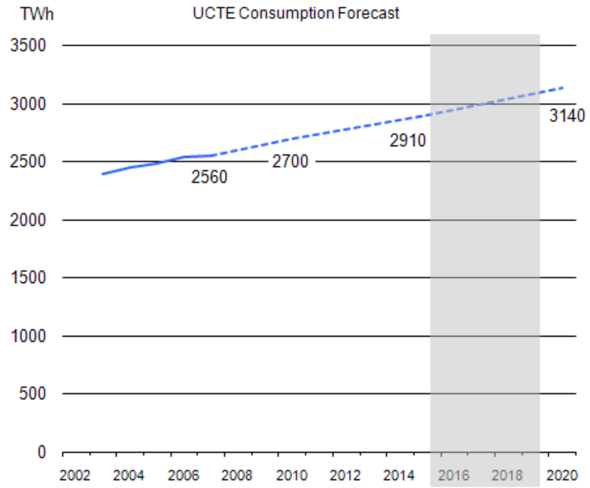
The analysis of adequacy is carried out over two scenarios of generating capacity evolution:

- **Conservative Scenario or Scenario A**: This scenario takes into account the commissioning of new power plants considered as sure and the shutdown of power plants expected during the study period.
- **Best Estimate Scenario or Scenario B**: This scenario takes into account the generating capacity evolution described in scenario A as well as future power plants whose commissioning can be considered as reasonably credible according to the information available to the TSOs.

Some TSOs have limited information regarding decommissioning. The countdown for older units not complying with the Large Combustion Plant Directive has however started. Cautious estimations are made by TSOs for the period 2009 and 2015, and for 2020, but no firm evolution can be presented immediately after the deadline set up by the LCPD directive: linear interpolation can simply be misleading. The corresponding 2016-2020 period is hence greyed on every figure of the present report.

UCTE Adequacy Forecast





In Conservative Scenario A, generating capacity in the whole UCTE should top in 2020 at about 791 GW and already 774 GW in 2015. Indeed, most of the investments confirmed today should be operational by 2015.

In Best Estimate scenario B, generating capacity should continuously increase all of the years long to reach about 813 GW in 2015 and about 873 GW in 2020. Further to the capacity already secured, extra capacity is foreseen: +20 GW in 2013 and up to +80 GW of in 2020. The expected average annual growth rate of generating capacity in the UCTE is expected to be +3.3% up to 2015 and then +2.5% up to 2020, to be compared with 2.7% and 1.2%, the figures provided last year.

On the other hand, based on national growth rate forecast and recorded national consumptions[1], UCTE consumption is expected to reach 2700 TWh by 2010 and exceed 2900 TWh by 2015 with an average annual growth rate of +1.6%. It is not possible to tell whether the reported trends actually match the EU “20-20-20” targets or not because overall energy savings and cuts in CO_2 emissions may result in increased electric consumption due to transfers from some primary energies to electricity, depending on national policies. The translation of the European objective in national target is only foreseen for 2010, with the application of the directive for the “*Promotion of the use of energy from renewable sources*[2]. This national translation will result in higher national targets for renewable energy sources, probably resulting in an even higher increase of renewable generation capacity in the future.

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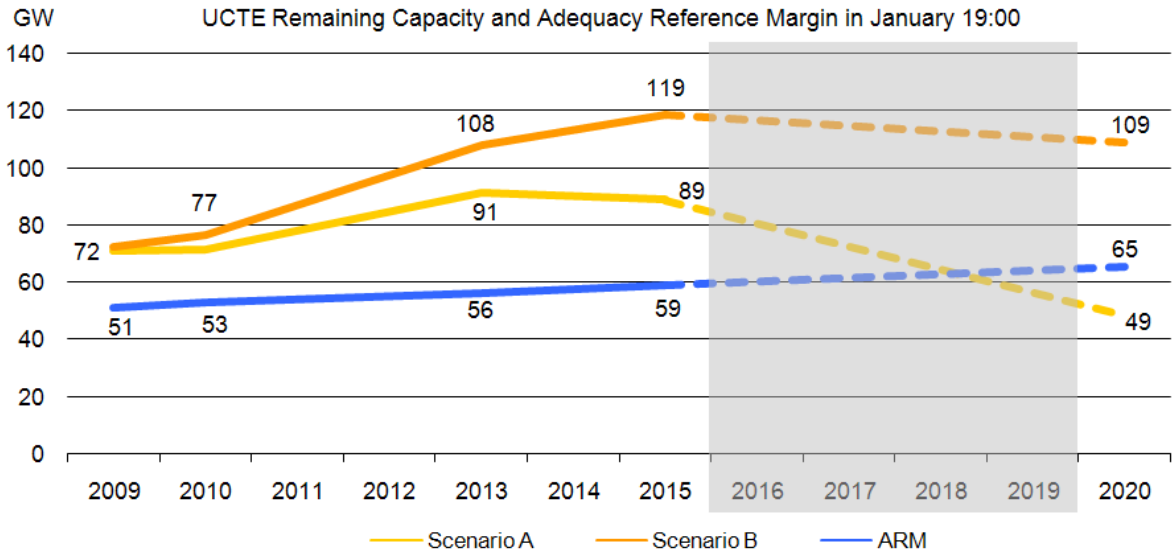
[1] UCTE estimates are based on the national consumptions in 2007 (source UCTE SAR 2007 report)

[2] Still to be voted by the time this report is prepared

Load at reference point January 19:00 (under standard weather conditions) should increase slower than total consumption up to 2010 (+0.9% Vs +1.8%) and then faster (+1.7% Vs +1.5%). The South of Europe should experience the most dramatic load growth rate, over +3%.



The comparison of Remaining Capacity and Adequacy Reference Margin shows that generation adequacy of the UCTE system should not be at risk up to 2015 in any generation scenario and at any reference point.

After 2015, additional investments in generating capacity are required to maintain the level of adequacy at an appropriate level.

Future investments in new generating capacity considered in Best Estimate scenario B look sufficient to maintain adequacy up to 2020 at least at the level of 2009.

Results in Conservative scenario A show that Remaining Capacity decreases as from 2013. To maintain generation adequacy in 2020 in most of the situations (i.e. the Remaining Capacity above the Adequacy Reference Margin), 15 GW of additional Reliably Available Capacity are necessary before 2020. This means that about 22 GW of additional investments in generating capacity will have to be confirmed and commissioned before 2020[3].

However, investments foreseen in Best Estimate scenario B seem sufficient to make the Remaining Capacity 45 GW above Adequacy Reference Margin in 2020, at a higher level than experienced in 2009. Indeed, Adequacy level is expected to improve from now on to 2015 due to an impressive development of generating capacity noticeably gas, hard coal and wind power.

Regional Adequacy Forecast

The global vision of UCTE as a whole can be enhanced by a more detailed analysis of five regional blocks[4].

---

[3] Assuming that on average 66% of the Net Generating Capacity over UCTE turns into Reliably Available Capacity.

[4] The present regional blocks do not match exactly the ERI clusters, as in the latter case, some countries belong to several ERI; whereas delineated borders between regional blocks with no overlapping are required to address transmission adequacy.

North Western Block

Austria, Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland

Remaining Capacity excess to Adequacy Reference Margin is slightly above 15 GW in 2009 (to be compared with the installed capacity of 330 GW in 2009). Afterwards it should continuously increase up to 2013 in both scenarios A (about +15 GW of additional remaining capacity or 23 GW of additional Net Generating Capacity) and B (about +26 GW of additional remaining capacity or 40 GW of additional Net Generating Capacity).

North Eastern Block

Czech Republic, Hungary, Poland, Slovak Republic and Ukraine-West

The level of adequacy of the North Eastern block should be stable up to 2010, confirming the forecast in the previous SAF 2008-2020 report.

Considering Conservative scenario A, the situation should worsen from 2010 on, so as to become inadequate as from 2013 with more and more fossil fuel plants likely to get closed and fossil fuel capacity decreasing by -25% from 2010 to 2020 (to be compared with the installed capacity that should amount 68 GW in 2010). After 2013, +18 GW additional Remaining Capacity would be necessary to maintain in 2020 the present level of adequacy, i.e. about 27 GW of additional Net Generating Capacity should be necessary before 2020 to keep adequacy as in 2009. If only Poland, by far the biggest country in the region, should experience an uncomfortable situation in 2013, all countries would be in that case in 2020.

Considering Best Estimate scenario B however, the level of adequacy should be satisfactory up to 2020, as also foreseen in the last SAF 2008-2020.

South Eastern Block

Bosnia-Herzegovina, Bulgaria, FYROM, Greece, Montenegro, Romania and Republic of Serbia

As from 2009, the South Eastern region should experience adequate level of adequacy. The situation is even foreseen to get better and better with a continuous increase in the adequacy up to 2015. The situation should be stabilised as from 2015 at a quite comfortable level, whatever the scenario taken into account.

Considering Best Estimate scenario B, Remaining Capacity should exceed Adequacy Reference Margin by +5 GW in 2013 (66 GW of installed capacity in 2009) and +12 GW in 2020 (83 GW of installed capacity in 2020). The region shows a continuous trend to develop new generation investment projects. The situation is however contrasted, with the adequacy level increasing a lot in some countries, which might become exporters to their neighbouring countries where generation does not catch up with load growth.

Centre South Block

Italy, Slovenia and Croatia.

Adequacy should be achieved up to 2014 in both scenarios A and B. However, this adequacy is achieved thanks to load management. Without load management, the adequacy would never be reached whatever the scenario. It was not the case in the previous SAF 2008-2020 report.

Considering Conservative scenario A, Remaining Capacity should be higher than Adequacy Reference Margin up to 2014 with only a difference of +1 GW left in 2013. In 2020, Remaining Capacity is slightly less than 1 GW lower than Adequacy Reference Margin, i.e. around 9 GW of additional Net Generating Capacity would be necessary before 2020 to keep adequacy as in 2009. As from 2014, Centre South block should rely on import capacities to ensure the balance of its power system under severe conditions.

Considering Best Estimate scenario B, Remaining Capacity should exceed Adequacy Reference Margin over all the period, but only thanks to load management. The most favourable situation should be reached in 2013 with a positive difference between Remaining Capacity and Adequacy Reference Margin of +4GW (with 117 GW of installed capacity in 2013). Around 5 GW of additional Net Generating Capacity would be necessary before 2020 to keep the adequacy level as in 2009.

South Western Block

Portugal and Spain

The level of adequacy of the South Western Block seems to get much better than in the previous SAF 2008-2020. The reasons for this improvement are mainly the high level of generation investment in the Spanish System as well as an important update in the adequacy forecast in the Portuguese System from 2013.

In Best Estimate scenario B, Remaining Capacity excess to Adequacy Reference Margin is about 5 GW over all the forecasted period up to 2020. This is a very important change compared to the previous SAF 2008-2020, which reported a decrease as from 2013. Adequacy forecast reflects a constant increase in generating capacity especially from renewable energy sources (mainly wind) over the period. Net Generating Capacity is expected to increase by about +57 GW (+54%) with Reliably Available Capacity increasing by +27 GW, while Load is expected to grow by about +22 GW (+ 41%). Because of that, the level of adequacy appears satisfactory over all the forecasted period.

Only in conservative scenario A, some additional generation capacity is required by 2020. About 2.4 GW of additional Generating Capacity would be necessary to maintain Remaining Capacity at the level of Adequacy Reference Margin. By 2020 and under severe conditions the region could rely on imports, which should count for less than 2% of the annual regional peak load (1,4 GW).

Conclusion

Generation Adequacy level is improving from now on to 2015 due to an impressive development of generating capacity noticeably gas, hard coal and wind power.

2016 up to 2020 could be a period for decommissioning due to usual economic optimisation. Indeed, the generating capacity available over the load (Remaining Capacity) appears to increase up to 2015 and then decrease, considering Best Estimate scenario B. Might the year 2015 be a temporary peak and thus would decommissioning (especially hard coal and lignite) be carried out after 2015?

Moreover, the analysis of the adequacy per regional block shows that the sum of the generating capacities reliably available in the five regional blocks is globally higher than the UCTE forecasted consumption. Therefore, either to ensure the profitability of investments or as a consequence of the present economic uncertainties, one could reasonably expect some market adjustments resulting in a level of adequacy not as high as forecasted in this report. However, it is possible that the net generating capacity includes back-up facilities that are at the high end of the economic merit order to be used under extreme conditions only.

The report was prepared in November and December 2008 at the beginning of the financial and economic crisis, while data was collected before mid-September. Due to the lack of information available at that time to assess the impact of this crisis on the economic activity and its consequences on the electricity consumption as well as on the investments in new generation capacity, with no stabilised perspective yet, the data collected in September 2008 was not amended. For these reasons, we can expect some discrepancies between the data in this report and the actual data in the 2009 SAR. In addition to a probably lower consumption growth rate, the major uncertainty regards the generation growth rate and the related decommissioning and investments in new generation capacity actually carried out. Regarding these latter, it could be quite reasonable to expect a postponement of some of the investments, which are not already in the critical stage of their implementation.

Nevertheless to sustain the present level of power system security, investment in generating means is more than required, even with the growing importance of Load Management. UCTE countries need to go on investing in electricity generation to face consumption growth: to maintain generation adequacy in most situations in 2020 at the required level, more than 20 GW of additional investments in generating capacity will have to be confirmed and commissioned before 2020 (or even 56 GW to maintain it at the 2009 level). The comparison of Remaining Capacity and Adequacy reference Margin shows that generation adequacy of the UCTE system should not be at risk up to 2015 in any generation scenario and in 99% of the situations.

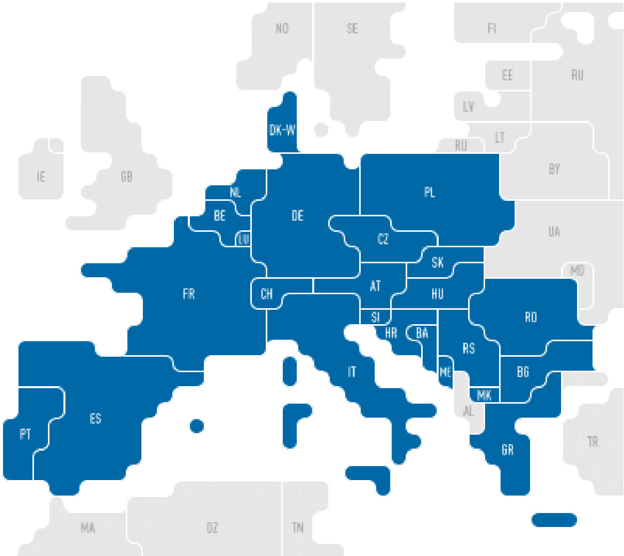
Table of Content

List of Figures

List of Maps

List of Tables

Few words about the UCTE



Map 1 UCTE Linking Up Europe

The "Union for the Co-ordination of Transmission of Electricity" (UCTE) is the association of transmission system operators in continental Europe, providing a reliable market base by efficient and secure electric "power highways".

50 years of joint activities laid the basis for a leading position in the world, which the UCTE holds with respect to the quality of synchronous operation of interconnected power systems.

Through the networks of the UCTE, about 450 million people are supplied with electric energy; annual electricity consumption totals approx. 2500 TWh.

General Introduction

System adequacy of a power system is the ability of a power system to supply the load in all the steady states in which the power system may exist considering standard conditions. System adequacy is analysed through generation adequacy and transmission adequacy.

This UCTE System Adequacy Forecast report aims at providing all players of the European power market with an overview of:

- Generation and demand in the UCTE system in 2009, 2010, 2013, 2015 and 2020,
- Generation Adequacy analysis for overall UCTE and for main regional blocks over 2009 – 2020,
- Role of transmission capacities.

The adequacy analysis is based on the comparison between available generation and load at three given reference time points of the year. The analysis at regional level (North-West, North-East, Central-South, South-East and South-West) complements the overall UCTE-wide picture by taking into account the major limitations in power flows within the whole synchronous area. National comments bring additional information to support the analysis.

With respect to generation, UCTE has developed **2 long-term generation scenarios** to help assessing the range of uncertainty and evaluating the risk for the security of supply over the coming years:

- **Conservative Scenario or Scenario A**: this scenario takes into account the commissioning of new power plants considered as sure and the expected shutdown of power plants during the study period. It shows the evolution of the potential unbalances if no new investment decision is taken in the future and stresses the investments required to maintain the expected security of supply over the forecast period.
- **Best Estimate Scenario or Scenario B**: this scenario takes into account the generation capacity evolution described in scenario A as well as future power plants whose commissioning can be considered as reasonably credible according to the information available to the TSOs. It gives an estimation of potential future developments, provided that market signals give adequate incentives for investments.

Regarding load, only one long-term forecast scenario is referred to.

It should be stressed that some TSOs have very limited information regarding the decommissioning process. The countdown for older units not complying with the Large Combustion Plant Directive[5] has however started, and the proposal for a Directive on the Promotion of the use of energy from renewable sources[6] may also accelerate the decommissioning pace. Cautious estimations are made by TSOs for the period 2009 and 2015, and for 2020; but no firm evolution can be presented immediately after the deadline

[5] This Directive (2001/80/EC) applies to combustion plants with a rated thermal input equal to or greater than 50 MW, irrespective of the type of fuel used. The Directive sets pollutions thresholds for NOx, SOx, dusts… Existing units must abide by these standards at the latest by the 31/12/2015 or must be shutdown. If an operator of an existing plant seeks exemption from compliance with the requirements set in the Directive, their output is also limited to a 20,000 operational hours starting form January 1st 2008 and ending no later than December 31st 2015.

[6] This Proposal for a European directive should be converted into national legislation by 31 March 2010 at the latest through a national allocation plan.

set up by the LCPD directive in 2015: linear interpolation can simply be misleading. The corresponding 2016-2020 period is hence greyed on every figure of the present report.

Moreover, no explicit "20-20-20" scenario is presented for the entire UCTE, as only few countries have developed their own national plans complying with these European objectives (and sometimes being even more ambitious).

The report was prepared in November and December 2008 at the beginning of the financial and economic crisis, while data was collected before mid-September. Due to the lack of information available at that time to assess the impact of this crisis on the economic activity and its consequences on the electricity consumption as well as on the investments in new generation capacity, with no stabilised perspective yet, the data collected in September 2008 was not amended in any respect.

The report sets out the most striking points of the analysis first considering the UCTE as a whole, then the 5 regional blocks, which enables to stress the role of interconnectors. The analysis country per country is carried out at the end of the report, which provides a consistent and interesting approach especially to assess the national actions and commitments vis-à-vis the European Energy Policy.

The content of this annual report is based on the expertise of the TSOs taking into account the information made available by the stakeholders at the time this report is written. It does not bind nor create any liability on behalf of UCTE and/or on behalf of all or part of its members.

This report comes with a comprehensive data file (Excel format) for each scenario A and B.

1 METHODOLOGY SUMMARY

1 Methodology Summary

The data and the methodology for system adequacy analysis used by UCTE in its System Adequacy Forecast (SAF) reports are described in details in the UCTE System Adequacy Methodology document downloadable on the UCTE web site:

http://www.ucte.org/_library/systemadequacy/saf/UCTE_System_Adequacy_Methodology.pdf

1.1 Introduction

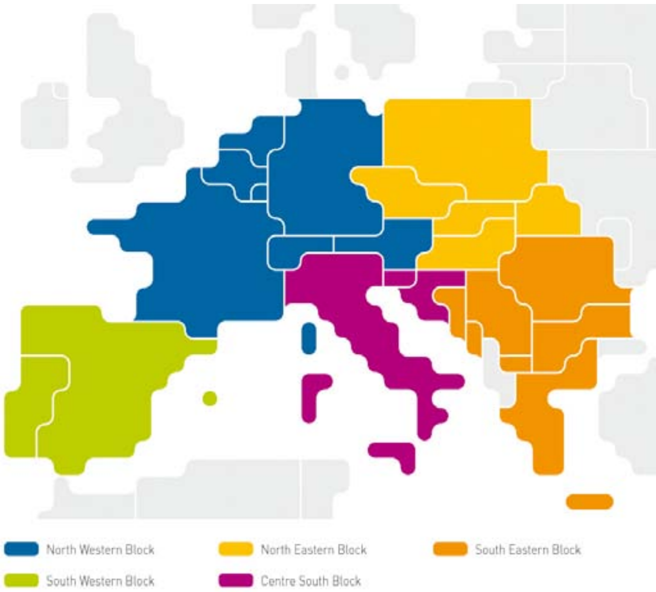
Generation adequacy of a power system is an assessment of the ability of the generation on the power system to match the consumption on the power system.

Generation adequacy is analysed at three levels: individual countries, 5 regional blocks (see Map 2) and the whole UCTE. The analysis at regional level completes the overall UCTE-wide picture by taking account of major limitations in power flows within the UCTE synchronous area.

Power data collected for each country are synchronous at each reference point (date and time power data are collected for) and can thus be aggregated. In order to compare the evolutions of the results, similar reference points are specified for all time horizons and from one report to another.

National correspondent collected data on a national basis for the following reference points: third Wednesday of January at 11:00, third Wednesday of January 19:00 and third Wednesday of July at 11:00. Time horizons are 2009, 2010, 2013, 2015 and 2020.

Calculations are made at these reference points of these time horizons. Any other results are estimations.



Map 2 Regional Blocks for Adequacy Analysis

The analysis of adequacy is carried over two scenarios of generating capacity evolution:

- **Conservative Scenario or Scenario A**: This scenario takes into account the commissioning of new power plants considered as sure and the shutdown of power plants expected during the study period.
- **Best Estimate Scenario or Scenario B**: This scenario takes into account the generation capacity evolution described in scenario A as well as future power plants whose commissioning can be considered as reasonably credible according to the information available to the TSOs.

1.2 Definitions

Below are the definitions of the main terms used in the report to carry out the analysis.

Load on a power system is the net (excluding consumption of power plants' auxiliaries, but including network losses) consumption corresponding to the hourly average active power absorbed by all installations connected to the transmission or distribution grid, excluding the pumps of the pumped-storage stations[7].

Load Management (LM) is the potential deliberate load reduction available at peak load to balance the system and ensure reliability.

Net Generating Capacity (NGC) of a power station is the maximum electrical net active power it can produce continuously throughout a long period of operation in normal conditions. NGC of a country is the sum of the individual NGC of all power stations connected to either the transmission grid or to the distribution grid.

Unavailable Capacity is the part of NGC that is not reliably available to power plant operators due to limitations of the output power of power plants. It consists of the Non-Usable Capacity, Maintenance and Overhauls, Outages and System Services Reserve.

Reliably Available Capacity (RAC) on a power system is the difference between NGC and Unavailable Capacity.

Remaining Capacity (RC) on a power system is the difference between RAC and Load[8].

Margin Against Peak Load (MaPL) is the difference between load at the reference point and the peak load over the period the reference point is representative of. SAF MaPL is seasonal and is called Margin Against Seasonal Peak Load (MaSPL). A MaSPL is estimated for each one of the 3 reference points.

Spare Capacity is the part of Net Generating Capacity that should be kept available at Reference Points to ensure the security of supply in most of the situations. Spare Capacity is supposed to cover a 1% risk of shortfall on a power system i.e. to guarantee the operation on 99% of the situations. UCTE studies concluded that Spare Capacity could be characterised in each individual country as 5% or 10% of NGC, depending on its system's features; and for a set of countries (regional blocks or whole UCTE) as 5% of NGC.

Adequacy Reference Margin (ARM) in an individual country is equal to Spare Capacity plus the related MaPL. ARM in a set of countries (regional blocks or whole UCTE) is estimated as the following sum:

(Sum of all individual MaPL values) + (Spare Capacity of the set of countries)

where Spare Capacity is estimated as 5% of NGC of the set of countries.

All the above definitions are illustrated in Fig. 1 below.

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[7] UCTE estimates are based on the national consumptions in 2007 (source UCTE SAR 2007 report).

[8] Net Generating capacity sums up the maximum output of every power plant. About 66% of Net Generating Capacity can be turned into Reliably Available Capacity (UCTE average value). Load is reduced with Load Management.

1.3 Generation Adequacy Analysis

Fig. 1 Principles for Generation Adequacy Analysis

Generation adequacy is assessed for each individual country, for each regional block and for the whole UCTE. Generation Adequacy Forecast at Reference Point under normal conditions on a power system is assessed with the Remaining Capacity value as shown in Fig. 1.

When Remaining Capacity is positive, it means that some generating capacity is likely to be available on the power system under normal conditions.

When Remaining Capacity is negative, it means that the power system is likely to be short of generating capacity under normal conditions.

Seasonal Generation Adequacy Forecast in most of the situations is assessed through the seasonal extension of the Generation Adequacy Forecast on a power system, by the comparison of the related Remaining Capacity and Adequacy Reference Margin.

In the calculation of ARM, two approximations have opposite effects: on one hand, the peak load of all countries are treated as if synchronous, on the other hand the exchange capacities between countries are considered as infinite. The resulting value is considered to be an acceptable margin to ensure a reasonably low risk of shortfall in UCTE.

The comparison used in this report to characterize the reliability of UCTE system is then, for each of the studied time points:

When Remaining Capacity is over or equal to Adequacy Reference Margin, it means that some generating capacity is likely to be available for export on the power system.

When Remaining Capacity is lower than Adequacy Reference Margin, it means that the power system is likely to have to rely on import flows when facing severe conditions.

Simultaneous Interconnection Transmission Capacity (SITC) of a power system is the overall transmission capacity through its peripheral interconnection lines. SITC are calculated according to the UCTE Transmission Development Plans. The SITC export value is called Export Capacity and may differ from the

SITC import value, called Import Capacity. SITC values are potentially different at every reference points on every time horizons.

Transmission adequacy forecast aim at identifying potential congestions and potential need for developments of interconnection lines. In the present study it is limited to the assessment of needs resulting from security issues and the ones that may derive from market price differences.

Transmission adequacy forecast is assessed at the reference points with the comparison of RC, calculated under normal conditions, and SITC. It assesses the ability of a power system to transmit its own positive RC to its neighbouring power systems.

When Remaining Capacity is positive and lower than Export Capacity, it means that the generating capacity likely to be available on the power system can be exported *under normal conditions at reference point.*

When Remaining Capacity is negative and its absolute value is lower than Import Capacity, it means that all the necessary import flows to meet load can be imported *under normal conditions at reference point*.

Seasonal Transmission Adequacy Forecast in Most of the Situations is assessed through the seasonal extension of Transmission Adequacy Forecast. It assess the ability of power system to meet its ARM with the necessary support of import flows from its neighbouring power systems or the ability of a power system to export its positive RM to its neighbouring power systems, if necessary.

When Remaining Capacity minus Adequacy Reference Margin is positive and lower than Export Capacity, it means that all the generating capacity likely to be available on the power system can be exported *in most of the situations*.

When Remaining Capacity minus Adequacy Reference Margin is negative and its absolute value is lower Import Capacity, it means that all the necessary import flows to meet load can be imported *in most of the situations*.

2 UCTE ADEQUACY FORECAST

2 UCTE Adequacy Forecast

This section sets out a global system adequacy analysis for the UCTE as a whole, according to the traditional items used till now in the previous reports.

Please refer to the Tab. 1 and Tab. 2 in Appendix for detailed data, which all analyses presented hereafter derive from.

2.1 Generating Capacity Forecast

Net Generating Capacity of a power station is the maximum electrical net active power it can produce continuously throughout a long period of operation in normal conditions.

As introduced in Section 1, two forecast scenarios have been considered for generation capacity:

- **Conservative Scenario or Scenario A**: this scenario takes into account the generation capacity evolution due to the commissioning of new power plants considered as sure and the shutdown of power plants expected during the study period.
- **Best Estimate Scenario or Scenario B**: this scenario takes into account future power plants whose commissioning can be considered as reasonably credible according to the information available to the TSOs.

As there are some uncertainties regarding the decommissioning of certain power plants (especially those running with coal), a grey shade is displayed on the charts, so as to draw attention on the way to interpret some results: an easy linear interpolation might be misleading.

These two forecasts for the Net Generating Capacity in the UCTE are shown in Fig. 2.

In Conservative scenario A, generating capacity in the whole UCTE will top in 2020 at about 791 GW but already 774 GW in 2015. Indeed, most of the investments confirmed today should be operational by 2015.

In Best Estimate scenario B, generating capacity should continuously increase to reach about 813 GW in 2015 and about 873 GW in 2020. Further to the capacity already secured, extra capacity is foreseen: with +20 GW in 2013 and up to +80 GW of in 2020. The expected average annual growth rate of generating capacity in the UCTE should be +3.3% up to 2015 and then +2.5% up to 2020, to be compared with 2.7% and 1.2%, the figures provided last year.

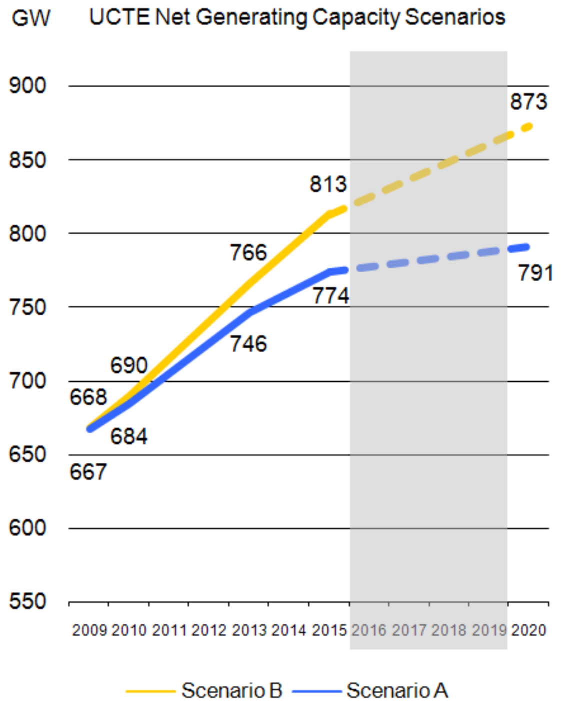
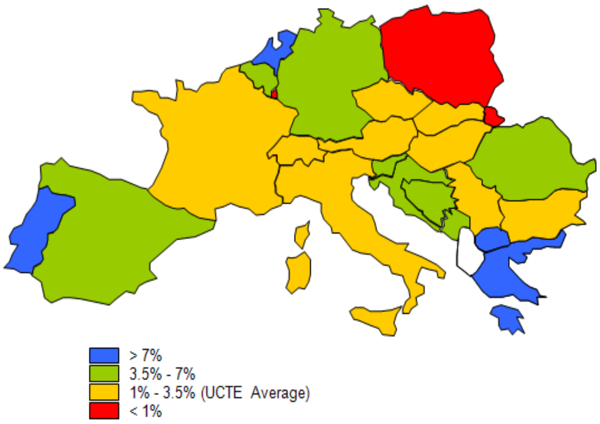


Fig. 2 UCTE Generating Capacity Forecast in January in Scenarios A and B



Map 3 Average Annual Growth Rate of Generating Capacity up to January 2013 in Scenario B

Commissioning of new generating capacity is expected to exceed decommissioning all over the UCTE grid in scenario B. However the growth rate of generating capacity is geographically contrasted as detailed in Map 3. Up to 2013, countries with the biggest growth rate of generating capacity should be the Netherlands and FYROM with +10% and then Greece with +9%, followed by Portugal (about +7%).

This difference in growth rate must be read through the types of generating capacities installed (gas, wind, solar, etc.), but also with the level of installed capacity at present as well as more generally with the national economic growth.

Considering Best Estimate scenario B, the first two major contributors to the UCTE generating capacity will remain Germany and France. Then, generating capacity in Spain will almost reach the one in Italy by 2013 and should exceed it from 2015.

Some additional national comments are in Section 5 while detailed figures are in Tab. 3 in Appendix;

One of the most striking points is the strong increase in generating capacity in comparison with last year forecasts: about +10 GW in 2010, +30 GW in 2013, +40 GW in 2015 and +50 GW in 2020, whatever the scenario.

The upwards shift in 2010 is mainly due to the updating of Spanish data (see Section 5 for national comments)

The most important update is unquestionably the impressive development of generating capacity using Renewable Energy Sources detailed in §2.1.1.1.

Yet the most important contribution to the NGC increase is still the development of generating capacity burning fossil fuels detailed in §2.1.1.2.

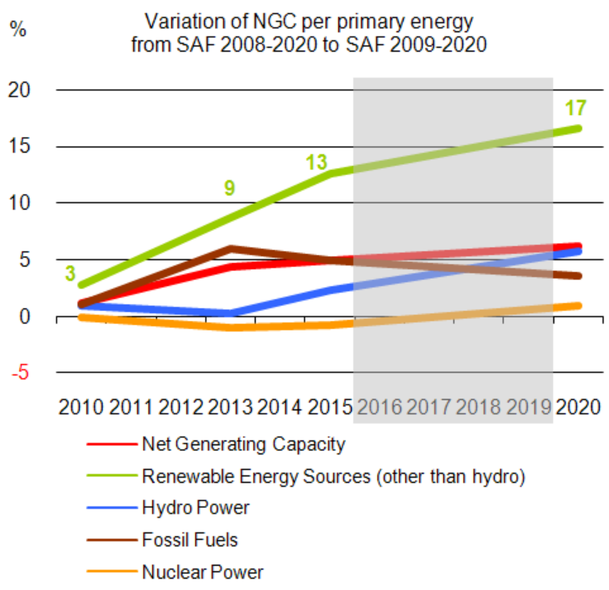


Fig. 3 UCTE Generating Capacity Forecast Update

Another point is that between 2015 and 2020, no value for generating capacity is reported. Thus, a linear extrapolation may not prove reliable, with an earlier drop more than probable.

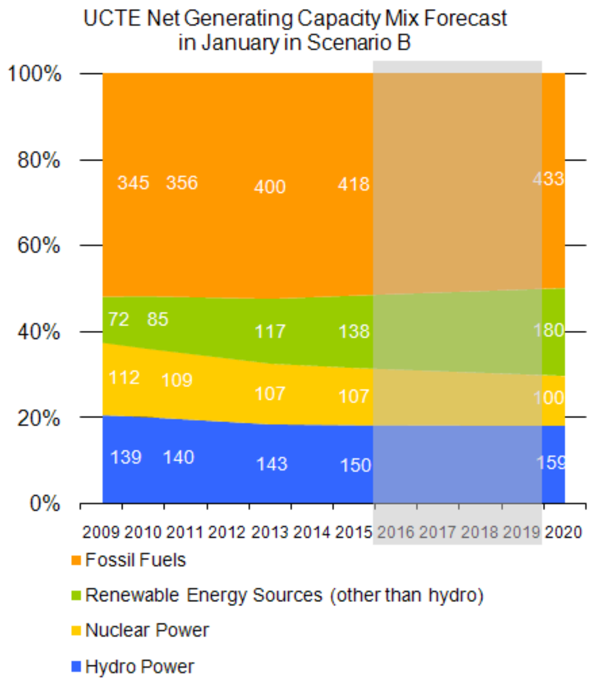
Regarding the LCPD implementation, only national assumptions were made by the corresponding TSOs on the date of decommissioning; for instance-in Spain the decommissioning of the concerned power plants will be completed by 2015-whereas in France it is assumed that it will be completed within 3 years and in Belgium-assumptions were made plant by plant.

2.1.1 Capacity Mix

The most increasing types of generating capacities are those with Renewable Energy Sources as primary energy sources. Considering RES other than hydro, generating capacity is expected in Scenario B to reach 138 GW by 2015, to be compared with 72 GW in 2009, as shown in Fig. 4. The role of wind capacity is detailed in §2.1.1.1

However, almost half of the generating capacity in the whole UCTE will remain fossil fuel based capacity like today. As shown in Fig. 5, this share is forecasted to be higher in the Best Estimate scenario B than in Conservative scenario A. This is an illustration of the persistent attraction of investors to fossil fuel, especially gas, as detailed in §2.1.1.2.

Unlike what could have been expected, the major and stable share of fossil fuel in the generating capacity mix is not altered by the fast increasing role of renewable energy sources with +140% up to 2020. This increase in RES generating capacity must not be confused with an actual increase of Reliably Available Capacity as the average usage rate of RES capacity is less than 25% today (source: UCTE SAR 2007 report), while the RAC reaches 66% of the NGC in average in UCTE over the period 2009-2020 (see § 2.1.2). The reduction of nuclear power capacity mainly highlights the phase-out in Germany and in Belgium. Please refer to details in §2.1.1.4.



