European Network of
Transmission System Operators
for Electricity

entsoe

# SUMMER OUTLOOK REPORT 2014 AND WINTER REVIEW 2013/14

21 May 2014

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## Content





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# 1. Introduction

ENTSO-E adopts and publishes on an annual basis the "**Summer Outlook and Winter review**". This report assesses the adequacy of the power system as well as the potential electricity issues it may be faced with during the coming summer period. It also provides an overview of the main events which occurred during the previous winter period.

The ENTSO-E Summer Outlook and Winter review report is adopted as required by Article 8 of the EC Regulation n. 714/2009. It sets ENTSO-E analysis and views for the coming summer period on the basis of a consolidated methodology on short term system adequacy reports. This is reflected in the questionnaire which highlights any potential electricity issues which the TSOs may face during the summer period as well as the measures which will be in place to respond to them.

The Winter review report shows the main events which occurred during the Winter period of 2013/14, according to TSOs, with reference to security of electricity supply (i.e. weather conditions, power system conditions, as well as availability of interconnections). The Winter review covers the period from 4 December 2013/14 (week 49) to 20 April 2014 (week 16). It outlines the main events during the previous winter in comparison with the forecasts presented in the ENTSO-E Winter Outlook report 2013/14, published on 28 November 2013.

The ENTSO-E Summer Outlook 2014 reports on the expectations of the national and regional power balances between forecast generation and load at reference points on a weekly basis for the upcoming summer period, from 1 June (week 22) to 17 September 2014 (week 38). More information regarding reference points is provided in Section 3: Methodology.

The purpose of this report is to present TSOs' views on any matters concerning security of supply for the forthcoming summer period. It also seeks to identify the risks and the countermeasures proposed by the TSOs in cooperation with neighbouring countries, whilst also assessing the possibility for neighbouring countries to contribute to the generation/demand balance if required.

In addition, throughout this period, an assessment of any "downward regulation" issues was performed in order to provide a level of confidence regarding the effects of intermittent generation such as wind and solar system operation. For this assessment, two reference points are used, aiming at identifying situations where excess inflexible generator output exceeds overnight minimum demands and any possible downward regulation issues in a low load – high renewable (RES) in-feed situation (typically a sunny weekend day).

In order to harmonise as far as practicable the assumptions on intermittent energy sources, bearing in mind the inherent differences between countries, two different approaches are applied: While the individual country analysis includes the data provided by the TSOs in order to take into account each country specificities, the Pan European Assessments include a harmonised probabilistic approach using a Pan European Climate database[1] (PECD).

[1]Data from Technical University of Denmark



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## 2. Executive summary

The ENTSO-E Summer Outlook 2014 reports the outlook of national and regional power balances between forecast available generation and peak demand on a weekly basis for the upcoming Summer period, from 1 June (week 22) to 17 September 2014 (week 38).

The summer outlook analysis, carried out by ENTSO-E, shows that Europe has sufficient generation for both normal and severe demand conditions despite the shutdown or mothballing of oil and gas power stations due to economic reasons causing severe local network congestions. While various countries may require imports to cover the expected demand, cross border capacity is expected to be sufficient to accommodate them in almost all cases. In general, similar margins are expected in the European power system over the coming summer when compared to summer of 2013.

The ENTSO-E Summer Outlook 2014 shows that, on the whole, the balance between generation and demand is expected to be maintained during the summer period in the case of normal weather conditions. Based on normal conditions for demand, the majority of countries do not require imports to maintain their balance between demand and supply.

However, under severe weather conditions such as heat waves and prolonged periods of high temperatures, demand increases from normal levels. In such a situation, from the data submitted by the TSOs, the analysis shows that reliability margins are reduced. Countries such as Denmark, Hungary and the FYR of Macedonia would require imports to maintain the demand and supply balance for all or nearly all reference points during the entire summer period. In Poland particularly, such import needs may exceed available import capacities, therefore specific operational measures are planned.

The downward adequacy assessment covers the cases when due to low overnight demands, an excess of generation can be present in the system, especially when variable renewable generation and inflexible classical generation are at high output levels. This could also occur on weekend days (characterised by low load and possibly high PV generation output). Therefore in seasonal outlooks, two different (one overnight and one daytime) reference points are examined for downward adequacy. Assumptions made for these downward assessments are based on different transmission conditions and may require specific operational measures.

In these cases, there could well be an excess of inflexible generation which would need to be exported or curtailed. When generation exceeds demand in a country due to one of the above reasons, cross border flows will occur in regions which can import the excess generation. When cross border capacities are fully used, curtailment of renewables (or other inflexible generation) will occur due to the lack of appropriate infrastructure, including storage facilities, which may be used to balance the inflexible generation.

The ENTSO-E Summer Outlook 2014 highlights the fact that during certain weeks over the summer, it may be necessary to reduce excess generation in various countries as a result of insufficient cross border export capability. For example, the combination of high renewables in-feed and inflexible generation in Belgium, Ireland and Sweden could lead to high exports to all surrounding countries in the overnight reference points, while a similar situation could occur in Hungary due to the relatively inflexible generation structure. Curtailment of RES output may become necessary under certain conditions in Northern Ireland due to a limited interconnection capacity. Around the daytime reference point, Latvia and FYR of Macedonia may have to export some of its generated power to neighbouring systems during low-load periods.

The ENTSO-E Winter Review 2013/14 highlights that during the winter 2013/2014 temperatures across the whole of Europe were above average. As a result, the power demand was below or around seasonal average in all countries. In some regions winter weather was exceptionally stormy, causing supply disturbances in several countries, mainly due to weather-related damage to transmission or distribution assets. Except for faults caused by winter storms, no critical situation related to system adequacy occurred in Europe during the last winter.

# 3. Methodology

## 3.1. Stakeholder Consultation Process on future ENTSO-E Adequacy Assessment

The European electricity industry is experiencing significant change; the integration of large amounts of renewable energy sources, the creation of the Internal Electricity Market, new storage technologies, demand side response and evolving policies all require an improvement of the adequacy assessment methodologies. ENTSO-E will develop its existing European methodology with a special emphasis on harmonised inputs, system flexibility and interconnected assessments.

It is crucial that stakeholders are involved in the process of developing a new methodology for system adequacy from the outset. Through dialogue, our aim is to become aware of concerns, expectations and requirements of stakeholders and interested parties with regards to the new adequacy methodology.

An inaugural workshop on ENTSO-E adequacy assessment took place on Wednesday 16 April 2014 in Brussels. Next steps include the hosting of a methodology proposal workshop in June 2014, followed by a two-month online consultation resulting in the publication of a methodology and implementation plan.

Look for more details on the SO&AF consultation section in the Adequacy page on ENTSO-E website: https://www.entsoe.eu/publications/system-development-reports/adequacy-forecasts/

## 3.2. Source of information

The Winter review report is prepared on the basis of the information given by ENTSO-E members through a questionnaire in order to present the most important events occurred during the Winter period in comparison to the forecasts and risks reported in the last Winter Outlook. The TSOs mainly answer if their respective power system experienced any important or unusual events or conditions during the winter period as well as the identified causes and the remedial actions taken.

The ENTSO-E Summer Outlook 2014 is based on the information provided by ENTSO-E members during February - March on both a qualitative and quantitative basis in response to a questionnaire which has been extended in order to increase the level of detail in the analysis performed. It presents TSOs' views as regards any national or regional matters of concern regarding security of supply and/or inflexible generation surpluses for the coming summer and the possibility of neighbouring countries to contribute to the generation/demand balance of each respective ENTSO-E member in critical situations. The questions mainly referred to practices as well as qualitative data sent by TSOs in order to present country forecasts on a common basis.

## 3.3. Data used for the Regional analysis

An extensive regional analysis was also added to the well-known per-country analysis in the methodology of seasonal outlooks. The aim of this investigation is to assess whether the country based adequacy still remains fulfilled when the larger, European scale is taken into account. In other words, it assesses whether the electrical energy will be available at certain points in time to allow the countries with a generation deficit to import the electric power needed from the surrounding countries.

A synchronous point in time was used for all countries to allow for a meaningful analysis when determining the feasibility of cross border flows. Before starting the data collection, and using European historical load data, a study was conducted to identify the most representative synchronous time for covering the global European peak load in summer. It was concluded that Wednesday, 12:00 CET most closely represents this situation, and therefore data was requested from TSOs for this time point. With regards to the regional analysis, the values which were actually used from the data collection spreadsheet can be found below:

– The Remaining Capacity for **normal** and **severe** conditions;



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– Simultaneous importing and exporting capacity;
– A best estimate of the minimum Net Transfer Capacity (NTC) values towards and from individual neighbouring countries.

In addition, across the period of assessment for the next summer, any European "downward regulation" issues where excess inflexible generator output exceeds demand are investigated. Similar to the peak demand analysis, it provides an indication which countries require exports to manage inflexible generation. Indeed, this involved an analysis of their ability to export this energy to neighbouring regions that are not in a similar situation. The reason for this analysis pertains to the fact that a number of TSOs expressed that they are experiencing growing problems for system operation (mainly) due to the increase of intermittent generation on the system (wind and solar) and the lack of more flexible generation means.

Similar to the generation adequacy analysis, to carry out a regional downward analysis, a synchronous point in time was used for all countries in order to allow for meaningful analyses when determining cross border flows. The same European load study mentioned before concluded that minimal demand conditions generally take place around 05:00 CET on Sunday morning.

In addition to this minimal demand conditions, it was concluded that these issues with inflexible generation are not only prone to happen during the night, but also during daytime when the energy production of solar panels nears its maximum. To cope with this effect, an additional synchronous time point was added for Sunday 11:00 CET, when a combination of potentially high photo-voltaic in-feed and reduced demand levels exist. Quantitative data for this point in time was therefore also requested from all TSOs to allow for a meaningful regional analysis.

For the regional downward analysis, the values which were actually used from the data collection spreadsheet can be summarized as:

– The expected inflexible generation surplus at Sunday 05:00 and 11:00 CET;
– Sum of the inflexible and must-run generation;
– Simultaneous importing and exporting capacity;
– A best estimate of the minimum NTC values towards and from individual neighbouring countries.

### 3.4. Renewables in-feed data

For the per-country analysis, each TSO was requested to give an estimation of the highest expected proportion of installed solar, onshore wind and offshore wind capacity to be taken into account for the downward analysis. Default values of 65% for wind and 95% for solar were presented, allowing for every country to enter its best estimate. For the generation adequacy analysis the renewables in-feed is handled through an estimation of the non-usable capacity in normal and severe conditions by each TSO.

For the regional analysis though, it was decided to envision building a consistent pan-European scenario for wind and solar in-feed. To this end, a Pan-European Climatic Database[2] was used containing per-country load factors for solar, onshore wind and offshore wind per hour for a ten-year period.

To achieve per country representative load factors for the generation adequacy analysis, the $50^{th}$ and $10^{th}$ percentile respectively for normal and severe conditions of the load factors per country and for solar, wind onshore and wind offshore separately are calculated considering historical values, per month, and for the appropriate time period.

As such, a renewable in-feed scenario is created which represents a consistent worst-case scenario over the different countries and for the different primary energy sources. This scenario can then be used to detect regional adequacy issues that can consequently be further investigated in more detail and with a more realistic (and therefore less worst-case) renewable infeed scenario if necessary.

The methodology for the downward analysis is very similar to the one above, with the difference that the $90^{th}$ percentile is used.

[2] Data from Technical University of Denmark

It is envisioned for the future outlooks to use the experience gained on this matter and further refine the applied methodologies.

## 3.5. Aims and methodology

**Upward adequacy**

The methodology consists of identifying the ability of generation to meet the demand by calculating the so-called "remaining capacity" under two scenarios: normal and severe weather conditions.

The methodology is schematically depicted on the figure on the following page:

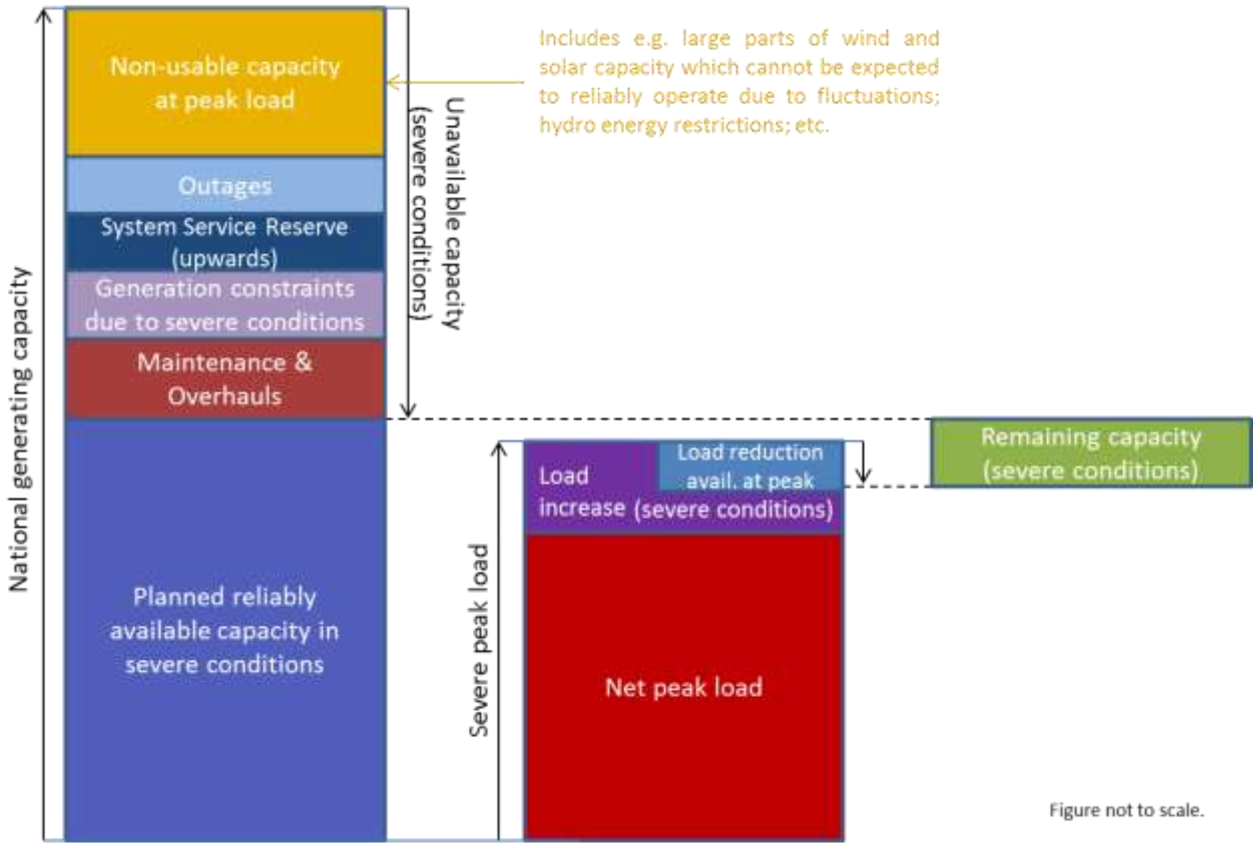


*Figure 1: Summary of upward adequacy methodology*

The basis of the analysis is the situation called "normal conditions". Normal conditions are defined as those conditions that correspond to normal demand on the system (i.e. normal weather conditions resulting in normal wind or hydro output and an average outage level). A severe scenario was also built showing the sensitivity of the generation-load balance to high temperature and extreme weather conditions. The severe conditions are related to what each TSO would expect in terms of demand which will be higher than in normal conditions and in terms of generation output which is reduced (i.e. severe conditions resulting on lower wind or restrictions in generation power plants due to extended drought).

The figures of the country individual responses show the "National Generating Capacity", the "Reliably Available Capacity" and the "Load at reference point" under normal and severe conditions. The remaining capacity is calculated for normal conditions. The remaining capacity is also evaluated with firm import/export contracts and for severe conditions.

For the Regional analysis, the choice can be made to use the Remaining Capacity before or after inclusion of firm contracts. The right method to use depends on how the Net Transfer Capacity (NTC) values are defined. When the maximal total commercial exchange between two countries equals the sum of NTC and firm contracts, the Remaining Capacity after inclusion of firm contracts should be used. If the maximal total commercial exchange is limited to the NTC value, the Remaining Capacity before inclusion of firm contracts should be used.