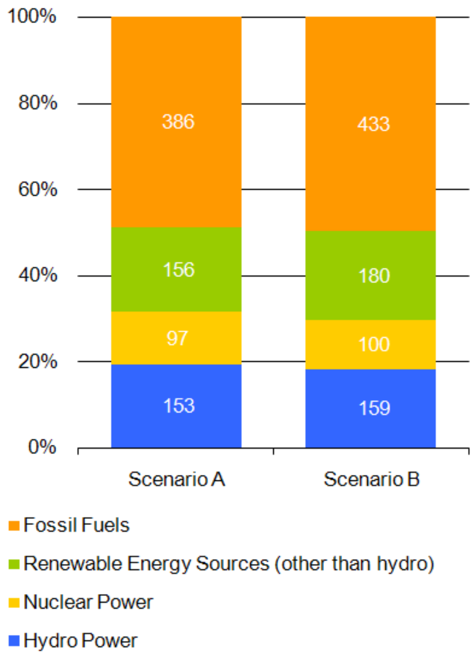


Fig. 4 **UCTE Generating Capacity Mix Forecast in January in Scenario B**

Fig. 5 **UCTE Generating Capacity Mix in January 2020 in Scenarios A and B**

In Fig. 6 below are summed up the UCTE forecasts for the different generating capacities in January according to the primary energy in Best Estimate scenario B. Considering Best Estimate Scenario B in 2013, hydropower[9] and renewable energy sources will exceed 50% of the total generating capacity in Austria, Switzerland, Portugal, Bosnia-Herzegovina, Luxembourg, Croatia and Montenegro.

[9] Hydropower capacity cannot be fully seen as renewable energy sources capacity because it also includes pumped storage.

Fig. 6 National Generating Capacity Mix in January 2013 in Scenario B

Some additional national comments are in Section 5 while detailed figures are in Tab. 4 in Appendix.

2.1.1.1 Renewable Energy Sources

Generating capacity with Renewable Energy Sources (other than hydro) as primary energy should continue to increase at a solid but decelerating[10] pace. In Best Estimate scenario B, the average annual growth rate for RES (other than hydro) capacity should be of about +17% up to 2010, then +10% up to 2015 and +5.5% up to 2020 (see Fig. 7). The share of RES (other than hydro) in the installed generating capacity in the whole UCTE should reach 15% in 2013 in Best Estimate scenario B.

It should be stressed that the updating of RES forecasted capacities (+15 GW in 2015 and +26 GW in 2020, in Scenario B compared to previous report) is quite impressive considering neither the 20-20-20 objectives nor the 3rd Energy Package have been entirely translated into national policies in all countries.

[10] RES capacity growth rate from 2006 to 2007 was +20% and +21.5% from 2005 to 2006 (source UCTE SAR 2007 Report)

As shown in Fig. 7, UCTE RES capacity should remain mainly wind capacity for about 78% up to 2015. The average annual growth rate of wind capacity in the whole UCTE should be almost +13% up to 2013 with the greatest growth rates in Eastern Europe and 6% up to 2020.

Solar capacity[11] should count for 8.7% of the total RES capacity in 2015 and above 10.5% in 2020. The average annual growth rate of solar capacity is foreseen to about 20% up to 2013 and 12% up to 2020.

Map 4 shows that, in 2013, the biggest shares of RES capacity (other than hydro) in total generating capacity are expected in Portugal (32%), Germany and Spain (28%) and finally Greece (21%).

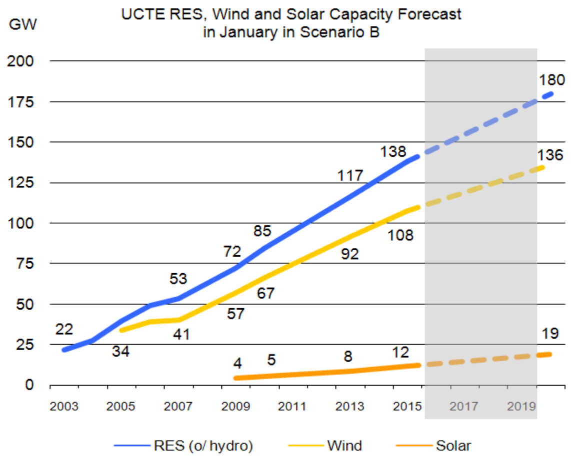
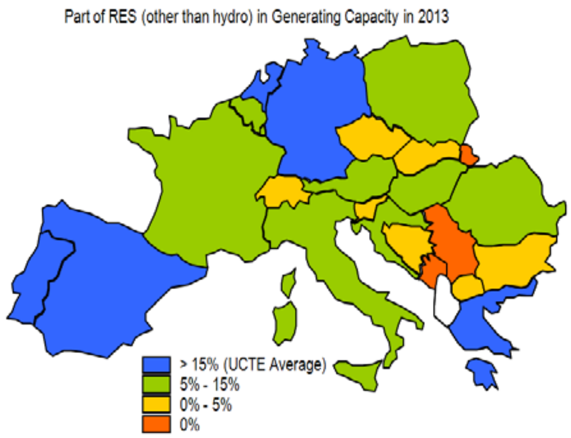


Fig. 7 **UCTE RES (other than hydro) Generating Capacity Forecast in January in Scenario B**



Map 4 **RES (other than hydro) Share in National Generating Capacity in January 2013 in Scenario B**

Some additional national comments are in Section 5 while detailed figures are in Tab. 5 in Appendix.

2.1.1.2 Fossil Fuels

Fossil fuel capacity in the UCTE is expected to increase with an average annual growth rate of +3.7% between 2009 and 2013 and +3.2% between 2009 and 2015 (see Fig. 4) according to Best Estimate scenario B. In comparison with SAF 2008-2020, an increase in capacity by 23 GW in 2013 and 15.4 GW in 2020 is forecasted.

Gas capacity is the main and most developed fossil fuel capacity in use, and will keep on increasing its importance, as shown in Fig. 8 and Fig. 9. In Best Estimate scenario B, the annual growth rate is about +8.0% up to 2013, +3.6% up to 2015 and then +2.7% up to 2020 for gas fired generating capacity; gas capacity should represent in 2013 about 38% of the fossil fuel capacity and 20% of the total generating capacity. This trend is challenging the security of electricity supply being more and more dependent on gas supply, which is mainly imported into the EU. This remark is also pointed out in the latest ETSO Winter Outlook Report[12].

As shown in Fig. 10 in page **Error! Bookmark not defined.**, Spain, Germany, Italy and the Netherlands have the most important gas power generating capacity. In addition, as shown in and Map 5, more countries should have gas capacity representing more than 20% of their fossil fuel capacity in 2013 (the

[11] Solar capacity is increasing significantly enough at the UCTE level to be itemised from now on.

[12] http://www.etso-net.org/upload/documents/WOR0809_Final_311008.pdf

Netherlands, Hungary, Spain, Belgium, Portugal and Slovenia; Switzerland and Luxembourg burn only gas in their fossil fuel capacity).

Hard coal and lignite come second to gas. According to Best Estimate scenario B, hard coal and lignite generation capacities increase on annual average respectively of +4% and +1,6% from 2010 to 2015 before slightly decline with the shutdown of oldest power plants. Later developments of hard coal and lignite capacities by 2020 could depend on progress in the CO_2 capture and storage technology. It should be pointed out that hard coal and lignite get more and more important in the mix of fossil fuel and generally in the generation mix as the generation costs are among the cheapest with current CO_2 costs.

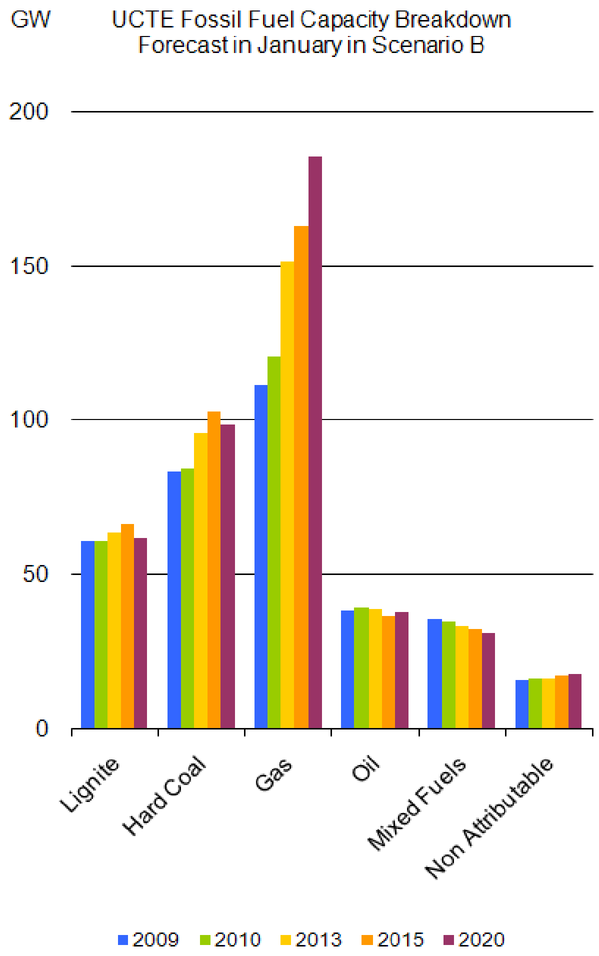


Fig. 8 **UCTE Fossil Fuel Capacity Breakdown Forecast in January in Scenario B**

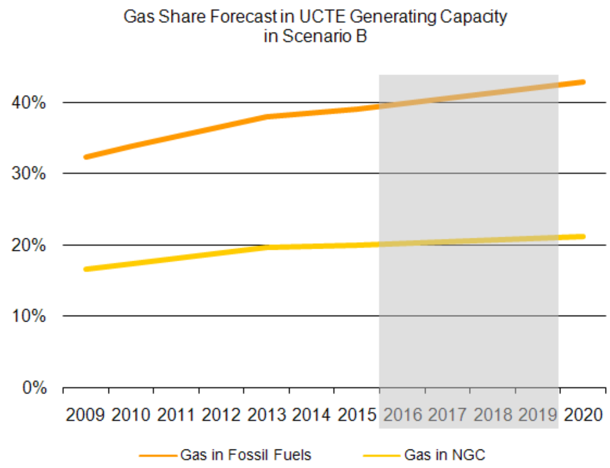
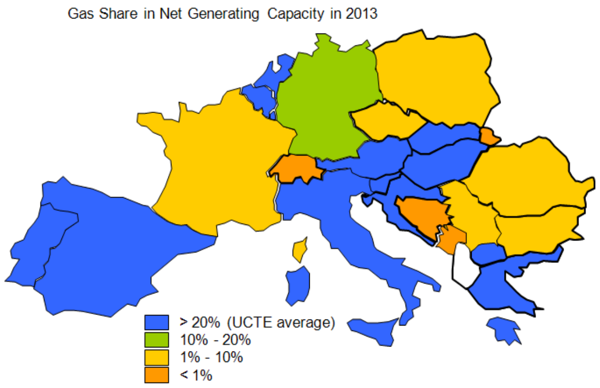


Fig. 9 **UCTE Gas Share in Net Generating Capacity Forecast in January Scenario B**



Map 5 **Gas Share in the Net Generating Capacity in January 2013 in Scenario B**

The share of oil is quite stable and no significant decline is foreseen.

There are several cases of thermal power plants able to burn several types of fossil fuels. The generating capacity of this category of power plants is decreasing over the period.

The growth of the Non Attributable fossil fuel capacity points out mainly the increasing difficulties that TSOs are facing to identify the fuel burnt in the various plants connected to their grids. The difficulties get greater with plants connected to the distribution grids.

Whereas Germany and Italy have similar fossil fuel capacity today, Germany will take the lead from 2013 on, with an impressive +20 GW increase in fossil fuel capacity from 2013 to 2015 (+28% or 9% per year) according to Best Estimate scenario B. More details on national fossil fuel capacity in 2013 are set out in Fig. 10.

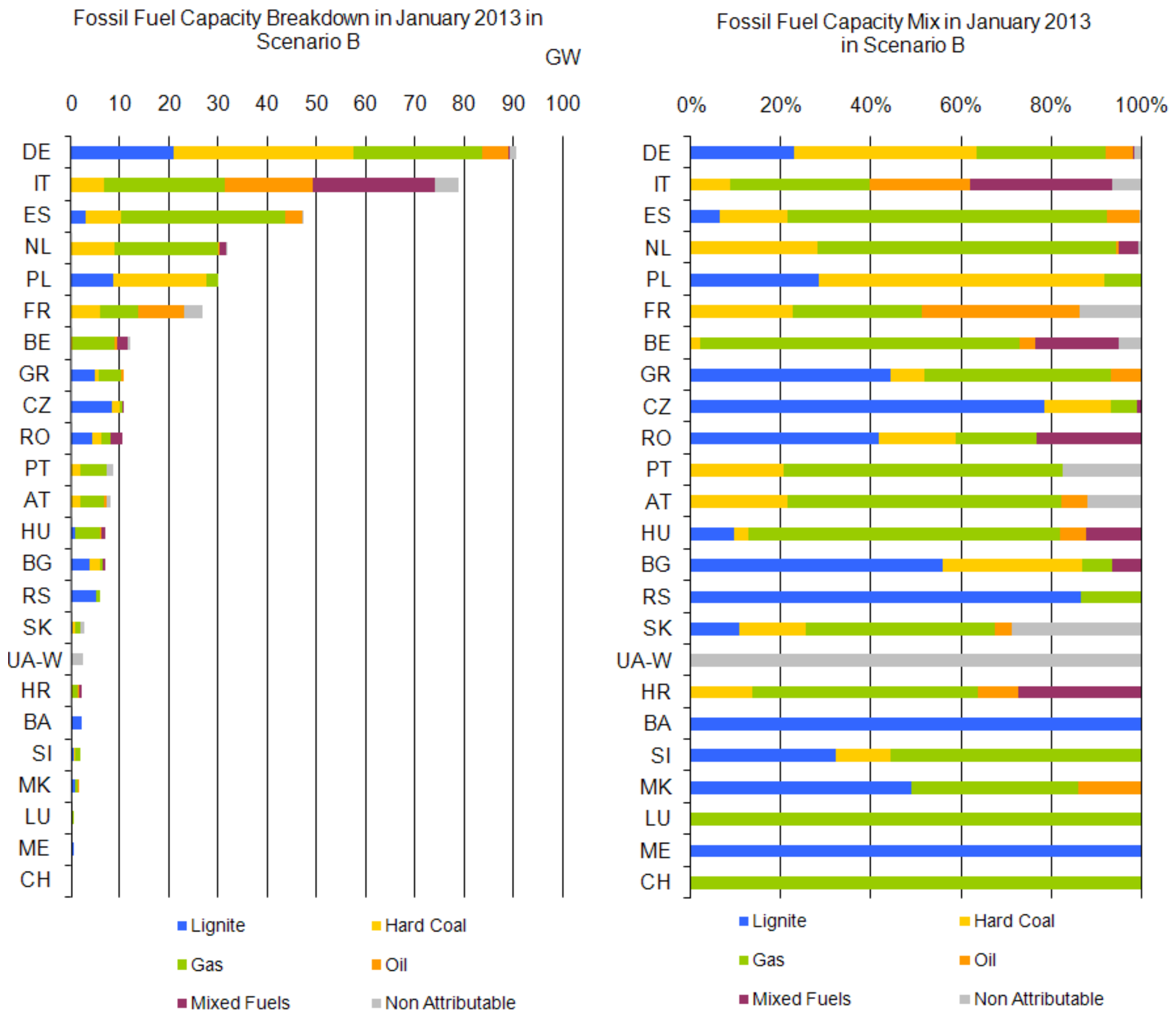


Fig. 10 National Fossil Fuel Capacity Mix in January 2013 in Scenario B

Some additional national comments are in Section 5 while detailed figures are in Tab. 6 and Tab. 7 in Appendix.

2.1.1.3 Hydropower

Important to notice is the update on the hydropower capacity forecast compared to the previous report as shown in Fig. 11. The UCTE hydropower capacity has been updated by almost 5% in 2015 and 9% in 2020.

The hydropower capacity should increase of +7.6 GW by 2020 in South Western block (Spain +4.5 GW and Portugal +3.1 GW), +6 GW in North Western block (Austria & Switzerland) and + 4GW for the countries in South Eastern block.

These increases are mainly due to new pumping capacities: either to have power available to cope with wind intermittency like in Spain or to benefit from must-run power (cogeneration, nuclear...) during night like in Romania. The objective in all cases is to benefit from the flexibility of pumping.

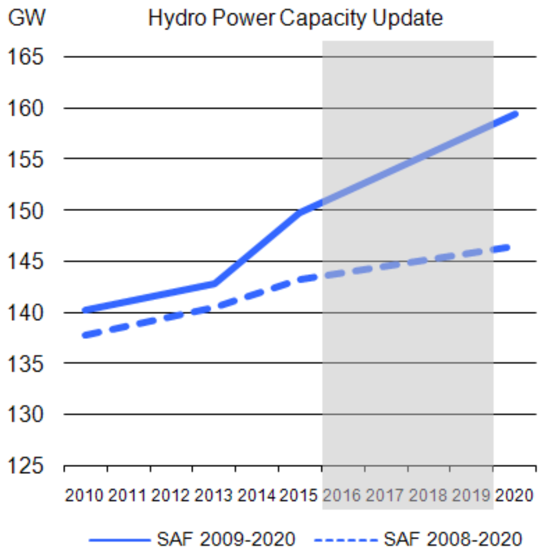


Fig. 11 UCTE Hydropower Capacity Forecast Update

Some additional national comments are in Section 5 while detailed figures are in Tab. 8 in Appendix.

2.1.1.4 Nuclear Power

Fig. 12 shows that the nuclear capacity in the UCTE should decrease by about 11% up to 2020, from 112 GW in 2009 to 100 GW in 2020. It is mainly due to the nuclear phase-out in Germany (at 32 years old) and later in Belgium (at 40 years old[13]). Yet, as shown in Map 6, the evolution of nuclear generating capacity is geographically contrasted with nuclear capacity increasing in France, Bulgaria, Romania, Slovenia and Slovakia while being stable in the other countries. Considering the time to build nuclear power plants, no massive nuclear recovery is foreseen at the UCTE level before 2020 at least.

[13]Although the nuclear phase out in Belgium foresees the decommissioning of three nuclear units in 2015 (more specific Doel 1 (15 February 2015), Tihange 1 (1 October 2015) and Doel 2 (1 December 2015), only one unit is taken out in the generation forecast of 2015 due to the selected references times (third Wednesday of January and third Wednesday of July).

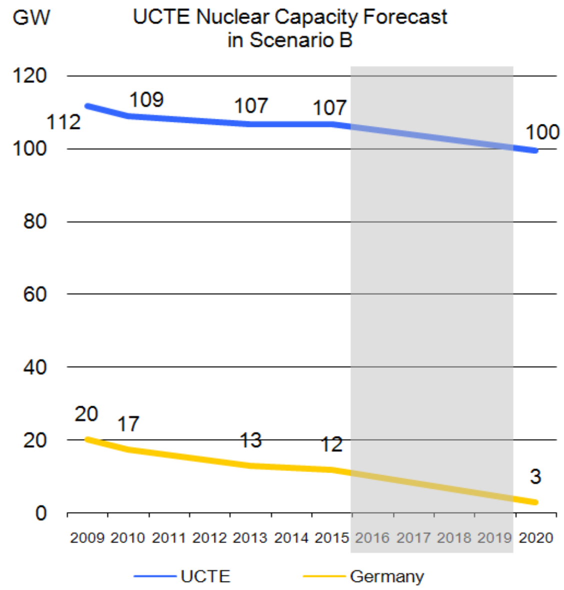
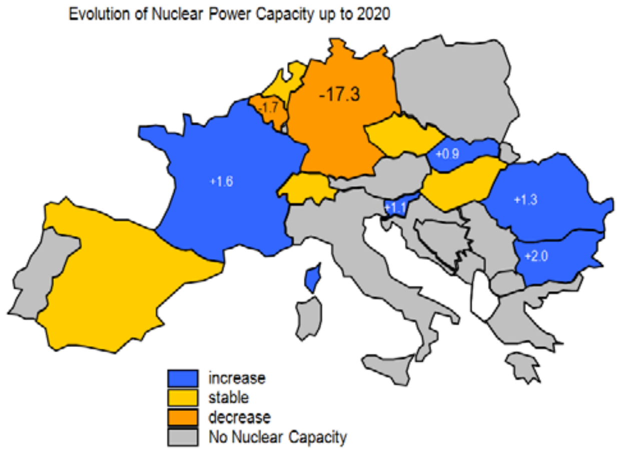


Fig. 12 UCTE Nuclear Capacity Forecast in Scenario B



Map 6 Nuclear Capacity Forecast up to 2020 in Scenario B

Some additional national comments are in Section 5 while detailed figures are in Tab. 9 in Appendix.

2.1.2 Reliably Available Capacity

Reliably Available Capacity (RAC) of a power system is the difference between Net Generating Capacity and Unavailable Capacity. Reliably Available Capacity is the part of Net Generating Capacity actually available to cover the load at a reference point. Unavailable Capacity is the part of Net Generating Capacity that is not reliably available to power plant operators due to limitations of the output power of power plants.

Considering Best Estimate scenario B, as shown in Fig. 13, while Net Generating Capacity is increasing by 99 GW up to 2013, about 61% of that additional generating capacity (i.e. 62 GW) will end up in additional Reliably Available Capacity. While Net Generating Capacity is expected to increase by 15.3%, Unavailable Capacity increases by 16.4%. The main reason is the increasing role of intermittent power, mainly wind power, in generating capacity, with actually a much lower availability.

UCTE System Adequacy Retrospect 2007[14] estimated the average usage rate of wind power generation to about 23% based on capacity and energy output in 2007 at the UCTE level. Regarding power availability at reference points, a large part of the wind power capacity is likely to be unavailable because of its stochastic nature and is therefore counted as Non-Usable Capacity.

Hence, with the increasing share of wind power capacity in the UCTE system and its contribution to Non-Usable capacity, about 70% of Net Generating Capacity is true Reliably Available Capacity in 2009 versus only 66% in 2020, as illustrated for Best Estimate scenario B in Fig. 13. Meanwhile, as shown in Fig. 14, Maintenance & Overhauls and Outages should remain globally stable in the whole UCTE[15]. System Services Reserve should increase by 21% up to 2020.

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[14] http://www.ucte.org/_library/systemadequacy/sar/UCTE_SAR_2007.zip

[15] The slightly decreasing level of Maintenance, Overhauls and Outages is not significant as these capacities become sorted as Non-Usable Capacity in Italy from 2013 on.

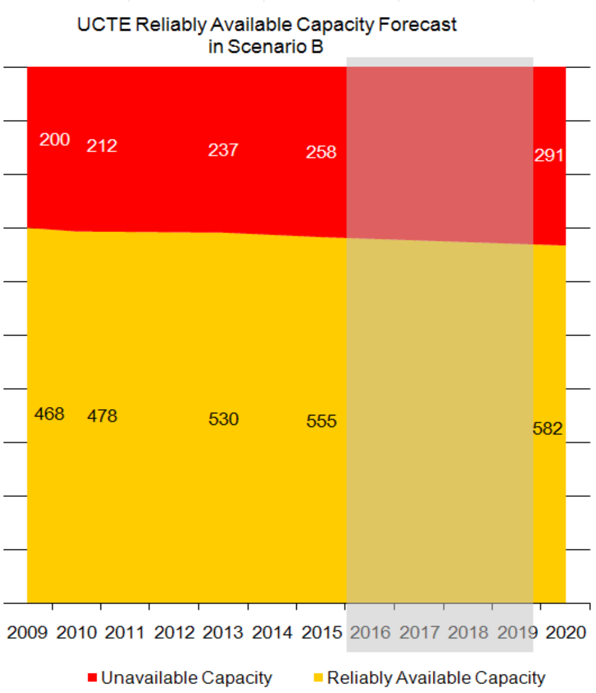


Fig. 13 **UCTE Reliably Available Capacity Forecast in Scenario B**

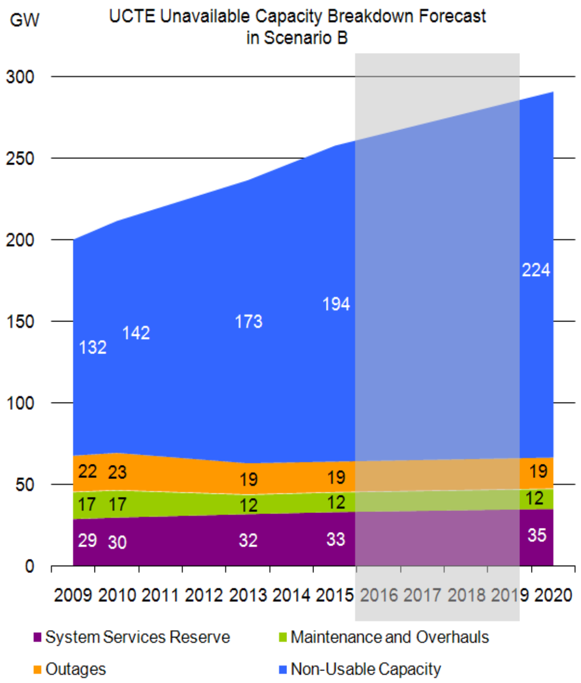
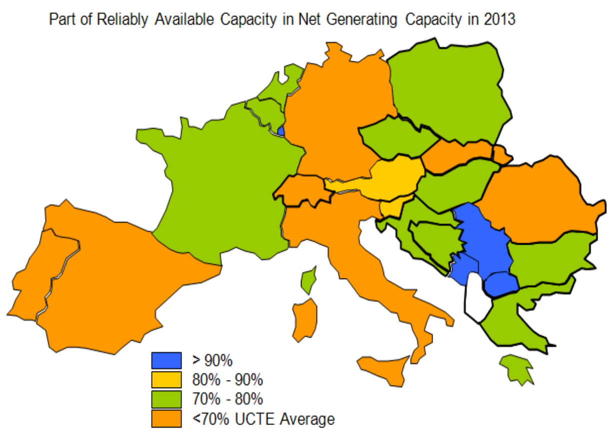


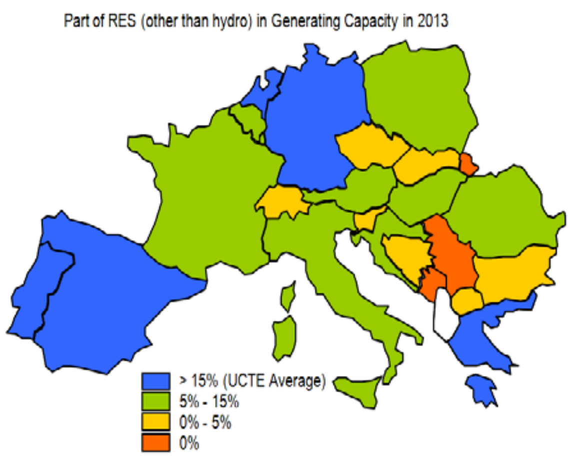
Fig. 14 **UCTE Unavailable Capacity Breakdown Forecast in Scenario B**

Accordingly, considering Conservative Scenario A, +125 GW of Net Generating capacity are foreseen before 2020 causing Reliably Available Capacity to increase by only 55 GW (44%). Considering Best Estimate Scenario B, +205 GW of generating capacity by 2020 is expected to provide +115 GW of Reliably Available Capacity (56%). It is due to the more important share of wind capacity in the project considered as firm today (Conservative scenario A) than in the most likely ones than in Best Estimate Scenario B.

To illustrate this increasing role of wind power capacity, note that countries with a part of RAC in the NGC below 70% in Map 7 are often those with a greater par of RES in their NGC shown in Map 4 (already shown in §2.1.1.1), bearing in mind that most of the RES capacity is actually wind capacity.



Map 7 **Reliably Available Capacity and Net Generating Capacity Ratio in January 2013 11:00 in Sc. B**



Map 4 **RES (other than hydro) Share in National Generating Capacity in January 2013 in Scenario B**

More details on national Reliably Available Capacity are in Fig. 15 below.

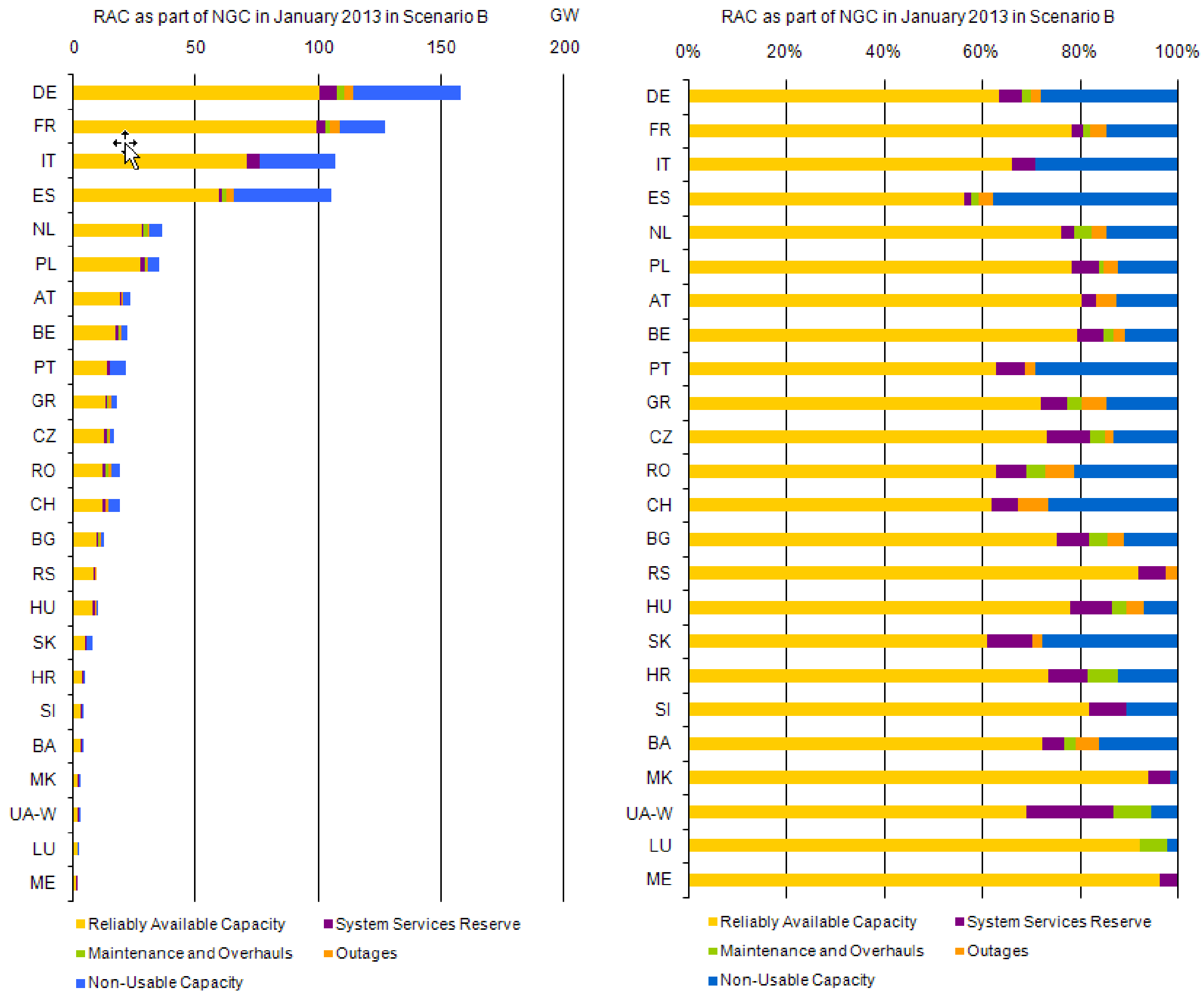


Fig. 15 National Reliably Available Capacity and Net Generating Capacity Ratio in Jan. 2013 in Sc. B

Some additional national comments are in Section 5 while detailed figures are in Tab. 10 in Appendix.

2.2 Load Forecast

Load on a power system is the net consumption corresponding to the hourly average active power absorbed by all installations connected to the transmission grid or to the distribution grid, excluding the pumps of the pumped-storage stations. “Net” means that the consumption of power plants‘ auxiliaries is excluded from the Load, but network losses are included in the Load. All load and consumption forecasts are built under standard weather conditions.

2.2.1 Energy Consumption

Based on national growth rate forecast and recorded national consumptions[16], UCTE consumption is expected to reach 2700 TWh by 2010 and exceed 3000 TWh by 2017 (see Fig. 17) with an average annual growth rate of +1.6%. It is not possible to tell whether the reported trends actually match the EU "20-20-20" targets: overall energy savings and cuts in CO_2 emissions may result in increased electric consumption, with some transfers of certain energy uses to electricity.

Consumption thus continues to increase all over UCTE. The biggest growth rates are expected in eastern and southern UCTE and especially in Bulgaria, Croatia, Slovenia and Greece, as shown in Map 8. In comparison with last year SAF 2008-2020, Poland has reviewed its consumption forecast, which has drastically decreased.

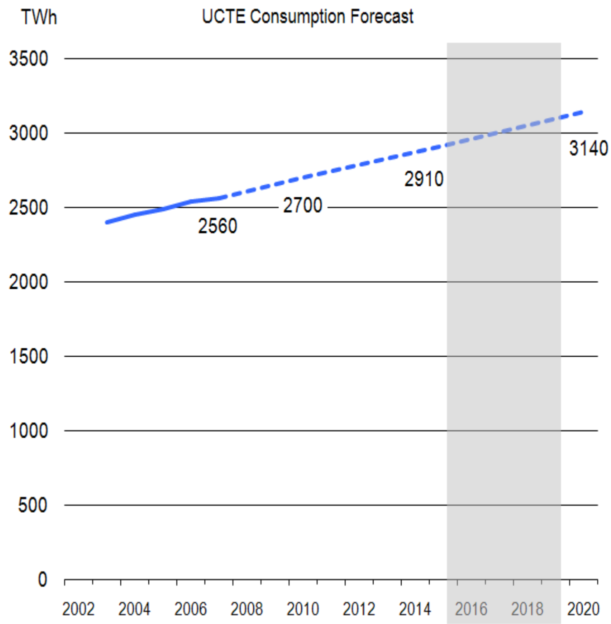
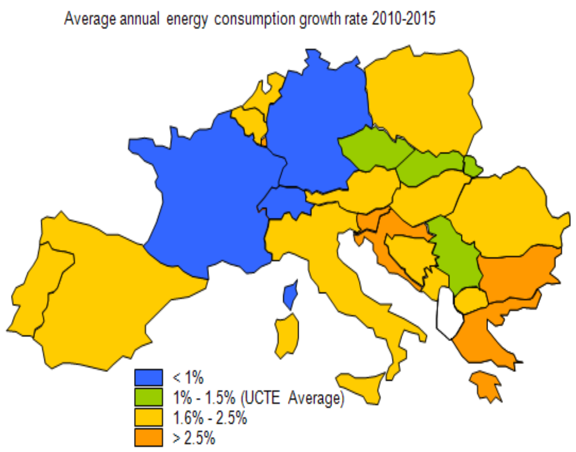


Fig. 16 **UCTE Consumption Forecast**



Map 8 **Average Annual Consumption Growth Rate up from 2010 to 2015**

Some additional national comments are in Section 5 while detailed figures are in Tab. 11 in Appendix.

2.2.2 Load at Reference Points

Reference points are the few dates and times, for which power data are collected. Reference points are characteristic enough of the whole studied period to limit the data to be collected to the ones at the reference points.

As shown in Fig. 17, UCTE synchronous Load at reference point January 19:00 (under standard weather conditions) should increase slower than total consumption up to 2010 (+0.9% Vs +1.8%) and then faster (+1.7% Vs +1.5%). The same variations are expected for the other reference points January and July 11:00. Similar evolutions are forecasted between winter and summer for the whole UCTE.

[16] UCTE estimates are based on the national consumptions in 2007 (source UCTE SAR 2007 report)

The South of Europe should experience the most dramatic load growth rate, higher than +3%, as shown in Map 9 for January 11:00. Highest rates are expected in the following countries: Croatia with +3.7%, Bosnia & Herzegovina with +3.4%, Greece with +3.1% and Spain with +3.0%.

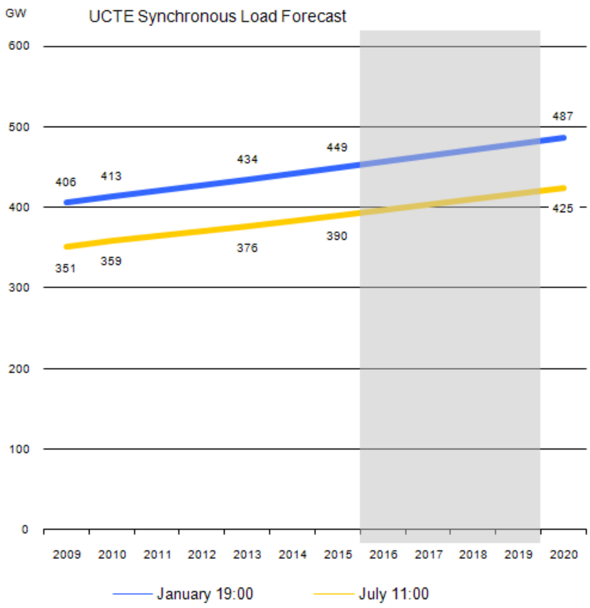
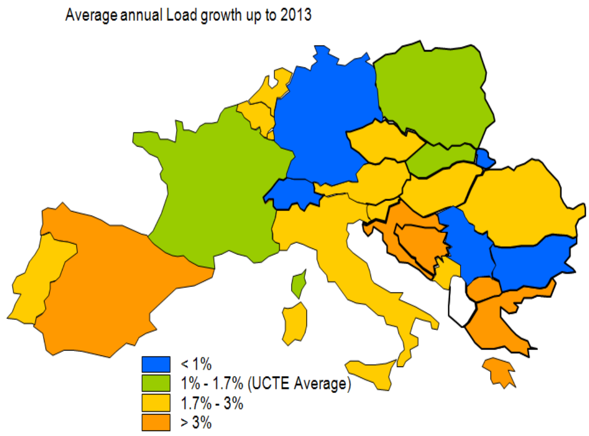


Fig. 17 UCTE Synchronous Load Forecast



Map 9 Average Annual Load Growth Rate from 2010 to 2015 in January 19:00

Some additional national comments are in Section 5 while detailed figures are in Tab. 12 in Appendix.

2.2.3 Load Management

Load Management is made of the load reduction measures intentionally used by any market player, especially on request of TSOs, and which might help balancing the system when stressed out[17]. Load Management is more and more in use in many systems, as it is reliable, whether or not it is directly controlled by the TSO. Load Management is part of the Remaining Capacity.

As shown in Fig. 18, potential load reduction due to Load Management is about 10.6 GW in January 2009 and should increase in the future up to 14.4 GW in January 2020.

About 1 GW additional potential reduction is reported in 2009 between winter and summer, with 2 GW more in France but 1 GW less in Greece. Brand new development of Load Management in winter in Greece will reach 1 GW by 2015 making a difference of 2GW between winter and summer at the UCTE level from 2015 on.

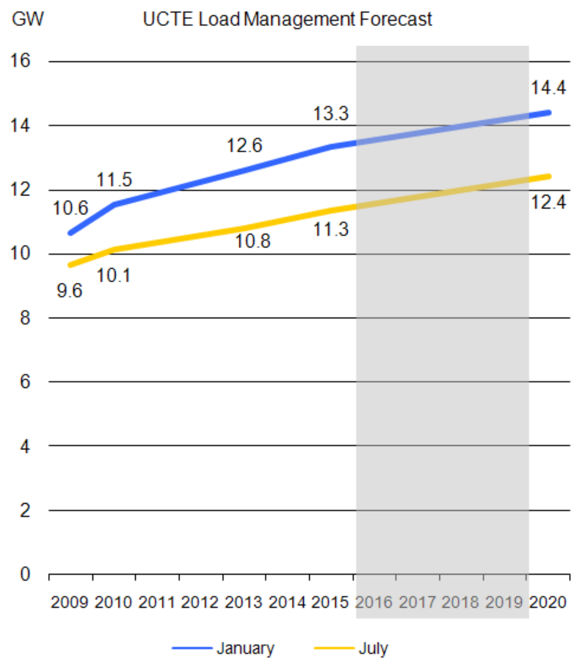


Fig. 18 UCTE Load Management Forecast

Some additional national comments are in Section 5 while detailed figures are in Tab. 13 in Appendix.

2.2.4 Margin Against Seasonal Peak Load

Margin Against Peak Load is the difference between the Load at the reference point and the peak load over the period the reference point is representative of. Margin Against Peak Load provided for January is the margin from the January Load to the winter peak load. Margin Against Peak Load provided for July is the margin from to July Load to the summer peak load.

Margin Against Peak Load is used in the calculation of Adequacy Reference Margin. Margin Against Peak Load is used to extend the analysis from a single reference point to the season the reference point is representative of. And representative they are indeed, with a difference between the load at Reference Point and the Seasonal Peak Load of 3.3% to 5.3% at the UCTE level.

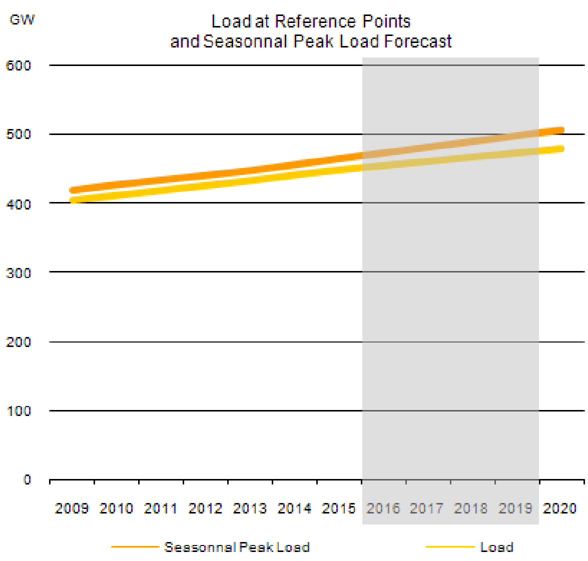


Fig. 19 UCTE Load at Reference Points and Seasonal

[17] Non-contractualised emergency load shedding is not considered as load management.

Peak Load Forecast

2.3 Generation Adequacy Forecast

Remaining Capacity on a power system is the difference between Reliably Available Capacity and Load[18]. Remaining Capacity is the part of Net Generating Capacity left to the system to cover any unexpected load variation and unplanned outages at a Reference Point.

Generation Adequacy at reference points is assessed by the comparison of Remaining Capacity and Adequacy Reference Margin, as introduced in the Methodology summary in Section 1.

2.3.1 Remaining Capacity: Generation Adequacy Under Standard Conditions

Methodology for generation adequacy analysis at a reference point under standard conditions is introduced in §1.3:

- When Remaining Capacity is positive, it means that some generating capacity is likely to be available on the power system under normal conditions.
- When Remaining Capacity is negative, it means that the power system is likely to be short of generating capacity under normal conditions.

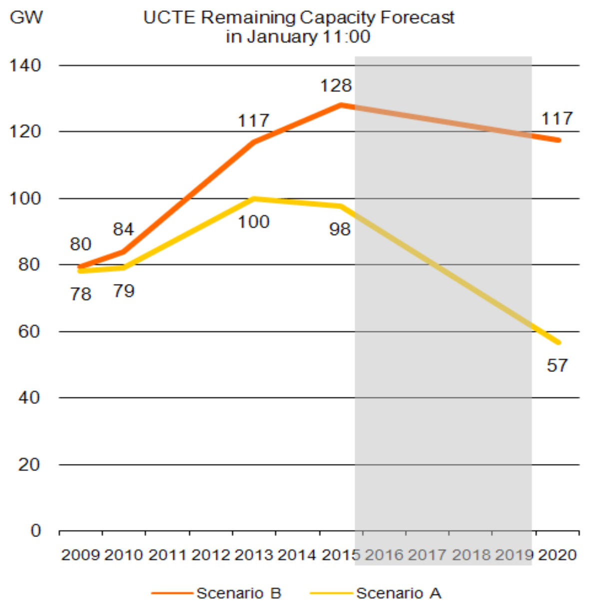


Fig. 20 UCTE Remaining Capacity Forecast in January 11:00 in Scenarios A and B

Fig. 20 shows that UCTE Remaining Capacity is expected to be positive, at all time frames and in both Conservative Scenario A and Best Estimate Scenario B. This forecast is also true at all other reference points.

The existing and future generating capacity should enable to cover the load later than 2015 at all Reference Points under standard conditions.

Remaining Capacity should increase in the near future, as upcoming generation investments cover more than the load growth.

The difference between scenarios B and A within the next five years is due to the relative short-notice of generating capacity development in gas (see §2.1.1.2) and RES (see §2.1.1.1) compared to other primary energies.

In Conservative scenario A, Remaining Capacity is expected to increase by almost +22 GW up to 2013: +80 GW of additional Net Generating Capacity result in +43 GW of RAC, while load should rise by about +27 GW. The period between 2015 and 2020 is greyed as no forecast has been made. Yet, a forecast for

[18] Load at reference time is reduced of potential Load Management

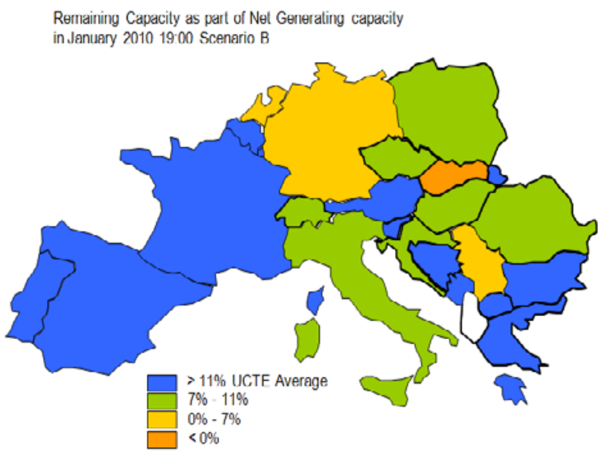
2020 is supplied. Remaining Capacity should be only 20 GW below its 2009 value (80 GW). Load is expected to grow by +80 GW up to 2020 while Reliably Available Capacity should increase by +55 GW due to Net Generating Capacity increasing by 125 GW.

To maintain generation adequacy under standard conditions in 2020 at its 2009 level (78 GW of RC), 20 GW of additional Reliably Available Capacity should be added before 2020 to the Scenario A forecast. In addition to the project confirmed today (Scenario A), about 30 GW of additional investments in generating capacity will have to be confirmed and commissioned before 2020.

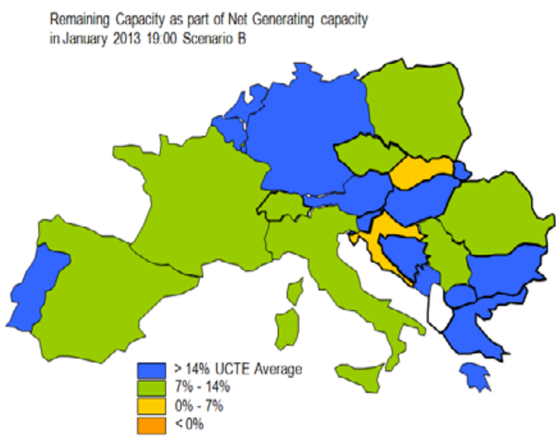
Considering Best Estimate scenario B, the situation looks of course better with more generating capacity. Remaining Capacity should increase by +40 GW up to 2013. It is due to the fact that +97 GW of additional Net Generating Capacity result in +62 GW of RAC while load should rise by +27 GW. Germany (+12.3 GW) and the Netherlands (+7.2 GW) should be the biggest absolute contributors to the increase of Remaining Capacity up to 2013, followed by Greece (+3.3 GW). Then, Remaining Capacity is likely to decrease as from 2015.

With the available collected data, it is not possible to know whether the decrease of RC between 98 GW in 2015 and 57 GW in 2020 would be rather linear, or if the pace would show a quick drop as from 2016[19]. Indeed, there are many uncertainties the market has to deal with:

- The decommissioning of fossil fuel units by the deadline of the LCP Directive,
- The public acceptance of wind power capacity development,
- The nuclear phase-out in Germany and Belgium,
- The future evolution of the CO_2 emission reduction policies,
- The progress in the Carbon Capture and Storage technology,
- The development of new mass-usages of electricity (for instance the introduction of heat pumps).



Map 10 Remaining Capacity as part of Net Generating Capacity in January 2010 19:00 in Scenario B



Map 11 Remaining Capacity as part of Net Generating Capacity in January 2013 19:00 in Scenario B

To locate the potential sources of remaining capacity to secure adequacy and potential needs for import, Remaining Capacity is compared to Net Generating Capacity in Map 10 and Map 11.

Considering Best Estimate scenario B, the average UCTE value should be about 12% up to 2020.

[19] 2016 will be analysed in the next report, then 2017 and so on.

By 2010, Slovakia is likely to have to import during winter in standard meteorological conditions. Germany (25 GW), France (15 GW) and Spain (10 GW) have the largest potential sources of capacity in 2013 under standard conditions.

Compared to the previous SAF report published one year ago and as shown in Fig. 21, the Remaining Capacity forecast is higher this time by around 20 GW in 2015 in Best Estimate Scenario B and in Conservative Scenario A. This is an impact of the steady investments in generating capacity announced in most of the countries.

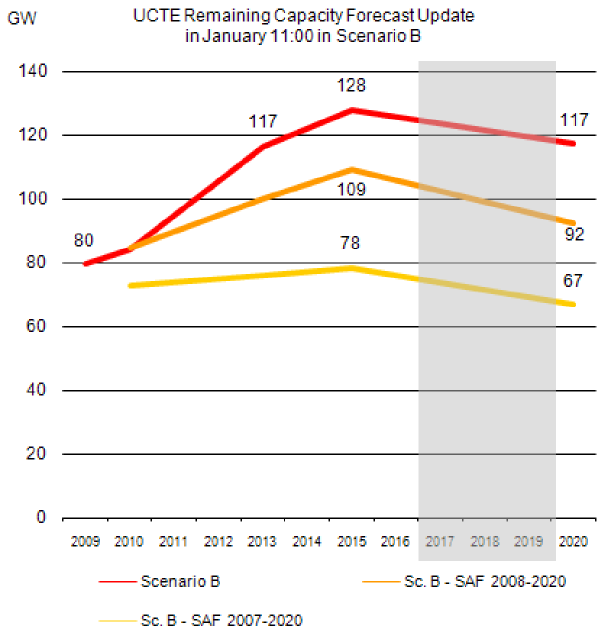


Fig. 21 UCTE Remaining Capacity Forecast Update in January 11:00 in Scenario B

The increasing trend of Remaining Capacity may be questioned. The investments in generating projects keep on growing whereas they do not appear necessary to maintain the level of adequacy. However, there are other reasons to invest in generating capacity than security of supply: RES incentive policies, market competition, higher efficiency of generation processes, etc.

Investors may also overestimate the need for new units because they do not have the full comprehensive picture (assessment of Load Management, etc.). No economic assessment is performed within this report, whereas the investments would be carried out only if they have been deemed profitable.

Furthermore, TSOs have only few information about future decommissioning of less competitive units so it could lead to overestimate the generating capacity and thus generation adequacy.

As Load Management is accounted for in the computation of RC, the increasing role of load management (see §2.2.3) also partly explains the higher level of generation adequacy.

Some additional national comments are in Section 5 while detailed figures are in Tab. 14 and Tab. 15 in Appendix.

2.3.2 Adequacy Reference Margin

Adequacy Reference Margin (ARM) is the part of Net Generating Capacity that should be kept available at all time to ensure the security of supply on the whole period each reference point is representative of. Adequacy Reference Margin in an individual country is equal to Spare Capacity plus the related Margin Against Peak Load.

Spare Capacity is the part of Net Generating Capacity, which should be kept available at Reference Points to ensure the security of supply in most of the situations. Spare Capacity is supposed to cover a 1% risk of shortfall on a power system i.e. to guarantee the operation on 99% of the situations. A 1% risk of shortfall is consistent for the whole UCTE system – respectively a regional block or some national systems – with a Remaining Capacity representing 5% of the generating capacity of the considered system.

For some other national systems, more sensitive to random factors (load variations or unavailability of generation), Remaining Capacity may represent about 10% of the national generating capacity to meet the same criterion. Some countries developed their own estimation methodology.

Some additional national comments are in Section 5.

2.3.3 Remaining Capacity Vs Adequacy Reference Margin: Generation Adequacy In Most of the Situations

Methodology for generation adequacy analysis in most of the situations is introduced in §1.3:

- When Remaining Capacity is over or equal to Adequacy Reference Margin, it means that some generating capacity is likely to be available for export on the power system.
- When Remaining Capacity is lower than Adequacy Reference Margin, it means that the power system is likely to have to rely on import flows when facing severe conditions.

Here below are the UCTE forecasts of Remaining Capacity and Adequacy Reference Margin for the three reference points in both scenarios A and B.

Adequacy Reference Margin is connected to Net Generating Capacity because Spare Capacity is estimated as a percentage of the Net Generating Capacity. Yet Adequacy Reference Margin calculated in Conservative scenario A and Best Estimate scenario B do not differ by more than 2 GW for the whole UCTE system up to 2015. Therefore, in the following analysis, only Adequacy Reference Margin in scenario B is considered.

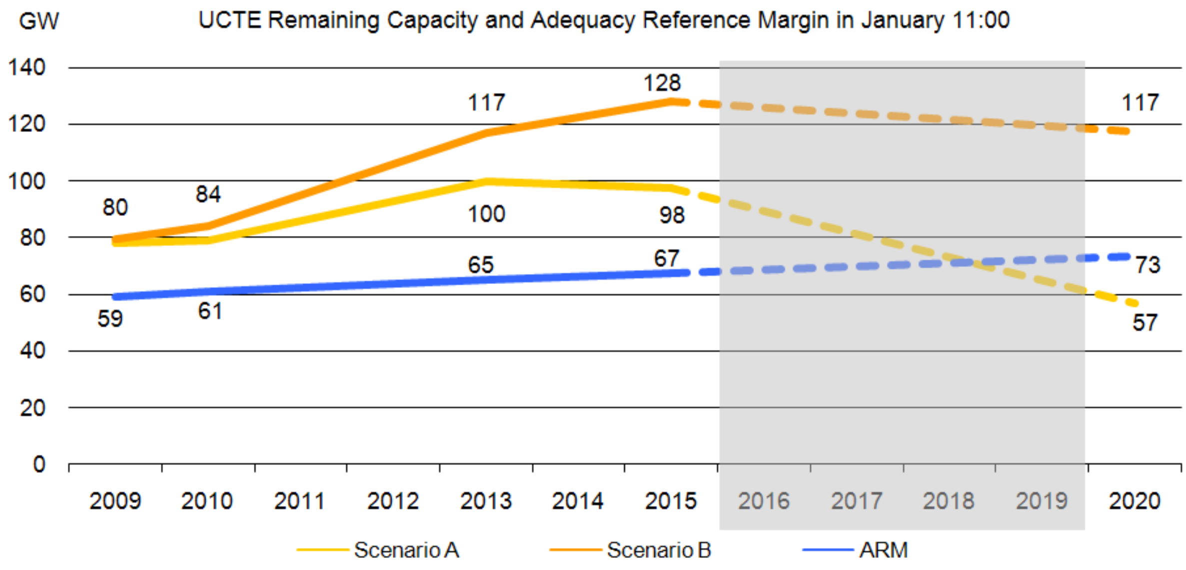


Fig. 22 UCTE Generation Adequacy Forecast in January 11:00 in scenario A and B

The January 11:00 peak load is made to compare winter and summer represented by July 11:00.

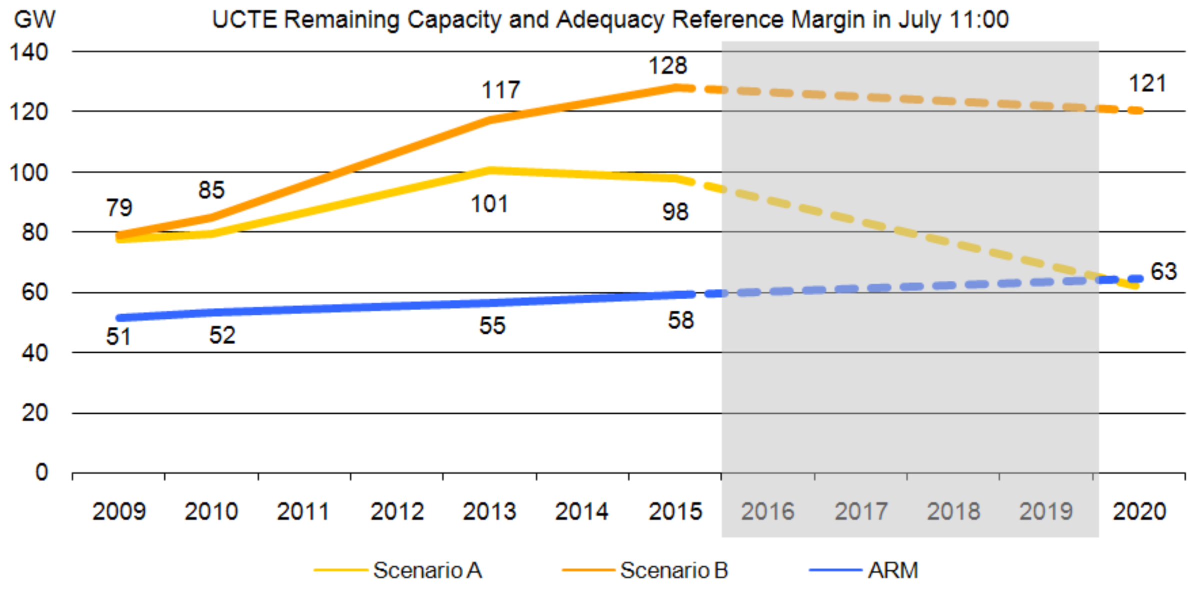


Fig. 23 **UCTE Generation Adequacy Forecast in July 11:00 in scenario A and B**

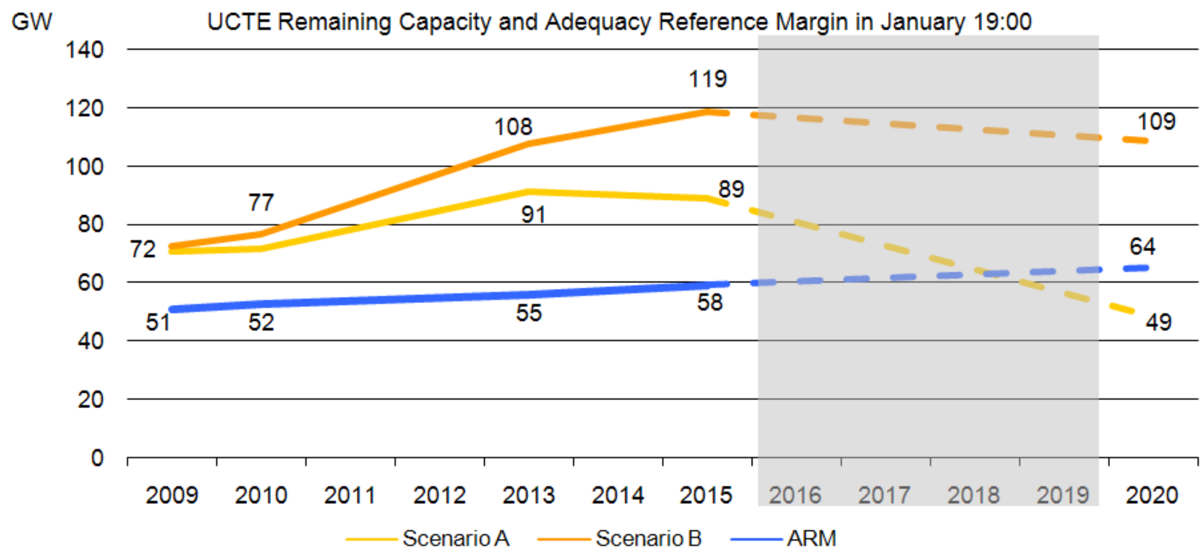


Fig. 24 **UCTE Generation Adequacy Forecast in January 19:00 in scenario A and B**

The daily peak load in winter is close to 19:00, with hence a minimal Margin Against Peak Load at this reference point, and consequently lower levels of Adequacy Reference Margin in Fig. 24 compared to January 11:00 in Fig. 22.

The comparison of Remaining Capacity and Adequacy Reference Margin shows that generation adequacy of the UCTE system should not be at risk up to 2015 in any generation scenario and in 99% of the situations.

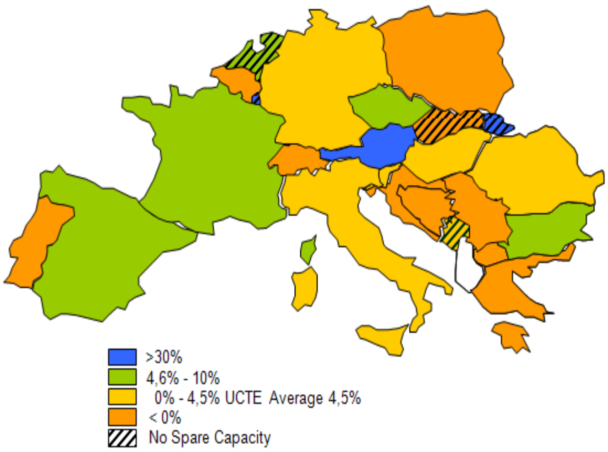
Considering Conservative Scenario A, generation projects considered as firm today will help maintaining adequacy beyond 2015. However, additional investments in generating capacity should be necessary before 2020 to maintain an appropriate level of adequacy in 99% of the situations: Remaining Capacity should end up in January 2020 15 GW below Adequacy Reference Margin. In order to maintain adequacy at its level of 2009 (i.e. a Remaining Capacity 22 GW higher than the ARM), 37 GW of additional Reliable Available Capacity would be necessary[20] to face most of the situations.

Further to the projects considered as firm today, +23 GW of additional generating capacity are required by 2020 to secure adequacy in 99% of the situations. + 56 GW are necessary to maintain its 2009 level.

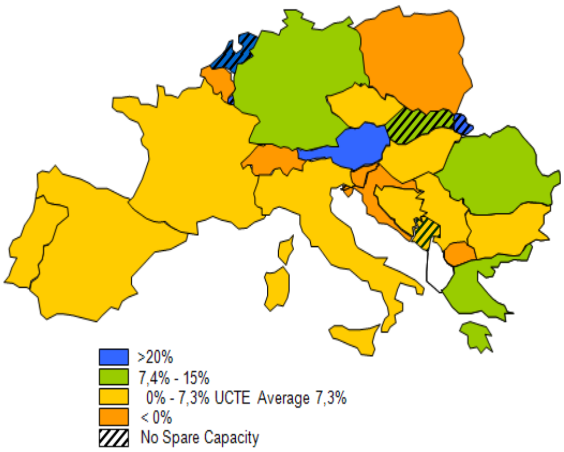
Additional investments in new generating capacity foreseen by stakeholders should be sufficient to maintain adequacy up to 2020 at its level of 2009 and even higher in 99% of the situations.[21]

In Scenario B, Remaining Capacity appears +45 GW above Adequacy Reference Margin in 2020. In this generation scenario B, Remaining Capacity looks sufficient up to 2020, even without Load Management measures (less than 15 GW see §2.2.3) in most of the situations.

The situation varies from a country to another one, so that it is interesting to assess the national situations and draw attention on some stressed cases. Note that UCTE methodology for adequacy forecast might end up with a stronger capacity requirement than the actual national requirements, especially for those countries that do not take any spare capacity into account.



Map 12 Generation Adequacy Forecast in January 19:00 2009 in Scenario A



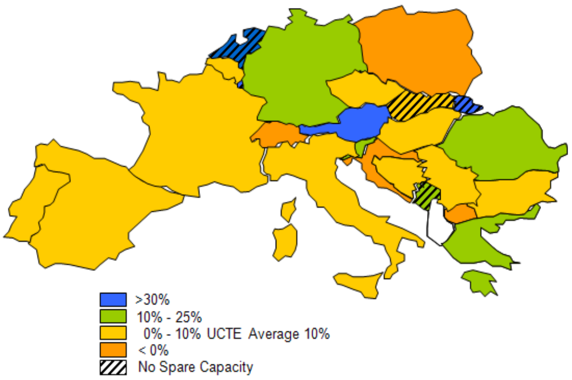
Map 13 Generation Adequacy Forecast in January 19:00 2013 in Scenario A

Considering Conservative scenario A in Map 12, Adequacy Reference Margin is expected to be lower than Remaining Capacity in 2009 in almost half of UCTE countries, taking into account Load Management. Belgium, Switzerland, Portugal, Poland, Slovakia, Serbia, Croatia, Bosnia-Herzegovina, Greece and FYROM should experience Adequacy Reference Margin higher than Remaining Capacity, and hence rely on imports to face the most severe situations.

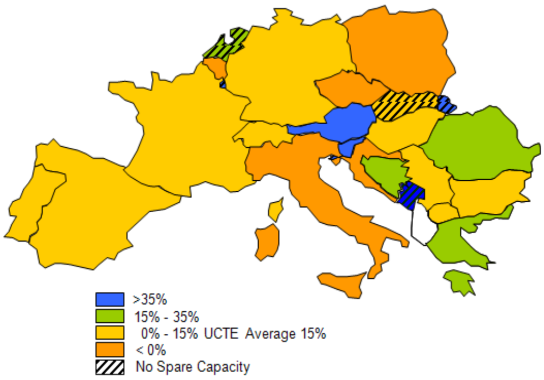
Without additional investments in generating capacity than those already considered as secure, Remaining Capacity will decrease in most of the UCTE countries. However, the situation improves for others, especially for Portugal, Slovakia, Serbia, Bosnia-Herzegovina, and Greece with a Remaining Capacity now greater than the Adequacy Reference Margin. Germany should see its situation get notably better in 2013 due to massive development of hard coal capacities.

[20] 66% of Net Generating Capacity end up into Reliably Available Capacity, see §2.1.2.

[21] Remaining Capacity is always calculated with Load Management, so that all these figures should be considered with Load Management measures.



Map 14 Generation Adequacy Forecast in January 19:00 2013 in Scenario B



Map 15 Generation Adequacy Forecast in January 19:00 2020 in Scenario B

According to scenario B, four countries should have a Remaining Capacity below the ARM in January 2013: Croatia (-5.6% of RAC), Poland (-9.7% of RAC), Switzerland (–1.7% of RAC) and FYROM (-1.1% of NGC).

All these countries should rely on imports to ensure the balance of their system under severe conditions. In January 2020, the situations of Switzerland and FYROM should get better, whereas the situations in Croatia and Poland are likely to be still stressed. Moreover, the situation is worsening in Belgium, the Czech Republic, as well as in Italy. Most of these countries should also face stressed situations in scenario A in January 2020.

Some additional national comments are in Section 5.

2.4 UCTE Conclusion

Generation Adequacy level is improving from now on to 2015 due to an impressive development of generating capacity noticeably gas, hard coal and wind power.

2016 up to 2020 could be a period for decommissioning due to usual economic optimisation after the LCP Directive threshold of 2015. Indeed, the generating capacity available over the load (Remaining Capacity) appears to increase up to 2015 and then decrease, considering Best Estimate scenario B. Might year 2015 be a temporary peak and thus would decommissioning (especially hard coal and lignite) be carried out after 2015? Continuous monitoring of the market is important and the next releases of this forecast report would help answering these questions.

3 REGIONAL ADEQUACY FORECAST

3 Regional Adequacy Forecast

The analysis at the level of regional blocks enable to highlight some weaknesses or strengthens of the UCTE system, which is complemented by the analysis country by country in Section 5.

3.1 North-Western Block

North Western block consists of Austria, Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland.

Here below are the forecasts of Remaining Capacity and Adequacy Reference Margin in the North Western block in January 19:00 in both scenarios A and B.

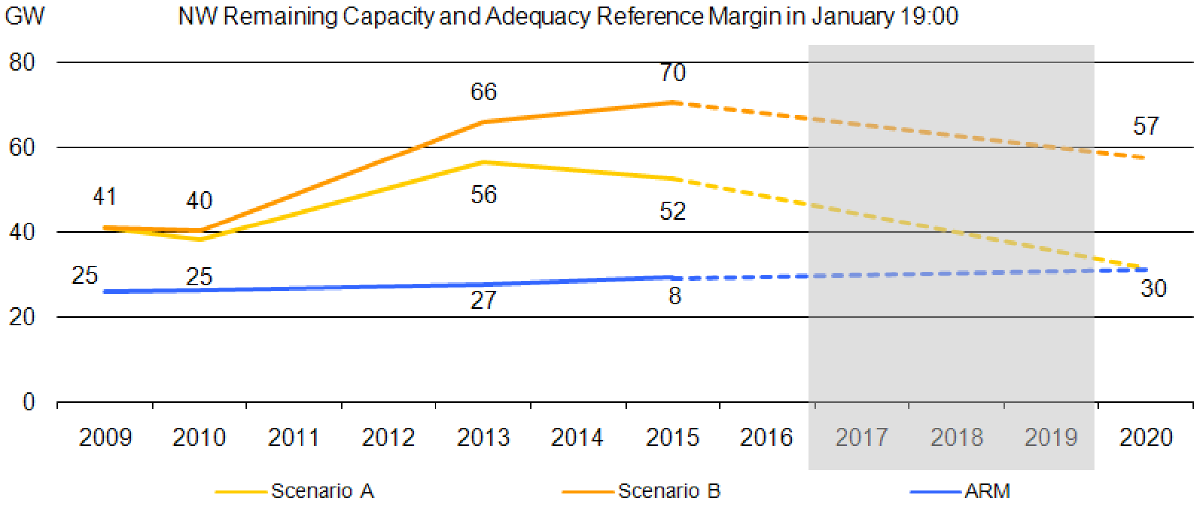


Fig. 25 North-Western Block Generation Adequacy Forecast in January 19:00 in Scenarios A and B

Remaining Capacity excess to Adequacy Reference Margin is slightly above 15 GW in 2009 but should decrease by 3 GW in 2010 in scenario A and remain quite at the same level in the alternative scenario. Afterwards it should continuously increase up to 2013 in both scenarios A (about +15 GW) and B (about +25 GW).

Regarding scenario B, up to 2013, Net Generating Capacity is expected to increase by about +48 GW +17%) with Reliably Available Capacity increasing by +32 GW while Load in expected to grow by about +7 GW (+3.6%). The Remaining capacity is hence expected to increase by +25 GW between 2009 and 2013, mainly in Germany (+ 12 GW) and the Netherlands (+7 GW), and at a slower pace until 2015: the generating adequacy should get better over the period 2009-2013 and even up to 2015 when RAC would not catch up with load increase. The level of adequacy appears satisfactory up to 2020, increasing up to 2015, and then decreasing afterwards.

Considering Conservative scenario A, Remaining Capacity will decrease after 2013 mainly because of the slowing growth rate of generating capacity (+1.3% from 2013 to 2020) with the shutdown of large fossil fuel and nuclear plants, while Load is expected to increase (+7.0% globally over 2015-2020). More than 14 GW additional Remaining Capacity would be necessary to maintain the same level of adequacy in 2020. With

66% of Net Generating Capacity assumed to turn into Reliably Available Capacity (see §2.1.2), around 22 GW of additional Net Generating Capacity would be necessary before 2020 to keep adequacy as in 2009.

3.2 North-Eastern Block

North Eastern block consists of Czech Republic, Hungary, Poland, Slovak Republic and Ukraine-West.

Here below are the forecasts of Remaining Capacity and Adequacy Reference Margin in the North Eastern block in January 19:00 in both scenarios A and B.