There were various countries that gave data on firm contracts. NTC values are used to limit commercial exchanges between neighbouring countries. All participants were asked to provide the best estimate of the minimum NTC values for being able to conduct a Worst-case analysis. When two participants provided different NTC values on the same border, the minimum value was taken.

The basis of the regional analysis is a constrained linear optimization problem. The target is to detect if problems can arise on a pan-European scale due to a lack of available capacity. No market simulation or grid model simulation whatsoever is taken into account. Therefore the analysis will only show if there is a shortage on the European or regional level, it will not say which countries exactly will have a generation deficit as this depends on the actual market price in all connected countries. The goal is to provide an indication whether countries requiring imports will be able to source these across neighbouring regions under normal and severe conditions. In other words, the investigation carried out is purely a "feasibility" analysis.

The first element that is checked is whether in a "copperplate" scenario there is enough power capacity to cover the demand. Here, all remaining capacity is simply summed, and when the result is greater than zero, theoretically enough capacity is available in Europe to cover everyone's needs. No problems are expected using this approach, neither for normal conditions nor for severe conditions. As this method does not take into account the limited exchange capacity between countries, it is too optimistic to draw final conclusions based on it.

As a consequence of this, a second, more precise approach is taken. The problem is modelled as a linear optimization with the following constraints:

– Bilateral exchanges between countries should be lower or equal to the given NTC values;
– Total simultaneous imports and exports should be lower or equal to the given limits.

Based on this methodology, it was calculated which groups of countries would have a generation deficit for a certain week due to saturated cross-border exchanges.

Due to no information about non ENTSO-E systems, like Russia, Belarus, the Ukraine except the Burshtyn Island (part of the Ukrainian system that operates synchronously with Continental Europe), Morocco and Turkey, the following values were assumed for these systems for the regional analysis:

– The balance (remaining capacity) of these systems was set at 0 MW.
– A best estimate of the minimum NTC comes from neighbouring systems belonging to ENTSO-E.

This approach will result in a possibility to "wheel" energy through these bordering countries, without them adding to or subtracting from the total generation level of the region.

**Downward adequacy**

Under minimum demand conditions, there is a potential for countries to have an excess of inflexible generation running. Every TSO is likely to have varying levels of "must-run" generation. This may be CHP or generators that are required to run to maintain dynamic voltage support etc. In addition there will be renewable generation such as run of river, solar and wind whose output is inflexible and variable. At times of high renewable output e.g. wind, the combination can result in generation exceeding demand and the pumped storage capacity of the country. In that case, the "excess" generation is either exported to a neighbouring region or curtailed.

The analysis takes the data submitted by TSOs and alters the renewables in-feed to a representative European scenario as was described in the section above. For countries that have an excess of generation, the optimisation tries to export to neighbouring regions based on the best estimate of the minimum NTC values submitted, and via a constrained linear optimisation.

The analysis will highlight periods where groups of countries cannot export all of their excess generation. It should be again stressed that this analysis is not a market simulation. Rather, it conducts a feasibility analysis to indicate countries which may be required to curtail excess generation due to limited cross border export capacity.

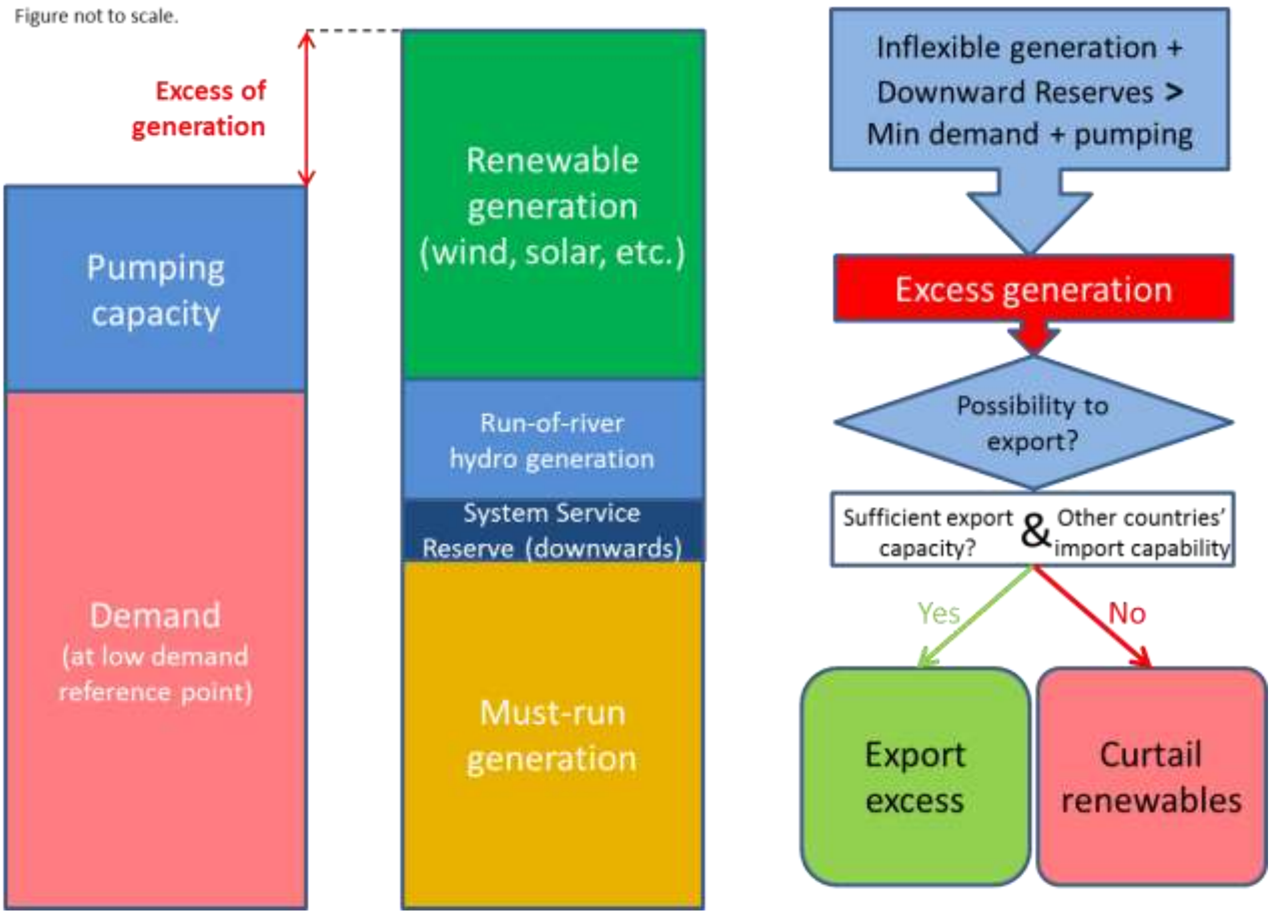


*Figure 2: Summary of downward adequacy methodology*



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## 3.6. Glossary of terms

**Downward Regulation Reserve**: The Active Power reserves kept available to contain and restore System Frequency to the Nominal Frequency and for restoring power exchange balances to their scheduled value;

**Downward Regulation**: The minimum amount of Downward Regulation Reserve, which is required by the TSO to be able to reduce output on the system;

**Firm import/export contracts:** Bilateral contracts for the import or export of electrical energy, agreed for a certain period of time in advance;

**Generation adequacy:** An assessment of the ability of the generation in the power system to match the Load on the power system at all times;

**Highest expected proportion of installed renewable generation running:** Maximum expected renewable in-feed which should be taken into account in downward regulation analysis. This is set at 65% for the wind and 95% for the solar as a default value but can be replaced as various TSOs will have historic experience of higher or lower output from renewables across the assessed period;

**Load factor:** The ratio of the available output capacity and installed capacity over a period of time for various types of power plants (used primarily to describe renewable output in this report);

**Load Management:** Load Management forecast is estimated as the potential load reduction under control of each TSO to be deducted from load in the adequacy assessment;

**Load:** 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;

**Must Run Generation** is the amount of output of the generators which, for various reasons, must be connected to the transmission/ distribution grid. Such reasons may include: network constraints (overload management, voltage control), specific policies, minimum number of units needed to provide system services, system inertia, subsidies, environmental causes etc.;

**National Generating Capacity (NGC):** The 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. The National Generating Capacity of a country is the sum of the individual Net Generating Capacity of all power stations connected to either the transmission grid or the distribution grid.

**Net Transfer Capacity (NTC):** The Net transfer capacity is the maximum total exchange program between two adjacent control areas compatible with security standards applicable in all control areas of the synchronous area, and taking into account the technical uncertainties on future network conditions;

**Non-usable capacity at peak load under normal conditions**: Aggregated reduction of the net generating capacities due to various causes, including, but not limited to temporary limitations due to constraints (e.g. power stations which are mothballed or in test operation, heat extraction for CHP's); limitations due to fuel constraints management; limitation reflecting the average availability of the primary energy source; power stations with output power limitation due to environmental and ambient constraints, etc.;

**Pumping Storage Capacity**: Net Generating Capacity of hydro units in which water can be raised by means of pumps and stored, to be used later for the generation of electrical energy;

**Reference Points:** Reference points are the dates and times data are collected for:

- Sundays of Summer on the 5$^{th}$ hour (05:00 CET) and on the 11$^{th}$ hour (11:00 CET)
- Wednesday of Summer on the 12$^{th}$ hour (12:00 CET)

**Reliably Available Capacity (RAC)**: Part of National Generating Capacity that is actually available to cover the Load at a reference point;



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**Remaining capacity (RC):** The RC on a power system is the difference between the RAC and the Load. The RC is the part of the NGC left on the system to cover any programmed exports, unexpected load variation and unplanned outages at a reference point;

**Run of River**: A hydro unit at which the head installation uses the cumulative flow continuously and normally operates on base load;

**Severe conditions** are related to what each TSO would expect under a 1 in a 10 year scenario.[3] For example, the demand will be higher than under normal conditions and in certain regions, the output from generating units (e.g. wind) may be very low or there may be restrictions in thermal plants which operate at a reduced output under very low or high temperatures.

**Simultaneous exportable/importable capacity:** Transmission capacity available for exports/imports to/from other Control Areas expected to be available each week. It is calculated taking into account the mutual dependence of flows on different profiles due to internal or external network constraints and may therefore differ from the sum of NTCs on each profile of a Control Area or country;

**System services reserve under normal conditions**: The capacity required to maintain the security of supply according to the operating rules of each TSO. It corresponds to the level required one hour before real time (additional short notice breakdowns are already considered in the amount of outages).

**Time of Reference:** Time in the outlook reports is expressed as the local time in Brussels.

[3] It is difficult to be very specific and hence a description of the scenario being considered should be described by each TSO and if a TSO is not using a 1 in 10 year scenario e.g. only calculates at a 1 in 20 year demand level, then this should be highlighted.



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# 4. Winter review

*During the winter 2013/2014 temperatures across the whole of Europe were above average. As a result, the power demand was below or around seasonal average in all countries.*

However in some regions winter was exceptionally stormy:

- UK experienced the stormiest period of weather for the last 20 years. 12 major winter storms in the UK resulted in severe flooding in many parts.
- In The Netherlands a converter station in Eemshaven was damaged during a storm on October 21st, therefore the NorNed cable was out of operation until December.
- In early December a storm hit the Swedish west coast and caused large power unbalances due to tripping of lines, production units and HVDC cables. Several thousands of households were without power.
- In Ireland a winter storm caused multiple power outages across the country on 12 February, leaving around 250 000 people without power supply.
- In France a winter storm caused the outage of two nuclear units in Flamanville (2 x 1300MW). The situation returned to normal within the following hours.

The HVDC link between Greece and Italy suffered a cable fault during the winter. It will be available again in July 2014.

*Except for faults caused by winter storms, no critical situation related to system adequacy occurred in Europe during the last winter.*



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# 5. Summer Outlook

## 5.1. General overview

The coordination team which developed the regional analysis methodology is comprised of very experienced experts from various TSOs across Europe. The data submitted has been inspected by team members with a focus on those regions on which they have extensive knowledge and have confirmed that the main conclusions from the analysis are valid.

It should be noted that the analysis was based on data submitted by each TSO. A synchronous point in time was requested for all data in order to allow for a comparison between regions. Hence, a feasibility test to determine that there is enough generation to meet demand under normal and severe scenarios was enabled.

Based on the data submitted by each TSO, Europe as a whole should have over 155 GW of spare capacity to meet demand and reserves under normal conditions in the ideal case of unlimited interconnection capacity. This value corresponds to nearly 38 % of the sum of peak loads. The analysis is forecasting a minimal surplus of 85 GW under severe conditions (approximately 20 % of peak load) under the same assumption (1 in 10 years). To put that into perspective, in the Summer Outlook 2013 report, ENTSO-E analysis was forecasting a copperplate surplus of 100 GW under severe conditions.

Taking into account the cross border capacities, the analysis indicated that there is sufficient interconnection capacity between countries to take full advantage of this excess of generaton capacity to cover the demand in all countries.

As for the past Summer and Winter Outlook reports, additional data was again requested to allow an analysis for downward regulation.

Based on the data submitted by each TSO, Europe as a whole should have about 55 GW of downward regulation margin (about 18% of load) at the daytime minimum demand and in the ideal case of unlimited interconnection capacity. When the overnight minimum demand is considered, this downward regulation margin drops to about 47 GW (approximately 20% of load).

Taking into account the reported interconnection capacities and using a consistent scenario for the renewables in-feed, the analysis revealed that under the considered circumstances sufficient means should be available to export energy out of the countries which expect an excess of inflexible generation.

In the next sections, we will first focus on the generation adequacy analysis, or in other words, the question whether the available generation can cover demand; both on a national and a pan-European level. Second the downward regulation margin will be looked at. In this section issues resulting from an excess of inflexible generation will be investigated, as well as the possibility to export these excesses, or alternatively the necessity to curtail their outputs.

## 5.2. Individual country perspective analysis

**Generation adequacy**

Considering *normal conditions*, the majority of countries are expected to be able to balance load without the need of imports, as shown in green in Table 1.

Some countries are expected to have in *normal conditions* some weeks (orange in Table 1) in which imports are required in order to meet their demand and reserve requirements. Denmark is expected to require imports to balance load throughout all weeks of summer.



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*Table 1: WEEKLY IMPORTING NEEDS UNDER NORMAL CONDITIONS*

When severe conditions are considered, which in summer generally means high temperatures (1 in 10 years probability), low wind in-feed, and greater unavailability of thermal power plants, the number of countries that require imports grows, but the general situation remains comfortable.

| week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
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*Table 2: WEEKLY IMPORTING NEEDS UNDER SEVERE CONDITIONS*

Most countries did not communicate an increased risk of generation adequacy issues for the coming summer. Some countries however provided specific comments on their situation. These comments are summarized below.



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*Belgium*

No new units are scheduled for commissioning this summer period. On the other hand, one CCGT unit is planned to be closed on 1 July, meaning a loss of about 485 MW of installed power in the Belgian system. However, following the plan Wathelet some units could be kept in service in a pool of strategic reserves for severe winter conditions. As detailed decisions on this topic are not known yet, for this summer outlook we considered the previously mentioned decommissioned unit as entering into a mothballed status.

End March it was announced by the operator that two nuclear units (1000 MW each) would be taken offline. Both units (Doel 3 and Tihange 2) have been offline for nearly a year prior to summer 2013 to investigate possible issues with the reactor vessels. Recently new tests have indicated that further analysis is required, hence the shutdown of both units until further notice. As the date of their return into service is not known yet, both units were considered as being unavailable throughout the complete summer outlook period.

*France*

The available generation is lower than last year in normal conditions but remains at the same level in severe conditions. For economic reasons many oil and gas generation units will be shut down this whole summer amounting to a volume up to 7.7 GW. This situation could cause local constraints in the south-eastern regions of France.

*Germany*

The shutdown of 5 GW nuclear capacity in southern Germany remains to be a point of concern to the operation of the system. The shutdown in 2011 still causes a regional shortage of available active and especially reactive power, leading to voltage regulation issues during the summer. New power plant projects are delayed. For the time being, the problem stems rather from the regional distribution of available power plants within Germany, and less a problem of capacity.