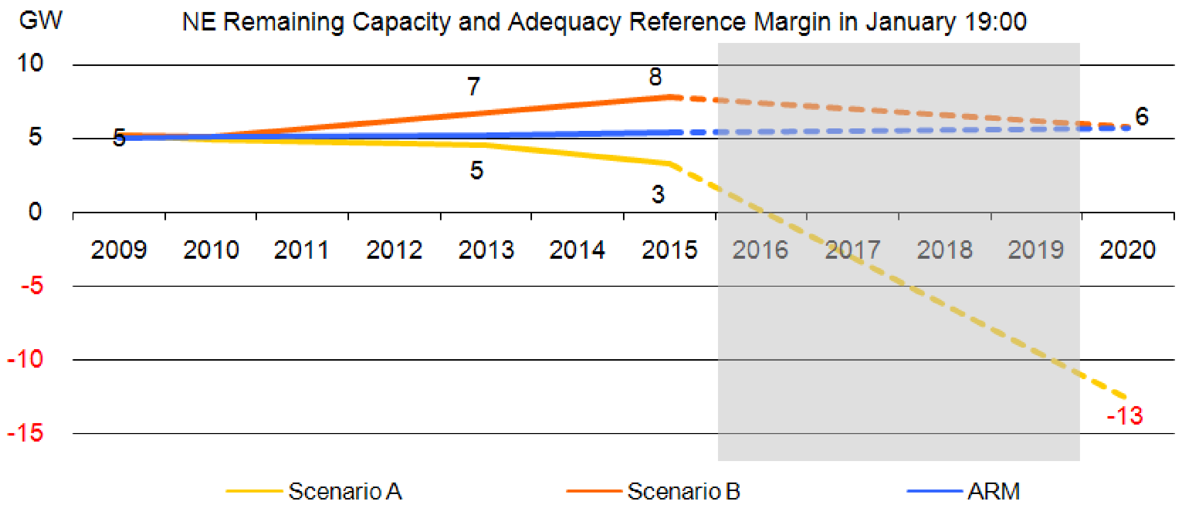


Fig. 26 North-Eastern Block Generation Adequacy Forecast in January 19:00 in Scenarios A and B

The level of adequacy of the North Eastern block should be stable up to 2010, confirming the forecast in the previous SAF 2008-2020 report. The situation after 2010 is however more pessimistic than in the previous report. Indeed, Poland revised its forecasts, as since 2006 a much shaper load increase has revealed a higher than forecasted level of non-usable capacity (how load is linked to non-usable capacity) which caused the Polish TSO to operate with a lower margin of RAC.

Considering Conservative scenario A, the situation should worsen from 2010 on, so as to become inadequate as from 2013 with more and more fossil fuel plants likely to get closed and fossil fuel capacity decreasing -25% from 2010 to 2020. After 2013, +18 GW additional Remaining Capacity would be necessary to maintain in 2020 the present level of adequacy. With 66% of Net Generating Capacity assumed to turn into Reliably Available Capacity), about 27 GW of additional Net Generating Capacity should be necessary before 2020 to keep adequacy as in 2009. If only Poland, by far the biggest country in the region, should experience an uncomfortable situation in 2013, all countries would be in that case in 2020.

Considering Best Estimate scenario B, the level of adequacy should be satisfactory up to 2020, as also foreseen in the last SAF 2008-2020. The commissioning of new generation capacities covering more than the decommissioned capacity over 2009-2013, should sustain the growth in Reliably Available Capacity (+ 9.0%), which should be higher than the growth in Load (+7.0%). The most comfortable period should be around 2015. Reliably Available Capacity should then remain almost stable up to 2020 (+2.8% over the period) while Load will increase rapidly (+7.8% over the same period).

3.3 South-Eastern Block

South Eastern block is made of Bosnia-Herzegovina, Bulgaria, FYROM, Greece, Montenegro, Romania and Republic of Serbia.

Here below are the forecasts of Remaining Capacity and Adequacy Reference Margin in the South Eastern block in July 11:00 in both scenarios A and B.

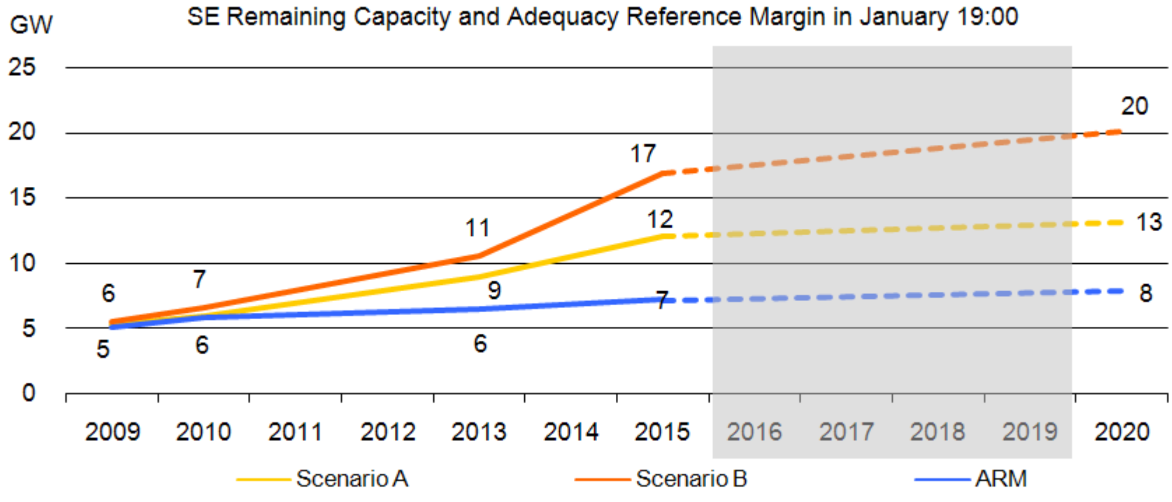


Fig. 27 South-Eastern Block Generation Adequacy Forecast in January 19:00 in Scenario A and B

Contrary to the last year forecast published in the previous SAF 2008-2020, as from 2009, the South Eastern region should experience an appropriate level of adequacy.

The situation is even foreseen to improve with a continuous increase in the adequacy up to 2015. The situation should be stabilised as from 2015 at a quite comfortable level, whatever the scenario taken into account.

Considering Best Estimate scenario B, Remaining Capacity should exceed Adequacy Reference Margin by +4 GW in 2013 and +12 GW in 2020, which is quite better than in the previous report.

This quite favourable situation should not hide national disparities, as some additional generating capacities in some countries may compensate consumption and load growth in others. Nevertheless there is a noticeable trend to develop new generation investment projects in this region.

3.4 Centre-South Block

Centre South block consists of Croatia, Italy and Slovenia.

Here below are the forecasts of Remaining Capacity and Adequacy Reference Margin in the Centre South block in July 11:00 in scenarios A and B.

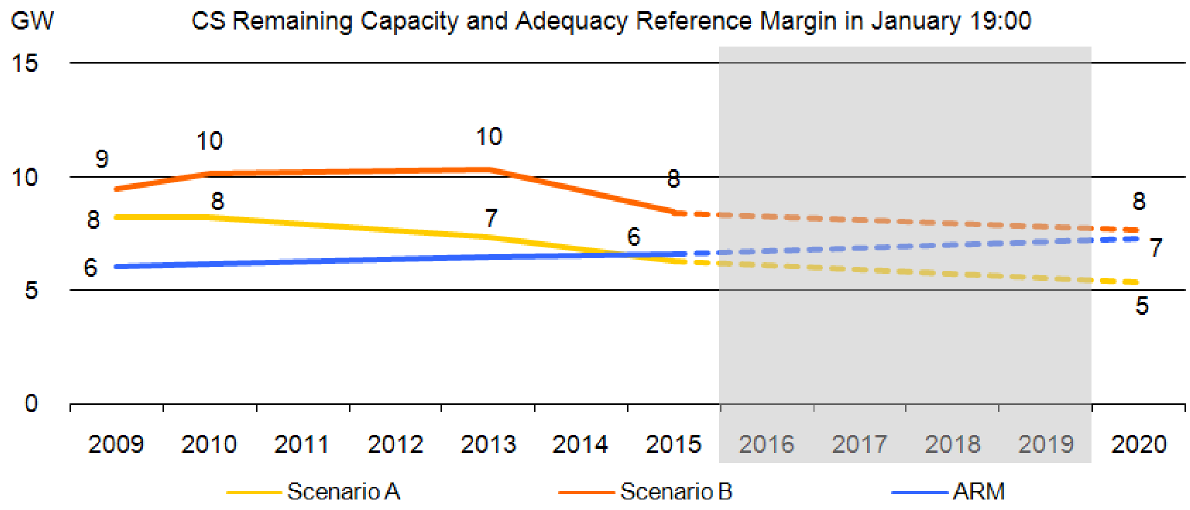


Fig. 28 Centre-South Block Generation Adequacy Forecast in July 11:00 in Scenarios A and B

Adequacy should be ensured up to 2014 in both scenarios A and B. However, without load management, the adequacy would never be reached whatever the scenario. This is one of the main changes in comparison with last year report.

Considering Conservative scenario A, Remaining Capacity should be higher than Adequacy Reference Margin up to 2014 with only a difference of +1 GW left in 2013. In 2020, Remaining Capacity is almost 1 GW lower than Adequacy Reference Margin. With 66% of Net Generating Capacity assumed to turn into Reliably Available Capacity (UCTE estimate, see §2.1.2), around 9 GW of additional Net Generating Capacity would be necessary before 2020 to keep adequacy as in 2009. As from 2014, Centre South block should rely on import capacities to ensure the balance of its power system under severe conditions.

Considering Best Estimate scenario B, Remaining Capacity should exceed Adequacy Reference Margin over the whole period, but only thanks to load management. The most favourable situation should be reached in 2013 with a positive difference between Remaining Capacity and Adequacy Reference Margin of +4 GW. With 66% of Net Generating Capacity assumed to turn into Reliably Available Capacity around 5 GW of additional Net Generating Capacity would be necessary before 2020 to keep the adequacy level as in 2009.

3.5 South-Western Block

South Western block consists of Portugal and Spain.

Here below are the forecasts of Remaining Capacity and Adequacy Reference Margin in the South Western block in January 19:00 in both scenarios A and B.

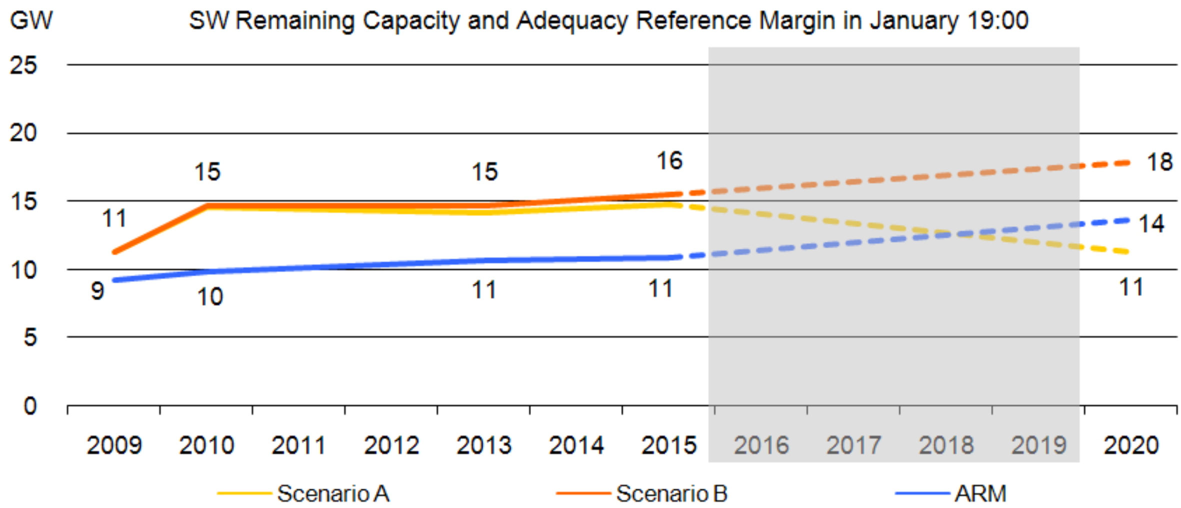


Fig. 29 South-Western Block Generation Adequacy Forecast in January 19:00 in Scenarios A and B

The level of adequacy of the South Western Block seems to improve much more than in the previous SAF 2008 - 2020. The reasons for this improvement are mainly the high level of generation investment in the Spanish System as well as an important update in the adequacy forecast in the Portuguese System from 2013, according to new Portuguese government objectives, regarding the accomplishment of 20-20-20 targets, and the application of National Portuguese Plan for Energy Efficiency.

In Best Estimate scenario B, Remaining Capacity excess to Adequacy Reference Margin is about 5 GW over all the forecasted period up to 2020. This is a very important change compared to the previous SAF 2008 – 2020, which reported a decrease from 2013. Adequacy forecast reflects a constant increase in generating capacity especially from renewable energy sources (mainly wind) over the period. Net Generating Capacity is expected to increase by about +57 GW (+54%) with Reliably Available Capacity increasing by +27 GW, while Load is expected to grow by about +22 GW (+ 41%). Because of that, the level of adequacy appears satisfactory over all the forecasted period. The commissioning of new generation capacities covers enough the decommissioning of old thermal capacity due to the impact of LCP Directive.

Only in conservative scenario A, some additional generation capacity is required by 2020. About 2.4 GW of additional Generating Capacity would be necessary to maintain Remaining Capacity at the level of Adequacy Reference Margin. This lack of capacity by 2020 is due to adequacy worsening that is observed in both countries and especially in Portugal.

3.6 Regional Conclusion

The trend of growth in generation investments is confirmed in all regional blocks.

North-Western Block, South-Eastern Block and South-Western Block should maintain at least the same level of adequacy as today up to 2015 and be able to export extra-capacities, even under sever conditions.

As far as North-Eastern Block is concerned, its situation should improve itself under scenario B up to 2015, whereas under scenario A, the block should rely on import to face severe conditions as from 2013.

Regarding Centre-South Block, its level of adequacy trends to get worst but remain positive in scenario B, whereas in scenario A the block should also rely on import to ensure its adequacy under severe conditions as from 2015.

4 ROLE OF INTERCONNECTORS

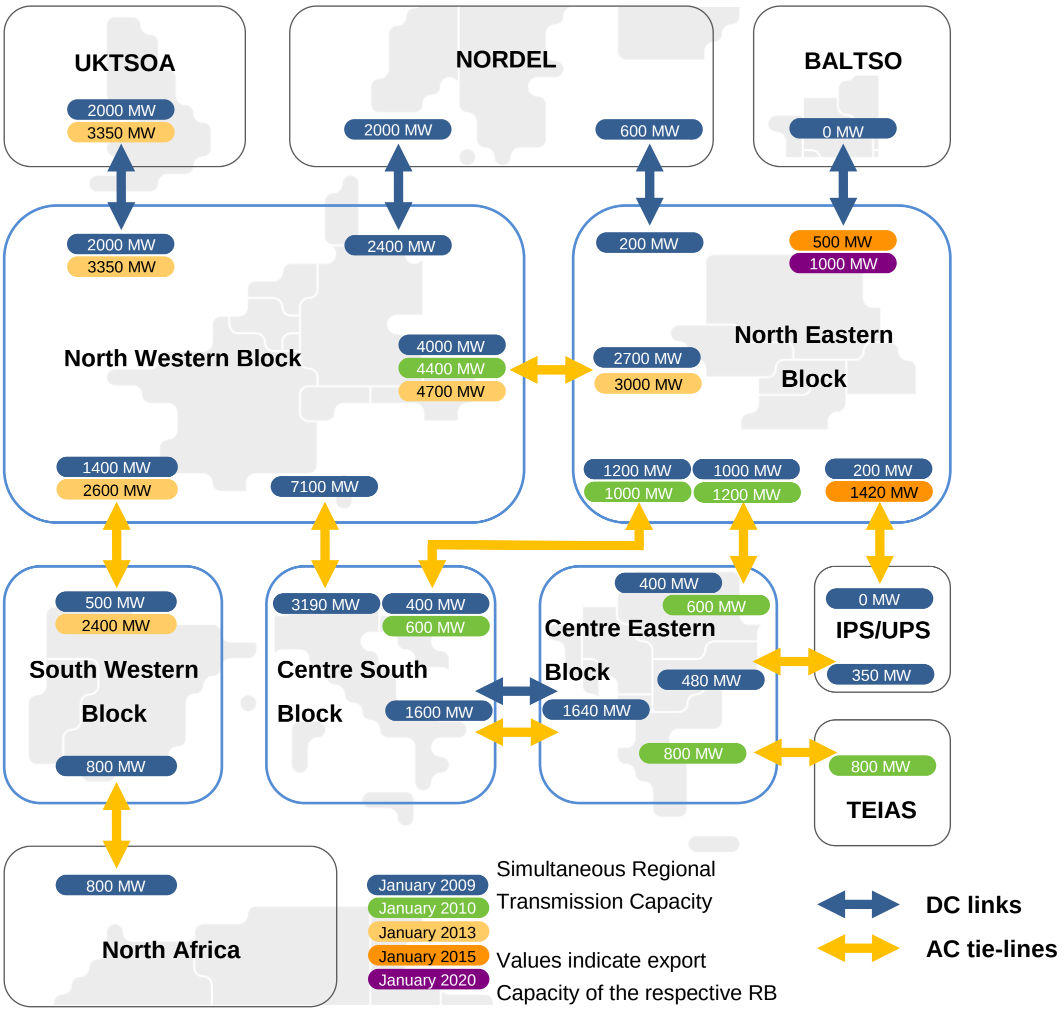
4 Role of Interconnectors

4.1 Simultaneous Interconnection Transmission Capacity

Simultaneous Interconnection Transmission Capacity (SITC) of a power system is the overall transmission capacity through its peripheral interconnection lines. SITC are calculated according to the UCTE Transmission Development Plans. The SITC export value is called Export Capacity and may differ from the SITC import value, called Import Capacity.

4.2 Regional Interconnectors Forecast

The following Map 16 sums up the evolution of Simultaneous Regional Transmission Capacity in 2009 and its forecasted evolution in the next five years based on identified projects. Beyond this horizon, too much uncertainty prevents from assessing any relevant SITC evolution.



Map 16 Simultaneous Regional Transmission Capacity Forecast

4.3 Regional Analysis

The following section compares for each regional block its remaining capacity even in most situations (i.e. even in severe conditions) with its import and export capacity:

- If RC-ARM is negative, the block is likely to require import in some severe situations. An RC-ARM value lower than the importing capacity of the block means that even if the surrounding blocks can provide support, not all of it can be transmitted and load shedding will occur. On the other hand, if RC-ARM is within the import capacity range, no transmission bottleneck at the borders of the block is likely to occur (but nothing ensures in this analyses, that the surrounding blocks would actually be able to provide a support, or that internal congestion within the block might not prevent all countries within the block to be supported).
- A positive RC-ARM value means that the block has a generation capacity to export in most of the situations, so even in quite severe conditions, taking also into account Load Management measures. If the block is not necessary able to export all of it. For instance, Load Management measures might not be activated for export purposes. Furthermore, RC-ARM greater than the export capacity does not necessarily imply that some additional transmission capacities are required: this remaining extra-capacity might not be competitive in comparison with other capacities available in other blocks.

4.3.1 North-Western Block

The North-Western Block should be able to export capacity even while facing severe conditions. This export capacity is supported by the new generation projects forecasted over the period even in scenario A. Nevertheless there are still quite some uncertainties on new projects especially after 2015. Moreover, the extra capacity could not be “exportable” as it could be too expensive in comparison with other capacities available in other blocks. It will depend strongly on the types of these additional capacities. Now, a simultaneous development in fossil fuel and wind capacities is forecasted in the block. This is another reason why one could reasonably believe that all the extra capacity could not be exported because some could be committed to complete intermittency of RES generation. Furthermore, in 2020 the Remaining Capacity includes 5.5 GW of Load Management possibilities that will not be used in order to export to surrounding blocks.

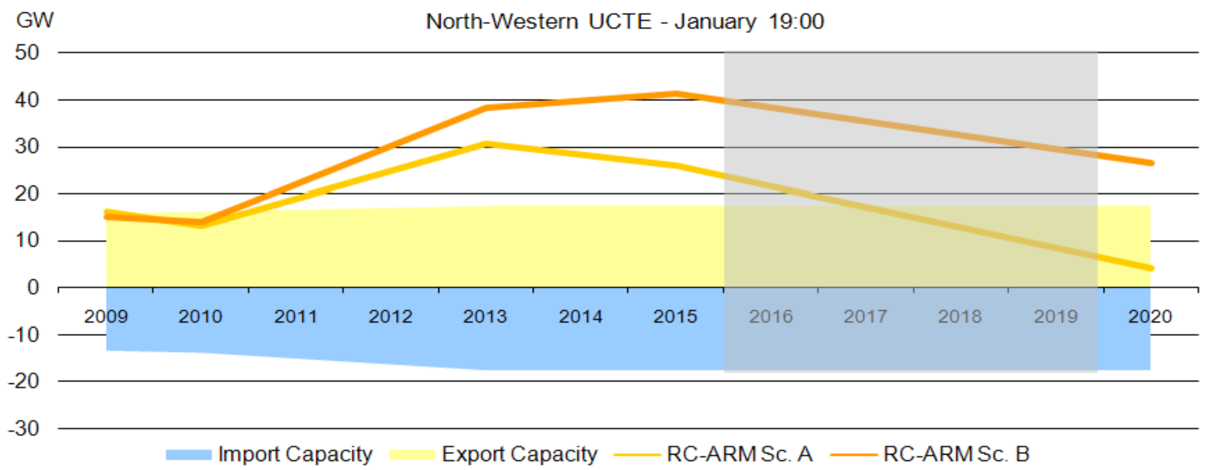


Fig. 30 System Adequacy Forecast of the North-western Block in Jan. 19:00 in Sc. A and B

4.3.2 North-Eastern Block

The North-Eastern Block should be self sufficient up to 2011 both in scenarios A and B. Then, the block would rely only on import to face severe conditions in scenario A and the import capacities might not be sufficient enough after 2016, if no new generating capacity is added.

Regarding scenario B, the Block should be in position of exporter after 2011 and just self sufficient as from 2020.

The way to define the ARM holds some uncertainties, so that this forecast should be read with cautious.

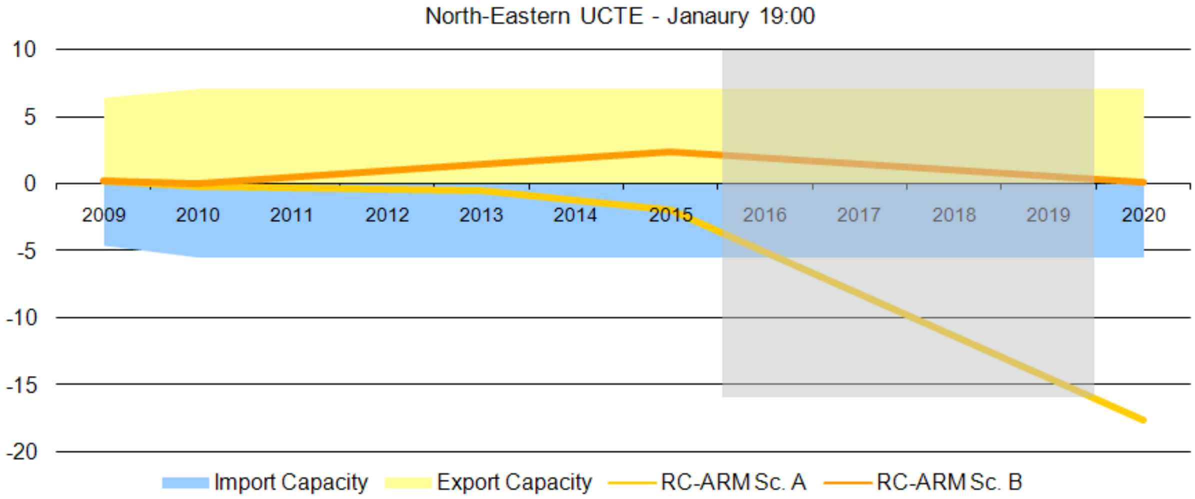


Fig. 31 System Adequacy Forecast of the North-Eastern Block in January 19:00 in Scenarios A and B

4.3.3 South-Eastern Block

The South-Eastern Block should be self-sufficient to ensure adequacy whatever the scenario considered and be in a position of exporter, even over the physical export capacities under scenario B.

Once again this analysis must be treated with caution because the extra capacity available for export could not be economically competitive. Furthermore, in 2020, the Remaining Capacity includes 1.4 GW of Load Management possibilities that will not be will not be used to export to surrounding blocks.

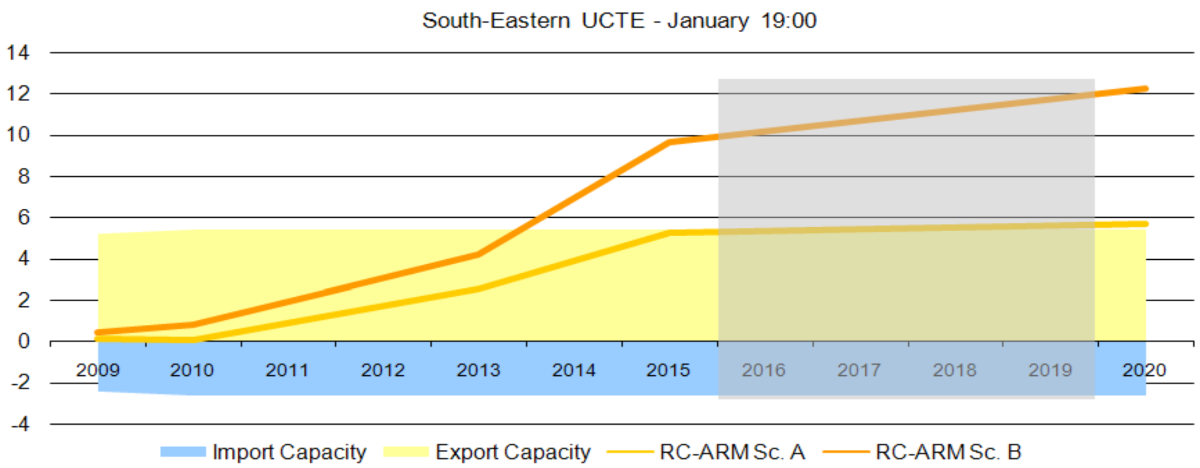


Fig. 32 System Adequacy Forecast of the South-Eastern Block in January 19:00 in Scenarios A and B

4.3.4 Centre-South Block

The adequacy in Centre – South Block should not be at risk up to 2014, whatever the scenario considered. The decreasing trend observed both in scenarios A and B limit the potential export capacities. However, in scenario A, the Block will rely on import capacity to ensure the adequacy, but under volumes compatible with the physical import capacity of the system. Regarding scenario B, the Block should always be in a position of exporter. The remaining Capacity includes 4 GW of Load Management possibilities.

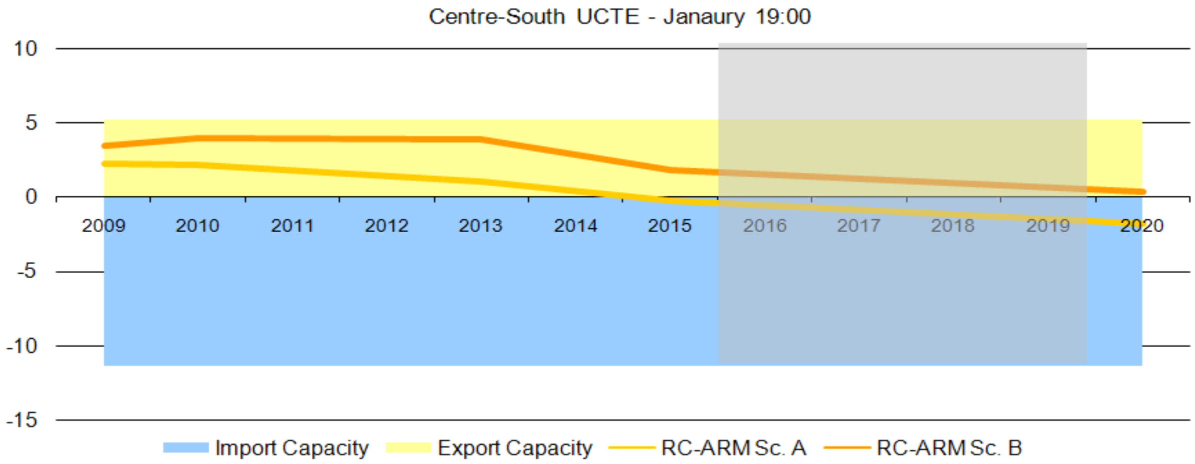


Fig. 33 System Adequacy Forecast of the Centre-South Block in July 19:00 in Scenarios A and B

4.3.5 South-Western Block

In South-Western Block, the adequacy follows the same trend and level in both scenario A and B up to 2015. The system is able to export capacities, even over the physical possibilities. From 2015, in scenario B, the stabilisation of adequacy enables to ensure a quite high level of exports, still over the physical possibilities. Regarding scenario A, the adequacy decreases by 2020, to have to rely on import (1.6 GW) representing only about 2% of annual peak load of the Block but this situation is compatible with the theoretical import capacity of the Block. In 2009 2 GW of Load Management possibilities are included in the remaining Capacity, while in 2020 this figures will reach 3 GW.

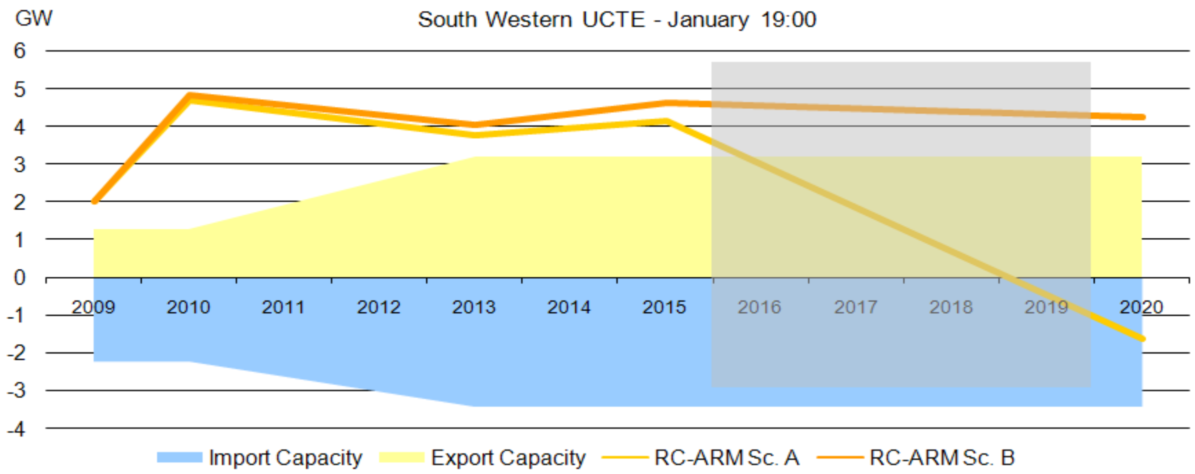


Fig. 34 System Adequacy Forecast of the South-Western Block in January 19:00 in Scenarios A and B

4.4 National Analysis

4.4.1 Under Standard conditions

To analyse the potential role of transmission capacities in the adequacy of the national systems in a simplified way, Remaining Capacity is compared to Simultaneous Interconnection Transmission capacity. As introduced in §1.3, countries with positive Remaining Capacity are potential sources of support to other systems through interconnection lines at reference times and under standard conditions. When Export Capacity is lower than a positive Remaining Capacity, it means that all the extra capacity cannot be exported under standard conditions.

In 2009, as shown in Fig. 35, Germany[22], Spain, France, Hungary, Poland, Portugal and Romania would seem not to be able to export all their extra capacity under standard conditions. This single comparison does not imply that additional transmission capacity is required. Remaining Capacity is only available under standard conditions, which might not be actual ones. Moreover, Remaining Capacity takes into account Load Management, which might not be activated by the stakeholders to secure exports and disregards any tertiary reserve for own system services reserve. Also, such exports may not be competitive.

Among the major contributors with positive Remaining Capacity, France and Germany[22] can export most of it, whereas Spain cannot. Italy has not reported any Export Capacity although reported being potentially exporter whatever the situation. Austria did not report any value nor comment.

In 2009, Slovakia is the only country likely to depend on import under standard conditions yet without constraints from a limited simultaneous import capacity.

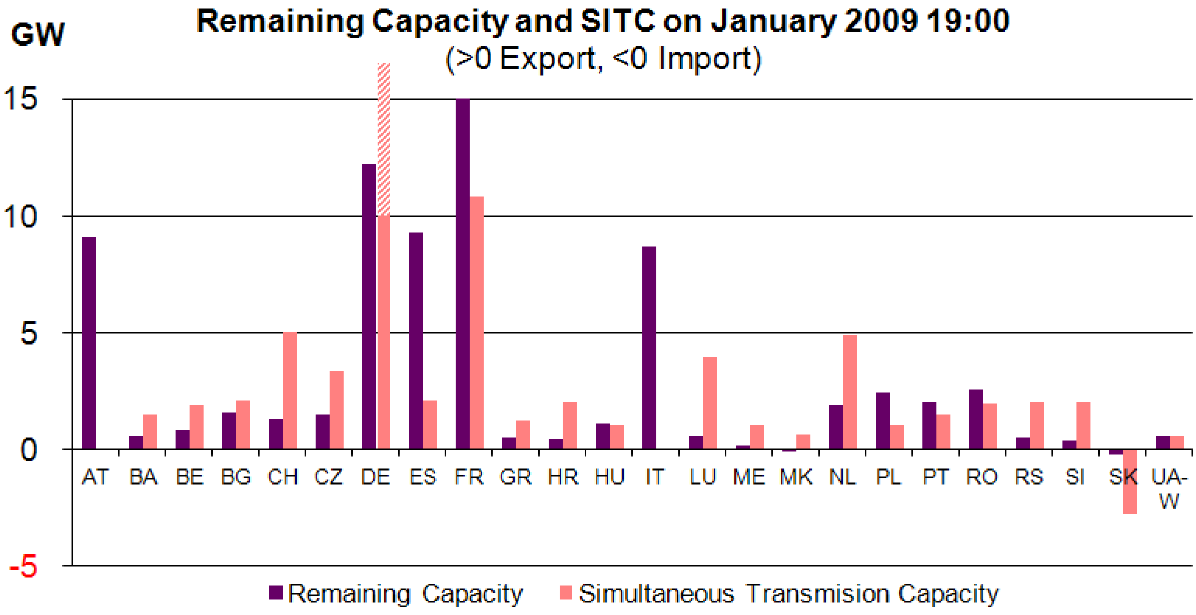


Fig. 35 National Remaining Capacity and Interconnection Capacity in Jan. 2009 19:00 in Sc. B

As shown in Fig. 36, all countries should have a positive Remaining capacity in 2013, and the Netherlands should join the list of major contributors with positive Remaining Capacity.

[22] Germany reported some uncertainties on its actual simultaneous transmission capacity, which so appears in the graphs.

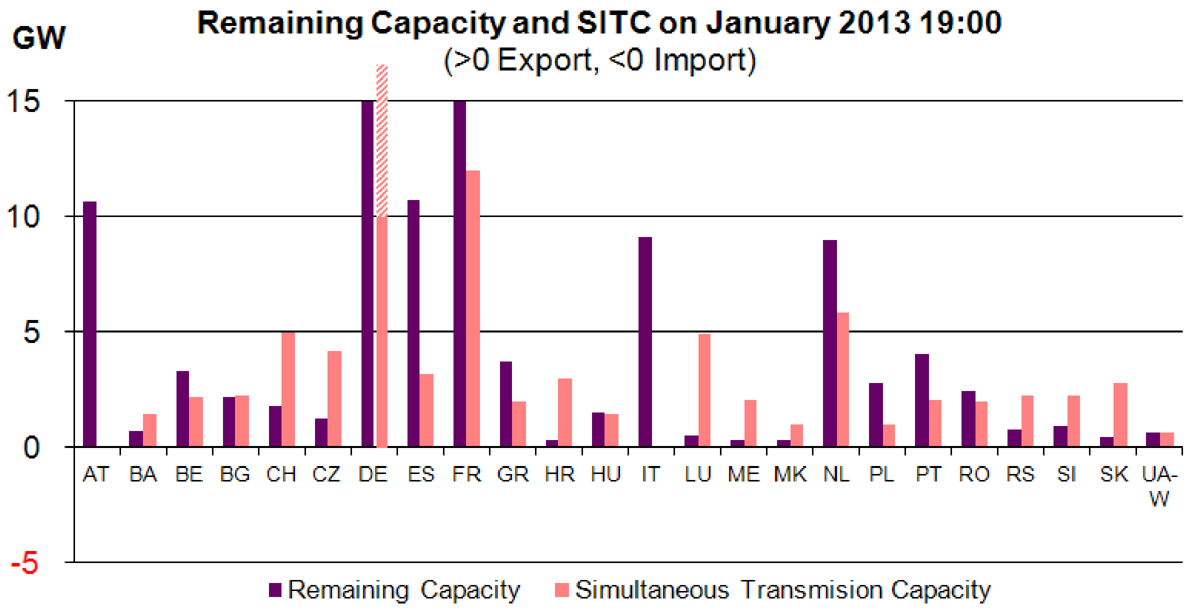


Fig. 36 National Remaining Capacity and Interconnection Capacity in Jan. 2013 19:00 in Sc. B

4.4.2 In Most of the Situations

As introduced in the methodology summary in §1.3, the previous analysis can be extended to the period which reference point is representative of and under most of the situations by cutting the Adequacy Reference Margin from the Remaining Capacity.