In the frame of their extensive grid analyses, German TSOs have identified the risk of high voltages for scenarios of very low load combined with a high PV feed-in in Southern Germany. Thus, in the summer period the German TSOs may be faced with problems to meet (n-1)-security rules affecting the violation of permitted voltage limits.

*Hungary*

As matters stand, the outcome of the Ukrainian crisis is possible to have a significant impact on the electricity system of Eastern Central Europe, in particular Hungary. In case the gas supply wanes or terminates, then the operation of gas-fired power plants is likely to become unpredictable. Beyond national analyses, it is necessary to take into consideration decrease of importable energy from neighbouring systems as a consequence of available capacity limitation in the gas-fired power plants of the adjacent electricity systems. Further sensitivity analyses on the impact of scenarios of gas supply interruptions, on covering the summer demand as well as on stock levels for next winter, can be found in the ENTSO-G Summer Supply Outlook 2014 and Summer Review 2013 report[4].

*Poland*

Extremely severe balancing conditions in the summer period may take place in case of long lasting heat spells leading to significant deterioration of Polish power balance (increase of load with simultaneous decrease of generating capacities due to higher forced outage rate of generators, worse cooling conditions and increase in network constraints). In contrast to previous years, the risk of high unscheduled transit flows through the Polish system (from the west to the south) during such weather conditions cannot be considered low any more (as a result of development of solar generation in Germany). In such a situation, if necessary from power balance point of view (to recover minimum generating capacity reserve margin required) the import towards the Polish system can be realised under the condition of simultaneous multilateral redispatch action (with source and sink respectively south and west of Poland) taken at the

[4] http://www.entsog.eu/publications/outlooks-reviews/2014#SUMMER-OUTLOOK

same time to limit the unscheduled transit flows through the Polish system. It is estimated that cca. 300 MW of such a redispatch (assuming source in Austria and sink in Germany) is necessary to allow 100 MW of import to Poland from Germany. A relevant framework for such a remedial action has been developed recently within TSC project.

**Downward regulation margin**

Table 3 and Table 4 below show the exporting needs at the Sunday, 11 AM and the 5 AM synchronous time point respectively. It should be noted that the renewables in-feed from the data collection was used, which represents a worst-case situation for every country separately.

The countries that need to export or curtail an excess of inflexible generation at the daytime minimum in case of high renewables (wind and solar) in-feed during (almost) all weeks are Bulgaria, Germany, Denmark, Latvia, Macedonia, Romania, Sweden and Cyprus.

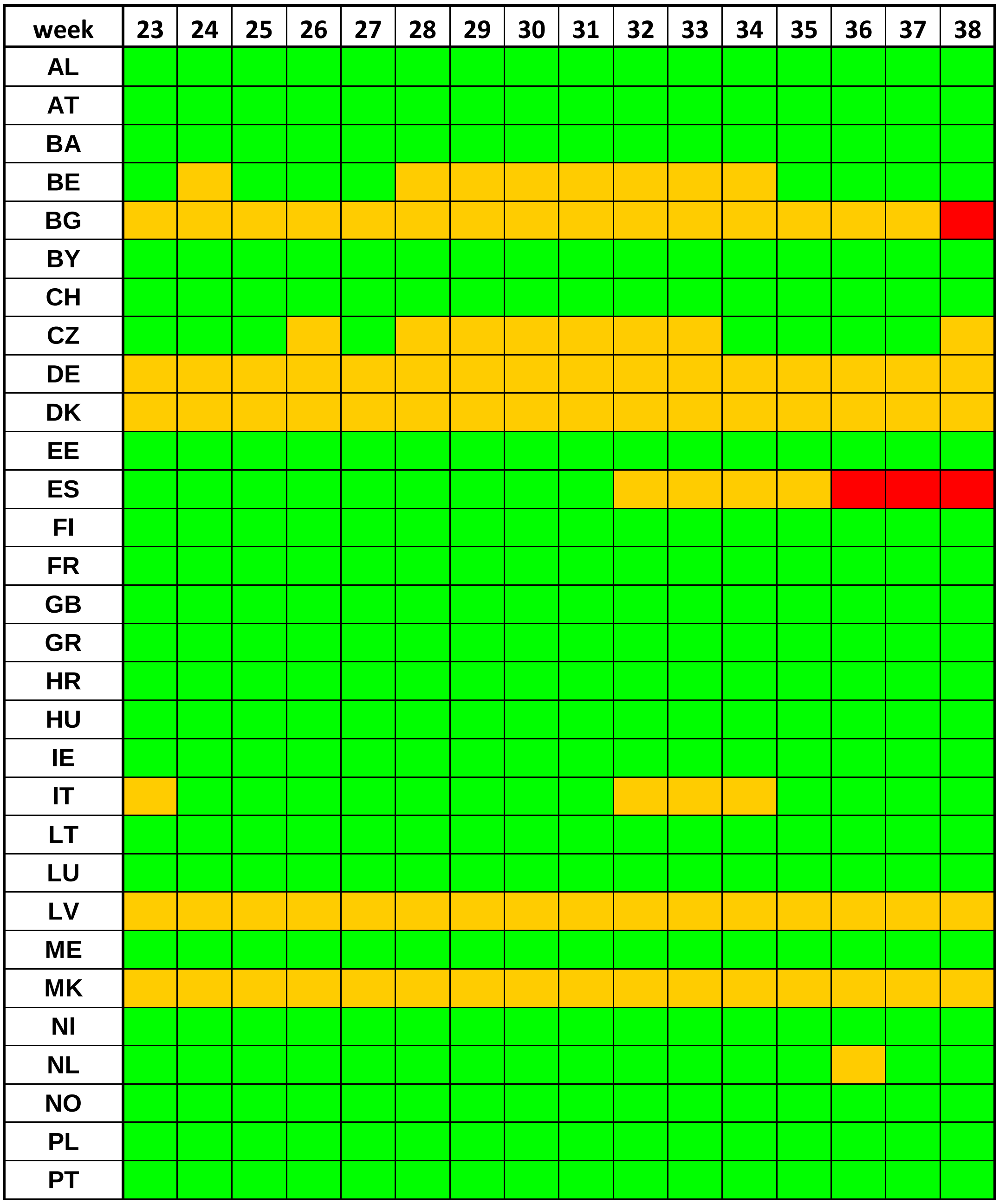




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*Table 3: WEEKLY EXPORTING NEEDS AT THE DAYTIME MINIMUM*

During the overnight minimum, the picture is more or less similar, now reflecting mainly the countries with large amounts of wind generation installed. The countries that need to export or curtail an excess of inflexible generation in case of high renewables (onshore and offshore wind) in-feed during (almost) all weeks are Bulgaria, Denmark, Hungary, Northern Ireland, Ireland, The Netherlands, Sweden and Cyprus.

| week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
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*Table 4: WEEKLY EXPORTING NEEDS AT THE OVERNIGHT MINIMUM*

Most countries did not communicate an increased risk of downward regulation issues for the coming summer. Some countries however provided specific comments on their situation. These comments are summarized below.

*Spain*

At minimum demand periods, with high amounts of renewable production, power surplus with spilling of RES can take place. The Spanish TSO has a specific control centre for renewable sources (CECRE), which is permanently monitoring and supervising the renewable production in order to maintain a balanced situation.

The export capacity of interconnectors is a key factor in order to avoid spilling of renewable energy, mainly wind power. Another point worth mentioning is the importance of energy storage - mainly pump storage plants - in order to properly manage the excess of inflexible power.

*Germany*

RES are continued to be installed at great speed. For southern Germany this is attributed largely to distributed PV generation. The installed capacity of PV generation in Germany is expected to reach about 39 GW in the coming summer. An amendment of the German Renewable Energy Law [EEG] is intended for August 2014. This amendment should define a reliable deployment corridor for renewable energies. At this time, the effects on the current increase of installed RES power capacity are difficult to predict.

## 5.3. Regional assessment

In this section, a regional assessment of generation adequacy and downward regulation margin is performed. For this analysis, the in-feed from renewable energy sources (notably wind and solar) was modified to obtain a more consistent scenario of renewable in-feed over Europe. To this end, the methodology described in paragraphs 3.2 and 3.3 was used.

It is important to underline that the scenarios evaluated in the regional assessment (for both upward and downward analysis) represent conditions that are significant and realistic for the European system as a whole, therefore they may differ from the scenarios evaluated in each individual country perspective analysis, which corresponds to conditions significant and realistic for each country. For example, the severe conditions of the whole European System do not correspond to the “simple envelope” of each individual severe condition. The results described in the paragraphs below could consequently differ from the ones presented in previous paragraph.

**Generation adequacy**

Based on normal conditions for generation and demand, the majority of countries do not require imports as shown pictorially in Table 5. Where a country is coloured green, it has excess capacity to meet demand and reserves. The countries which are coloured in orange can cover their deficit with imports, whereas for the countries in red the regional analysis revealed that their deficit cannot be covered with imports due to insufficient reported cross-border exchange capacities or a lack of energy.


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*Table 5: WEEKLY STRESS ASSESSMENT UNDER NORMAL CONDITIONS*

While the majority of regions do not require imports for adequacy reasons, markets will determine the economic energy transfers based on the respective price differentials between regions, and hence various borders may be transmitting power at their maximum capacity. As indicated in the description of the methodology, this analysis is not a market simulation and hence real physical flows resulting from commercial exchanges are not indicated. Although some regions do require imports for generation adequacy reasons, there is ample interconnector capacity from neighbouring regions to cover their demand.

Under severe conditions (defined as 1 in every 10 years), the picture is somewhat different: the demand of certain individual countries increases due to air-conditioning needs, whilst generation availability might be lower due to unfavourable meteorological conditions. The analysis indicated that even under severe conditions across all of Europe, demand is met and reserves can be maintained. The limited NTC on the synchronous profile remains to be a key issue in the power system of Poland.

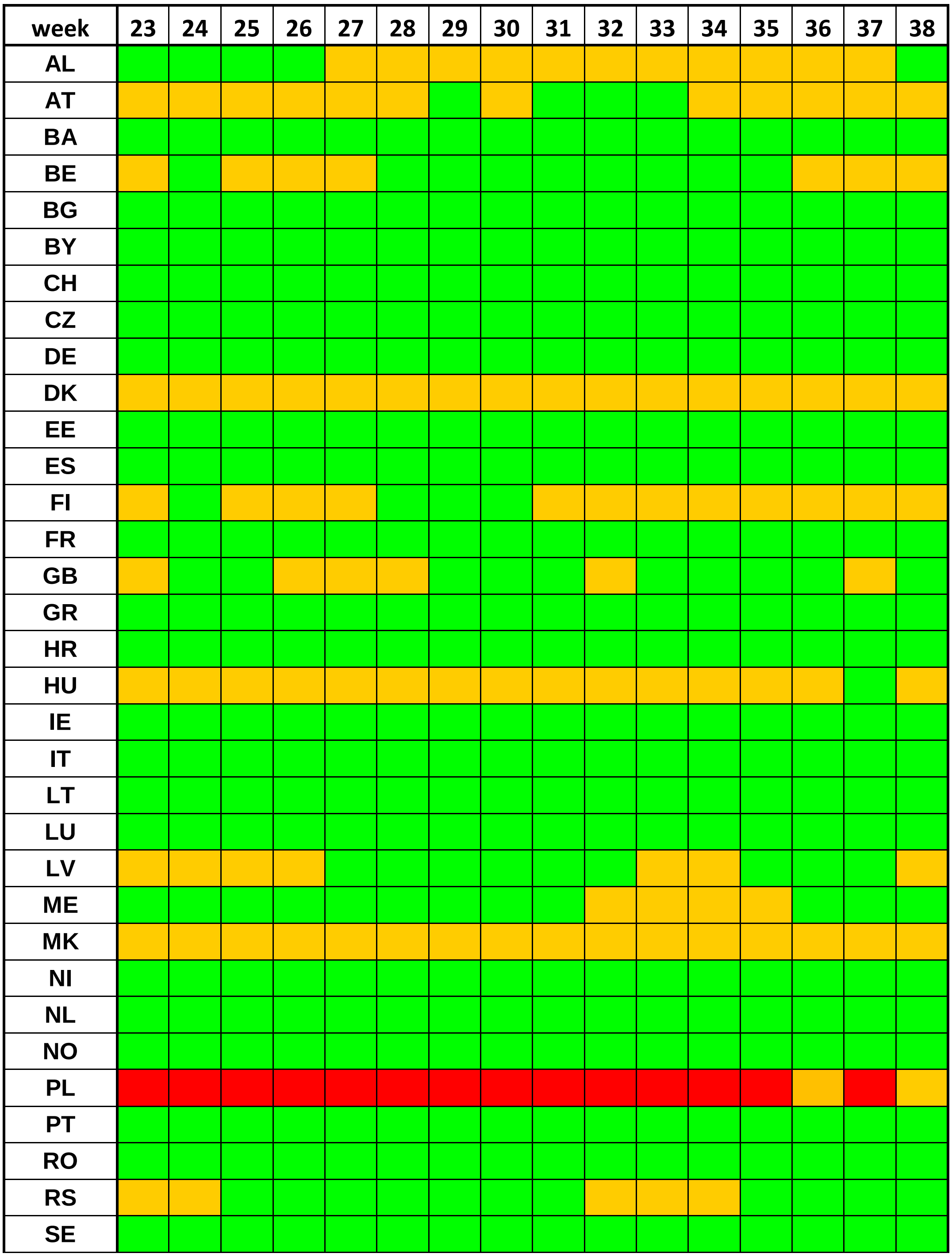




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*Table 6: WEEKLY STRESS ASSESSMENT UNDER SEVERE CONDITIONS*

The map below gives another view on the data shown in Table 6. It indicates the countries expecting a need for imported energy in at least one week of the considered period or in all weeks of the considered period respectively. As can be seen on this map, the need for importable energy is quite limited and geographically distributed, resulting in a low probability of potential issues regarding generation adequacy for the coming summer period.

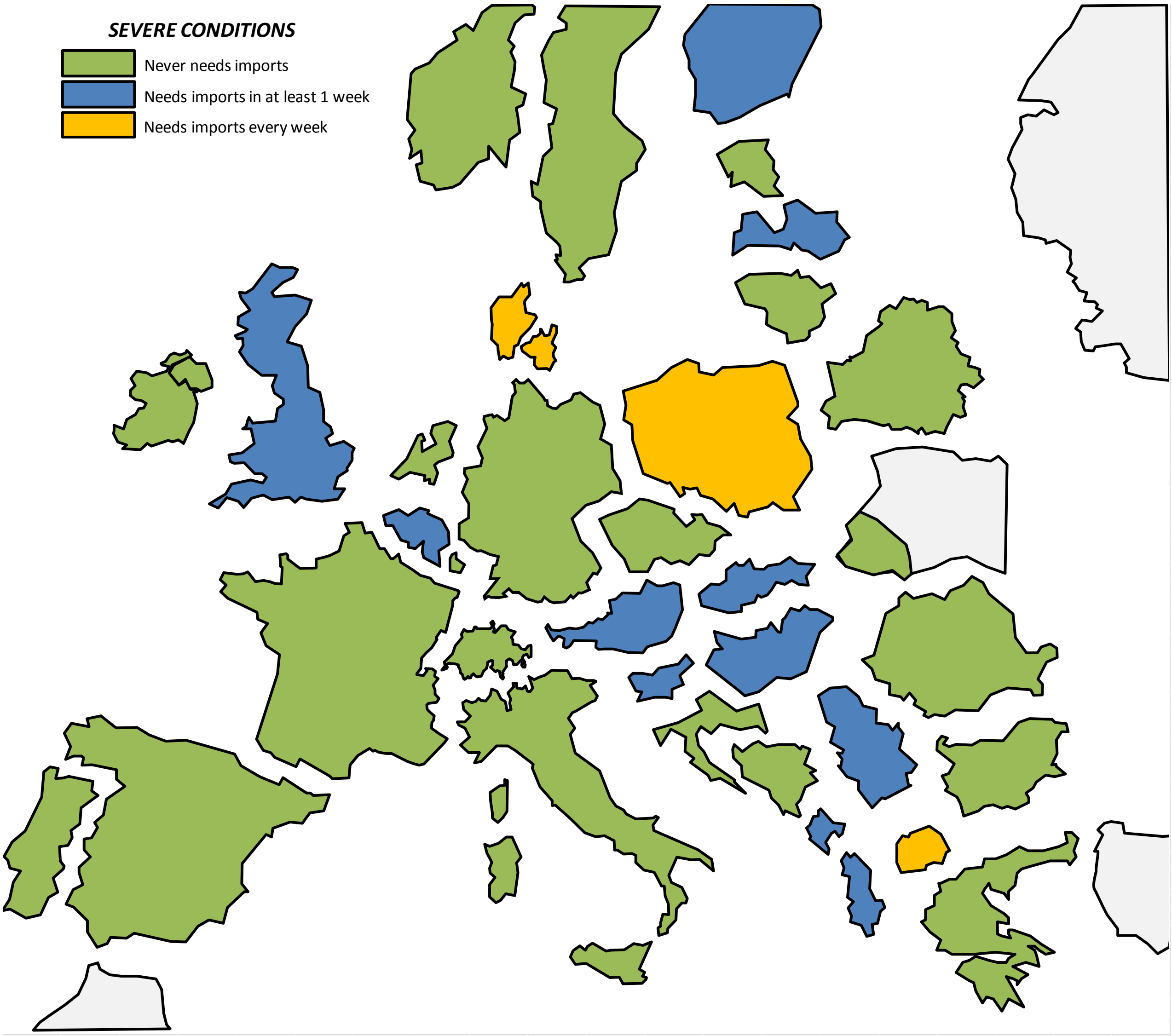


*Figure 3: OVERVIEW OF THE IMPORT NEEDS FOR SEVERE CONDITIONS*

### Downward regulation margin

With increasing renewable generation in Europe, the output of the analysis is shown below in Table 7. Where a country is coloured green, it has sufficient downward regulation margin. The countries which are coloured in orange can export their excess energy, whereas for the countries in red the regional analysis revealed that their excess cannot be entirely exported considering the reported NTC values.