Any positive Remaining Capacity minus Adequacy Reference Margin is extra capacity potentially exportable in most of the situations, to be compared to simultaneous export capacity.

When negative, Remaining Capacity minus Adequacy Reference Margin is missing capacity in some severe situations, likely then to be imported, it has to be compared to simultaneous import capacity.

RC-ARM over SITC is not necessary calling for additional transmission capacities[23], as many uncertainties exist to size the real capacity. Remaining Capacity is only available under standard conditions, which might not be actual ones and Adequacy Remaining Margin calculation is not accurate enough to be used as a criteria to size transmission capacities. Moreover, Remaining Capacity takes into account Load Management, which might not be activated by the stakeholders to secure exports and disregards any tertiary reserve for own system services reserve. Also, such exports may not be competitive (the merit order of the units in both side of the borders are definitely to be considered, which is not the case here). Internal congestions on the borders within the Regional Blocks have not been taken into account.

In 2009, as shown in Fig. 37[24], unlike in the previous analysis, France can truly export its extra capacity available in most of the situations, while Spain[25] can export most of it. Spain is the sole country experiencing a constraint.

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[23] Additional transmission projects are already under study but not accounted for yet.

[24] Austria and Italy have not reported SITC Export

[25] In 2009, Remaining Capacity in Spain will include 2 GW of Load Management.

More countries are likely to rely on imports when considering most of the situation than the only standards conditions like in §4.4.1: Belgium, Switzerland Greece, Croatia, Former Yugoslavian Republic of Macedonia, Poland, Portugal, Serbia and Slovakia. Yet, Poland is the only country likely to rely on import, which might face a constraint under severe conditions.

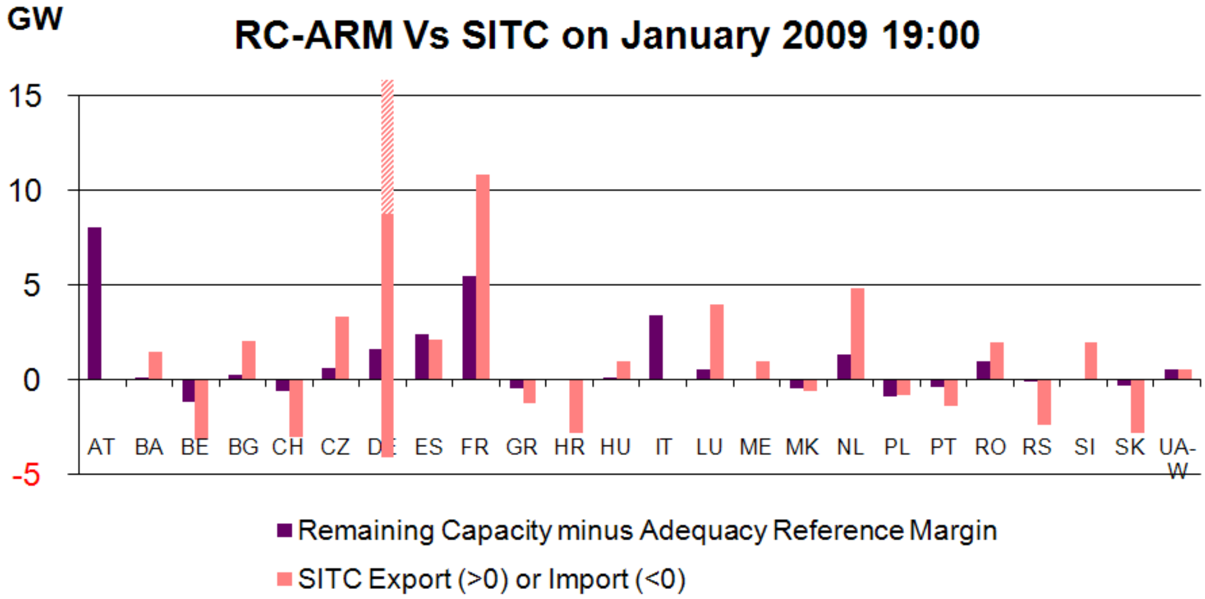
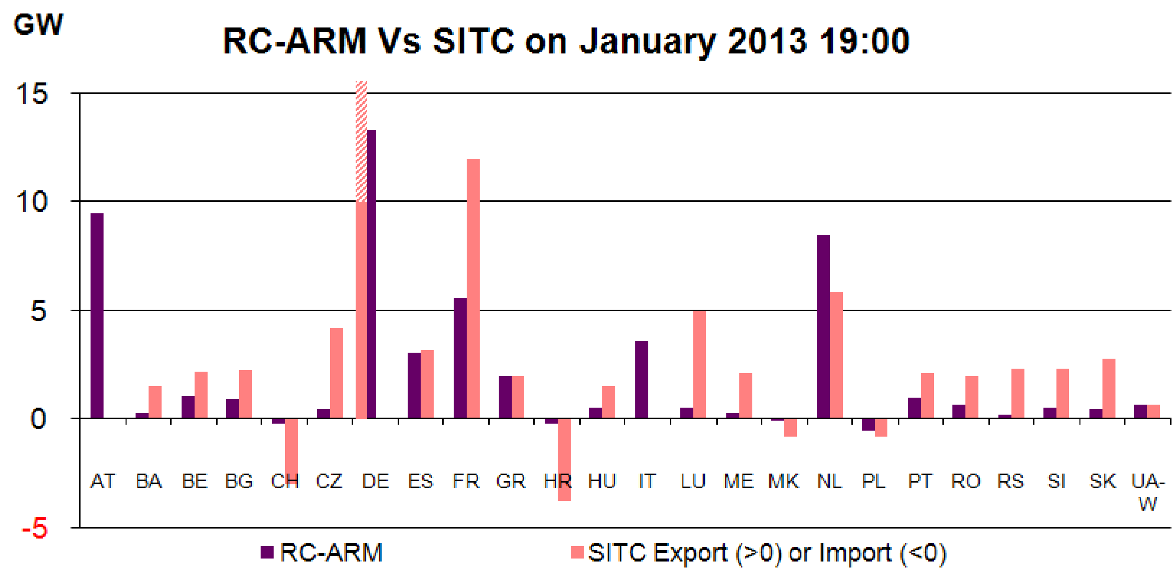


Fig. 37 National Remaining Margin and Interconnection Capacity in Jan. 2009 19:00 in Sc. B

As shown in Fig. 38[26], the situation should be more comfortable in 2013 with less country likely to rely on import under severe conditions. The Netherlands might also not be in a position to export all the extra capacity available under most of the situation[27]. Again, to conclude that additional transmission capacity is required, the economic likeliness of such export will have to be considered.



[26] Austria and Italy have not reported SITC Export

[27] In 2009, Remaining Capacity in the Netherlands will include 1.5 GW of Load Management.

Fig. 38 National Remaining Margin and Interconnection Capacity in Jan. 2013 19:00 in Sc. B

4.5 Interconnectors Conclusion

In 2009, as shown Germany, Spain, France, Hungary, Poland, Portugal and Romania would seem not to be able to export all their extra capacity under standard conditions. In 2013, the Netherlands and Belgium should also join this group. All this extra capacity is likely to include back-up facilities that are at the high end of the economic merit order, and may just not be competitive and the Remaining Capacity includes load management possibilities that will not be activated for export purposes. (No more accurate assessment is however possible with the presently available material for this report.)

When considering the case representing most of the situations, the situation should be more comfortable in 2013 than in 2009 with fewer countries likely to rely on import under severe conditions. Once again this analysis confirms the trends of investments in generating capacities.

5 NATIONAL COMMENTS

5 National Comments

In this section are the comments provided with the forecast made for each country introduced by a chart of the adequacy forecast in January 19:00.

AT – Austria

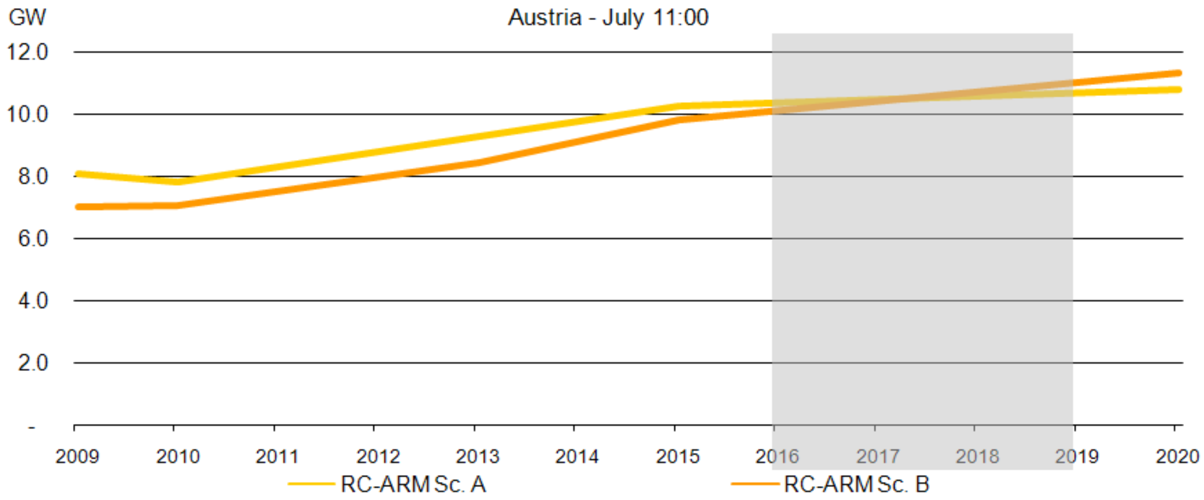


Fig. 39 System Adequacy Forecast in Austria in January 19:00 in Scenario A and B[28]

Generating Capacity

Load

Generation Adequacy

Spare capacity is 5% of NGC. There is no additional spare capacity in Austria, which is managed by the TSO in case of normal market operation. For the case of real lack of energy, a special law with special regulations is put into force.

Interconnection Capacity

[28] No data available for import and export capacities.

BA - Bosnia-Herzegovina

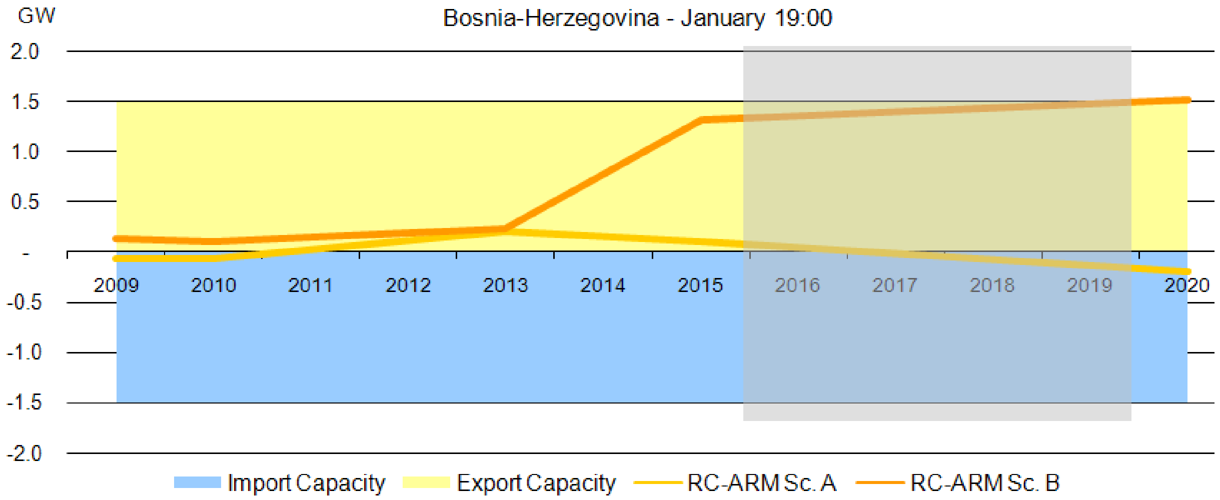


Fig. 40 System Adequacy Forecast in Bosnia-Herzegovina in January 19:00 in Scenarios A and B

Generating

By 2015 are planned new TPP (lignite-420MW), HPP (RoR-60MW) and several farms WPP (200MW). After the year 2015 are considering the construction of new TE, and HE WE, but currently has no official approval of these projects. If they build a planned capacity, Bosnia and Herzegovina will be a significant exporter of electricity after the year 2015.

During the years 2010 and 2012 are planed a longer repair of two TPPs of 300 MW. In the year 2017 and 2018 two TPPs with total power 300 MW will come out due to obsolescence.

Load

Generation Adequacy

Interconnection Capacity

BE – Belgium

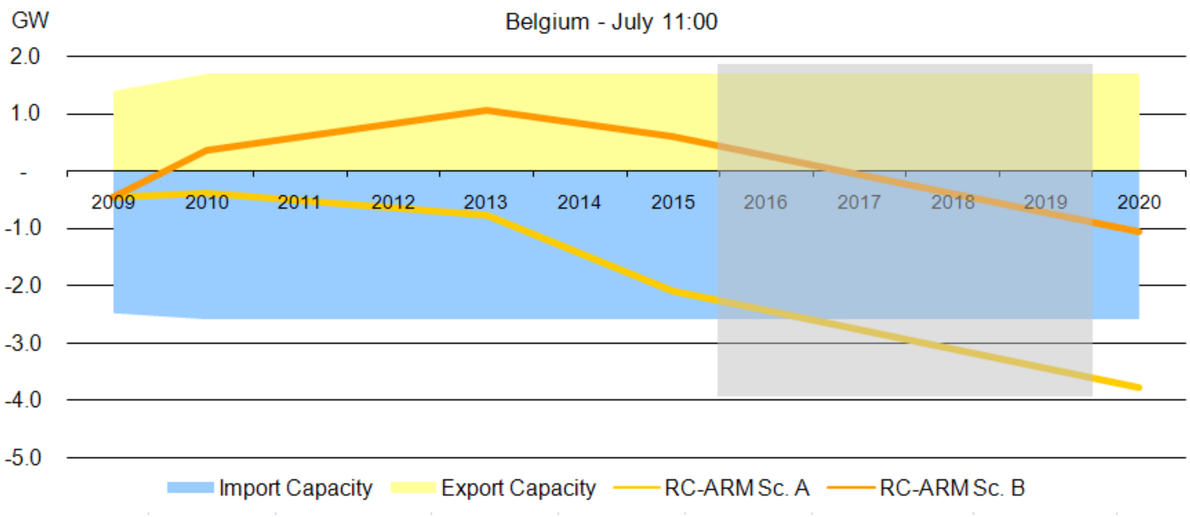


Fig. 41 System Adequacy Forecast in Belgium in January 19:00 in Scenarios A and B

Generating Capacity

The additional installed generating capacity of centralized power stations in scenario A is calculated using information from specific confirmed projects announced to the TSO. In scenario B these specific confirmed projects are complemented with projects involving centralized power stations, which are not decided but estimated as probable by the TSO. The increase in decentralized generating capacity is based on a similar methodology. Specific projects announced to the TSO and DSOs are added to the installed generating capacity in both scenarios.

Unavailable capacity will increase over the period 2008-2020 mainly due to a rise in the number of wind farms, biomass power stations and CHPs included in the net generating capacity. This trend will lead to an increase in the volume of non-usable capacity. The higher net generating capacity of windmills in the specified period will also result in a rise in the volume of the system services reserve.

Load

The average annual energy consumption growth in Belgium is based on the long run growth prospects forecasted by the PRIMES model (run 2007- source Federal Planning Bureau). For the medium term (+1 year till +5 years), the growth rates of PRIMES are adapted in order to address the most recent trends of Belgian energy consumption.

The load values of 2009 are the historic values of the 3rd Wednesday of January and July 2008 respectively at 11am-7pm and 11am augmented by the growth rate of 2008/09 in order to simulate the future values of 2009 (the same methodology was used for the load values of the years 2010, 2013, 2015 and 2020).

There are numerous load-shedding contacts with industrial customers. These contracts are part of the system services reserve. This type of reserve in not included in the UCTE definition of system services reserve. Therefore these load-shedding contracts are reported in the SAF 2009-2020 as load management.

Generation Adequacy

If the generation development projects of scenario B are realized respecting the indicated deadlines, the remaining capacity will ensure self-sufficiency from 2010 to 2015. From 2015, the implementation of the nuclear phase-out and the European Large Combustion Plant Directive 2001/80/EC may lead to significant decommissioning. This means that the system will rely on as yet unknown supplementary generation development projects to maintain the remaining capacity at a sufficient level. A level is estimated as sufficient when it ensures that Belgium doesn't rely on structural import from neighbouring countries. However, in case of the minimum investment scenario (scenario A), the interconnection transmission capacity will remain crucial throughout the period 2009-2020.

The spare capacity was elaborated using the proposed UCTE methodology for an individual country. It was set at 5% of Net Generating Capacity.

The winter peak load is elaborated using historic maximum values of the last completely measured winter (quarter one and four of 2007) and the forecasts of energy consumption growth. More severe temperature conditions in winter 2007 compared to winter 2006, resulted in a higher simulated winter peak load than the one simulated last year, resulting in a higher winter margin against peak load compared to last year simulation. To obtain the summer peak load historic maximum values of the summer 2007 (quarter three and four) were combined with the growth of energy consumption forecast. This methodology results in slightly increasing margin against seasonal peak load over the period 2009-2020.

Interconnection Capacity

The simultaneous import capacity of Belgium is affected by the commissioning of a phase shifter in Zandvliet and two phase shifters in Van Eyck (spring 2008) and will be influenced by the commissioning of the second circuit of the 220 kV AC Aubange-Moulaine line (early 2010). Future possible interconnection reinforcements that are still under study (such as new interconnections between Belgium and Luxemburg, between Belgium and Germany and between Belgium and the UK) are not considered in the current assessment of the simultaneous import and export capacity.

National Representativeness

The Belgian figures refer to Belgian territory and reflect the Belgian national figures (including all voltage levels in Belgium). Furthermore, the reference point for the load figures is based on real measurements that were supplemented by estimates to ensure 100% representativeness.

BG – Bulgaria

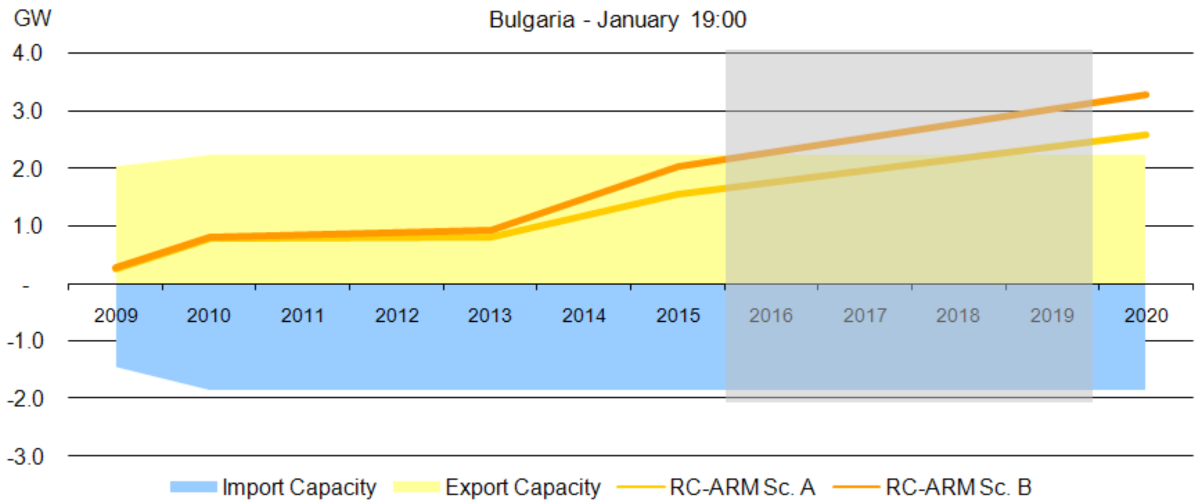
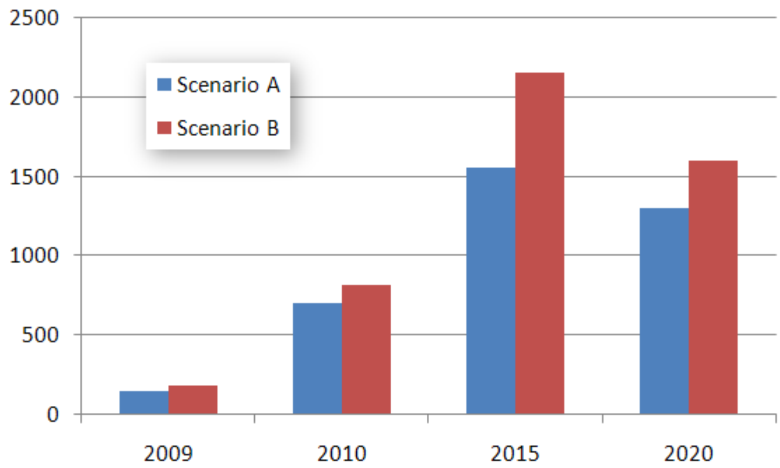


Fig. 42 System Adequacy Forecast in Bulgaria in January 19:00 in Scenarios A and B

Generating Capacity



A new wind farm of 160 MW will be connected to the transmission network in July 2009.

There will be a slight increase of the unavailable capacity in the period 2015 – 2020 due to the expected increase of the non-usable capacity and the outage rates of the older units.

Load

The annual electricity consumption forecast has been made on the basis of the expected economic development of the country after becoming a member of the EU.

No DSM measures have been planned up to now.

Generation Adequacy

The remaining capacity in the period 2015 – 2020 will increase due to the expected new additions of generating capacity (NPP Belene).

The spare capacity in the period 2015 – 2020 will also increase due to the new generating capacities.

All values will be kept stable throughout the planning period.

Interconnection Capacity

The simultaneous interconnection capacity increases in 2010 due to the commissioning of the 400 kV line between Chervena mogila (BG) and Shtip (MK). The export capacity is bigger due to bigger stability limits.

National Representativeness

The index is 99.2% because of the small hydro and wind generators connected to the distribution grid.

CH – Switzerland

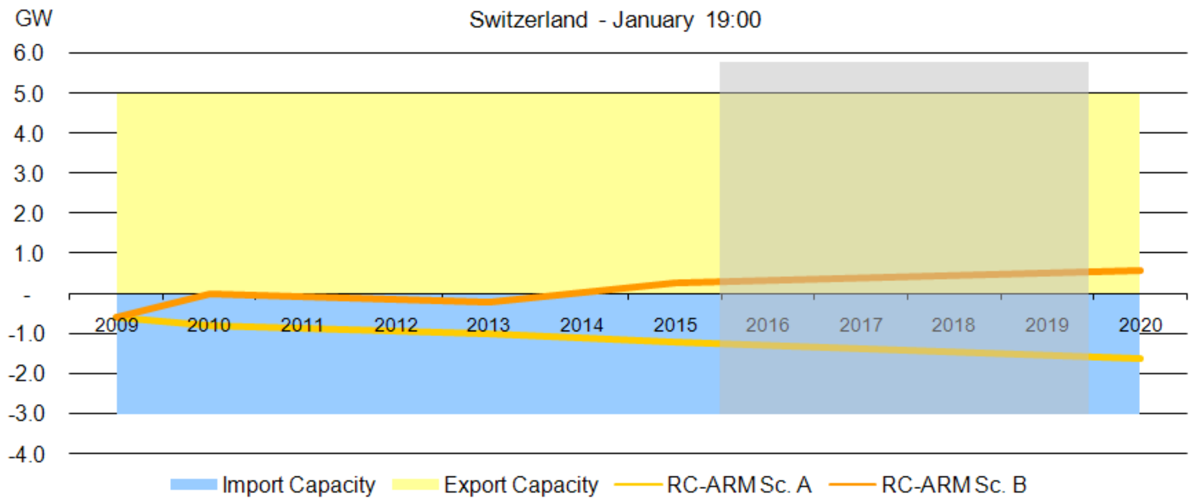


Fig. 43 System Adequacy Forecast in Switzerland in January 19:00 in Scenarios A and B

Generating Capacity

"Not clearly identifiable hydro power capacity" is in fact the capacity of pure and mixed pump storage water plants. Unfortunately, we don't have the information on how to split them into these two categories.

In winter we consider that the following capacities are not usable (the values in the parenthesis refer to the year 2009):

- 75% of the capacity of run of river hydro plants (2.78 GW)
- 10% of the capacity of storage hydro plants (0.79 GW)
- 20% of the capacity of pure and mixed pump storage water plants (0.38 GW), which are mentioned under "not clearly identifiable hydro power capacity", because we don't have the information on how to split them into these two categories.
- 5% of the capacity of nuclear power plants (0.16 GW)
- 5% of the capacity of large fossil fuel thermal power plants (0 GW)
- 5% of the capacity of small conventional thermal power plants (which don't necessarily use fossil fuels; installed capacity in 2009 as of 0.4 GW) – mostly cogeneration of heat and electricity (0.02 GW)
- 100% of renewable energy sources (0.3 GW)
- 100% of the capacity of other plants - mostly industrial plants amounting to about 0.2 GM in 2009

In summer we consider that the following capacities are not usable (the values in the parenthesis refer to the year 2009):

- 35% of the capacity of run of river hydro plants (1.3 GW)
- 100% of the capacity of small conventional thermal power plants (which don't necessarily use fossil fuels; installed capacity in 2009 as of 0.4 GW) – mostly cogeneration of heat and electricity
- 100% of renewable energy sources (0.3 GW)
- 100% of the capacity of other plants - mostly industrial plants amounting to about 0.2 GM in 2009

Load

No Load Management measures possible in Switzerland.

Margin Against Seasonal Peak Load is given under normal whether conditions. An additional load increase, which can be observed during very cold winters, is considered under the Spare Capacity.

Generation Adequacy

In Scenario A the remaining capacity is very low and in the month of January it doesn't match the Adequacy Reference Margin during the whole investigated period 2009 - 2020. In January 2020 the remaining capacity is even negative (-0.2 GW).

In Scenario B the remaining capacity matches exactly the Adequacy Reference Margin as soon as in January 2010. However a deficit of 0.2 GW can be seen again in January 2013. This is of no long duration and in 2015 and 2020 the remaining capacity is well beyond the Adequacy Reference Margin.

We consider that the Spare Capacity (reflecting random fluctuation of load, climatic sensitivity and additional power plant outages) should amount to 7% of the Net Generating Capacity i.e. 1.2 GW in 2008. The most part of this can be ascribed to extreme climatic conditions in case of a very cold winter (-15°C), which requires the activation of additional production capacities of about 1 GW in Switzerland.

Interconnection Capacity

CZ - Czech Republic

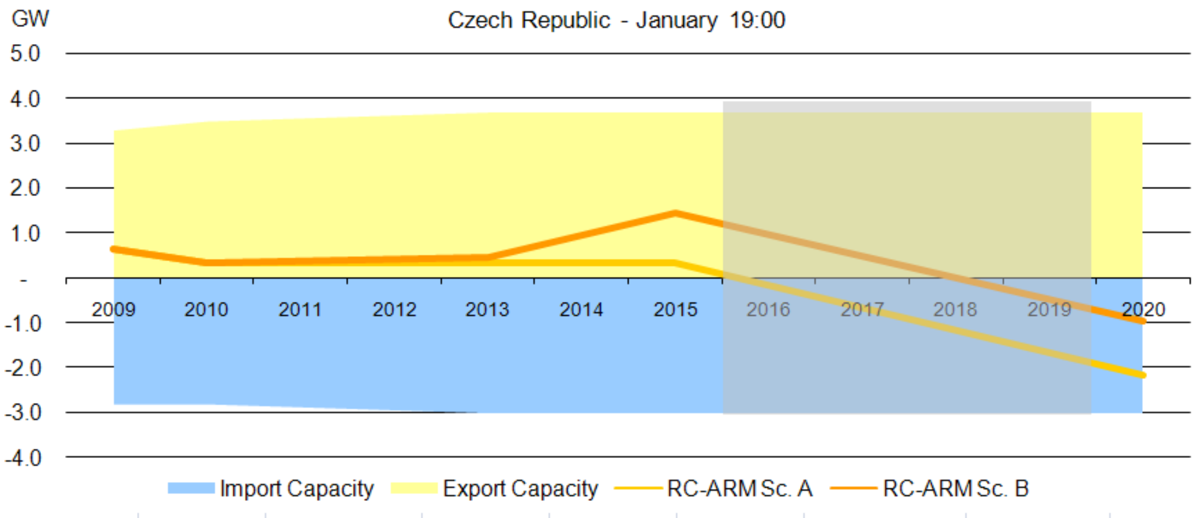


Fig. 44 System Adequacy Forecast in Czech Republic in January 19:00 in Scenarios A and B

Generating Capacity

In conservative scenario increase of NGC in 2013 – 2015 corresponds to development of generation capacity of lignite units. New and retrofitted lignite units 660 MW and 400 MW are expected to start operations, first in 2012 and second 2014 respectively. On the other hand it is expected that some old lignite units reaching their estimated lifetime will be stopped down which also causes decrease of NGC in 2020.

In best estimate scenario additional new gas (CCGT) units 880 MW and 440 MW in the year 2015 go to operation.

Structure of non-usable capacity:

Pumped storage	0,5 GW used for
Storage Hydro	0,4 GW (limited by hydrological conditions)
Run-of-river	0,1 GW (limited by hydrological conditions)
Wind	0,3 GW (This value will rise up to 0,8 in 2015 by the reason of constructing of the new wind units.)
Fossil Fuels	0,7 GW (Of which 0,2 GW are unavailable due to heating and approximately 0,5 GW is the unavailability of small fossil fuels units where CEPS doesn't have detailed information about the reasons of the unavailability.)

Overhauls for 2009 are consistent with the last schedule provided by the generators for year 2009. For further years best TSO estimate is given. Value of outages is based on the unavailability rates of significant units.

Load

Generation Adequacy

Analyses show, that for scenario B, there is practically zero remaining capacity, and in scenarios A there are even negative values in 2020. It is expected, that imports will be necessary. This situation results from reduction of NGC (particularly lignite units).

Calculated as 5% of NGC rounded on hundreds of MW.

Interconnection Capacity

New 400 kV line to Austria (on the common towers with the existing 400 kV line V437) should increase both the safety of operation and simultaneous export capacity. The line goes to operation already at the end of 2008.

DE – Germany

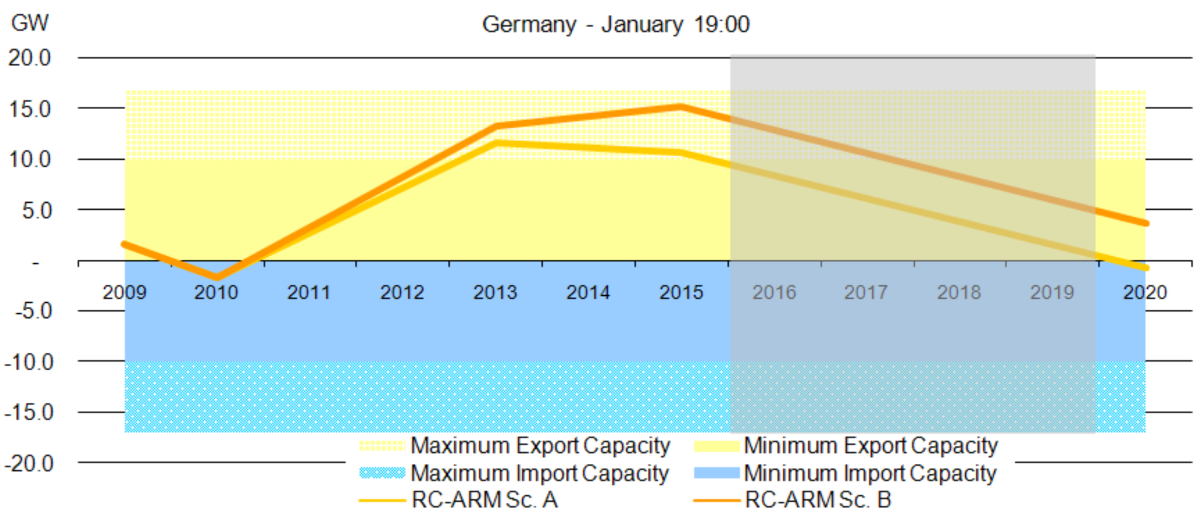


Fig. 45 System Adequacy Forecast in Germany in January 19:00 in Scenarios A and B

Generating Capacity

The increase in renewable-based generating capacity during the period from 2009-2020 is expected to be more than 30 GW. The major part will be wind power. The consensus achieved about the remaining life of nuclear power stations leads to a strong decrease in the capacity of nuclear power plants and is visible in this forecast. The increase in thermal conventional capacity is mostly based on hard coal and gas-fired power plants. Some generating capacity of regional and municipal companies, which is not known in detail, has been assigned to the category “Not clearly identifiable”.

Uncertainties concerning future commissioning and decommissioning of power stations in Germany have to be noticed. The phase-out of nuclear power stations decided by the former government is again under discussion. The election to the "Bundestag" in 2009 might lead to different political constellations compared to now. That could have an effect on the future operational use of the existing nuclear power stations. Furthermore, there is a general political discussion going on about the realization of the planning of coal-fired power stations related to the CO2 problem.

A large part of the generating capacity of wind-energy plants needs to be considered as “non-usable” or “unavailable” capacity owing to the stochastic nature of wind energy availability.

Generally, it has to be noted that power station operators consider data on “non-usable capacity” to be sensitive information in terms of competition; for this reason, detailed information of this kind is not made available to system operators. The data used for the power balance forecast are values estimated on the basis of pragmatic values obtained prior to the liberalisation of the German electricity market.

Load

The implementation of energy saving measures and the increase in technological efficiency, respectively, will lead only to a moderate growth in electricity demand in Germany.

Generation Adequacy

From the TSOs' point of view, power station operators would have to secure at least the output of the largest unit as hours reserve within the respective control area, as the TSO makes the reserve available only for a maximum of one hour (dimensioning of system services). However, almost all power station operators try to reduce this power through pooling with other power station operators. As a result, this reserve is likely to become even smaller in the future.

Adequacy Reference Margin and Remaining Capacity are balanced in both scenarios (related to around 5% of the NGC).

Interconnection Capacity

NTC values for the years 2009 to 2020 will be calculated by UCTE experts and published by ETSO; they are currently not available for the future.

ES – Spain

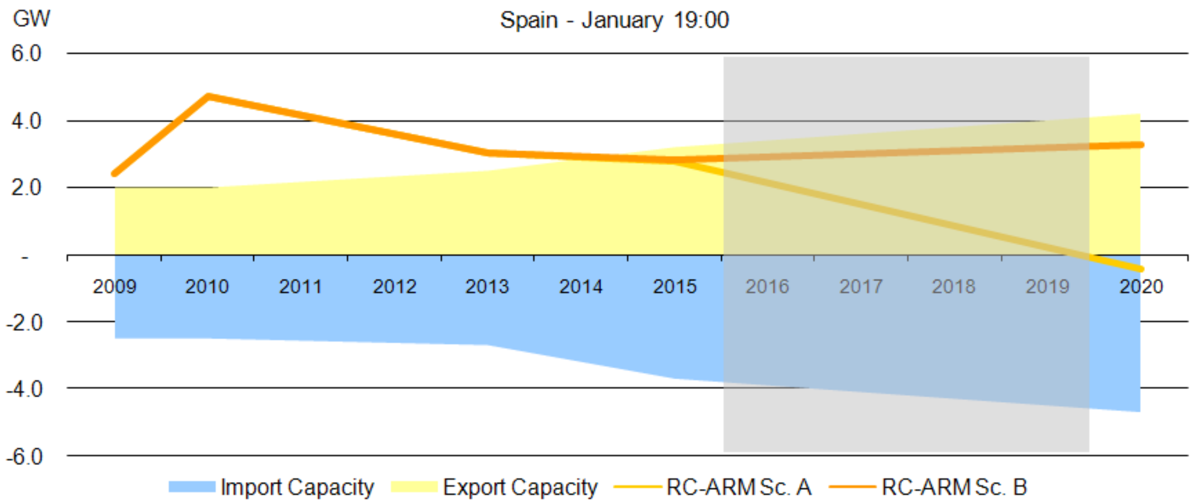


Fig. 46 System Adequacy Forecast in Spain in January 19:00 in Scenarios A and B

Generating Capacity

Generation expansion planning is mainly based on the commissioning of new CCGT (Combined Cycle Gas Turbines) and Renewable Energy Sources (the major part will be wind and solar plants).