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*Table 7: WEEKLY STRESS ASSESSMENT FOR DAYTIME MINIMUM*

It can be observed that with a wind and solar output set at a representative level across the ENTSO-E region (see Appendix for the load factors used), there are some countries that would be required to export excess inflexible generation under minimum daytime demands to neighbouring regions. For all countries, the estimated minimal NTC's in combination with the possibility for neighbouring countries to absorb excess energy result in a feasible ENTSO-E wide situation.

| week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AL | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green |
| AT | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green |
| BA | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green |
| BE | orange | orange | green | green | green | orange | orange | orange | orange | orange | orange | green | green | green | green | green |
| BG | orange | orange | orange | orange | orange | green | green | green | green | green | green | orange | orange | orange | orange | orange |
| BY | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green |
| CH | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green | green |
| CZ | green | green | orange | orange | green | orange | orange | orange | orange | orange | orange | orange | orange | orange | green | orange |
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| DK | green | green | green | green | green | green | green | green | green | green | green | green | green | orange | orange | orange |
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| SK | green | orange | green | green | green | green | green | green | green | green | green | green | green | green | green | green |

*Table 8: WEEKLY STRESS ASSESSMENT FOR OVERNIGHT MINIMUM*

An analysis of the overnight minimum demand scenario yields the same results and conclusions as for the daytime scenario: sufficient interconnection capacity is available to export excess inflexible generation to neighbouring countries under the investigated hypotheses.

The maps below give another view on the data shown in Table 7 and 8. They indicate the countries expecting a need for exported energy in at least one week of the considered period or in all weeks of the considered period respectively. As can be seen on these maps, the need for exportable energy is quite limited, resulting in a low probability of potential issues on a pan-European scale regarding an excess of inflexible generation for the coming summer period.

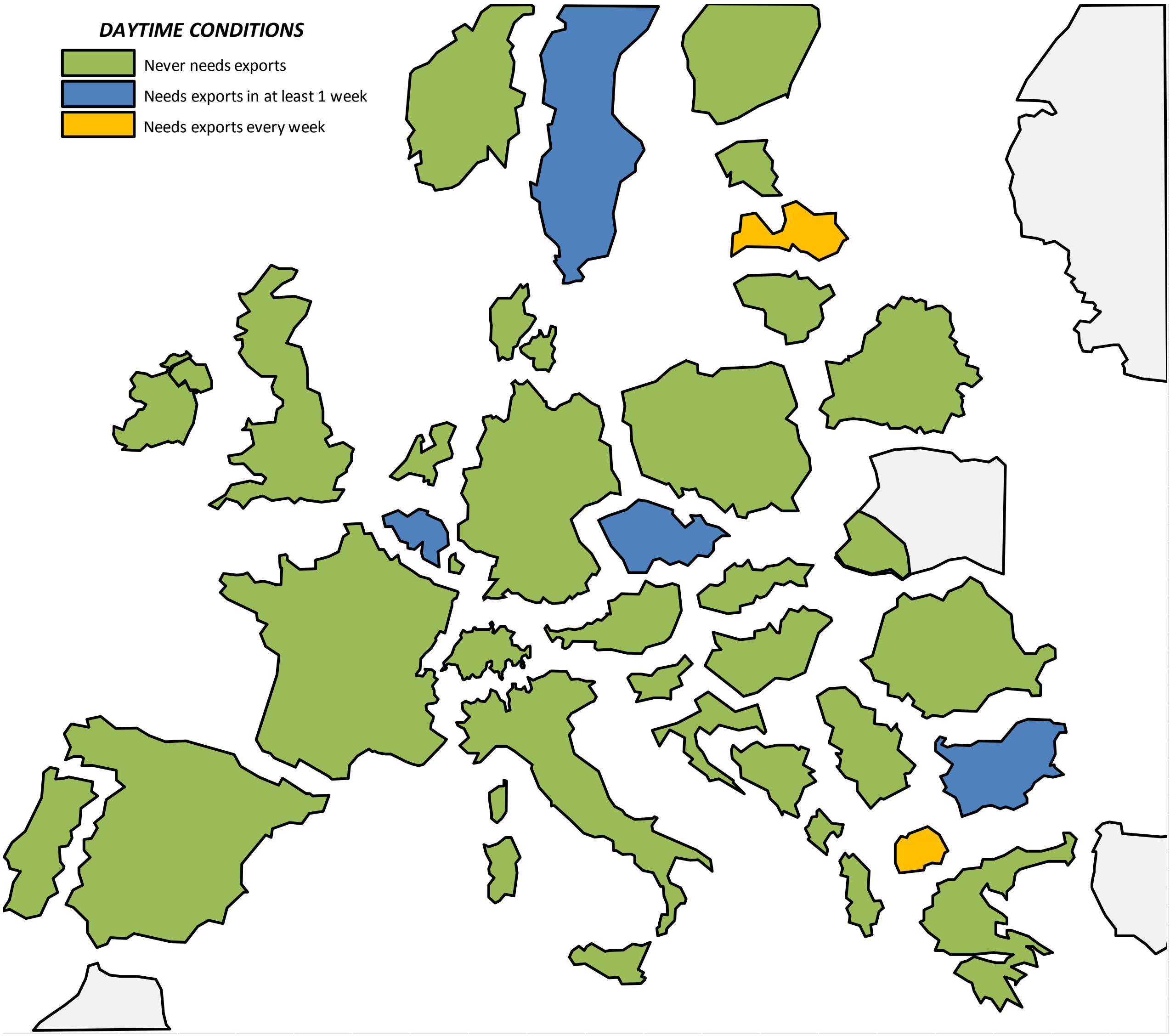


*Figure 4: OVERVIEW OF THE EXPORT NEEDS FOR THE DAYTIME SCENARIO*



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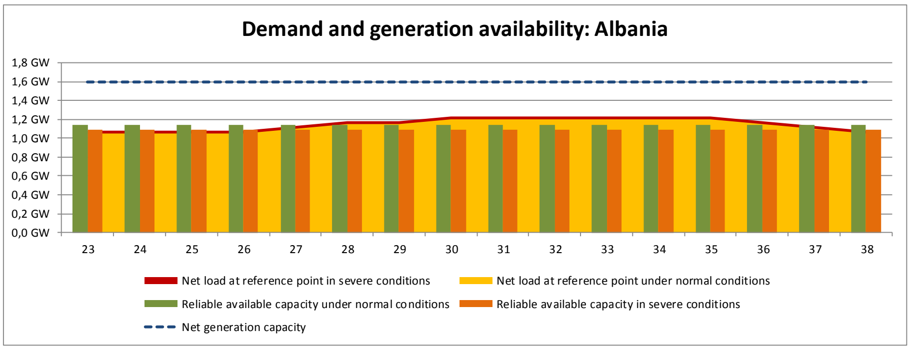
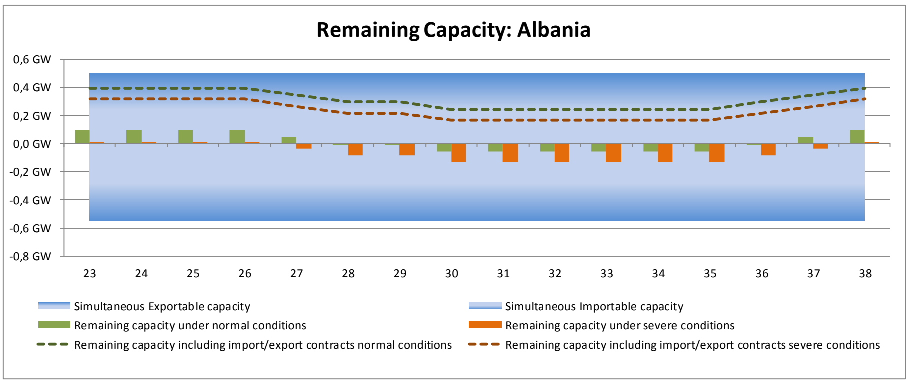
*Figure 5: OVERVIEW OF THE EXPORT NEEDS FOR THE NIGHTTIME SCENARIO*

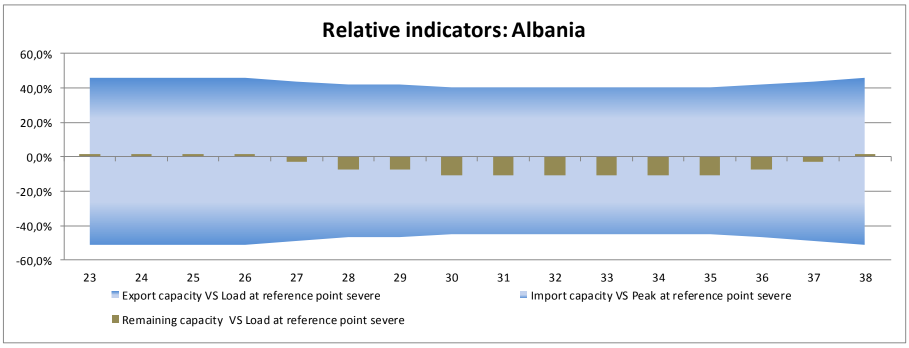
## 6. Country level

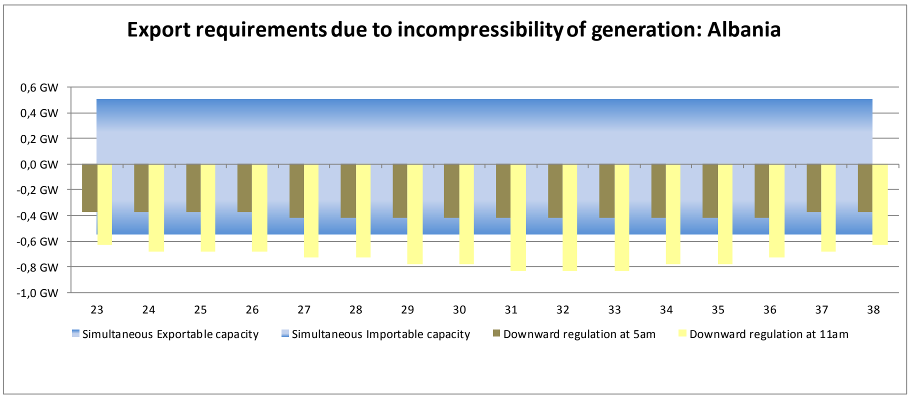
### 6.1. Individual country responses to Summer Outlook

**Albania**



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## Synopsis

Taking into account the firm import contracts for this year, we do not anticipate significant balance problems in the Albanian Power System for the coming summer period. In case of facing problems with unexpected high temperatures associated with increasing of demand, and potentially low inflows at Drin River Cascade, it will be requested to increase the import volume using the availability of interconnections. Physical imports are expected on the Greece and Montenegrin border and exports on the Kosovo border. Due to high transfer capacities (two interconnectors 400 kV and two 220 kV), no problems with congestions due to transit flows or security of supply are expected. In general the interconnections are sufficient for import/export of electricity. The average simultaneous import/export capacity for the coming summer is approximately 500 MW. The simultaneous import and export capacity was obtained by adding the average NTC-values of all borders and multiplying this sum with a simultaneous coefficient of 0.7. The transfer capacities of imp/exp indicated in the worksheet represent about 60% of real transportable capacity that is calculated monthly for each border in collaboration with neighbouring TSOs, and afforded by monthly auctions. Available cross border capacity allows compensation of eventual energy deficit and transit of energy for successfully functioning of electrical market. The most of maintenance works in generation and transmission system are concentrated in the period of April – May and September – October, when the demand is relatively lower. The level of remaining capacity considered as necessary in order to ensure a secure operation for the next summer is around 100 MW. In Albania there are not yet intermittent energy sources like wind or solar, to be taken into account in our assessment. Distribution System Operator (DSO) which also holds the license for Retail Public Supply (RPS) has already concluded import contracts with traders, yearly based for 300 MW. This is the reason that in the worksheet we have not indicated the exporting countries, although the firm import contracts are in place. Under these conditions all criteria for the system adequacy will be met.

## General situation

Most of the maintenance works in generation – transmission system will be performed during summer period from April till October. The most critical period remains during months of July and August, depending from the temperatures, and due to that, the maintenance schedule of units and transmission elements in that period is set to minimum. This period is also characterized by low hydro levels. Unfortunately, Albania has not TPP with gas and fulfilment of our needs for covering the demand is based on the electricity imports.

## Most critical periods

The most critical period lays on months of July and August, depending from the weather conditions, due to strong relation between temperatures and electricity consumption. Based on the experience of last years, the most critical weeks are from 28 till 33.

## Expected role of interconnections

In general the interconnections are sufficient for fulfilling the need of electricity imports, and also for exports if it will be the case, and they are used as well for transits, mainly towards Greece. The maintenance works of the interconnectors is arranged to be in the period of April – May and September – October, when the demand is relatively lower, also in the neighbouring TSOs, thus the adequacy level will be maintained.

The export capacity of our interconnectors normally is around 500 MW, and on the other hand, Albania has not yet inflexible generation, thus it is not expected to have any problem with demand minimum periods.

## Framework and methodology of the assessments

According to the Grid Code, OST's regular operation planning horizons are: year (Annual Operation Study, AOS), month, week and day. The AOS is based on a model combining stochastic and deterministic approach, and make use of information provided by grid users. In medium and short term, OST conducts studies concerning the Generation Adequacy Assessment. The studies include load forecasts and multiple scenarios on energy management using probabilistic and deterministic methods. The energy management studies aims at checking the actual energy situation and the level of hydro reserves. These studies are regularly revised to include mainly variations in hydro-levels, demand and/or the availability of the power plants. The monthly peak load is calculated for both normal and severe conditions. The severe demand scenario is built considering a temperature higher by 5°C than the season normal temperature that is of about 30°C. A statistical approach is followed based on recorded hourly load and temperature data covering the period of last 10 years. The dependency of the load on the temperature averages to 10 MW/°C, and the load for severe conditions, in the assessment, is increased with 50 – 100 MW mainly in the period of July – August. In this assessment, the thermal power of 90 MW, is put at non-usable capacity due to information from generation company KESH-Gen, that intend to use it only in case of a very dry period.

## Austria

### General situation

Average temperatures are expected for summer 2014. A slight increase of load is expected compared to summer 2012.

### Most critical periods

Due to economic reasons almost no thermal production units are available for congestion management measures in the summer period. Furthermore, there are major restrictions concerning the availability of pump storage power plants during summer time. Therefore APG plans - only for operation purposes - to conclude contracts with Austrian thermal power plants for higher flexibility. The range of these contracts is subject of an ongoing analysis and could therefore not be taken into account for this report.

### Framework and methodology of the assessments

For the upcoming summer APG assumed an increase of load of +0.5% compared to summer 2013.

Wind power plants and solar power plants are treated as 100% Non-usable capacity at peak load under normal and severe conditions. Biomass power plants are assumed to be ""Must Run Units"" during the next summer period. (Beside run of river)

APG expects that no thermal units will be available in summer time for congestion management measures. Therefore they are considered to be mothballed or under maintenance.

As there is a common market area with Germany no NTC limitations are taken into account at this border.


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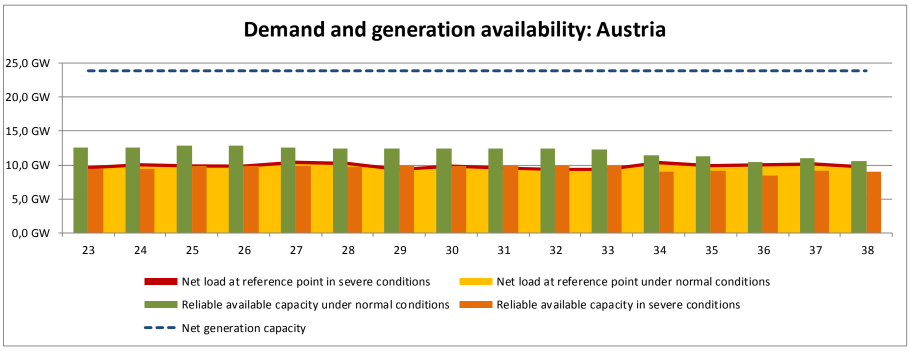
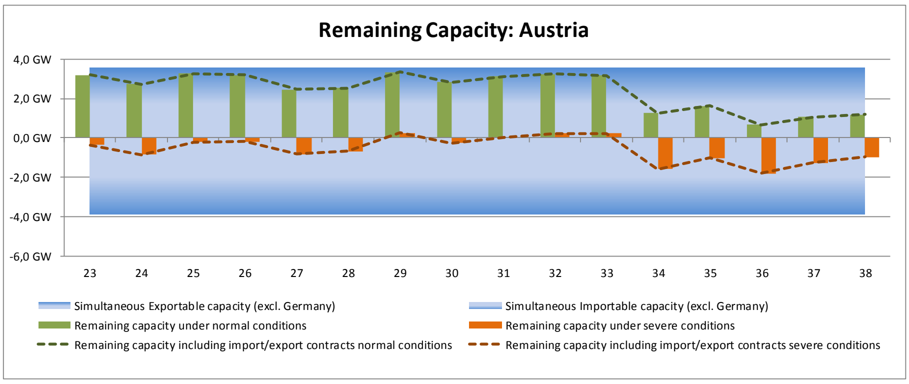
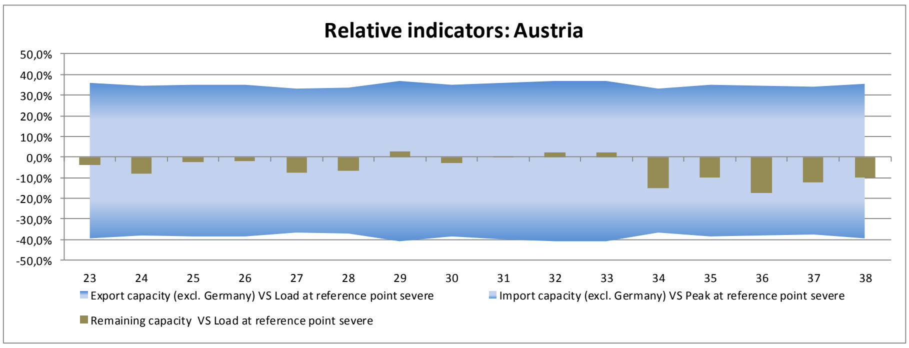


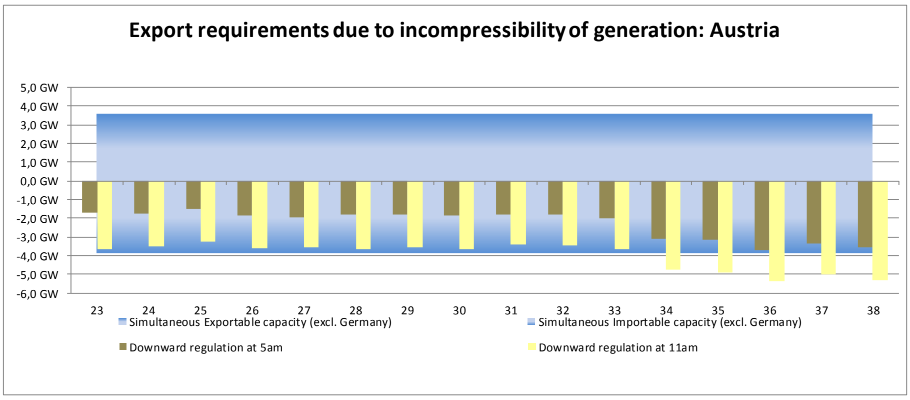
Demand and generation availability: Austria
25,0 GW
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity

Remaining Capacity: Austria
4,0 GW
2,0 GW
0,0 GW
-2,0 GW
-4,0 GW
-6,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity (excl. Germany)
Simultaneous Importable capacity (excl. Germany)
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

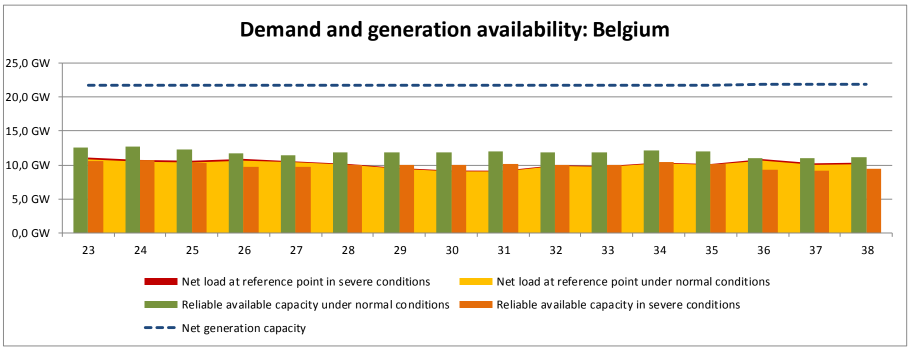



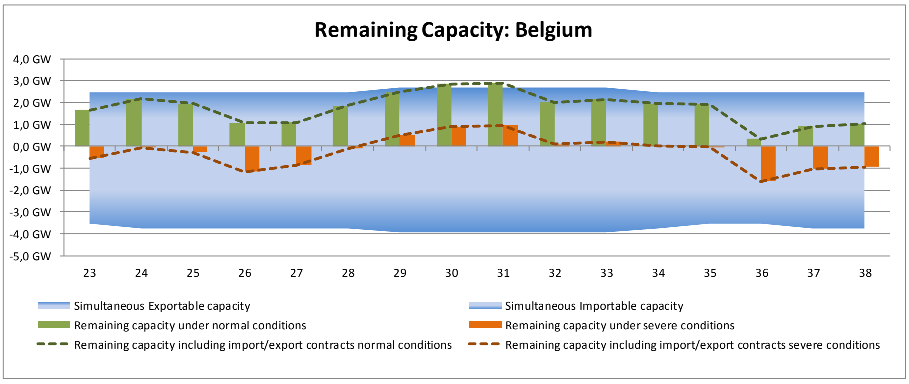
Relative indicators: Austria
50,0%
40,0%
30,0%
20,0%
10,0%
0,0%
-10,0%
-20,0%
-30,0%
-40,0%
-50,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity (excl. Germany) VS Load at reference point severe
Import capacity (excl. Germany) VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

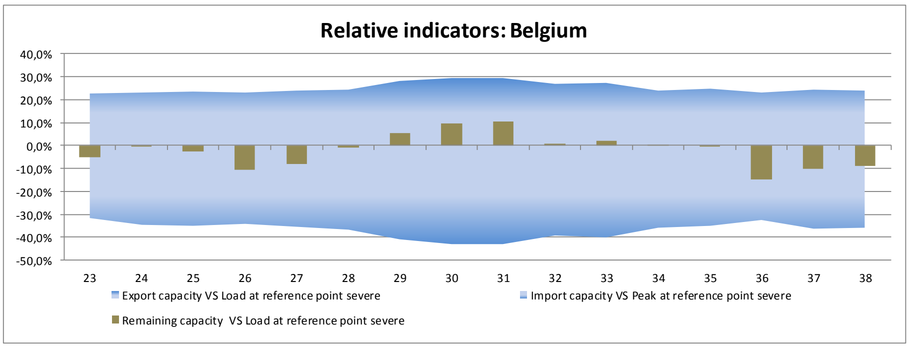



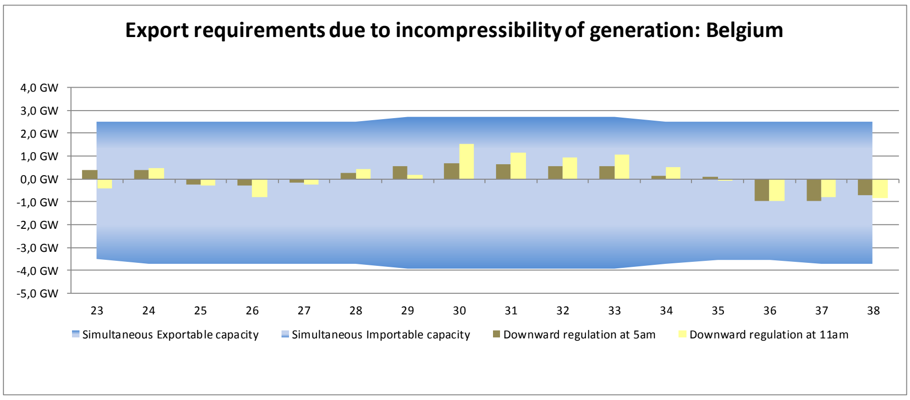
Export requirements due to incompressibility of generation: Austria
5,0 GW
4,0 GW
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
-4,0 GW
-5,0 GW
-6,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity (excl. Germany)
Simultaneous Importable capacity (excl. Germany)
Downward regulation at 5am
Downward regulation at 11am

## Belgium



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### Synopsis

For the summer to come, Elia does not expect severe issues regarding a lack of generation. For normal conditions, no significant import levels are expected to be needed to cover the internal Belgian consumption. In case severe conditions materialize, structural import levels up to 1.6 GW (2.4 GW if the Belgian peak load is considered) are expected to be needed during the investigated period. These levels however should be manageable considering the expected minimum import capacities for Belgium.

The probability of experiencing significant levels of excess inflexible generation is limited. During the months of July and August - where at the moment only a limited volume of generation is planned to be in maintenance - in case of simultaneous high wind and high solar conditions, surplus energy needing to be structurally exported could account for a volume of about 1 GW during some weeks. There should be no issue in exporting such volumes considering expected minimal interconnection capacities. Nevertheless, should a situation of incompressibility materialize, Elia has implemented mechanisms to give the right market incentives in order to mitigate potential risks.

Traditionally, the level of maintenance on generation units scheduled during the summer period (especially July and August) is rather limited. The values given reflect the latest information on maintenance schedules in the possession of Elia. However, last years an increase of the maintenance planned during the most critical period regarding incompressibility issues was noticed in the weeks prior to the summer period, which greatly alleviates the need for exporting surplus energy in case of high renewables infeed.

No new units are scheduled for commissioning this summer period. On the other hand, one CCGT unit is planned to be closed on July 1st, meaning a loss of about 485 MW of installed power in the Belgian system. However, following the plan Wathelet some units could be kept in service in a pool of strategic reserves for severe winter conditions. As detailed decisions on this topic are not known yet, for this summer outlook we considered the previously mentioned decommissioned unit as entering into a mothballed status.

End March it was announced by the producer that two nuclear units of 1000 MW each would be taken offline. Both units (Doel 3 and Tihange 2) have been offline for nearly a year prior to summer 2013 to investigate possible issues with the reactor vessels. Recently new tests have indicated that further analysis is required, hence the shutdown of both units until further notice. As the date of their return is not known yet, both units were considered as being unavailable throughout the complete summer outlook period.

### Most critical periods

No significant risk regarding generation adequacy was identified for the summer to come. Expected minimum import and export capacities should be sufficient to cover expected deficits or surpluses in the Belgian system.

### Expected role of interconnections

In general, the possibility to import and export energy is an important factor for the Belgian system. Regarding imports to cover the need of additional energy, it is not expected that - from a generation adequacy point of view - extraordinary high levels are needed to maintain system security during summer. The real-time exchanged energy is however dependent on the market situation, and can therefore be completely different from the strictly theoretical necessity of importing energy for maintaining generation adequacy.

Should the specific situation of combined high wind and high solar infeed materialize, significant levels of inflexible generation could need to be exported out of the Belgian system. However, interconnection capacities are expected to be more than sufficient for accommodating needed exports.

### Framework and methodology of the assessments

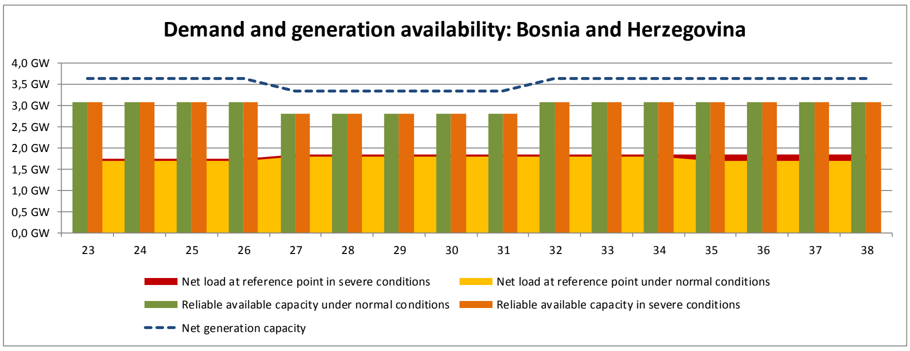
The desired safety level under standard conditions for the generation-load balance regarding upward regulation is reached during the whole summer period, for the 12:00 time of weeks 23 to 38 of 2014. The lowest remaining capacity in normal conditions is foreseen for September 12th, namely a remaining capacity of 140 MW. This minimum is mainly due to the combined announced overhaul of several units.

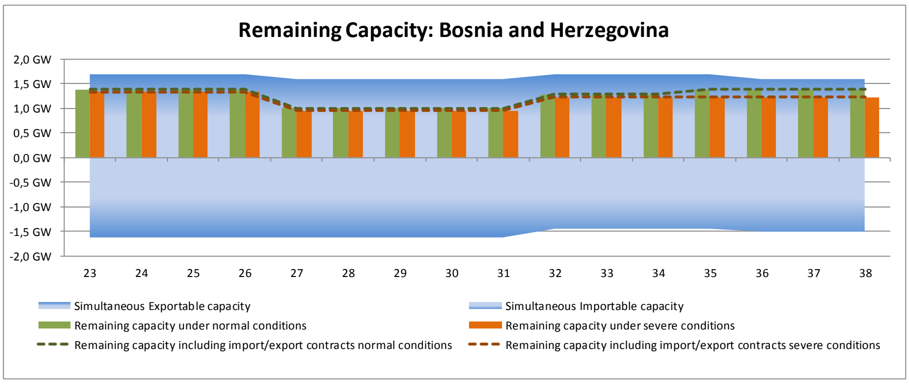
This assessment takes into account the actual, announced overhaul and an estimation of the average outages and non-usability factors of the generator units connected to the Elia grid and the DSO grids. The average outage rates of generation units were estimated based on historical data for the Belgian production park. Currently, load management under the form of interruptibility contracts is only available in normal circumstances for providing part of the manual Frequency Restoration Reserves, and these are therefore not included in the reported margins. Regarding the forecasted load, a structural increase of 0.05 % with respect to previous summer's load is assumed.