At the moment there are 6 new CCGT units under construction to be commissioned before the end of 2011, representing a volume of 2.900 MW:

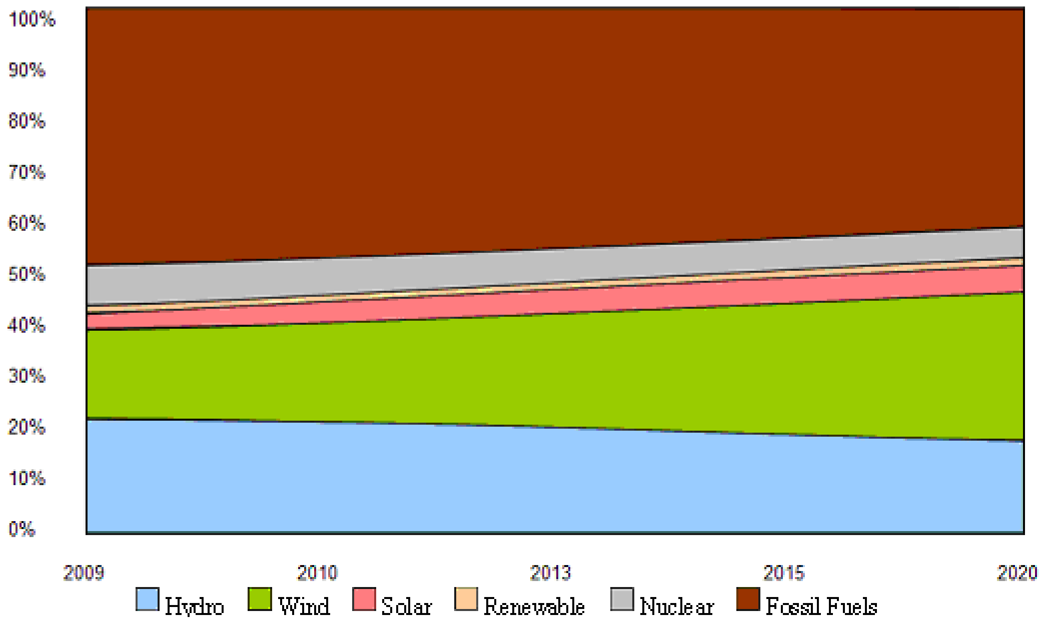
- Málaga: 425 MW
- Besós 5: 825 MW
- Algeciras 3: 400 MW
- Algeciras 4: 400 MW
- Barcelona 1:425 MW
- Barcelona 2:425 MW

One Peaker Open Cycle Gas Turbine (OCGT) of 100 MW is also under construction and will be in operation in 2010.

In the medium term, it is expected that additional 5.000 MW of CCGT and 800 MW of OCGT will be in commercial operation by 2015. In the long term, there are several projects concerning coal fired units with CCS (Carbon Capture and Storage) technology, however there are still significant uncertainties regarding their completion.

In the other hand, the impact of LCP Directive will rise to the decommissioning of 13 thermal plants (mainly oil fired plants) representing a capacity of 3.300 MW. The operation of these plants has been reduced to 20.000 hours from January 2008 and they will be decommissioned by December 2015 at the latest.

At the moment, renewable capacity represents about 40% of generating capacity in Spain. The role of renewable energy sources will reach almost 50% in 2015. The expected wind capacity by 2015 is about 28.000 MW (currently 16.000 MW) and the forecasted solar capacity by 2015 is about 5.000 MW (currently over 1.000 MW). The weight of nuclear will slightly decrease from 8% in 2009 to 7% in 2015.



Generation investments until year 2015 have been already decided, because of that the only difference between Scenarios A and B refer to year 2020.

Generation capacity will increase about 25% until year 2015; however non usable capacity will increase about 50% in the same period, due mainly to the increasing role of intermittent generation capacity (mainly wind and solar).

The most important assumptions taken into account for the calculation of non-usable capacity in the system adequacy forecast provided are the following:

- Thermal forced outage rate: available thermal capacity with probability of 95% has been considered
- Dry hydro conditions: significant non usable hydro capacity resulting from lack of water in the reservoirs
- Wind conditions: available wind capacity with probability of 90% has been considered

Load

Load forecast has been built taking into account medium and long-term projections of economic growth rate (GDP) and population, as well as the impact of energy efficiency policies and demand side management on load.

Existing contracts with industrial companies and legal issues allows System Operator to reduce consumptions at peak load. The values of DSM capacity can reach up to 4% of total peak load.

Generation Adequacy

From the point of view of generation adequacy, in the short term, the situation in the Spanish system is not critical for next year. Forecasted remaining capacity is higher than adequacy reference margin even in case of extreme peak demand.

In the medium and long term, the perspectives show that there will be margin enough in the Spanish system along the study time horizon, taking into account load forecast and generation expansion planning. In scenario B (best estimate) remaining capacity seems to be sufficient. Capacity margin values are fairly stable along the forecasted adequacy time frame from 2009 to 2020. The expected remaining capacity is about 9 – 13 GW in winter and about 11 – 16 GW in summer, always higher than adequacy reference margin, even in case of extreme demand due to severe weather conditions (extreme temperatures).

Only in scenario A (conservative) additional generation capacity is required by 2020.

Spare Capacity is assumed to be 10% of extreme seasonal peak load in Spanish system. This value is about 5% of net generating capacity, as assumed in System Adequacy Forecast Reports produced in 2007 and 2008.

In the Spanish system, generation adequacy and evaluation of Spare Capacity are carried out by the Adequacy Index. Adequacy Index is defined as the relationship between available capacity and peak demand. In this framework, available capacity is defined as generating capacity minus non-usable capacity at peak demand, overhauls and outages. Reference value for Adequacy Index is 1,10 in case of extreme seasonal peak load, that is Spare Capacity is assumed to be 10% of extreme seasonal peak load as stated above.

In scenario B (best estimate) Adequacy Index is over 1,10 from 2009 to 2013 and it is about 1,08 from 2015 to 2020. Only in scenario A (conservative) Adequacy Index is about 1,03 by 2020.

Interconnection Capacity

Increase of interconnection transmission capacity between Spain and France (the rest of UCTE system) is one of the main concerns of Spanish TSO regarding adequacy evolution, as well as the increase of transmission interconnection capacity with Portugal in the framework of the development the Iberian electricity market.

National Representativeness

National Representativeness index is about 98% of the total Spanish consumption because the power balance does not include the load (self consumption) of cogeneration.

FR – France

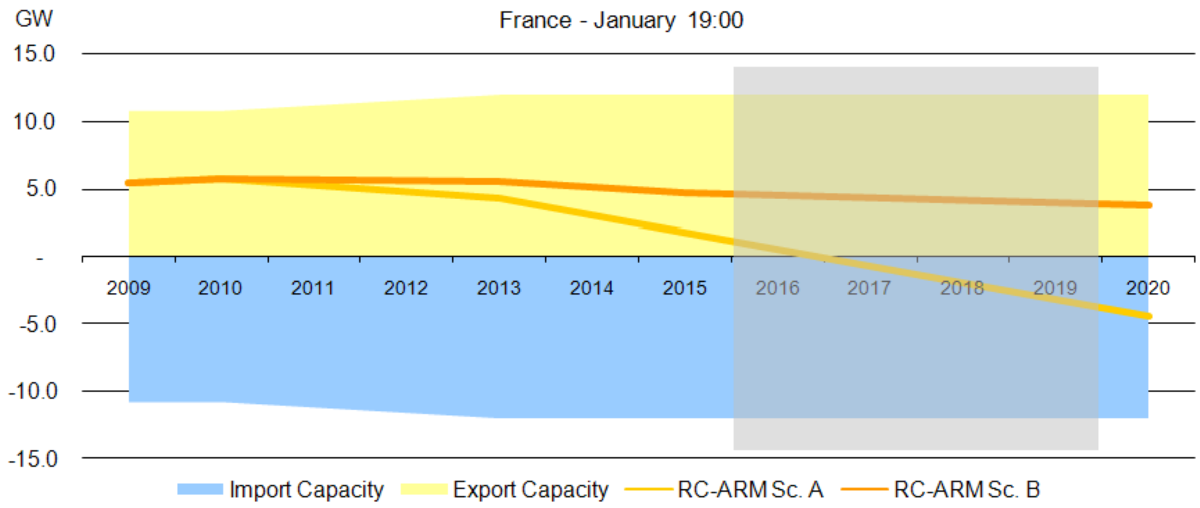


Fig. 47 System Adequacy Forecast in France in January 19:00 in Scenarios A and B

Source of the next comments can be found on the RTE website www.rte-france.com: RTE, "Generation Adequacy Report", 2007 edition & "Actualisation du bilan prévisionnel", 2008. The next complete English edition of the French Generation Adequacy Report will be issued by July 2009.

Generating Capacity

Since the beginning of the year 2005, the applications for the connection to the French Transmission System, for which RTE proposed a solution accepted then by the generator, have represented a volume over 13,000 MW.

Most of these projects are for Combined Cycle Gas Turbines (CCGT): 24 units, with a cumulative capacity of almost 10,900 MW. Six of these (2,600 MW), on which construction work began before 1st June 2007, should be commissioned between 2009 and 2010. For the others, lacking the necessary planning permissions or any irrevocable decision to green light the project, RTE cannot currently be certain that they should be carried through to completion. This is especially true in view of the fact that the political or economic context could influence decisions on whether to build the facilities in France or other countries.

Conversely, there is decommissioning of existing conventional thermal plants, mainly because of the application of the LCP Directive: around fifteen units, mainly coal-fired plants, representing a capacity of 3600 MW, will see their operation reduced to 20,000 hours from 1st January 2008 on, and will have to be decommissioned by 31 December 2015 at the latest. The operation of other conventional thermal units may be continued beyond 2020.

Concerning nuclear power, the construction of a new EPR reactor has begun at the Flamanville site. It is expected to be commissioned in 2012, and will provide 1,600 MW of capacity.

Renewables also began to soar, with 1400 MW of wind power at the beginning of 2007, but face technical and environmental constraints. The best estimate forecast is 5 GW in 2010, 10 GW in 2015 and 17 GW in 2020 as planned in the last System Adequacy Forecasts. As far as cogeneration is concerned, RTE plans a decrease by 1 GW by 2013.

Projects concerning coal-fired units also have a grid connection authorisation. However, there are still significant uncertainties regarding their completion (local acceptance, CO2 capture and storage, etc.).

(Source: RTE, Generation Adequacy Report, 2007 edition & Actualisation du Bilan Prévisionnel, 2008)

Load

The updating of the Generation Adequacy Report, edition 2007, confirms the global trends on the demand forecast set out last year. The demand forecast reaches 514 TWh in 2013, i.e. an increase by 4 TWh with respect to the reference scenario of the last year study. This result takes into account the increase in the prices of fossil energies and the growth in the Building Industry, but remains consistent with the long term trend which forecasts a decrease in the demand growth.

In this context, demand grows by 1.4 % per year until 2010, and 0.7% over the following decade, in the new baseline scenario used for the updating of the *[French]* Generation Adequacy Report [*2007 and UCTE System Adequacy Forecast 2007-2020]*, leading to annual energy demand of 534 TWh by the year 2020 in France (excluding Corsica).

The growth in the demand is mainly driven by the residential sector (+1.4 % between 2004 and 2020) and tertiary sector (+1.7 on the same period), whereas industry reaches only +0.3%.

One can be stressed also that the peak load is expected to reach a higher level in the coming years due mainly to the residential consumption with the development of the electrical heating.

In parallel, the reinforcement of actions to promote energy efficiency is confirmed. The new French legislation and the European Commission new action plan set down concrete objectives that also affect the electricity sector. Strengthening of building energy regulation, tax credits granted to equipment that is energy-efficient or uses renewable energy, measures to promote labelling, Energy Savings Certificates, tend to achieve these objectives.

RTE estimates that the effect of the demand-side management measures taken into account in the baseline scenario will save approximately 35 TWh per year by 2020.

(Source: RTE, Generation Adequacy Report, 2007 edition & Actualisation du Bilan Prévisionnel, 2008)

Generation Adequacy

Taking into account the updating of the Generation Adequacy report, edition 2007 with the assumptions on the generation and load set out here above, the supply-demand balance is satisfactorily assured till 2013. However, all the projects leading to this conclusion need to be monitored very closely over the next few years:

- Concerning supply: the start of work on new CCGTs, the rate of development of wind farms (and other RES), possible decisions to decommission CHP units,
- Concerning demand: growth in demand, notably peak demand (for heating, heat pumps in particular), demand shading,
- Concerning exchanges with neighbouring systems: development in the supply-demand balance within these systems, and available capacities at peak demand times in France.

Moreover one can be stressed that the adequacy criterion should have very small margins during winter 2009-2010 and 2012-2013, mainly due to the increase in the peak loads and the decrease in cogeneration capacities. In the coming 3-4 years, the balance could more and more depend on exchange with neighbouring countries.

(Source: RTE, Generation Adequacy Report, 2007 edition & Actualisation du Bilan Prévisionnel, 2008)

Interconnection Capacity

The French power system is interconnected with those of neighbouring countries. The balance of exchange of France reached 56.7 TWh in 2007.

The trilateral market coupling between France, Belgium and the Netherlands has lead to a better use of the daily capacities between these countries. The other regional initiatives involving also France should also lead to a better optimisation of the interconnection capacities.

The France-Spain interconnection capacity is deemed insufficient given the size of the French and Iberian power systems (the maximum NTC is currently 1400 MW from France to Spain and 800 MW in the opposite direction). An agreement has been reached between RTE and REE so as to increase the exchange capacity and reinforce the solidarity between France and Spain through a new tie line Baixas (FR) - Sta Llogaia (ES). This project will take benefit of the highly valuable work of M. Monti, who was appointed as European Coordinator for facilitating the consultation.

RTE is studying the possibility to increase the capacity of the French-Italian interconnector by 1600 MW, either through the optimisation of the existing lines or through the erection of a new line.

GR – Greece

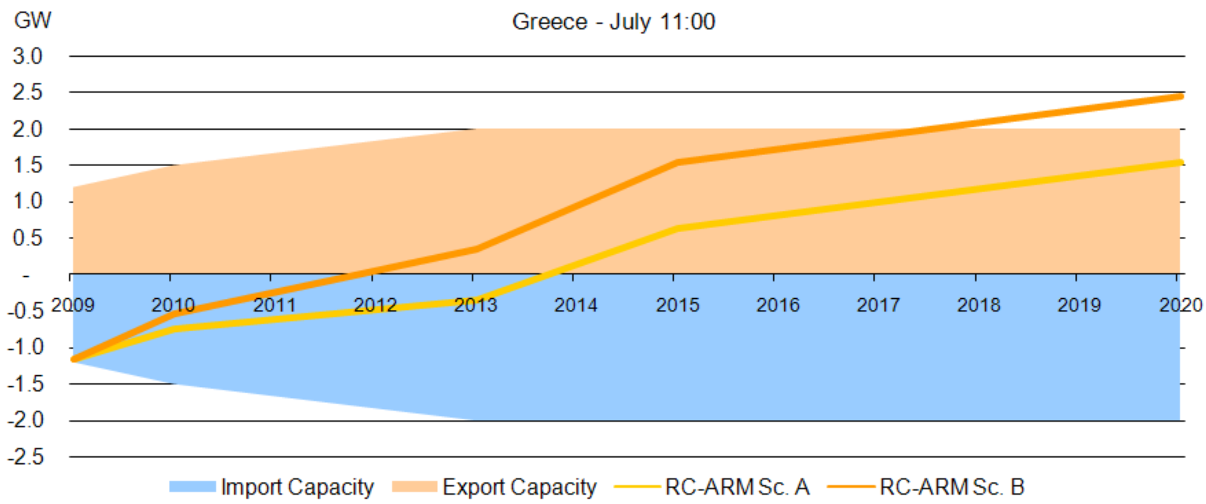


Fig. 48 System Adequacy Forecast in Greece in January 19:00 in Scenarios A and B

Generating Capacity

Currently, there are two mechanisms considering new generation in the Greek system: the market-driven mechanism and through tenders by HTSO to ensure adequacy. The values presented here for years after 2013 are indicative.

Considering renewable energy sources, new legislation has given strong motivation for the installation of photovoltaic systems (a target of 600 MW for year 2010 has been set). However, a delay for the implementation processes is expected.

The Non-Usable Capacity includes mainly hydro capacity (which is reduced due to limited water reserves) and capacity of wind power plants (an average of 75% of which is non usable during the summer peaks). The water management aims at saving the water reserves to use them at the peak demand and only along with irrigation management.

The overhauls of the thermal power plants are avoided during periods of high demand. In this assessment a provisional overhaul schedule of the thermal units has been considered. The overhauls of the hydro power plants are implemented during periods of low use, that is low water reserves or low load periods. Therefore, the scheduled outages of the hydro power plants do not affect the remaining generating capacity.

The forced outage rate of the thermal generating units is expressed by the Equivalent Demand Forced Outage Rate (EFOR).

System services include primary, secondary and tertiary reserve according to the UCTE OH Policy 1.

Load

Seasonal peaks depend highly on weather conditions, mostly temperature. A statistical approach is followed based on recorded hourly load and temperature data covering the period since 1997.

The load is the sum of two components. The first one reflects the load sensitivity to the weather (temperature, humidity and cloudiness), while the other one depends on miscellaneous effects (financial and human activities). The seasonal peak load calculated represents the 90% probability of not exceeding forecasted maximum.

Types of LM measures:

- Industrial customers participate in a peak shaving scheme (new legislation since 2006)
- Irrigation management (during high peak hours, if necessary, irrigation is limited, through existing contracts)

Generation Adequacy

Interconnection Capacity

The completion of new transmission projects in north neighbouring systems (expected in 2010) will lead to an estimated 25% increase of the SITC.

HR – Croatia

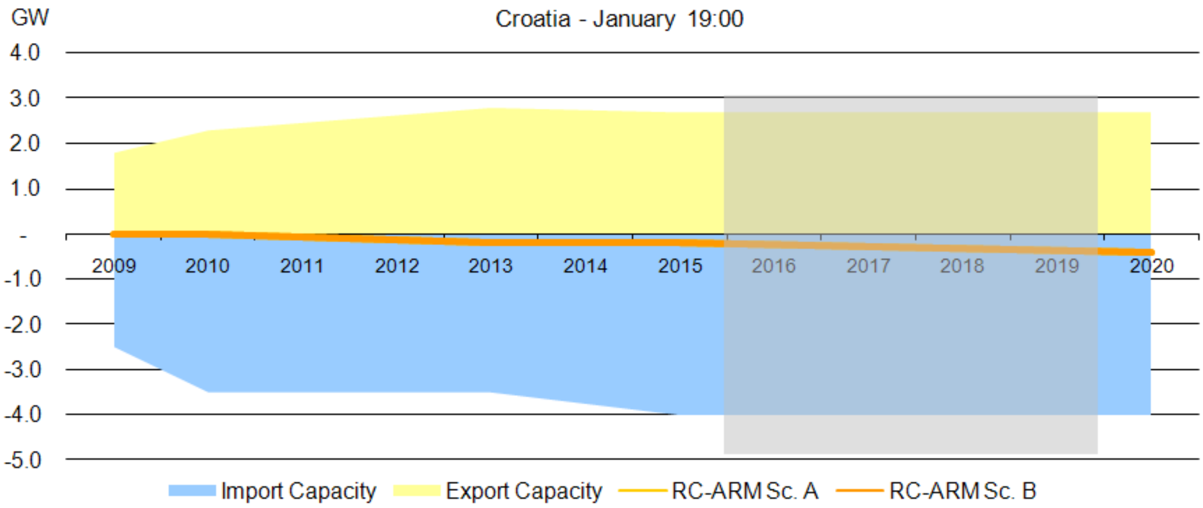


Fig. 49 System Adequacy Forecast in Croatia in January 19:00 in Scenarios A and B

Generating Capacity

The construction of the new gas fired unit of 100 MW power is in progress in the Thermal Power Plant Zagreb (TE-TO Zagreb) and its commissioning is expected within 2009. The commissioning of the new gas fired unit in TPP Sisak of 230 MW nominal power is expected in 2011 and the construction finalization and commissioning of gas fired TPP Slavonija of 400 MW installed power is expected until the end of 2013. Commissioning of gas fired TPP Dalmacija of 400 MW installed power is planned during 2015. The construction finalization of the coal fired TPP Plomin 3 of 500 MW installed power is planned within 2014, and also the end of operation of TPP Plomin 1 of 100 MW installed power. The construction possibility of combined cycle power plant “LNG” of 400 MW installed power exists in the next ten-year period in coastal region (depending on the location of the LNG terminal).

In the observed period till the year 2020, decommission of up to 1000 MW of old thermal power plants units that use fuel oil and coal is planed.

Till the end of 2012, the installed capacity of new renewable energy sources, mainly wind power plants, will amount between 400 and 500 MW. The trend of construction of renewable energy sources will continue, in order that such installed capacity enables reaching national target of 19% total produced electricity in the year 2020.

Regarding Hydro power plants HPP Leš•e with 42 MW installed power is under construction and its commission is planed by the end of 2009. In the observed period till the year 2020 due to construction of new HPP and revitalization and increase of the installed capacity of some existing HPP total installed capacity will increase for 250 MW.

Depending on hydrological circumstances and availability of renewable energy sources (of which the installed capacity in the amount of net generating capacity will increase constantly) the constant increase of unavailable capacity is expected. A contribution to that will also come from the performance of the regular maintenance works of the generation facilities as well as continuous mild increase of necessary amount of

System Service Reserve. This trend will be more significant than non-usable capacity in old TPP units that will gradually stop operation.

Load

In the observed period until 2020 the annual increase of electricity consumption is expected to mildly decrease due to energy efficiency measures.

Load forecast has been built taking into account medium and long term projections of economic growth rate. Growth of the load depends directly on the industry development and growth of the household consumption.

Load Management measures have not been considered yet (new national Energy strategy is under discussion).

Generation Adequacy

Remaining capacity will show a constant increase until 2015 dominantly due to increased volume of construction of gas fired thermal power plants. After the end of that cycle a slow constant decrease is expected, which will cause a need for smaller import of electricity in the period until 2020, but the dependence on imported energy will be reduced in relation to the current situation.

Spare capacity will move in the range from 5 to 7% Net Generation Capacity that is from 200 MW in 2009 to expected 400 MW in 2020.

The values of margin against seasonal peak load will remain stable during the observed period of the time.

Interconnection Capacity

Double power line 400 kV Ernestinovo – Pecs is under construction and the year of commissioning is 2010. This double tie line between Croatia and Hungary is expected to increase steady state security in region. The importing capability of Croatia and surrounding countries from central Europe and Ukraine is expected to be increased as well.

A new OHL 2X110 kV Plat (HR) – Herceg Novi (ME) is under consideration. It could be the first transmission connection between Croatia and Montenegro.

New 400 kV interconnection between Bosnia and Herzegovina and Croatia is under consideration. Project significance is bilateral and regional; it will enhance security of supply in both systems and strengthen the exchange and transit capacities in the region.

A construction of 400 kV HVDC submarine cable with a 500 - 1.000 MW capacity between Dalmatia in Croatia and Italy is under consideration. According to the Agreement on ToR common feasibility study is underway.

National Representativeness

The index is 99 % since TSO data does not include production of industrial power plants, which was not delivered to the grid, but consumed in their industrial facilities.

HU – Hungary

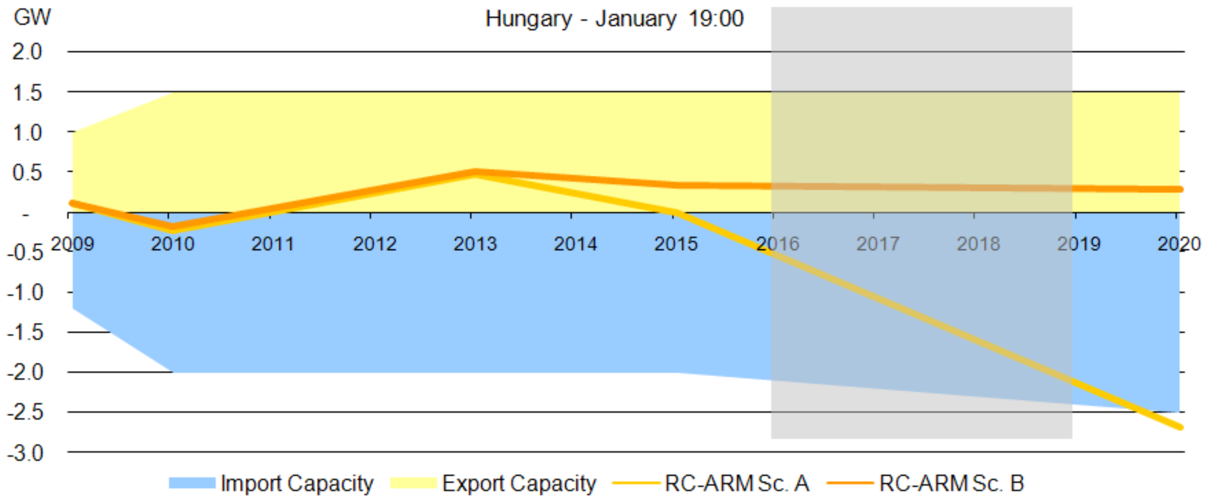


Fig. 50 System Adequacy Forecast in Hungary in January 19:00 in Scenarios A and B

Generating Capacity

New gas-fired units under construction: Göny• PP (410 MW – 2010), Dunamenti PP (400 MW – 2010), Heller PP (210 MW – 2010), and Nyírtass.

PP (800 MW – 2011). There are also some other gas-fired projects under preparation.

One new lignite-fired unit is expected: Mátra PP (400 MW – 2014).

Some smaller biomass units were also taken into account.

The total generating capacity of wind power is limited to 330 MW, but this limit is subject to regular revision.

Not Clearly Identifiable RES include mostly biomass units.

Load

This load forecast is based on macroeconomic research and energy policy analysis. Although some improvement in energy efficiency is assumed, no major changes in the current consumption trends are taken into account until 2015/2020.

Generation Adequacy

In case of scenario A, additional generating capacity will be required after 2015.

The average growth rate of summer peak load is somewhat higher than the average growth rate of winter peak load.

Interconnection Capacity

IT – Italy

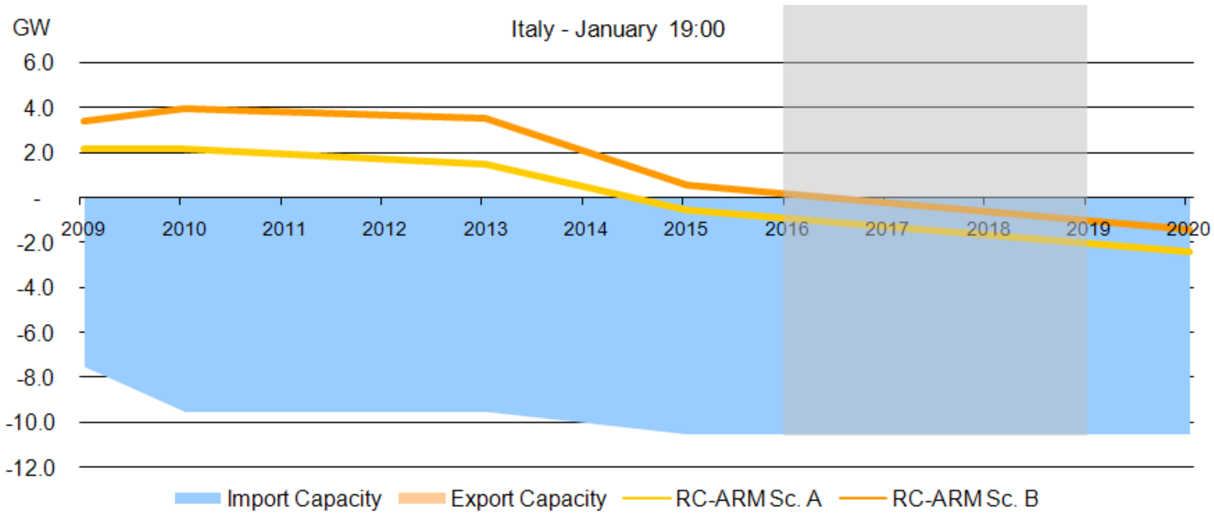


Fig. 51 System Adequacy Forecast in Italy in January 19:00 in Scenarios A and B

Generating Capacity

An increase higher than 10000 MW for conventional thermal plants is expected up to 2013 and over than 3000 MW of wind power.

- Unintentional temporary limitation (transmission constrain, environmental constrain, etc.)
- Limitation of the primary energy source (for example the last period of time has been very mild and scarce of rain with impact on the use of hydro power station)

Load

For a better estimation of the power we need to cover future demand the energy consumption forecast growth index has been built considering the major evolution scenario.

A special customer power supply contracts for an automatic load shedding in emergency situations.

Generation Adequacy

In normal conditions the remaining capacity, including only the firm importing contracts in most times is enough. This value can be higher with a full importing capacity.

The spare capacity is assumed to be 5% in Italy.

Interconnection Capacity

Under normal conditions in the Italian electric power system the load demand can be supplied by relying on the internal capacity.

Nevertheless the importing capacity from external power systems gives a fundamental contribution. Under severe conditions the importing capacity becomes necessary to guarantee adequate reserve margins.

Interconnection plan studies is one of the main priority for development of the electrical system oriented to increase the security and the geographical diversity of the sources.

In the medium time the main planned intervention finalized to increase the total exchange of energy from Italy and the neighbouring countries are:

- The studies of interconnection with France finalized to increase the total capacity, promoted by CE with collaboration of Terna and RTE (new HVDC line Grand Ile – Piossasco);
- The development of the interconnection with North Africa region.

LU – Luxembourg

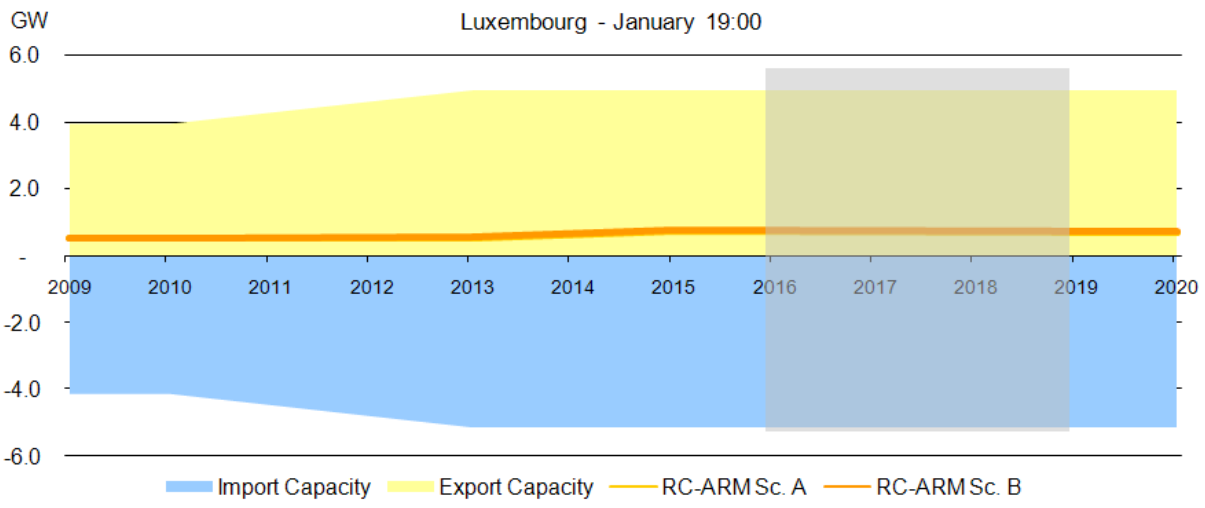


Fig. 52 System Adequacy Forecast in Luxembourg in January 19:00 in Scenarios A and B

Generating Capacity

<u>Scenario A</u>

The main pump storage power plant in Luxembourg will be enlarged by a new 200 MW unit. Target date for commissioning is end 2012, beginning 2013.

<u>Scenario B</u>

Till 2013 several wind farms with a total capacity of 30 MW are planed. Their commissioning will depend on the local permitting procedures

<u>Pump storage plant of Vianden.</u>

- The overhaul of the machines in the pump storage plant is going on and from March to December 2009 a unit of 200 MW will not be available.
- In 2010, from Mai to September, four units of in total 400 MW will not be available during the construction of the new unit.
- From 2011 to 2020, every year during 30 weeks, the overhaul of one unit of 100 MW is scheduled

In 2009 the maintenance of the main thermal power plant is scheduled during 2 weeks in May or June.

Any other non-usable capacity may be caused by lack of wind or limitation of water.

Load

During the last five years we noticed an average annual growth of the load of about 2,7%. We assume that the economic situation and the growth of the population by emigration will result in a more or less similar growth of the load for the next years.

Existing contracts with some small cogeneration units and legal issues allow us to start or to stop production during peak load. Modulation of the charging period of storage heating during the night is also possible. The values of DSM power can reach up to 5% of the national load.

Generation Adequacy

The remaining capacity in Luxembourg is true for the interconnected UCTE grid but it does not represent the real situation for the local national grid, because the two main generator plants in Luxembourg does not inject directly in the national grid. The pump storage power plant (1 100 MW) is connected via dedicated lines to the German grid of RWE and delivers system services for that grid. The thermal power plant (385 MW) is located in our grid but there are dedicated lines (open switches) to connect it to the Belgium grid of ELIA. The needed interconnection capacity for the tie lines with the national grid must be defined in accordance.

This very important remark concerning the physical situation in Luxembourg should be in mind when analysing he following figures and tables.

The spare capacity is assumed to be 10% in Luxembourg.

Interconnection Capacity

A new Interconnector between Luxembourg and Belgium will be in operation for the public grid around 2013 with a capacity of 2 x 500 MW.

The given import and export capacity takes into account also the lines for the connection of the power plants. The interconnection capacity available for the public grid is lower but it is sufficient to cover at all moment the national load in the grid.

ME – Montenegro

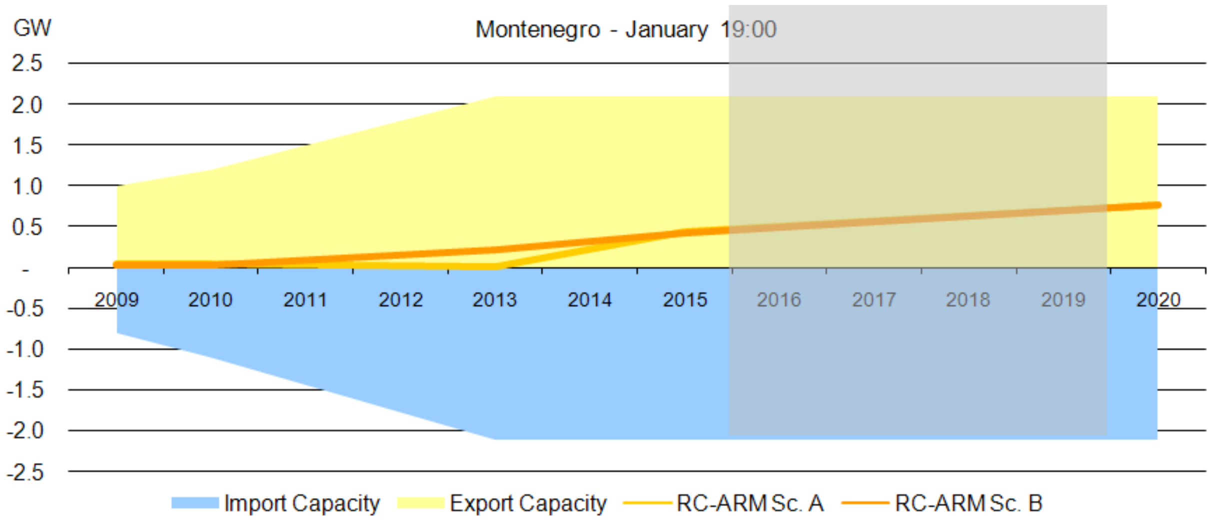


Fig. 53 System Adequacy Forecast in Montenegro in January 19:00 in Scenarios A and B

Generating Capacity

According to the National development strategy, following years will be used mainly for utilization of non-used hydro-potential. Ongoing project is installation of additional unit in the existing Hydro Power Station Perucica and it should be finished by the 2010. In parallel, extension of existing thermal production should be prepared (TPP Pljevlja 2). Rest of the increase of generating capacities are connected to several scenarios of hydro-production utilization. No decommissioning of power units is planed for the period 2008-2020.

Load

It is assumed that no major industrial consumers will appear during the period 2009-2020. Growth of the consumption directly depends on the households consumption forecast. As no decision is taken, this forecast is not taking into account possible decommissioning of the largest consumer in the country (aluminium smelter), which would dramatically change consumption growth.

DSM is based on the bilateral contract with steal mills. It is also expected that DSM potential can be increased if becomes necessary in next years, due to the structure of rest of the industrial consumption.

Generation Adequacy

Interconnection Capacity

MK - Former Yugoslav Republic Of Macedonia

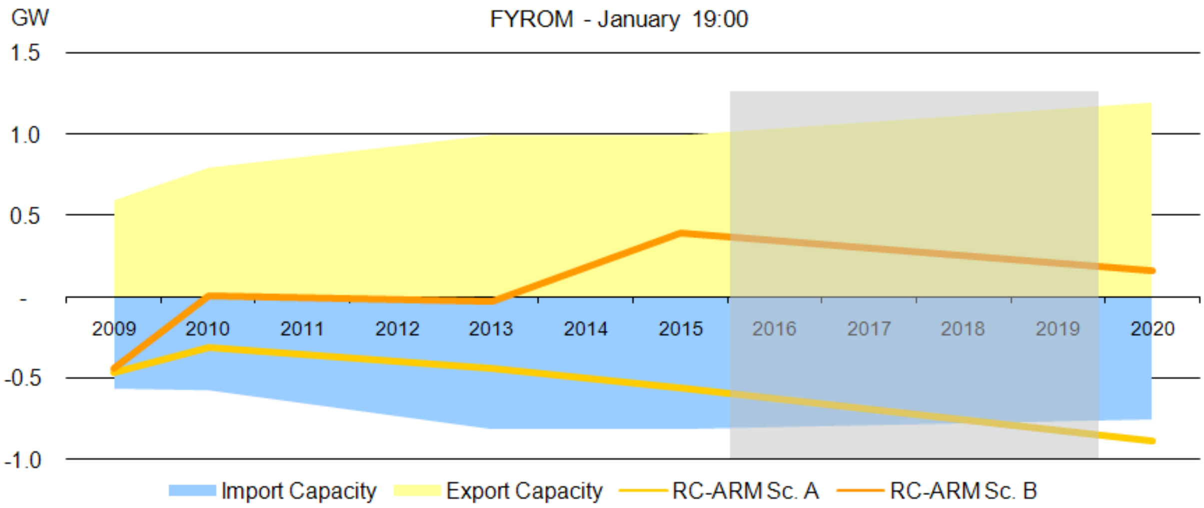


Fig. 54 System Adequacy Forecast in FYROM in January 19:00 in Scenarios A and B

Generating Capacity

According to governmental electricity strategy, development of Macedonian power system is based on installation of new gas fired power plants in urban areas (two CCHP with 530 MW) as well as future investments in hydro power plants (about 850 MW) in order to take advantage of unused hydro capacities in the country. This development plan is represented as best estimate scenario.

Investors are showing interest for investments in wind energy in Macedonia. Preliminary analyses and measurements are already started, but data are volatile and it is hard to predict future deployment of wind power plants. However, best estimate scenario takes into account some possibilities for utilization of wind power in Macedonia (about 100 MW on long-term run).

Conservative scenario takes into account only power plants with firm realization. New hydro facilities require large investments and realization of hydro projects is complex and time consuming. Also, complete gas infrastructure and gas delivery arrangements are preconditions for new CCHP. These facts are considered as uncertainties in conservative approach.

Wind power plants output cannot be fully predicted due to unpredictability of wind and their generation is considered in this category.

Construction of new thermal power plant of 300 MW, lignite fired, is considered on long-term period in best-estimate scenario, but commissioning is not firmly available because of possible delays or modifications.

Load

Constant annual energy growth of 2.5% is predicted along the considered period.

Load strongly depends on temperature conditions. Assumed climatic conditions are close to the average with some fluctuations of the temperature that causes higher consumption in summer.

Consumptions of direct metallurgic customers influence a lot overall load of the country. Consumption in last few years has large increase due to increased consumption in metallurgy, which depends on market price variation of their products. So, variation of load is hardly predictable on long-term basis.

Generation Adequacy

Because of the investment program in best-estimate scenario, remaining capacity has positive value at all reference points for all target periods. There will be some power in range from 300 MW up to 1000 MW that should be available for export.

Remaining margin in conservative scenario is changing depending on seasonal working regime. In winter period there is need for import power to cover the load. During peak hours, deficit is expected to be covered by imports from the north power systems. In opposite, in summer there will be some possibilities for exporting, especially after commissioning of new CCHP in 2009/2010. Of course, export possibilities will be determined by temperature and hydrological conditions.

Spare capacity is considered as 5% of Net Generating Capacity in order to ensure the security of supply.

Margin against peak load in winter is 20% for 11:00 CET and 14% for 19:00 CET. In summer, margin against peak load is about 10%. These trends are assumed over the whole planning period.

Interconnection Capacity

Macedonian transmission network has well developed interconnections with neighbours: two 400 kV tie lines with Greece and one 400 kV tie line to Serbia. 400 kV interconnection to Bulgaria will be commissioned at the end of 2008. According to transmission development plans, two more interconnections are expected in near future: second 400 kV tie line to Serbia (2010/2011) and 400 kV tie line to Albania (2012). Transmission network will be capable to facilitate big power imports/exports depending on generation development, as well as to support bulk power exchanges across the region.

NL - The Netherlands

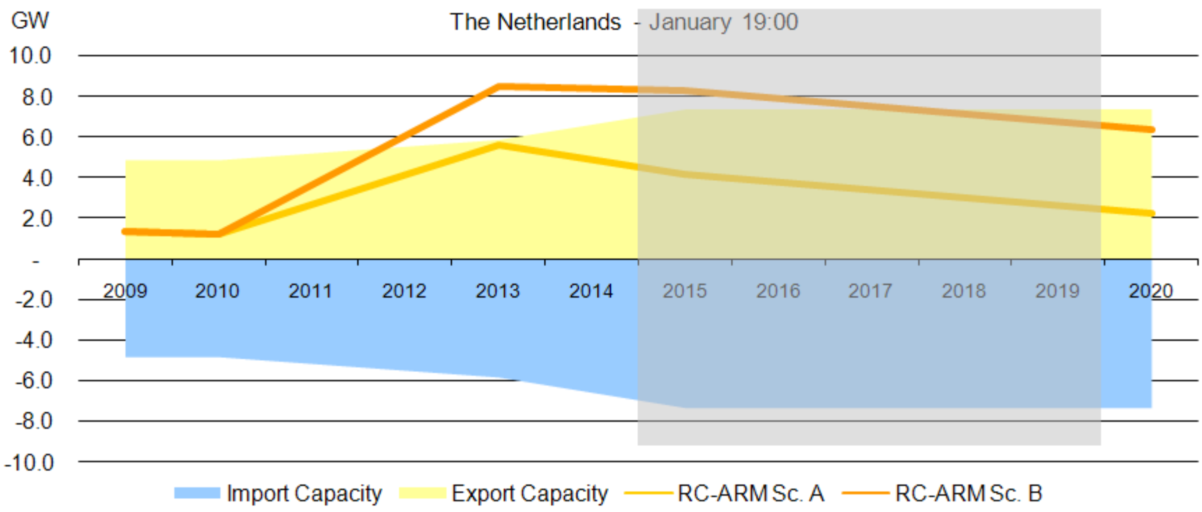


Fig. 55 System Adequacy Forecast in the Netherlands in January 19:00 in Scenarios A and B

Note that the import/export capacities in the Fig. 55 are valid only for scenario B. In the conservative scenario A, the import/export capacity is 1.5 GW less. See Interconnection Capacity below.

Generating Capacity

In the past few years, TenneT has had to deal with a considerable increase in the number of requests to connect production capacity to the grid. Plans have been developed for the construction of large power stations, as well as numerous smaller CHP plants and wind turbines. After the year 2009, large-scale production will increase significantly. The Netherlands has a number of advantages, including: excellent supply routes over sea for fuels, such as coal, a high quality gas and electricity network, a relative high availability of cooling- water and substantial supply of gas. Next is the advantage of the relative high number of interconnection capacity and an attractive business climate. Up to 2015 a relative high quantity of approximately 15 GW in relation to new buildings for large-scale production capacity has been registered. At present the Netherlands has a total production capacity of 25 GW. More than half of the new building projects (7 GW) will probably be completed until the year 2013. This means that up from 2013 there might be an export potential of 7 GW. After this year the potential will possibly further grow up to 9 GW in 2015 if all registered projects will become reality. As it is uncertain whether all projects will indeed be realised, in the national Monitoring Report of 2008, a separate calculation has been made to determine the supply guarantee if not all new buildings plans will be developed. From the analysis it has become clear that even if only 25% of all intended projects will be developed, the supply guarantee for the Dutch production park will not be lower than the level in the preceding years.

This development first became apparent in our Monitoring Report of 2007.

For the time being, most of this new production capacity will have to be transmitted across the existing grid. In some locations, however, the grid does not have sufficient capacity to transmit this (new) supply of electricity at all times. TenneT TSO is therefore working to expand the grid's capacity. However, this may take several years, as the development of new grid infrastructure generally takes longer than the construction of new power stations. In the meantime, we continue to abide by the principle that all connection requests will be granted where possible. In some cases, certain conditions may apply. In addition, TenneT is developing a congestion management system to deal with capacity shortages on the grid.

The non-usable capacity in thermal plants has mainly two components: heat production in combined heat/power plants during the winter period and cooling water restrictions on occasion in summertime. For waste burning plants it's lack of waste during 25% of time. For wind power units the average production over the year at full power is nearby 25% of the capacity.

Load

The annual growth rate forecast for the 2010-2015 period (2%) has been extrapolated for the period to 2020.

Investigations by the Ministry of Economic Affairs of the Netherlands show that there's a DSM potential of 1000-1500 MW directly related to market prices. In the figures it's supposed that this capacity will grow gradually over the period until 2020. There are no specific tariffs to make this capacity available. Within the bid-system for reserve and regulation power of TenneT TSO BV part of this market potential can be used.

Generation Adequacy

The experience of TenneT TSO BV until now is, that all contingencies were solvable with the available amount of reserve. So it appears to exist sufficient resources by market parties themselves to maintain programmatic balance, meanwhile sufficient resources were left to maintain system balance in an adequate way.

Interconnection Capacity

The given values aren't NTC-values but average operational values as agreed on with the TSO-auction partners. In these operational capacities isn't taken into account an increase that eventually could be obtained by developing the infrastructure in networks of the neighbouring TSO's, as far as isn't decided about yet.

The DC-cable from Norway to the Netherlands with a capacity of 700 MW was commissioned in May 2008 and has shown good results for imports.

The BritNed cable between England and the Netherlands with a capacity of 1320 MW is actually under construction and can most probably be taken into service in the year 2010.

The Doetinchem-Wesel interconnection to Germany, with a capacity of 1.5 GW is still not decided on, but is accounted in scenario B as to be operational up from 2015.

PL – Poland

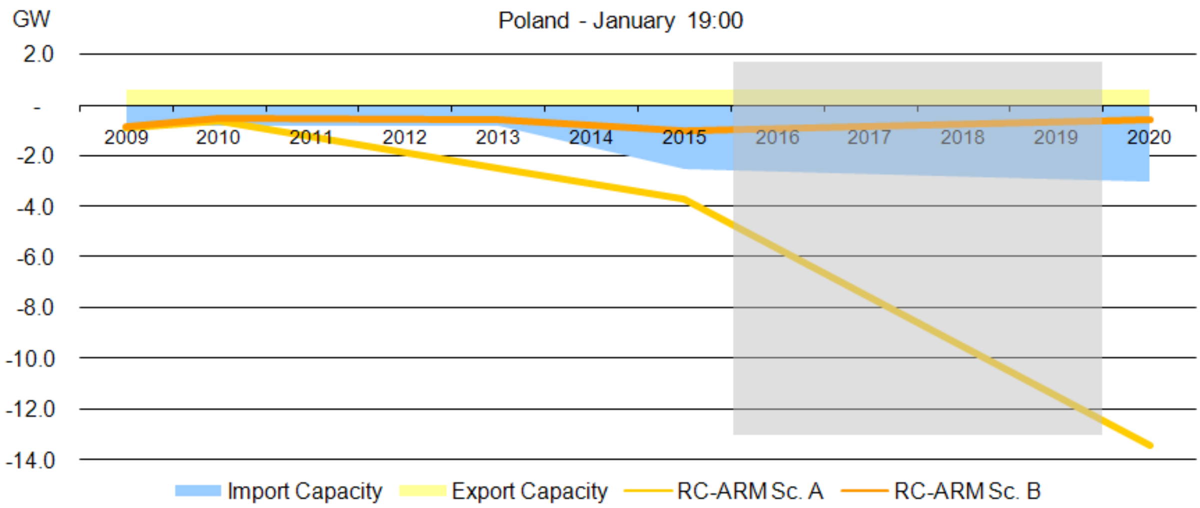


Fig. 56 System Adequacy Forecast in Poland in January 19:00 in Scenarios A and B

Generating Capacity

During the year 2009 there is a commissioning of the new conventional thermal unit expected with the maximum output capacity amounted 430 MW. At the same time some shutdowns of conventional thermal units will be necessary as the result of the environmental constrains. The last commissioning of the main power stations confirmed by Polish TSO is planned at the end of year 2010.

For the Conservative Scenario, there is no commissioning after the year 2010, except a moderate increase in wind turbines between year 2010 and 2013. This scenario indicates potential imbalances in the event that no new investment decisions were taken in the future.

Changes (Commissioning and Shutdowns) of generating capacity presented in Best Estimate Scenario are according to Development Plan accepted by Polish Regulatory Office in December 2006. The added capacity in conventional power stations (in general) is the result of calculations taking into account the Reserve Margin value. The increase of Renewable Energy Sources, mainly wind farms, is forecasted to reach the percentage level of electrical energy consumption in Poland given by Ministry of Economy.

No “Not Clearly Identifiable” is reported.

Following the excel table there are:

1. For Non-usable capacity:
   - ✓ Technological limitation of production in combined heat and power plants (during summer season);
   - ✓ Restrictions due to cooling water temperature in some of thermal power plants (during summer season);
   - ✓ Limitations due to transmission network capacity during high temperature (during summer season);
   - ✓ Average factor of unavailability of wind generation, which amounts 75%;
   - ✓ Increase of the heat production in combined heat and power plants (during winter season).
2. For maintenance and overhauls:
   - ✓ Overhauls;

- ✓ Long and mid-term maintenances.

3. For Outages:
   - ✓ Forced Outages;
   - ✓ Present maintenances due to unexpected faults during the start of the unit.

   Outages are calculated not only on basis of statistical data, but also by taking into consideration present situation in the system. This is the reason, that values in the table changes every year.

4. For System Services Reserve:
   - ✓ Power saved for primary and secondary reserves in conventional thermal power plants;
   - ✓ Power saved in pumped storage hydropower as the intervention reserves.

Load

The forecasted level of annual energy consumption growth for the next years is a bit lower then in previous System Adequacy Forecast report and amounts 2,5%. For years 2010-2020 it is 1,8%.

The main reasons of the growth given in previous report are up-to-date and there are:

- High economic growth which caused the increase of demand for energy;
- The changes of the climatic conditions: strong winters and unexpected hot summers, which cause the intensive use of air-conditioning.

For the years 2009-2020 the potential load management is not considered.

Generation Adequacy

In the scenario “A” remaining capacity decreases, as the result of decommissioning caused by environmental constrains.

In the scenario “B” remaining capacity, in general, remains at the present level – part of added capacity results from rehabilitation activities, mostly connected with environmental upgrading.

According to the Polish “Instruction of Transmission System Operation and Maintenance” the required level of the power, which should be kept available at all time, corresponds to the level of 5% of NGC (in the yearly time horizon).

Referring to the seasons in the SAF excel table (January – winter, July – summer) value in this table is calculated as 5% of Net Generating Capacity minus Maintenance and Overhauls – 5% * (NGC-M&O).

For Poland the representative season for winter are months: December, January and February. For summer it is the period between second half of May and first half of August. Statistically before and after this period the daily peak load takes place in the afternoon, so the comparison of them with morning peak load will be misleading.

Statistically (last 6 years), in Poland during the winter, the daily peak load takes place at about at 17:15 (as well as the monthly and season peak load), for summer it is 13:15.

Statistically margin against the seasonal peak load during the winter is constant – the increase of the peak load on 3rd Wednesday are almost the same as in all winter season. But for summer season, Polish TSO recently observes higher growth of the peak load on the reference hour then the growth of the peak load during all summer season. In connection with this fact margin against seasonal peak load in relation to the previous SAF report has decreased.

Interconnection Capacity

PSE-Operator S.A. gives aggregated data for the whole PL - DE/CZ/SK profile. The simultaneous interconnection transmission capacity for the DE/CZ/SK -> PL direction amounts 0 MW, all import concerns PL - SE and PL - UA border.

For Import Capacity following new technical capabilities for year 2015 were assumed: Lithuania – 500 MW and Ukraine – 1200 MW. For year 2020: Lithuania – 1000 MW, Ukraine 1200 MW. Both of them will be asynchronous connections with back-to-back.

PT – Portugal

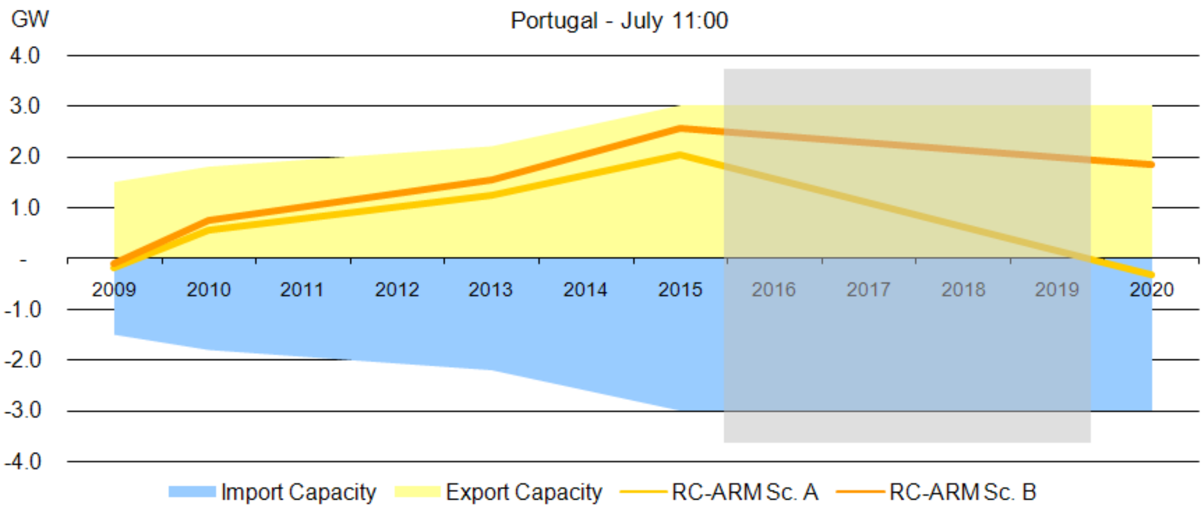


Fig. 57 System Adequacy Forecast in Portugal in January 19:00 in Scenarios A and B

Generating Capacity

During next 5 years, according to governmental plans/objectives, the commissioning of new 3200 MW in combined cycle gas turbines is expected, while all the fuel oil old units should be decommissioned. On the other hand, following government's target of 45% of consumption supplied by RES in 2010, a total of 5700 MW in wind farms is expected by 2013. That wind capacity shall represent more than 25% of the total installed capacity in Portugal in 2013.

Regarding large hydro capacity new 1750 MW should be installed until 2015, of which 1250 MW will be mixed pump-storage. The latter will enable the necessary complementarities to the new intermittent RES generation (wind power).

The "20-20-20" objectives under EU 3rd Energy Package will represent for Portugal a 31% share of energy consumption based on RES in 2020. Concerning electricity sector that shall represent a target of 60% of consumption supplied by RES generation. This is reflected in terms of new RES planned capacity (e.g. a total of 7000 MW in wind farms) and further investments in large hydro capacity up to a total capacity of 7400 MW (i.e. 28% of total installed capacity in the system).

"Non clearly identifiable fossil fuels" refers to CHP and Urban Solid Wastes using fossil fuels.

"Not Clearly Identifiable RES" include other RES that although identified are neither Wind nor Solar power.

Non-Usable Capacity:

- Wind Energy – reflects the average lack of wind power (70%);
- Hydroelectric energy (large power stations) – reflects the average lack of primary energy along with the incorporation of new mixed-pump power plants.
- Thermal RES and CHP (small independent producers) – reflects the average amount of capacity not being delivered to the grid, based on historical values

Outages:

- The larger unit installed in the Portuguese system was assumed

System Services Reserve:

- 2% of peak load to face load forecast uncertainties
- Expected sudden decrease of wind power within 1h period (this criterion has revealed more accuracy than the recommended secondary control reserve empirical function)

Load

The energy consumption forecast is based on estimations enabling the compliance of the "National Action Plan for The Energy Efficiency", that defines for the electric sector a total amount savings of 7% of consumption in 2015.

Along with the referred "National Action Plan for The Energy Efficiency" it was assumed an amount of load capacity that can be interrupted under peak load periods. That capacity will be progressively increasing up to 3,6% of peak demand in 2015.

Generation Adequacy

In both scenarios Remaining Capacity (minus ARM) should stay slightly reduced in 2009. During 2010-2015 margin should be adequate even in conservative scenario (A). In 2020 RC-ARM should be negative in scenario A. However it was assumed that the decommissioning of a very large power plant planned for 2017 is happening along with no unconfirmed investments in capacity, which is unlikely to occur.

The increase in Remaining Capacity in comparison with last year SAF is due a set of positive events for the system: increase in Net generating Capacity, decrease in Load as well as Load Management, which was not taken into account until now.

In this study Spare Capacity was assumed to account for the increase of peak load (during winter) due to temperature and the increase of Non-Usable Capacity (mainly wind and hydro) under severe conditions. This criterion proved to be more adequate to Portuguese system although more restrictive than the 10% of installed capacity that has been used in the past.

According to the last 4 years of demand data, Margin Against Seasonal Peak Load is assumed to be 9,9%, 4,4% and 6,4% of peak load, on January 3rd Wednesday at 11h, January 3rd Wednesday at 19h and July 3rd Wednesday at 11h, respectively.

Contribution from Portugal for the observed increase of Remaining Capacity in SW Block (mainly observed in 2015 and 2020) is significant and mainly due to 2 factors: the increase of Net Generating Capacity (e.g. +13% in 2015-ScenB) and decrease of expected Load (e.g. -6% in 2015 – Scen B). According to Portuguese government's objectives, regarding the accomplishment of "20-20-20" target under EU 3rd Energy Package, 60% of electricity consumption is to be supplied by RES generation in 2020. This means that a total of 7.7 GW of wind capacity and 8.1 GW of hydro capacity (i.e. additional 4.1 GW of NGC comparing to previous SAF) is expected to be installed until 2020. Concerning Load forecast, Portuguese "National Action Plan for The Energy Efficiency" defines savings of 7% of consumption in 2015 and supports Load Management that will be progressively increasing up to 3,6% of peak demand in 2015.

Interconnection Capacity

Simultaneous Interconnection Transmission Capacity was calculated based on 80% of expected NTC between Portugal-Spain.

National Representativeness

During 2009 and 2010, representativeness of Portuguese System should be equal to 98,4% and 99,2%, respectively, due to residual auto-consumption of some CHP generators. Beyond 2010 it is expected to be 100% since all the energy generated by CHP should be delivered to the grid.

RO – Romania

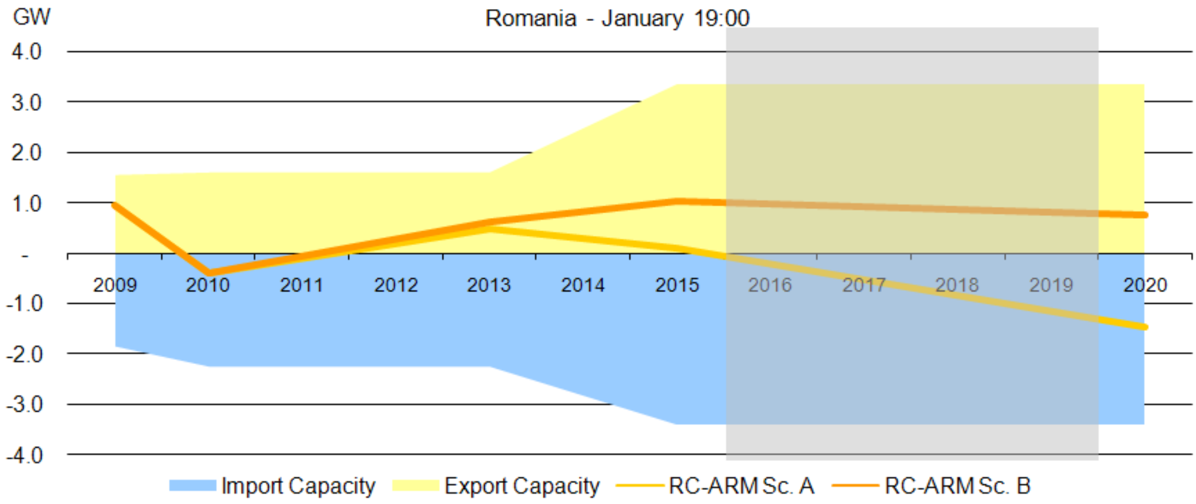


Fig. 58 System Adequacy Forecast in Romania in January 19:00 in Scenarios A and B

Generating Capacity

The latest Romanian Energy Strategy carried out by Ministry of Economy and Finance considers the commissioning of two new nuclear units (of 648 MW each) and a pumped storage HPP (of total installed capacity of 1000 MW) that will be put in operation until 2015-2016.

The generating capacity on lignite will remain almost constant (by rehabilitations/shutdown/ new units commissioning) in order to maintain the mining level of the domestic lignite resources at the level of 30 mil tones annually.

Also it is envisaged that more hydro power plants will be commissioned during 2008-2015 period, totalising 245 MW.

Non-usable capacity includes:

- Temporary limitation of capacity in hydroelectric power stations;
- Lack of wind in wind power stations during certain seasons;
- Limitation of electrical capacity direct related to the heat extraction needed, in the combined heat and power plants;
- High temperatures of the cooling agent in thermal power plants;
- Use of coal with low calorific power;
- Retrofitting programs;
- Other temporary limitations.

Maintenance and overhaul program:

Based on the correspondent standards related to annual planned maintenance period for each category of generating units, it is scheduled a program of maintenance/overhauls to be carried out mainly during off-peak periods.

Outages:

The equivalent outage rates for the stations is determined taking into account the units unavailability probability due to equipment failure, based on multi- annual statistics.

Load

The load forecast was assessed on the base scenario related to the evolution of the main social and macroeconomic indicators (as GDP, population growth) concerning development of Romania in the 2009 – 2020 periods.

There is a regulatory frame regarding the load reduction, but in despite of this there is not any solicitation to license the consumers yet in order to balance the system.

Generation Adequacy

The figures of Remaining Capacity in Scenario A reveal that new investments in generating capacity are required for 2020; a part of them are covered in Scenario B.

Based on the past experience, related to the load variation and the generation capacity structure of Romania, a Spare Capacity of 5% of NGC was considered in order to assess the Adequacy Reference Margin.

Summer season includes the months from April to September, whereas the other six months are considered as winter season.

Interconnection Capacity

For 2009 the commissioning of 400kV OHL Nadab-Bekescsaba will be contributing to the increasing of the Romanian transfer capacities with 100 MW for import / 200 MW for export.

For 2020 the increasing of the Romanian transfer capacities with 1500 MW for import / 1200 MW for export is taking into account the following commissioning of new internal OHL and tie-lines:

Line or Equipment name	*Voltage Level (kV)*	*Commissioning Date*	*Main Characteristics (single or double circuit line, length, AC lines or DC lines, etc.)*
OHL Oradea - Nadab	*400*	*2008*	*75 km, single circuit, AC line*
OHL Resita – Timisoara (actually operating al 220 kV, double circuit)	*400*	*2015*	*73 km, single circuit, AC line*
OHL Timisoara -Arad	*400*	*2015*	*54 km, single circuit, AC line*
OHL Timisoara or Resita (RO) – Vârşeţ or Novi Sad or Pancevo (Serbia)	*400*	*2015*	*~ 100 km, simple circuit, AC line*
OHL Suceava (RO) – Balti (MD)	*400*	*2016*	*150 km, (93km on RO) single circuit, AC line*
OHL Suceava – Viişoara (Bistrita) - Gadalin	*400*	*2018*	*260 km, single circuit, AC line*
OHL Cernavoda-Stilpu	*400*	*2016*	*156km, single circuit, AC line*
Substation Tarnita (Pumping storage hydro power plant)	*400*	*2016*	*-*
OHL Tarnita-Mintia	*400*	*2016*	*145km, double circuit, AC line*
OHL Tarnita-Gadalin	*400*	*2017*	*40km, single circuit, AC line*

RS - Republic of Serbia

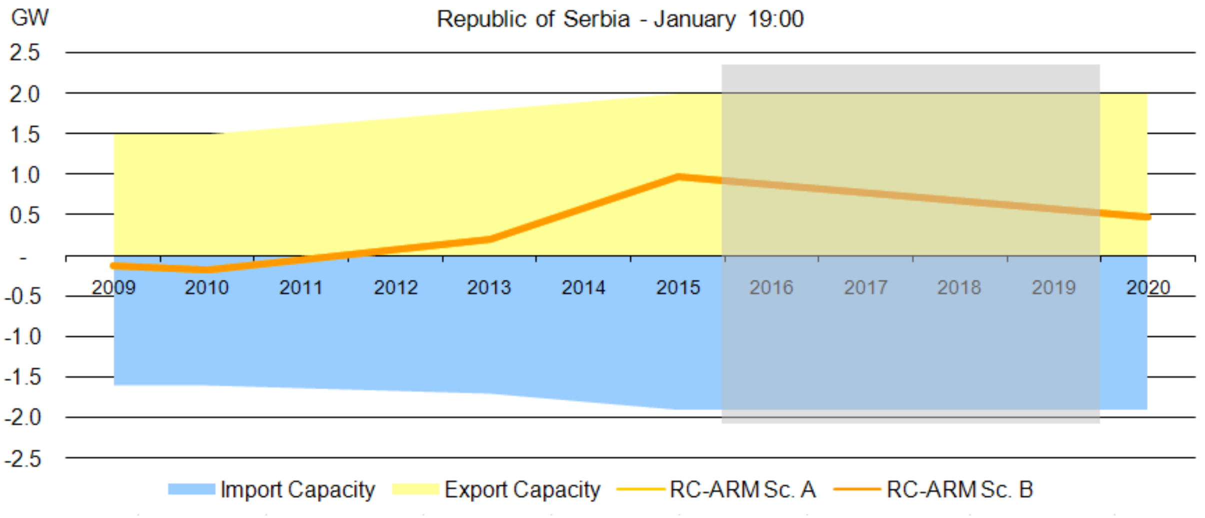


Fig. 59 System Adequacy Forecast in Republic of Serbia in January 19:00 in Scenarios A and B

Generating Capacity

First significant change in generation capacity of Serbia should occur in 2013. Expected increase till year 2020 should be 1750 MW.

According to the plan four existing units in TPP Kolubara A will be replaced with the new larger unit, one unit in the gas turbine combined cycle PP Novi Sad 2 will be build and additional generator in HPP Bajina Basta will be commissioned till the year 2013, altogether 530MW.

In period 2013 – 2015 one more unit will be added in Novi Sad 2 and start of operation of a new HPP Buk Bijela is expected. In total it adds up to additional 1220MW in Serbian power system.

Main reason of increase of unavailable capacity is non-usable capacity of units at the end of the lifetime

The amount of system reserve is in accordance with Serbian Grid code and won't change significantly since the capacity of the largest unit will not change.

Load

Generation Adequacy

Interconnection Capacity

SI – Slovenia

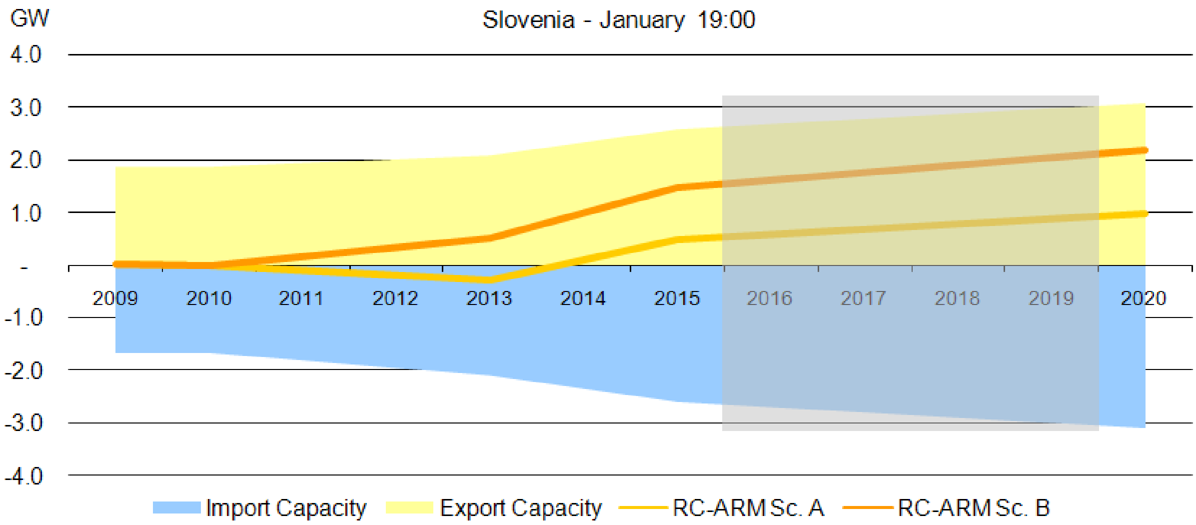


Fig. 60 System Adequacy Forecast in Slovenia in January 19:00 in Scenarios A and B

Generating Capacity

The generating capacity increases due to new hydro units on middle and lower Sava river, 2 pump-storage units on So• a and Drava river, new lignite thermal unit in Šoštanj and gas units in Brestanica, Trbovlje and Koper. Wind power is expected in Best scenario after 2011. Best Estimate Scenario B takes also into account a new unit in Krško nuclear power plant in 2019.

Decommissioning in both scenarios arrives at the end of units' lifetime.

Nuclear power plant Krško:

The table considers 100 % of its generation capacity although ownership of the nuclear power plant Krško is equally divided between Slovenia and Croatia, thus half of its generation is delivered to Croatia in accordance with the international agreement.

A Non-Usable Capacity arrives mainly from lower availability of the primary energy source in hydro power stations. Reduction due to maintenance and overhauls are included in the Non-Usable Capacity.

Load

Generation Adequacy

Remaining capacity, especially in scenario A, will decrease and reach its lower value in winter 2013. Fossil fuels units that come into operation after 2013 raise Remaining Capacity to a high degree. The lack of generating capacities will be covered with import.

As already mentioned, tables considers 100% of NPP Krško. In case of 50% consideration, RC becomes negative in whole three reference points in 2013 (in Scenario A).

Spare Capacity presents 5% of NGC respecting the results of the statistical data based analyses.

On average, Winter Peak rises 2.6% per year and Summer Peak 2.7% per year till 2020. The loads at 11:00 at reference point reaches approx. 90% of Seasonal Peak Load in Winter and 93% in Summer.

Interconnection Capacity

The capacities will increase due to construction of 400 kV PST in Diva•a in 2011, double 400 kV interconnection with Hungary in 2013 and double 400 kV interconnection with Italy in 2016.

National Representativeness

Representativeness index equals 93% (year 2007) due to a limited access to data on the distribution network. The other 7% represents distributed generation on distribution network. The 93/7 ratio refers to energy production in 2007.