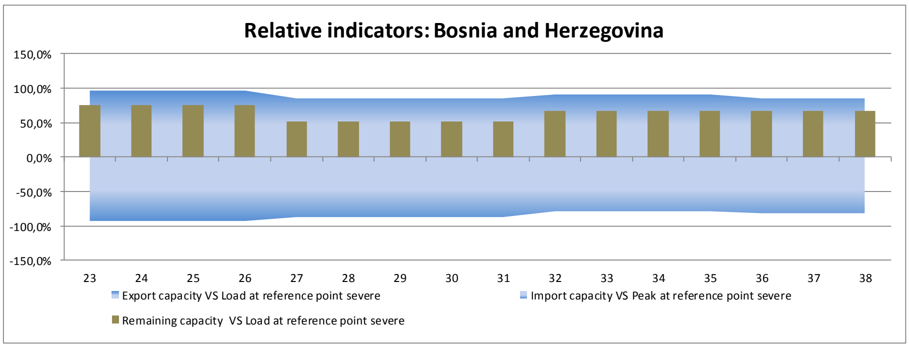
If additional forced outages, non-usable generation capacity and an increased load are taken into account in the severe conditions scenario, margins will decrease significantly, resulting in a minimum remaining capacity which drops to -1.80 GW for week 37. Therefore, in this period and in case of severe conditions, net imports may be necessary to cover the Belgian load; which should not be an issue as long as there is no lack of energy on a European scale.

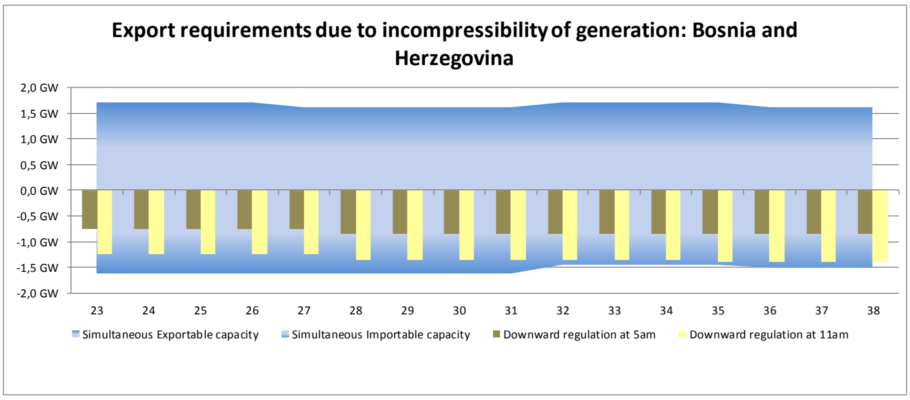
In case of exceptional climatic conditions (e.g. extended periods of dry and hot weather) the available generation capacity could decrease even more significantly. If these circumstances occur, the safety level might be affected.

## Bosnia and Herzegovina

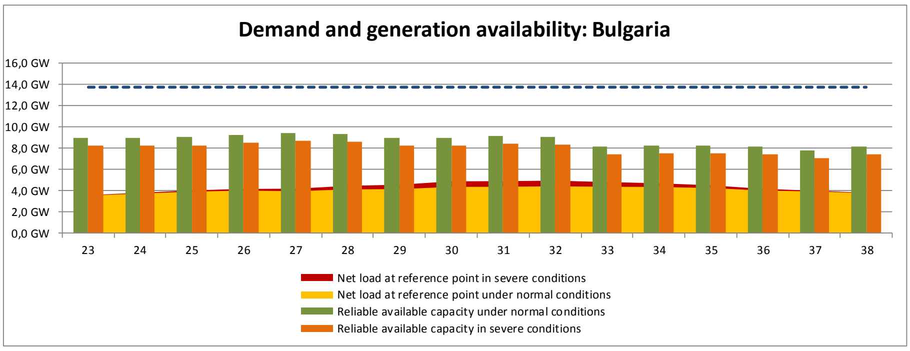


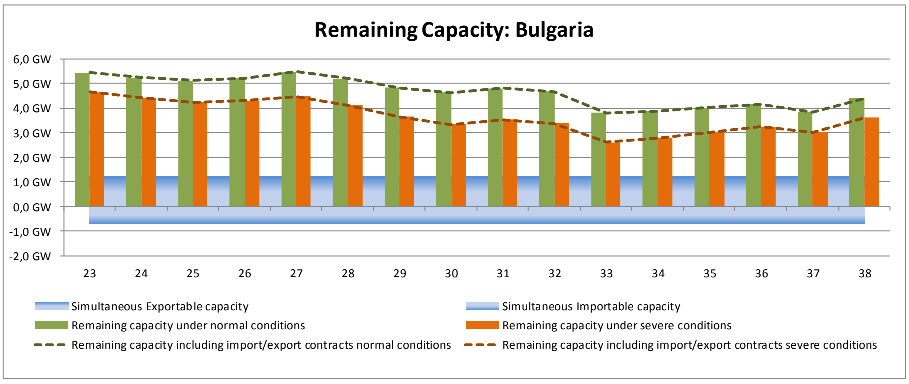



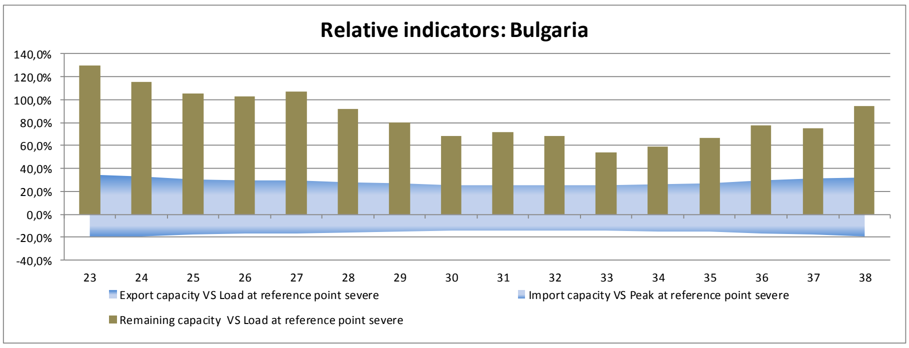



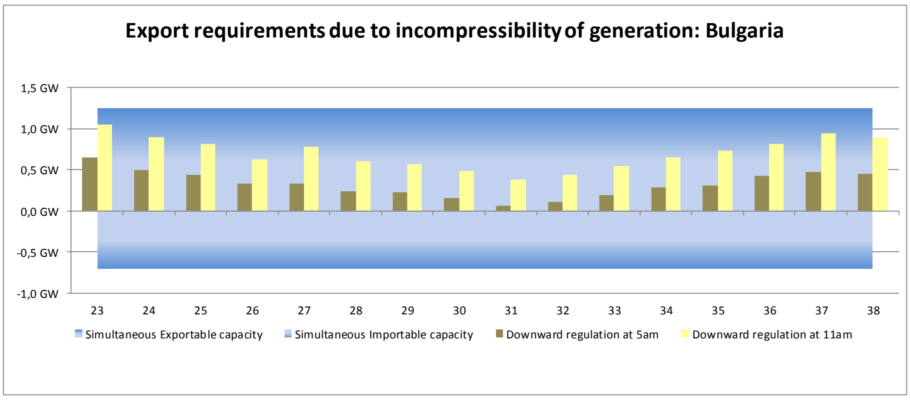



## Bulgaria

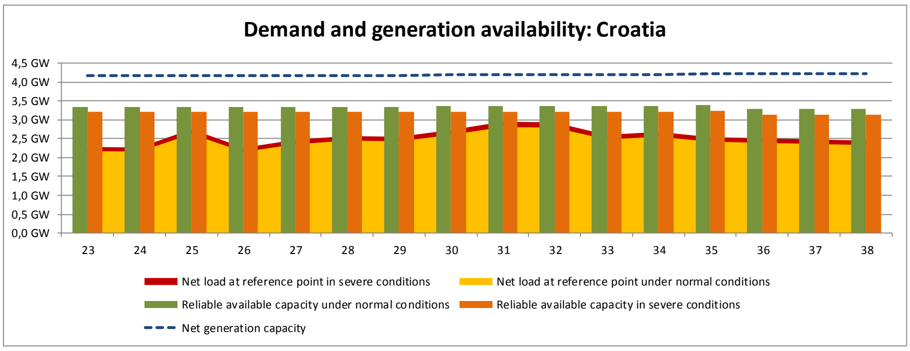

Demand and generation availability: Bulgaria
16,0 GW
14,0 GW
12,0 GW
10,0 GW
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions


Remaining Capacity: Bulgaria
6,0 GW
5,0 GW
4,0 GW
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

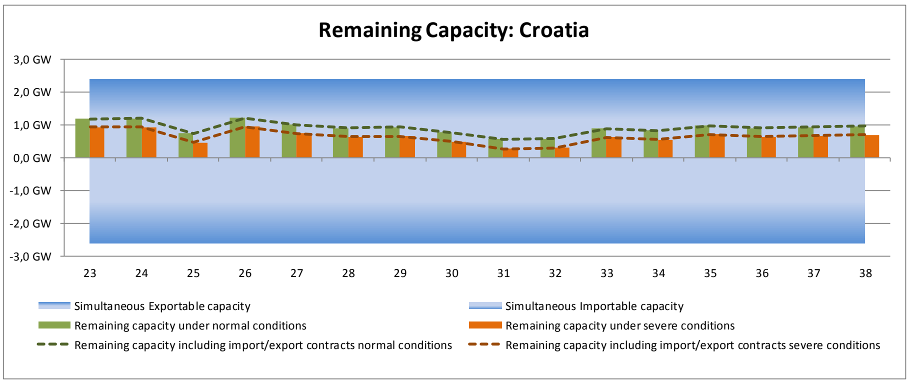

Relative indicators: Bulgaria
140,0%
120,0%
100,0%
80,0%
60,0%
40,0%
20,0%
0,0%
-20,0%
-40,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: Bulgaria
1,5 GW
1,0 GW
0,5 GW
0,0 GW
-0,5 GW
-1,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

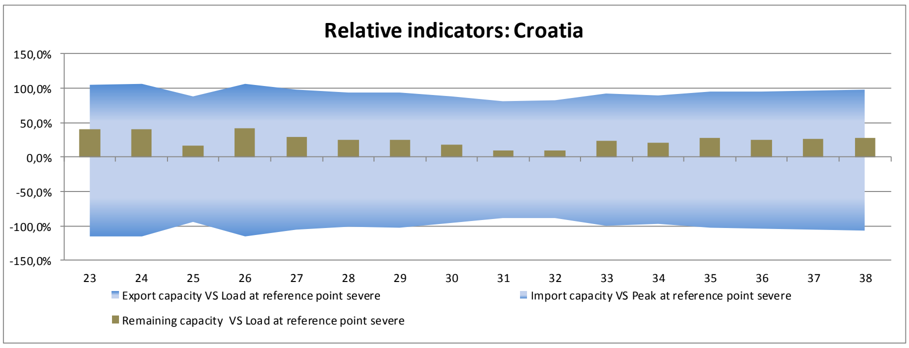
## Croatia



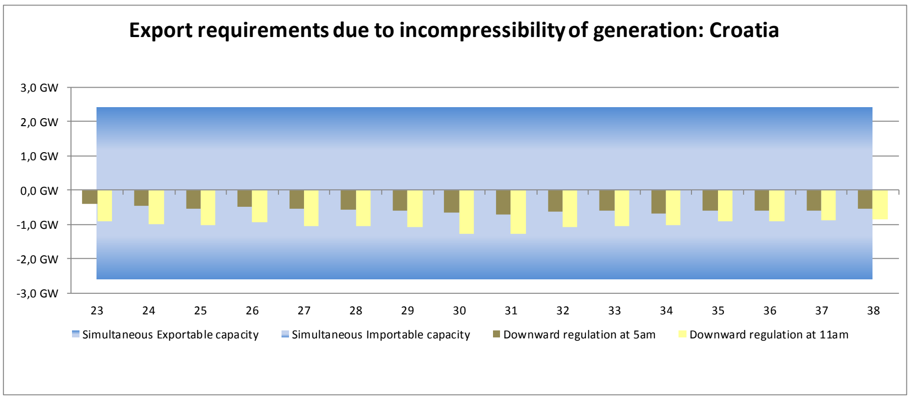
Demand and generation availability: Croatia
4,5 GW
4,0 GW
3,5 GW
3,0 GW
2,5 GW
2,0 GW
1,5 GW
1,0 GW
0,5 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity

Remaining Capacity: Croatia
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

Relative indicators: Croatia
150,0%
100,0%
50,0%
0,0%
-50,0%
-100,0%
-150,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

Export requirements due to incompressibility of generation: Croatia
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

### Synopsis

Croatian power system remains stable during the summer 2014. Available generation capacities will be sufficient to meet demand. Increasing capacity of wind power plants makes difficulties in planning, but transmission system operator still can manage the situation. Higher demand is expected in periods of very hot weather and increased number of tourists in the country. However, remaining generation capacity will be positive for both normal and severe conditions.

### General situation

As usual, in the summer period it is planned to complete some maintenance on generation units and in transmission grid as well. At this moment (beginning of March 2014) hydro levels are satisfactory. It is not expected that the new wind power plants will cause problem in the system.

### Most critical periods

Most critical weeks are those with high air temperatures that cause higher consumption and reduce transmission capability of lines.

### Expected role of interconnections

Installed generation capacities in Croatian power system are sufficient for the electricity supply. Nevertheless, it is assessed that the import is more profitable than generation from some domestic sources at this time.

It is not expected that the excess of inflexible generation will cause a need for additional export.

### Framework and methodology of the assessments

For this report Croatian power system operator (HOPS) used the data from its data base and the yearly plan of maintenances. At the moment the information about generation from solar and biomass power plants is not available, but the influence of these energy sources on the system is negligible. It is presumed that the consumption will be at the same level as previous year for normal conditions and five percent higher for severe conditions. NTC values are taken to be some higher than already agreed yearly values.

## Cyprus

### Synopsis

There is sufficient generation adequacy to meet the expected load demand. No other problems are anticipated.

### General situation

Due to the financial crisis the load demand in Cyprus is expected to be lower than the previous years by approximately 8%.

### Most critical periods

No specific period is considered critical.

### Framework and methodology of the assessments

The load prediction is reduced with respect to the previous years. This is due to results of the economic crisis in Cyprus. National generation adequacy is reviewed on a weekly basis by taking into consideration the unit availability and the approved maintenance programme.



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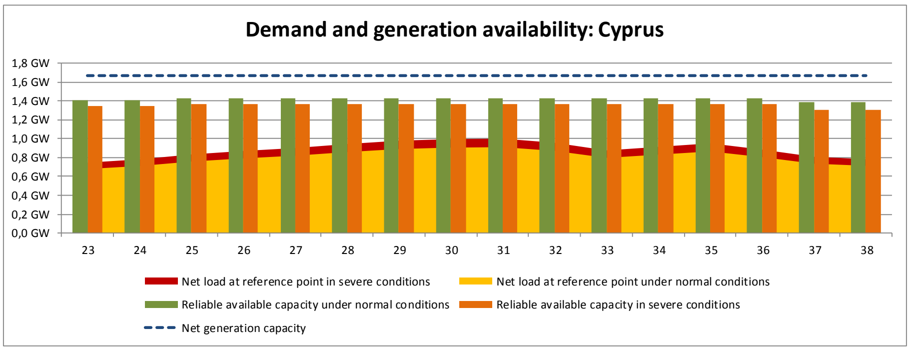
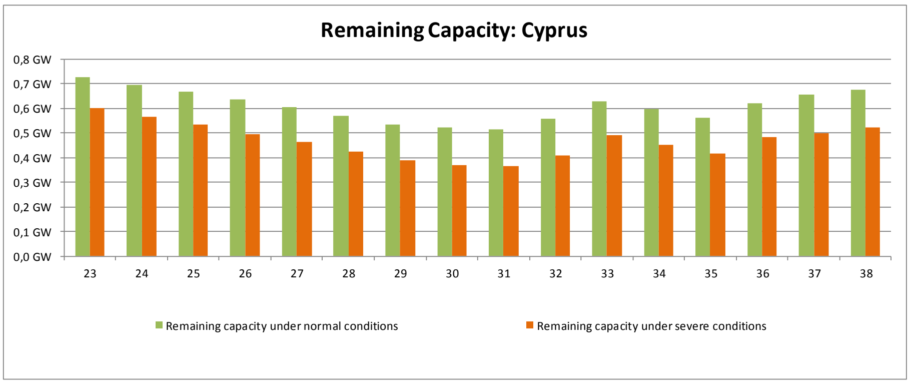
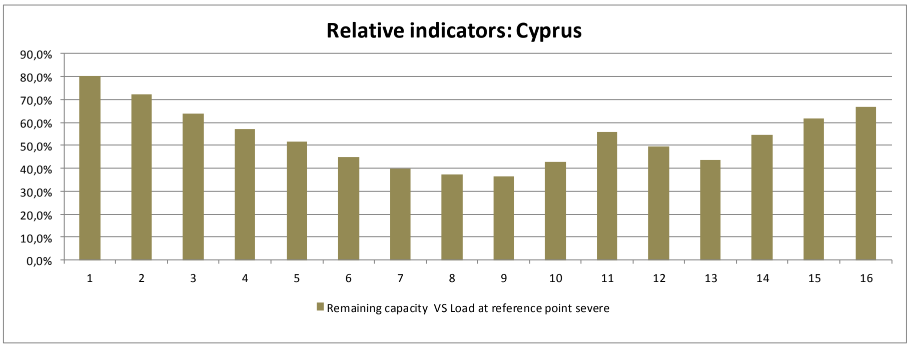



## Czech Republic

### Synopsis

Availability of generation units and expected load is adequate during whole summer period. Load scenario is based on actual outlook of the electricity consumption in CR.