SK - Slovak Republic

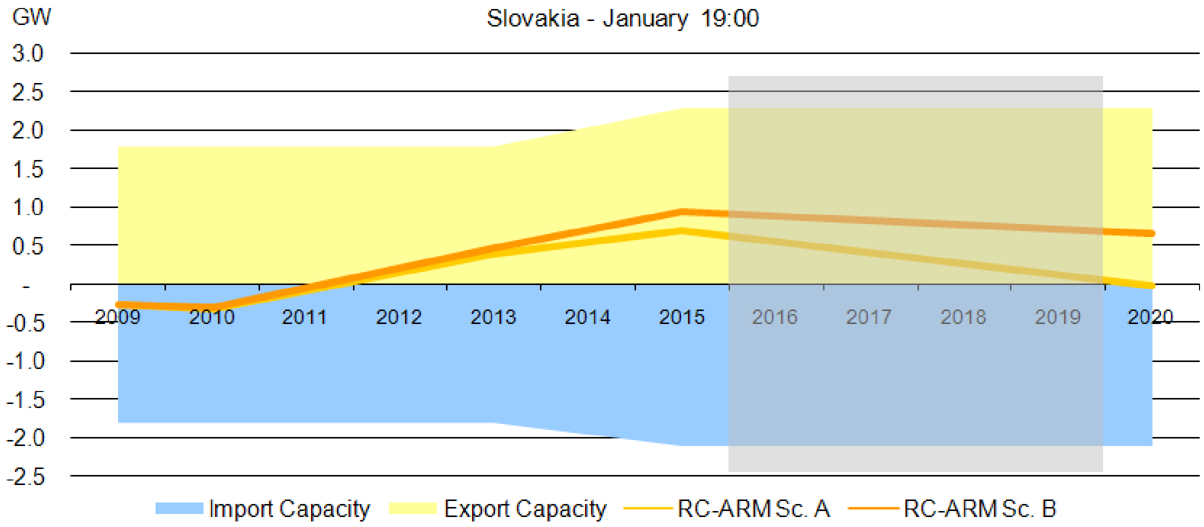


Fig. 61 System Adequacy Forecast in Slovak Republic in January 19:00 in Scenarios A and B

Generating Capacity

Scenario A

Differences between the previous and this SAF are being caused by the decommissioning of existing energy sources and the construction of new planned sources continually till 2018. Unavailable capacity is influenced by the following three factors:

- By 2013, in general prevails system decommissioning of existing sources in the Slovak transmission, compared to the construction of new ones, which are kept behind.
- From 2006 to 2010, decommissioning of sources in a total amount of approximately 1370MW (especially decommissioning of two blocks in Jaslovské Bohunice nuclear power plant, 2x440MW, and then for example some blocks of thermal power plants in Vojany a Nováky - altogether approximately 330MW) is being expected.
- By 2018, decommissioning of other thermal power plants blocks in Vojany and Nováky with circa 550MW is being expected.

In this period, construction and commissioning of some new sources is being expected (regarding mainly the two blocks of Mochovce nuclear power plant, 2x471MW, or Malženice combined cycle power plant, 430MW). Furthermore, the continuous nominated power increase in wind power plants is being expected (until 2013 circa 140MW, after this period continually even more). However, there are not notable differences in comparison with previous SAF

Scenario B

In this scenario, there is a more optimistic assumption of new sources construction (especially thermal power plants in eastern part of the Slovak transmission system) being expected particularly from 2015, which improves the power balance of the Slovak Republic.

This type of capacity is influenced by:

- Change of methodology in appraisal of ancillary services necessity

- Hydrological conditions in hydro power plants operation
- Decrease in thermal power plant production during summer months

There are any notable differences in comparison with the previous SAF.

Load

In principle, data do not vary from the previous SAF. Continuous increase of the Slovak economy is being expected, particularly in the following years, what has a direct influence on the electricity consumption in Slovakia.

„Concerning Load Management, SEPS, a.s, as the Slovak Transmission System Operator does not consider this possibility in connection with the Slovak power system control and operation.

Generation Adequacy

Till 2013, the Slovak power system will be deficient. It is caused mainly due to the rate of decommissioned sources to constructed sources (see Net Generating Capacity). After this year, improvement in connection with this line is being expected and the power system of Slovakia will become a slightly exporting country. This state, however, could be very easily influenced by investor's decisions regarding the construction of new sources, which can modify their intentions depending on actual situation (primary sources prices, negotiations with involved state authorities etc.)

Slovak Dispatch Centre does not operate with such figures as ARM and Spare Capacity. It controls the Slovak power system in accordance with UCTE recommendations so that the power balance consumption-production is well balanced in each moment.

Interconnection Capacity

The situation has not changed in comparison with the previous SAF. In Scenario A, the new 400kV line between Slovakia and Hungary is being considered (+500MW in NTC) from 2015.

In Scenario B the same line from 2013 and the first power transmission line between Slovakia and Austria from 2020 are being considered (+400MW in NTC). The feasibility of these projects depends on joint sessions with our foreign partners. Such negotiations are running at this time on the level of involved work groups.

UA-W - Ukraine-West

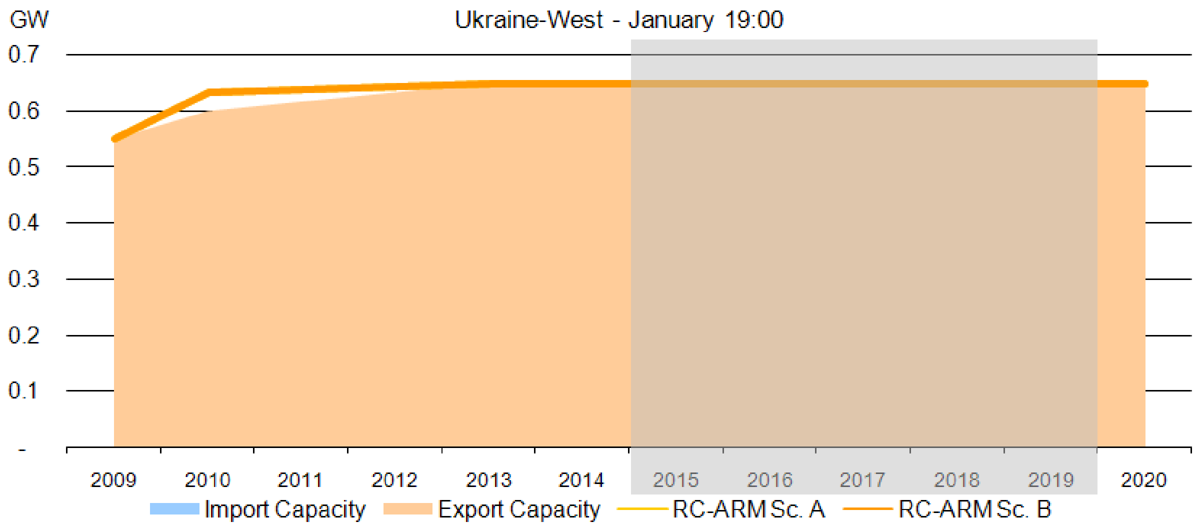


Fig. 62 System Adequacy Forecast in Ukraine-West in January 19:00 in Scenarios A and B

Generating Capacity

Load

Generation Adequacy

Interconnection Capacity

6 GENERAL CONCLUSION

General Conclusion

Adequacy level is improving from now on to 2015 due to an impressive development of generating capacity noticeably gas, hard coal and wind power.

2016 up to 2020 could be a period for decommissioning due to usual economic optimisation after the LCP Directive threshold of 2015. Indeed, the generating capacity available over the load (Remaining Capacity) appears to increase up to 2015 and then decrease, considering Best Estimate scenario B. Might the year 2015 be a temporary peak and thus would decommissioning (especially hard coal and lignite) be carried out after 2015?

Moreover the analysis of the adequacy per regional blocks shows that the sum of the generating capacities in the five regional blocks is globally higher than the UCTE forecasted consumption. So one can reasonably expect some market adjustments to make the investment profitable and thus reach a level of adequacy not so high as forecasted in this report. This situation should be also more in line with the economic and financial context. This adjustment should lead to stress the role of interconnectors between regional blocks to ensure generation adequacy. However, it is possible that the net generating capacity includes back-up facilities that are at the high end of the economic merit order but that still can be used if required under extreme conditions. Furthermore the Remaining Capacity includes Load Management possibilities that will not be activated for export purposes.

The report was prepared in November and December 2008 at the beginning of the financial and economic crisis, while data was collected before mid-September. Due to the lack of information available at that time to assess the impact of this crisis on the economic activity and its consequences on the electricity consumption as well as on the investments in new generation capacity, with no stabilised perspective yet, the data collected in September 2008 was not amended.

For these reasons, we can expect some discrepancies between the data in this report and the actual data in next year SAR. In addition to a probably lower consumption growth rate, the major uncertainty regards the generation growth rate and the related decommissioning and investments in new generation capacity actually carried out. Regarding these latter, it could be quite reasonable to expect a postponement of some of the investments, which are not already in the critical stage of their implementation.

Nevertheless to sustain the present level of power system security (Scenario A), investment in generating means is more than required, even with the growing importance of Load Management. UCTE countries need to go on investing in electricity generation to face consumption growth: to maintain generation adequacy in most situations in 2020 at the required Adequacy Reference Margin level, more than 20 GW of additional investments in generating capacity will have to be confirmed and commissioned before 2020 (or even 56 GW to maintain it at the 2009 level)[29]. The comparison of Remaining Capacity and Adequacy reference Margin shows that generation adequacy of the UCTE system should not be at risk up to 2015 in any generation scenario and in 99% of the situations.

[29] Impact of Load Management is not accounted for.

APPENDIX

Appendix Tables

All data are available in Excel file format on the UCTE website.

GW Scenario A	2009			2010			2013			2015			2020		
	January		July	January		July	January		July	January		July	January		July
	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00
Nuclear Power	111.7	111.7	111.1	108.9	108.9	108.9	106.7	106.7	106.7	106.8	106.8	106.7	96.7	96.7	96.0
Fossil Fuels	344.1	344.1	341.7	352.6	352.6	355.4	386.6	386.8	388.5	394.7	394.7	395.8	385.8	385.8	388.0
Renewable Energy Sources (other than hydro)	72.0	72.0	75.6	82.9	82.9	88.2	110.8	110.8	115.1	126.5	126.5	129.9	155.7	155.7	159.1
Hydro power	138.5	138.5	138.7	139.0	139.0	139.2	141.3	141.3	141.7	145.2	145.2	145.7	152.6	152.6	152.6
Not Clearly Identifiable Energy Sources	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Net Generating Capacity	666.8	666.8	667.6	683.9	683.9	692.2	745.9	746.1	752.4	773.8	773.8	778.7	791.3	791.3	796.3
Unavailable Capacity	200.6	200.6	248.3	210.4	210.7	263.7	233.2	233.5	286.0	248.9	249.2	301.8	270.0	270.4	322.1
Reliably Available Capacity	466.3	466.2	419.2	473.5	473.2	428.6	512.7	512.7	466.5	524.8	524.5	477.0	521.4	521.0	474.2
Load	398.8	405.9	351.3	405.9	413.0	359.1	425.5	433.9	376.4	440.4	448.9	390.3	478.9	486.6	424.5
Load Management	10.6	10.6	9.6	11.5	11.5	10.1	12.5	12.5	10.7	13.2	13.2	11.2	14.2	14.2	12.2
Remaining Capacity	78.1	71.0	77.6	79.1	71.6	79.5	99.8	91.3	100.8	97.6	88.8	97.9	56.6	48.5	61.9
Spare Capacity	33.3	33.3	33.4	34.2	34.2	34.6	37.3	37.3	37.6	38.7	38.7	38.9	39.6	39.6	39.8
Margin Against Seasonnal Peak Load	22.0	14.2	15.6	22.8	15.1	15.9	23.2	14.6	15.6	24.6	16.3	17.0	27.1	19.1	19.1
Adequacy Reference Margin	57.8	50.1	50.4	59.4	51.6	51.9	62.6	54.0	54.3	64.2	55.9	55.9	67.8	59.9	59.1

Tab. 1 UCTE Power Balance Forecast in Conservative Scenario A

GW Scenario B	2009			2010			2013			2015			2020		
	January		July	January		July	January		July	January		July	January		July
	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00
Nuclear Power	111.7	111.7	111.1	108.9	108.9	108.9	106.7	106.7	106.7	106.8	106.8	106.7	99.6	99.6	98.9
Fossil Fuels	345.1	345.1	342.8	355.6	355.6	358.1	399.5	399.5	401.2	417.6	417.5	419.2	432.9	432.9	435.8
Renewable Energy Sources (other than hydro)	72.2	72.2	76.6	84.7	84.7	90.9	116.6	116.6	120.9	138.1	138.1	141.7	179.9	179.9	183.5
Hydro power	138.6	138.6	138.7	140.2	140.2	140.5	142.8	142.8	143.1	149.8	149.8	150.3	159.4	159.4	159.5
Not Clearly Identifiable Energy Sources	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Net Generating Capacity	668.1	668.1	669.7	689.9	689.9	698.9	766.1	766.1	772.4	812.8	812.7	818.5	872.4	872.4	878.1
Unavailable Capacity	200.4	200.4	248.9	211.8	212.1	265.1	236.8	237.0	289.8	258.0	258.4	311.6	290.6	291.5	345.7
Reliably Available Capacity	467.7	467.7	420.8	478.5	478.1	434.1	529.6	529.4	483.0	555.1	554.5	507.2	582.0	581.2	532.8
Load	398.8	405.9	351.3	405.9	413.0	359.1	425.5	433.9	376.4	440.5	449.0	390.4	479.0	486.7	424.6
Load Management	10.6	10.6	9.6	11.5	11.5	10.1	12.6	12.6	10.8	13.3	13.3	11.3	14.4	14.4	12.4
Remaining Capacity	79.6	72.4	79.1	84.1	76.7	85.1	116.8	108.0	117.4	127.9	118.9	128.2	117.4	108.9	120.6
Spare Capacity	33.4	33.4	33.5	34.5	34.5	34.9	38.3	38.3	38.6	40.6	40.6	40.9	43.6	43.6	43.9
Margin Against Seasonnal Peak Load	22.0	14.2	15.6	22.8	15.1	15.9	23.2	14.6	15.6	24.6	16.3	17.0	27.1	19.1	19.1
Adequacy Reference Margin	58.9	51.1	51.6	60.8	53.1	53.3	64.8	56.2	56.5	67.5	59.2	59.2	73.4	65.4	64.6

Tab. 2 UCTE Power Balance Forecast in Best Estimate Scenario B

GW	2009	2010	2013	2015	2020
AT	21.3	21.2	23.1	24.8	27.3
BA	3.7	3.9	4.3	5.7	6.2
BE	17.4	19.6	21.8	22.7	21.9
BG	11.2	12.0	12.4	14.1	15.6
CH	17.6	18.9	19.0	19.9	20.7
CZ	15.9	16.1	16.9	18.7	16.9
DE	129.5	131.3	157.6	169.1	167.0
ES	90.2	94.7	104.8	112.6	136.9
FR	118.0	120.2	127.0	129.8	142.0
GR	12.4	14.2	17.8	20.2	23.2
HR	4.0	4.1	4.9	5.5	6.1
HU	8.8	8.8	10.0	10.2	11.1
IT	102.2	104.4	107.0	108.9	116.3
LU	1.7	1.7	1.8	2.0	2.1
ME	0.9	0.9	1.1	1.4	1.8
MK	1.5	2.0	2.2	2.8	3.2
NL	25.2	26.7	36.4	38.6	38.6
PL	33.4	33.9	34.7	35.4	38.6
PT	16.0	17.7	21.3	23.2	26.4
RO	16.7	17.0	19.2	21.5	23.2
RS	8.3	8.4	8.8	9.9	9.9
SI	3.0	3.1	3.9	5.1	6.5
SK	6.7	6.6	7.6	8.2	8.3
UA-W	2.5	2.5	2.5	2.5	2.5
UCTE	668.1	689.9	766.1	812.8	872.4

Tab. 3 National Net Generating Capacity Forecast in January in Scenario B

GW	Nuclear Power	Fossil Fuels	Renewable Energy Sources (other than hydro)	Hydro Power	Not Clearly Identifiable Energy Sources	Net Generating Capacity
AT	-	8.1	1.6	13.3	-	23.1
BA	-	2.1	0.2	2.0	-	4.3
BE	5.9	12.1	2.4	1.4	-	21.8
BG	2.0	6.9	0.6	2.9	-	12.4
CH	3.2	0.1	0.4	14.8	0.5	19.0
CZ	3.5	10.6	0.7	2.1	-	16.9
DE	13.1	90.6	44.5	9.4	-	157.6
ES	7.5	47.1	29.0	21.2	-	104.8
FR	64.9	26.7	10.0	25.4	-	127.0
GR	-	10.8	3.8	3.2	-	17.8
HR	-	2.2	0.5	2.2	-	4.9
HU	1.9	7.0	1.1	0.1	-	10.0
IT	-	79.0	6.6	21.4	-	107.0
LU	-	0.5	0.1	1.1	-	1.8
ME	-	0.4	-	0.7	-	1.1
MK	-	1.4	0.0	0.7	-	2.2
NL	0.5	31.8	4.1	0.0	0.0	36.4
PL	-	30.0	2.4	2.3	-	34.7
PT	-	8.7	6.9	5.8	-	21.3
RO	1.3	10.4	1.3	6.2	-	19.2
RS	-	6.0	-	2.8	-	8.8
SI	0.7	1.9	0.2	1.2	-	3.9
SK	2.2	2.7	0.3	2.5	-	7.6
UA-W	-	2.5	-	0.0	-	2.5
UCTE	106.7	399.5	116.6	142.8	0.5	766.1

Tab. 4 National Net Generating Capacity Mix in January 2013 in Scenario B

GW	2009	2010	2013	2015	2020
DE	30.8	34.5	44.5	50.5	60.9
ES	18.6	21.2	29.0	34.2	47.2
FR	4.8	6.0	10.0	13.2	23.2
IT	5.4	6.0	6.6	7.4	9.7
PT	4.0	5.0	6.9	7.6	9.6
NL	2.5	2.9	4.1	5.2	5.2
GR	1.0	1.5	3.8	4.5	5.4
BE	1.4	1.7	2.4	3.0	4.0
PL	0.7	1.3	2.4	2.5	2.7
AT	1.4	1.4	1.6	1.9	2.0
HU	0.8	1.0	1.1	1.0	1.2
CZ	0.3	0.5	0.7	0.9	1.1
SK	0.0	0.1	0.3	0.4	0.7
CH	0.3	0.3	0.4	0.4	0.4
BA	0.0	0.2	0.2	0.4	0.4
BG	0.1	0.2	0.6	1.0	1.3
RO	0.0	0.4	1.3	2.8	3.0
LU	0.1	0.1	0.1	0.1	0.2
SI	0.0	0.0	0.2	0.4	0.5
HR	0.1	0.2	0.5	0.7	1.1
ME	0.0	0.0	0.0	0.0	0.0
MK	0.0	0.0	0.0	0.1	0.1
RS	0.0	0.0	0.0	0.0	0.0
UA-W	0.0	0.0	0.0	0.0	0.0
UCTE	72.2	84.7	116.6	138.1	179.9

Tab. 5 National RES (o/ hydro) Capacity Forecast in January in Scenario B

Fossil Fuel GW	2009	2010	2013	2015	2020
DE	69.0	70.0	90.6	97.4	93.7
IT	75.6	77.2	79.0	80.0	84.6
ES	43.3	45.2	47.1	48.3	56.9
NL	22.2	23.3	31.8	32.9	32.9
PL	30.4	30.2	30.0	30.6	33.6
FR	24.5	25.5	26.7	26.3	28.5
BE	8.7	10.5	12.1	12.4	12.4
GR	8.3	9.5	10.8	12.4	14.4
CZ	10.0	10.0	10.6	12.2	10.2
RO	9.4	9.3	10.4	11.2	10.3
PT	7.0	7.7	8.7	8.8	8.7
AT	7.3	7.1	8.1	8.5	8.9
HU	6.1	5.9	7.0	7.2	6.8
BG	6.3	6.9	6.9	7.2	7.2
RS	5.5	5.5	6.0	7.0	7.0
SK	2.6	2.3	2.7	2.7	2.4
UA-W	2.5	2.5	2.5	2.5	2.5
HR	1.8	1.8	2.2	2.5	2.7
BA	1.7	1.7	2.1	2.5	3.0
SI	1.3	1.3	1.9	2.3	2.3
MK	0.9	1.4	1.4	1.4	1.7
LU	0.5	0.5	0.5	0.6	0.7
ME	0.2	0.2	0.4	0.5	0.5
CH	0.1	0.1	0.1	0.2	1.0
UCTE	345.1	355.6	399.5	417.6	432.9

Tab. 6 National Fossil Fuel Capacity Forecast in January in Scenario B

Fossil Fuels GW	2009	2010	2013	2015	2020
Lignite	60.8	61.0	63.5	66.2	61.9
Hard Coal	83.6	84.1	95.7	102.5	98.8
Gas	111.5	120.6	151.8	163.0	185.7
Oil	38.3	39.2	38.7	36.5	38.0
Mixed Fuels	35.3	34.7	33.4	32.2	30.9
Non Attributable	15.5	16.1	16.3	17.2	17.6
Total	345.1	355.6	399.5	417.6	432.9
NGC	668.1	689.9	766.1	812.8	872.4

Tab. 7 UCTE Fossil Fuels Capacity Forecast in January in Scenario B

HYD	2009	2010	2013	2015	2020
FR	25.4	25.4	25.4	25.4	25.4
IT	21.2	21.2	21.4	21.5	22.0
ES	20.8	20.9	21.2	22.6	25.3
CH	13.5	14.8	14.8	15.6	15.6
AT	12.6	12.6	13.3	14.5	16.4
DE	9.4	9.4	9.4	9.4	9.4
RO	5.9	6.0	6.2	6.2	7.2
PT	5.0	5.0	5.8	6.8	8.1
GR	3.1	3.1	3.2	3.3	3.4
BG	2.9	2.9	2.9	2.9	3.1
RS	2.8	2.8	2.8	2.8	2.8
SK	2.4	2.5	2.5	2.5	2.5
PL	2.3	2.3	2.3	2.3	2.3
HR	2.1	2.1	2.2	2.3	2.3
CZ	2.1	2.1	2.1	2.1	2.1
BA	2.0	2.0	2.0	2.8	2.8
BE	1.4	1.4	1.4	1.4	1.4
SI	1.1	1.1	1.2	1.7	1.9
LU	1.1	1.1	1.1	1.3	1.3
MK	0.6	0.6	0.7	1.3	1.4
ME	0.7	0.7	0.7	0.9	1.3
HU	0.1	0.1	0.1	0.1	1.3
NL	0.0	0.0	0.0	0.0	0.0
UA-W	0.0	0.0	0.0	0.0	0.0
UCTE	138.6	140.2	142.8	149.8	159.4

Tab. 8 National Hydropower Capacity Forecast in Scenario B

GW	2009	2010	2013	2015	2020
FR	63.3	63.3	64.9	64.9	64.9
DE	20.3	17.4	13.1	11.8	3.0
ES	7.5	7.5	7.5	7.5	7.5
BE	5.9	5.9	5.9	5.9	4.1
CZ	3.5	3.5	3.5	3.5	3.5
CH	3.2	3.2	3.2	3.2	3.2
SK	1.7	1.8	2.2	2.6	2.6
BG	2.0	2.0	2.0	3.0	4.0
HU	1.9	1.9	1.9	1.9	1.9
RO	1.3	1.3	1.3	1.3	2.6
SI	0.7	0.7	0.7	0.7	1.8
NL	0.5	0.5	0.5	0.5	0.5
UCTE	111.7	108.9	106.7	106.8	99.6

Tab. 9 National Nuclear Capacity Forecast in January in Scenario B

GW	Net Generating Capacity	Non-Usable Capacity	Maintenance and Overhauls	Outages	System Services Reserve	Reliably Available Capacity
DE	157.6	43.8	3.1	3.2	7.2	100.3
FR	127.0	18.3	2.0	4.3	3.0	99.4
IT	107.0	31.0	0.0	0.0	5.1	70.9
ES	104.8	39.5	1.6	3.0	1.5	59.2
NL	36.4	5.3	1.3	1.1	1.0	27.7
PL	34.7	4.3	0.3	0.9	2.0	27.2
AT	23.1	2.9	0.0	1.0	0.7	18.8
BE	21.8	2.3	0.5	0.5	1.1	17.4
PT	21.3	6.2	0.0	0.4	1.3	13.4
GR	17.8	2.6	0.5	0.9	1.0	12.8
CZ	16.9	2.2	0.5	0.3	1.5	12.4
RO	19.2	4.0	0.8	1.2	1.2	12.0
CH	19.0	5.0	0.0	1.2	1.0	11.8
BG	12.4	1.4	0.5	0.4	0.8	9.4
RS	8.8	0.0	0.0	0.2	0.5	8.1
HU	10.0	0.7	0.3	0.4	0.9	7.8
SK	7.6	2.1	0.0	0.1	0.7	4.7
HR	4.9	0.6	0.3	0.0	0.4	3.6
SI	3.9	0.4	0.0	0.0	0.3	3.2
BA	4.3	0.7	0.1	0.2	0.2	3.1
MK	2.2	0.0	0.0	0.0	0.1	2.0
UA-W	2.5	0.1	0.2	0.0	0.5	1.8
LU	1.8	0.0	0.1	0.0	0.0	1.6
ME	1.1	0.0	0.0	0.0	0.0	1.1
UCTE	766.1	173.5	12.0	19.4	31.9	529.6

Tab. 10 National Reliably Available Capacity Breakdown Forecast in January 2013 in Scenario B

%	2009-2010	2010-2015	2015-2020
AT	1.7	1.7	1.7
BA	2.5	2.0	2.0
BE	1.7	1.9	1.1
BG	3.3	5.0	6.0
CH	1.4	0.8	0.8
CZ	1.7	1.4	1.1
DE	0.5	0.2	0.6
ES	2.5	2.3	2.3
FR	1.4	1.0	0.4
GR	3.5	3.0	2.5
HR	3.6	3.2	2.5
HU	2.0	2.0	2.0
IT	2.5	2.3	2.2
LU	3.0	3.0	3.0
ME	3.0	2.0	2.0
MK	2.5	2.5	2.5
NL	2.0	2.0	2.0
PL	2.6	1.8	1.8
PT	2.7	2.3	3.6
RO	2.4	2.5	2.6
RS	1.4	1.4	1.4
SI	3.5	3.1	2.5
SK	1.9	1.4	1.5
UA-W	1.1	1.1	1.1
UCTE	1.8	1.6	1.6

Tab. 11 National Average Annual Consumption Growth Rate Forecast

GW	2009			2010			2013			2015			2020		
	January		July	January		July	January		July	January		July	January		July
	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00
AT	8.8	7.6	8.1	8.9	7.7	8.3	9.4	8.1	8.7	9.7	8.4	9.0	10.5	9.2	9.8
BA	2.1	2.2	1.6	2.1	2.2	1.6	2.2	2.4	1.7	2.3	2.6	1.9	2.5	2.9	2.3
BE	12.7	13.5	11.1	12.9	13.7	11.3	13.6	14.5	11.9	14.1	15.0	12.3	14.8	15.8	13.0
BG	6.4	7.0	4.1	6.5	7.1	4.2	6.7	7.2	4.3	6.8	7.3	4.5	7.2	7.4	4.8
CH	10.0	9.5	8.1	10.3	9.8	8.4	10.5	10.0	8.6	10.7	10.2	8.7	11.1	10.6	9.0
CZ	9.9	10.1	7.5	10.2	10.4	7.6	10.9	11.1	8.1	11.2	11.5	8.4	11.8	12.1	8.9
DE	75.5	75.8	67.8	76.1	76.3	68.6	75.3	76.0	68.0	76.3	77.2	69.3	78.4	78.8	70.9
ES	43.4	45.4	42.8	44.5	46.5	44.0	49.0	51.0	48.0	52.0	54.0	51.0	61.7	63.7	60.0
FR	81.0	82.7	59.0	81.9	83.7	59.8	84.6	86.4	62.0	86.8	88.1	63.3	91.4	92.4	66.3
GR	8.3	8.7	10.0	8.6	9.0	10.3	9.4	9.9	10.9	10.0	10.5	11.4	10.8	11.3	12.5
HR	3.2	2.9	2.5	3.3	3.0	2.6	3.6	3.3	2.9	3.9	3.6	3.2	4.3	3.9	3.6
HU	5.7	5.8	5.5	5.9	6.0	5.6	6.3	6.4	5.9	6.5	6.6	6.1	7.2	7.3	6.8
IT	58.6	58.7	60.3	59.8	59.9	62.4	65.6	65.8	67.2	68.7	68.9	70.3	76.9	76.9	77.8
LU	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.1	1.1	1.1	1.2	1.3	1.2
ME	0.7	0.7	0.5	0.7	0.8	0.6	0.7	0.8	0.6	0.8	0.8	0.6	0.9	0.9	0.7
MK	1.4	1.5	0.9	1.4	1.5	1.0	1.6	1.7	1.1	1.7	1.8	1.1	1.9	2.0	1.3
NL	18.5	18.3	17.5	18.8	18.6	17.8	20.0	19.8	19.0	20.8	20.6	19.8	23.0	22.8	22.0
PL	22.0	23.1	18.8	22.5	23.7	19.4	22.9	24.4	19.9	23.8	25.4	20.6	25.8	27.5	22.4
PT	8.2	8.7	7.3	8.5	9.0	7.5	9.1	9.6	8.0	9.5	10.1	8.3	11.3	12.0	9.9
RO	8.0	8.6	7.2	8.3	8.8	7.4	8.9	9.6	8.0	9.4	10.1	8.4	10.8	11.6	9.6
RS	6.7	7.0	3.9	6.8	7.1	4.1	6.9	7.3	4.5	7.0	7.4	4.6	7.4	7.9	5.0
SI	2.0	2.0	1.8	2.0	2.1	1.8	2.2	2.3	2.0	2.3	2.4	2.1	2.6	2.7	2.4
SK	3.8	4.0	3.3	3.9	4.0	3.4	4.0	4.2	3.5	4.2	4.3	3.6	4.5	4.6	3.9
UA-W	1.0	1.1	0.6	1.0	1.1	0.6	1.0	1.1	0.7	1.0	1.1	0.7	1.1	1.2	0.7
UCTE	398.8	405.9	351.3	405.9	413.0	359.1	425.5	433.9	376.4	440.5	449.0	390.4	479.0	479.0	424.6

Tab. 12 National Load Forecast

GW	January				
	2009	2010	2013	2015	2020
IT	4.0	4.0	4.0	4.0	4.0
FR	3.0	3.0	3.0	3.0	3.0
ES	2.0	2.3	2.5	2.7	3.0
NL	1.0	1.0	1.1	1.3	1.5
GR	-	0.4	0.8	1.0	1.3
DE	0.2	0.3	0.4	0.5	0.5
BE	0.3	0.3	0.4	0.4	0.4
HU	-	0.1	0.1	0.1	0.2
ME	0.0	0.0	0.1	0.1	0.1
LU	0.0	0.0	0.0	0.0	0.1
UCTE	10.6	11.5	12.6	13.3	14.4

Tab. 13 National Load Management Forecast in January 11:00 in Scenario B

GW	January 11:00 2020 in scenario B			Variation SAF 2009-2020 vs SAF 2008-2020
	SAF 2007-2020	SAF 2008-2020	SAF 2009-2020	
DE	4.5	17.8	17.7	-0.1
IT	5.4	8.5	5.4	-3.1
PT	2.7	0.9	1.7	0.7
RS	-0.4	1.2	7.8	6.6
GR	1.3	4.7	16.7	12.0
FR	13.6	14.1	2.9	-11.2
SI	1.0	0.9	1.0	0.0
ME	0.0	0.9	2.1	1.3
BE	-0.6	0.0	-0.2	-0.2
NL	4.7	6.9	6.7	-0.2
BG	2.5	3.8	5.1	1.4
HU	1.0	1.5	1.6	0.1
LU	0.7	0.9	0.8	-0.1
BA	1.1	2.7	2.7	0.0
PL	1.0	3.6	4.7	1.1
AT	4.1	5.5	0.0	-5.5
HR	-1.3	-1.3	0.0	1.3
CZ	1.5	1.5	0.0	-1.5
MK	-0.4	-0.2	0.0	0.2
UA-W	0.7	0.7	0.0	-0.7
CH	3.1	2.7	2.2	-0.5
RO	0.6	1.3	0.8	-0.5
SK	-0.1	0.0	15.1	15.2
ES	11.5	5.5	4.7	-0.8
UCTE	58.1	84.3	117.4	33.1

Tab. 14 National Remaining Capacity Forecast Update in January 2020 11:00 in Scenario B

GW	2009			2010			2013			2015			2020		
	January		July	January		July	January		July	January		July	January		July
	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00	11:00	19:00	11:00
AT	7.9	9.1	8.1	8.0	9.1	8.1	9.4	10.6	9.6	10.8	12.1	11.1	12.4	13.8	12.7
BA	0.6	0.5	0.8	0.6	0.5	1.0	0.9	0.7	1.3	2.2	1.9	2.5	2.5	2.1	2.6
BE	1.7	0.8	1.9	3.1	2.3	2.8	4.2	3.3	3.7	4.2	3.3	3.3	2.1	1.2	1.7
BG	2.1	1.5	2.8	2.6	2.1	3.6	2.7	2.2	3.4	4.0	3.5	4.5	5.1	4.9	5.5
CH	0.8	1.3	4.1	1.5	2.0	5.1	1.3	1.8	5.0	1.9	2.4	5.8	2.2	2.7	6.3
CZ	1.7	1.5	2.0	1.4	1.2	1.7	1.5	1.3	2.0	2.7	2.4	3.2	0.3	0.0	0.9
DE	12.5	12.2	12.5	9.4	8.9	12.1	25.4	24.5	26.2	28.9	27.6	28.6	17.7	16.9	17.2
ES	11.3	9.3	11.6	14.0	12.0	13.3	12.7	10.7	12.8	12.6	10.6	12.7	15.1	13.1	16.3
FR	16.8	15.1	12.8	17.4	15.6	16.7	17.8	15.9	17.3	16.7	15.2	17.3	16.7	15.2	19.1
GR	0.8	0.4	0.5	2.3	1.9	1.4	4.2	3.7	2.4	5.8	5.3	3.8	7.8	7.3	4.9
HR	0.1	0.4	0.5	0.1	0.4	0.5	0.0	0.3	0.7	0.0	0.3	0.7	-0.2	0.2	0.5
HU	1.2	1.1	0.8	0.9	0.8	0.7	1.7	1.6	1.5	1.5	1.4	1.2	1.6	1.5	1.5
IT	8.8	8.7	8.2	9.5	9.4	7.3	9.3	9.1	8.7	6.4	6.2	5.6	4.7	4.7	5.8
LU	0.6	0.6	0.5	0.6	0.6	0.3	0.6	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8
ME	0.2	0.1	0.3	0.2	0.1	0.3	0.4	0.3	0.5	0.6	0.5	0.8	1.0	0.9	1.1
MK	0.0	-0.1	0.2	0.5	0.4	0.7	0.5	0.4	0.8	1.0	0.8	1.3	0.8	0.7	1.2
NL	1.7	1.9	2.7	1.5	1.7	2.5	8.8	9.0	9.8	8.6	8.8	9.6	6.7	6.9	7.7
PL	3.5	2.4	1.0	3.9	2.8	-0.4	4.3	2.8	-0.2	4.0	2.4	-0.2	4.7	3.0	0.0
PT	2.5	2.0	2.1	3.2	2.7	3.1	4.6	4.0	4.3	5.5	4.9	5.5	5.4	4.7	5.4
RO	3.1	2.5	2.4	1.8	1.2	1.0	3.1	2.5	2.0	3.7	3.0	3.5	3.8	3.0	2.7
RS	0.8	0.5	2.6	0.7	0.4	2.5	1.2	0.8	2.6	2.1	1.7	2.9	1.7	1.2	2.5
SI	0.4	0.4	0.5	0.4	0.3	0.5	1.0	0.9	1.1	2.0	1.9	2.2	2.9	2.8	3.0
SK	-0.1	-0.3	-0.5	-0.2	-0.3	-0.5	0.6	0.5	0.3	1.1	0.9	0.7	0.8	0.7	0.5
UA-W	0.7	0.6	0.8	0.7	0.7	0.8	0.8	0.7	0.7	0.8	0.7	0.7	0.8	0.7	0.7
UCTE	79.6	72.4	79.1	84.1	76.7	85.1	116.8	108.0	117.4	127.9	118.9	128.2	117.4	108.9	120.6

Tab. 15 National Remaining Capacity Forecast in Scenario B

Contact

Boulevard Saint-Michel, 15
B-1040 Brussels – Belgium
Tel +32 2 741 69 40
Fax +32 2 741 69 49

info@ucte.org
www.ucte.org

UCTE