### General situation

Standard level of maintenance is expected during the summer; therefore no problems with limited generation capacity are foreseen. Run of new large gas unit (800 MW) could be limited during the commissioning tests.

### Most critical periods

Yearly load minimum can be considered as the most critical period in the summer and is expected during the week 30-31. Sufficient amount of ancillary services for downward regulation is reserved. Export is necessary condition to support sufficient downward regulation.

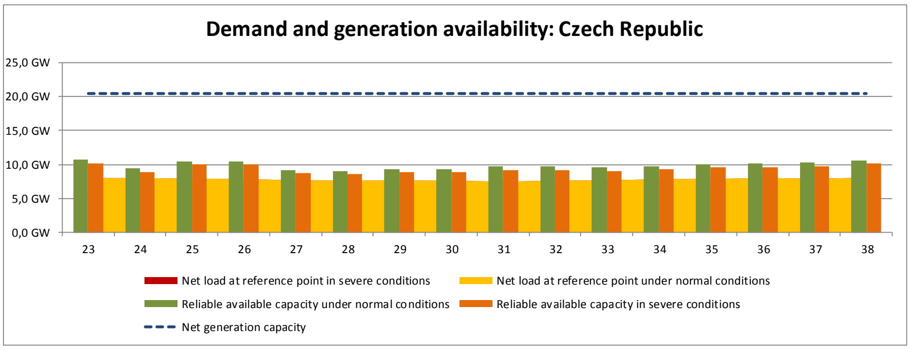
### Expected role of interconnections

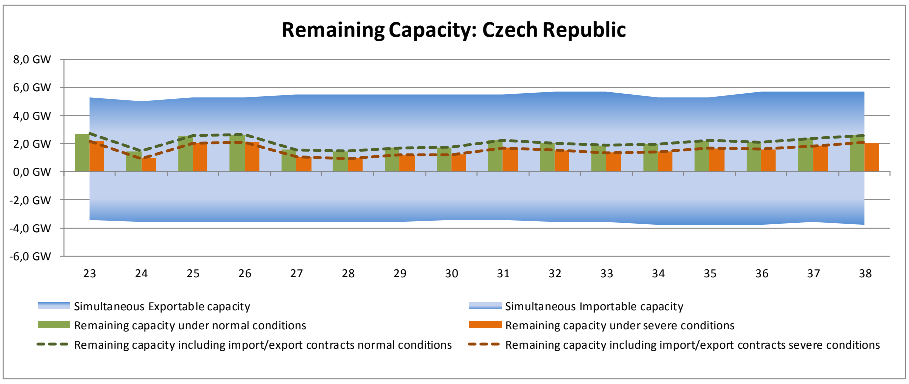
Ability to import or export shouldn't be limited.

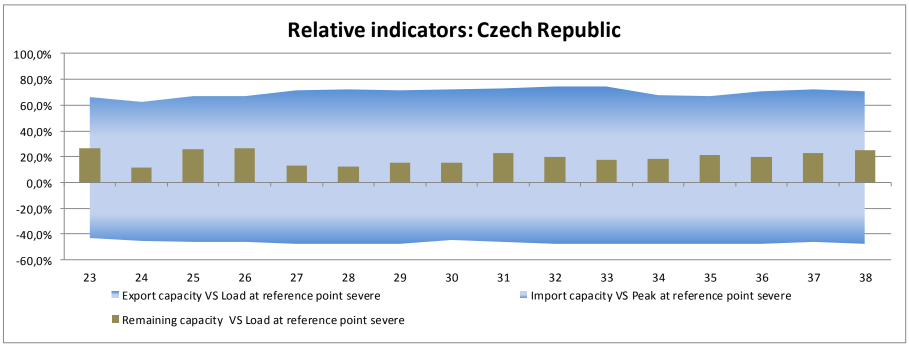
Role of the available interconnecting capacity might be crucial at demand minimum periods.

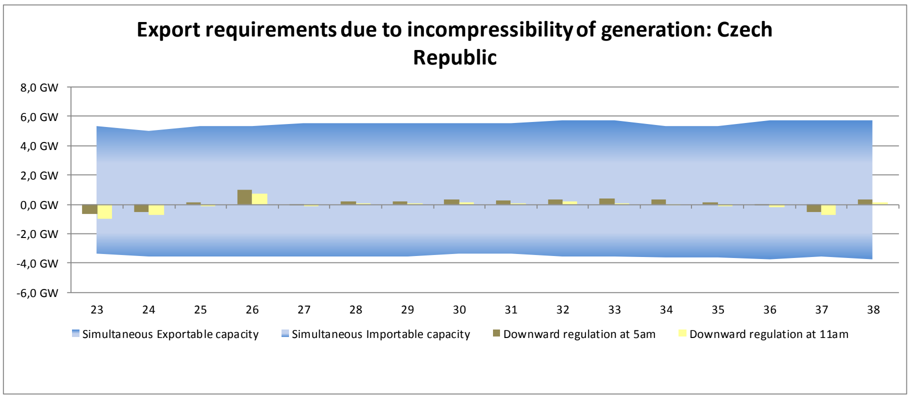
## Framework and methodology of the assessments

We use methodology of ENTSOE.



## Denmark

### General situation

The summer is expected to be calm; however, there are quite a lot of large-scale projects which will cause great limitations to the transmission grid.

The SK4 projects requires a total outage time on Skagerrak of three to four weeks in April, where the entire connection is disconnected. Concurrently, the Kassø-Tjele project has an outage time of three weeks, where the 400 kV connection Askær-Tjele is disconnected.

The combination of these outage times gives major constraints on the international interconnections to Norway, Sweden and Germany.

TenneT is also in the process of building a substation just south of the Danish border and this means that both 400 kV connections from Kassø to Audorf is Germany will be disconnected in May.

In addition to the above-mentioned projects, several projects run over the summer. The projects include the cable laying at Køge Bay, the transfer of 132 kV/150 kV installation, cable laying in Central Jutland, etc.

There are a few power station renovations of longer duration, but if we manage to stay on schedule, it looks reasonable.

Power balance is expected to be OK over the summer. Disregarding the disconnection in April and May (Skagerrak and Kassø-Audorf), it looks just fine.

### Most critical periods

Especially week 32, 33, 34 and 35 are in particular critical due to the balance being around -2.5 GW. This is caused by a number of maintenances of CHP plants.



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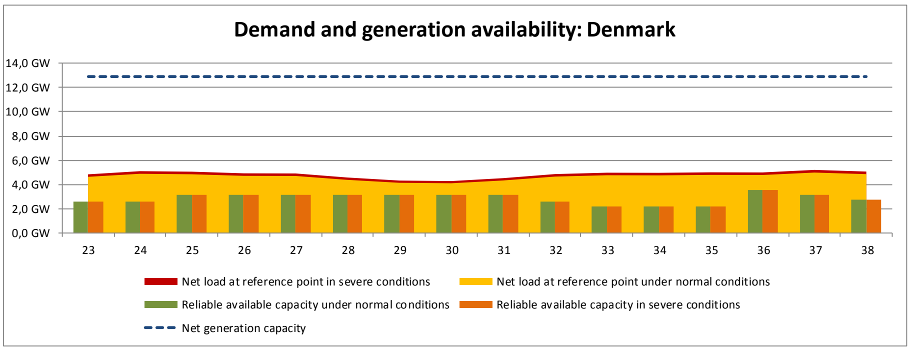
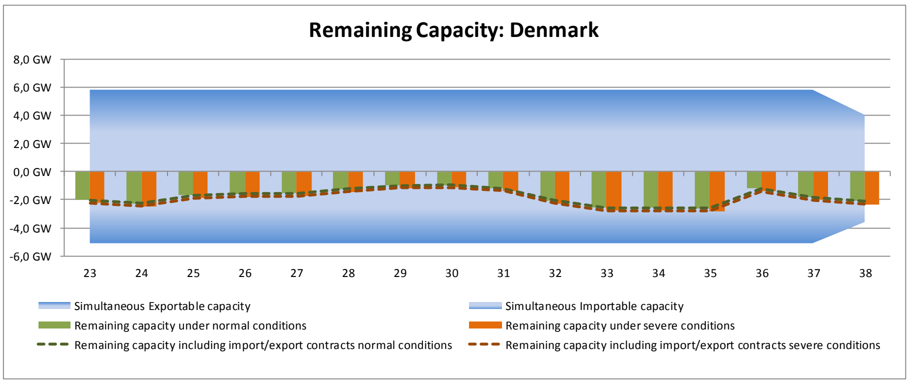
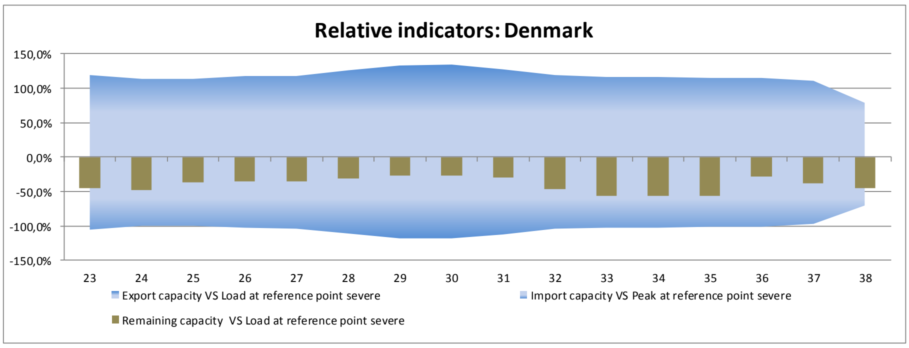


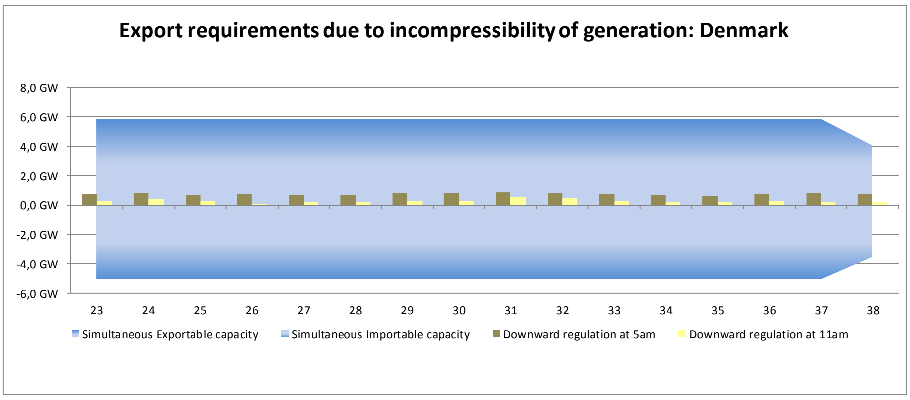
Demand and generation availability: Denmark
14,0 GW
12,0 GW
10,0 GW
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity

Remaining Capacity: Denmark
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
-2,0 GW
-4,0 GW
-6,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

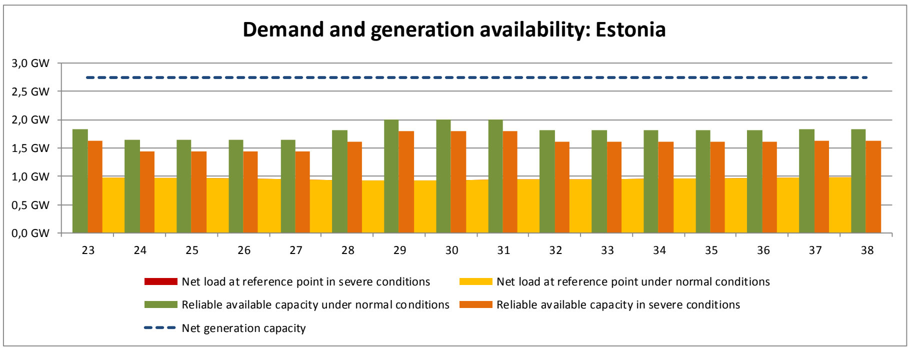



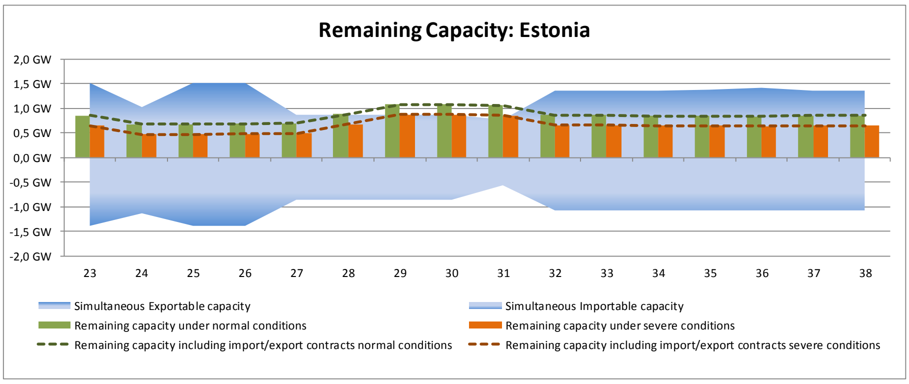
Relative indicators: Denmark
150,0%
100,0%
50,0%
0,0%
-50,0%
-100,0%
-150,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

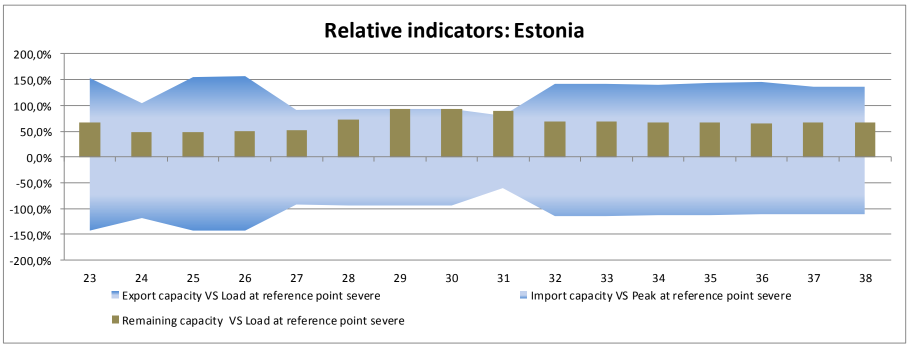



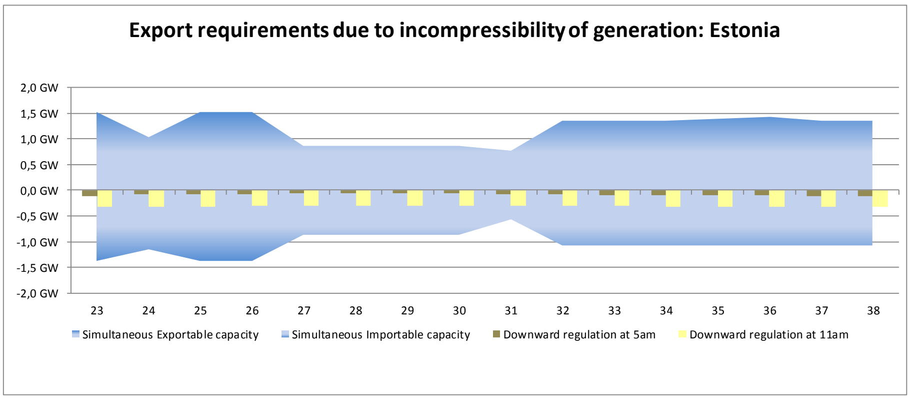
Export requirements due to incompressibility of generation: Denmark
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
-2,0 GW
-4,0 GW
-6,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

# Estonia



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**Synopsis**

It is expected that the generation -load adequacy is guaranteed for upcoming summer. The system is expected to be net export for whole summer. There is some maintenance in production units, but the remaining generating capacity even during the most severe maintenance period still highly exceeds expected peak load. As previous summers it is expected that there might occur some congestion in Estonia-Latvia interconnection, due to large energy flows to Lithuania and Latvia. There might also occur transit flows from Russia to Lithuania. In case of significant congestion in interconnection Estonia/Russia-Latvia, transmission lines maintenances will be limited during the stressed period.

**General situation**

The lowest level of available generating capacity in the system is from week 24 to week 27. This is caused by the maintenances of two generators in oil shale power plants. Still the system is expected to be net export for the whole summer.

**Most critical periods**

In case of hot weather condition and large energy flow to Lithuanian and Latvian power system, there might occur some stressed period for interconnection between Estonia and Latvia. Considering the maintenances of grid elements affecting the interconnections capacity, the most critical period for Estonian TSO is expected to be from week 32 to 34 and weeks 37, 38, when the export capacity to Latvia is lowest and the congestions might occur. In case of significant congestion in interconnection Estonia/Russia-Latvia transmission lines, maintenances will be limited during the stressed period.

**Expected role of interconnections**

It is expected that there might occur some congestion in Estonia-Latvia boarder, as it has happened in previous summers, due to large energy flow to Lithuania. There might also occur transit flows from Russia to Lithuania which worsens the situation in Estonia-Latvia interconnection even more. In severe conditions counter trades between Estonian and Latvian TSO are made. For night time, when temperatures are lower, capacity of interconnections can be increased and additional capacity can be given to the market in Estonia-Latvia cross-border.

The part of inflexible generation in Estonian system is not large enough to cause any serious problems, even for times of minimum demand.

**Framework and methodology of the assessments**

NTC values of interconnections and maintenances of production units are given according the market messages in Nord Pool Spot. The weekly load data is given according the weekly peak load of previous year statistics and is same for normal and severe conditions. The difference between normal and severe conditions lies in the different outage rates. The outage rates for normal and severe conditions are chosen according previous years experiences.

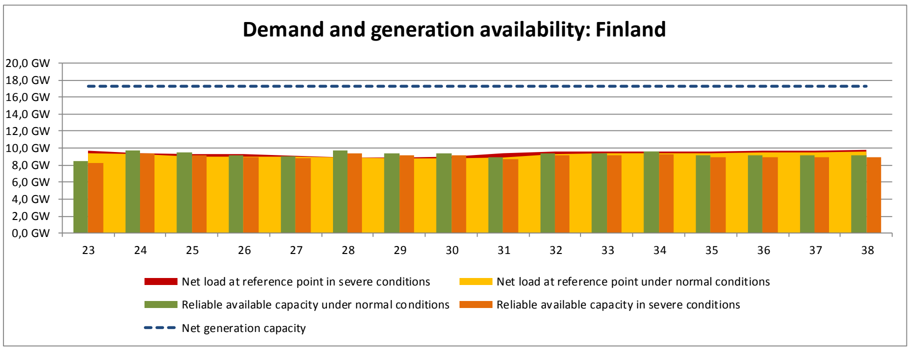
## Finland

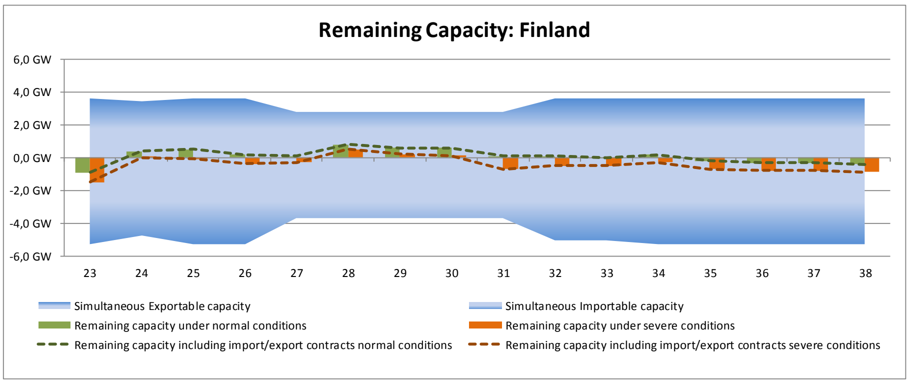
**Synopsis**

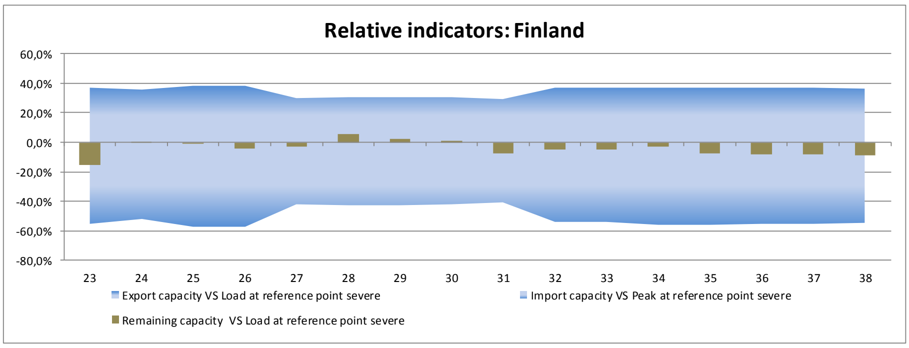
Typically, there are no adequacy problems in Finland during summer period. The typical peak load in summer is 60 to 70 % of the corresponding winter peak values. However, high level of maintenances limits available capacity in summer period. Both production units and interconnection lines have overhauls, and several heat power plants are closed for the season. Thus, import from neighbouring systems is required to meet the demand in several weeks. Import capacity is sufficient to meet the deficit despite the maintenance periods.

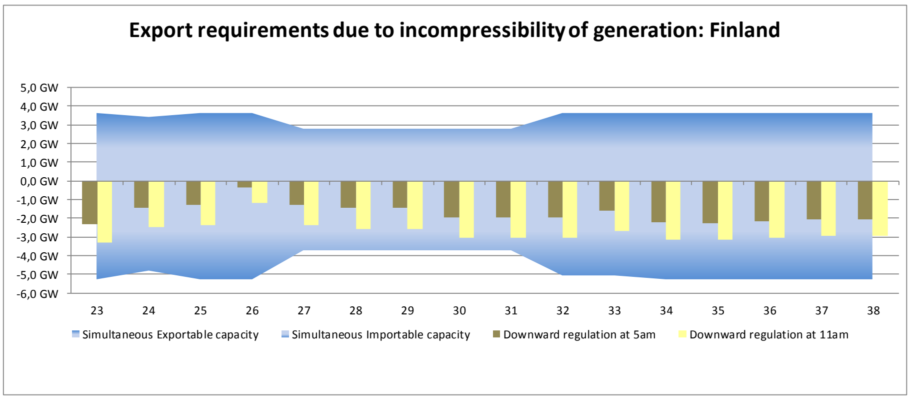
**General situation**

Typically, there are no adequacy problems in Finland during summer period. Characteristics of the Finnish summer are low load and high level of maintenances.




### Most critical periods

Most critical weeks are at the first week and the last eight weeks of the period. At that time demand is higher than in the middle of the period and nuclear units have maintenances.

### Expected role of interconnections

Import from neighbouring systems is required to meet the demand in several weeks. Import capacity is sufficient to meet the deficit despite the maintenance periods.

There are no specific export needs due to inflexible generation at minimum demand period.

**Framework and methodology of the assessments**

Load levels are chosen so that "normal conditions" corresponds to average load level and "severe conditions" corresponds to maximum load level of the past five summers. In addition, the difference between normal and severe conditions is that there is less hydro power and wind power available in severe conditions.

Maintenances are estimated according to current market information and TSO's experience.

Must run generation in Finland is assumed to include nuclear power generation in total, and hydro and CHP generation to some extent.

## <u>France</u>

**Synopsis**

The risk related to security of supply is rather low in France this summer.

The main risk this summer is a long drought combined with unexpected high outage rates specifically on nuclear generation.

**General situation**

The available generation is lower than last year in normal conditions but at the same level in severe conditions. In summer in severe conditions almost all the oil generating capacity has always been non-usable due to environmental constraints, while this year it is non-usable at normal conditions for economic reasons.

Also fossil fuel capacity has decreased over the last year. This has been offset by increases of solar and onshore wind generation capacity.

The level of must-run generation is very low for downward regulation because most of the nuclear plants will not come into a stretch-out period before maintenance.

Load forecast is similar to last year with a maximum weekly peak load close to 55 GW.

**Most critical periods**

There are no critical weeks, in severe conditions the margins are always above 10 GW expected in September whereas they are above 2 GW in case of a long drought.

**Expected role of interconnections**

No dependency to interconnectors is identified. As a consequence, the role of interconnectors is let to optimize market efficiency. However, outages in Europe can affect French cross border capacities, (e.g. Slovenia’s major grid outages on 7 February caused a reduction of export capacity of 300 MW towards Italy.)

**Framework and methodology of the assessments**

The framework used for the summer adequacy assessment is as follows: normal and severe demands are forecast (the severe demand forecast is +7°C above normal conditions); generators submit their availability (fossil fuel and nuclear generation, hydro power); breakdown rates are calculated for all units above 100 MW of maximal power based on data provided by generators and correlated with historical data; RES load factors are calculated from data in the last four years; the resultant generation profile is compared with the demand and the system services reserve.

For the downward adequacy assessment load factors are calculated from historic data; must run generation (excluding wind/solar/run of river) is at the moment exclusively inflexible nuclear generation.



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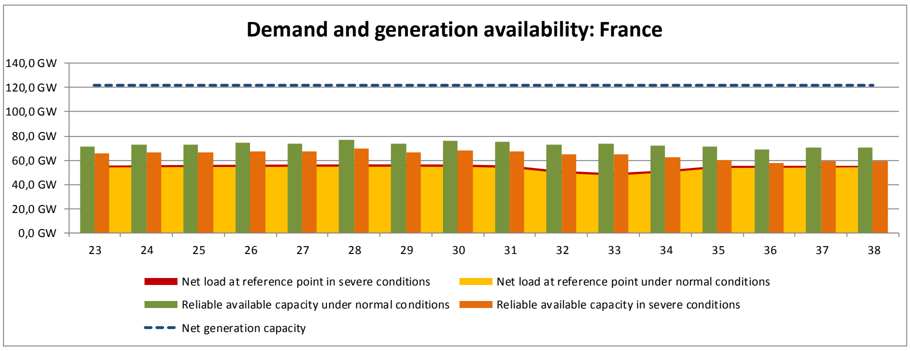
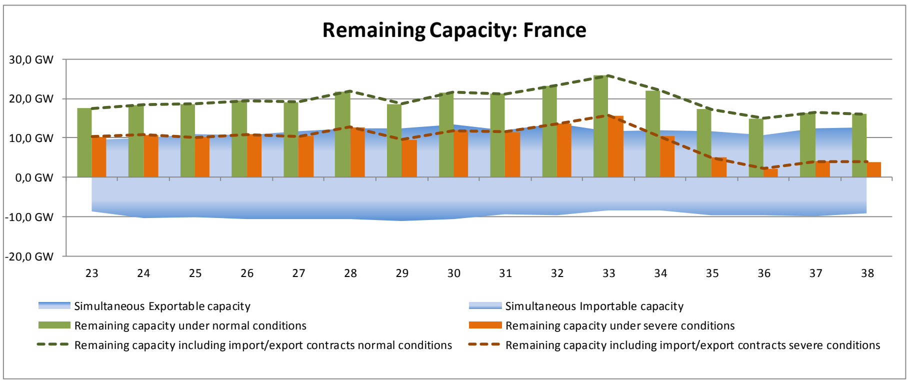
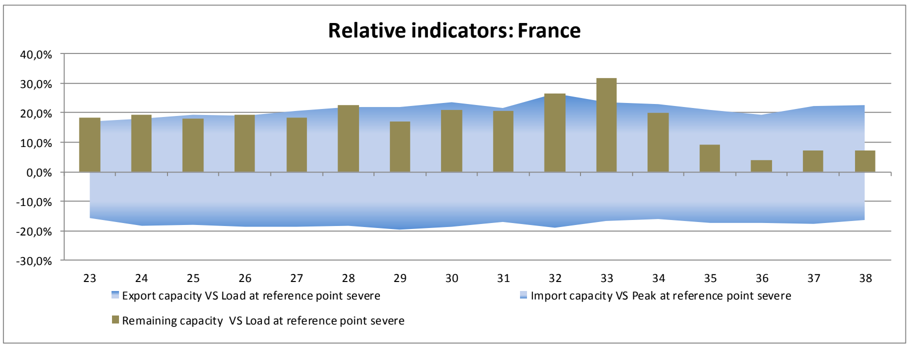
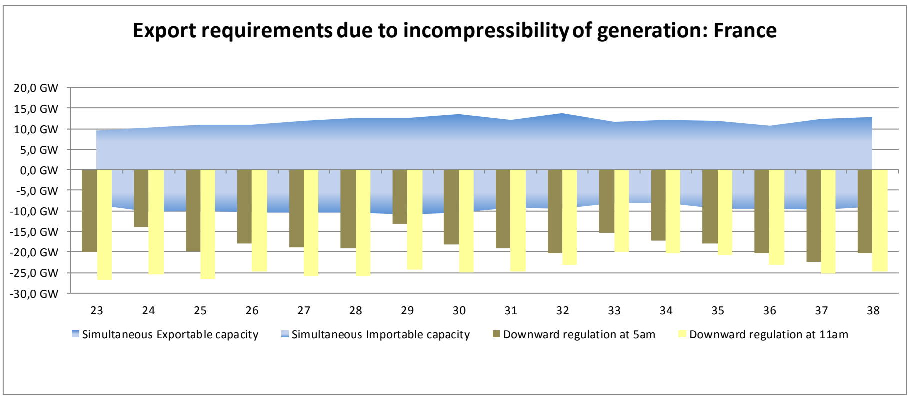

Demand and generation availability: France
140,0 GW
120,0 GW
100,0 GW
80,0 GW
60,0 GW
40,0 GW
20,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity


Remaining Capacity: France
30,0 GW
20,0 GW
10,0 GW
0,0 GW
-10,0 GW
-20,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions


Relative indicators: France
40,0%
30,0%
20,0%
10,0%
0,0%
-10,0%
-20,0%
-30,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: France
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
-5,0 GW
-10,0 GW
-15,0 GW
-20,0 GW
-25,0 GW
-30,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## Germany

### Synopsis

The common evaluation of the German TSOs gives an overview of the security of electricity supply for the coming summer 2014.

The shutdown of 5 GW nuclear power in southern Germany is still one of the topics that bother the German TSOs. The shutdown in 2011 still causes a regional shortage of available active and especially reactive power. This can lead to voltage problems during the summer. New power plant projects are delayed. Right now the problem is not so much a problem of capacity, but rather a problem of regional distribution of power plants in Germany.

RES are continued to be installed at great speed. For southern Germany this attributes largely to distributed PV generation. The installed capacity of PV generation in Germany is expected to reach about 39 GW in the coming summer. An amendment of the German Renewable Energy Law [EEG] is intended for August 2014. This amendment should define a reliable deployment corridor for renewable energies. At this time, the effects on the current increase of installed RES power capacity are difficult to predict.

For high RES feed-in in the north of Germany combined with low PV feed-in in the south, a high utilisation of north-to-south grid elements is expected.

The shutdown of the nuclear power plants causes a shortage of available reactive power. In the frame of their extensive grid analyses, German TSOs have identified the risk of high voltages for scenarios of very low load combined with a high PV feed-in in Southern Germany. Thus, in the summer period the German TSOs may be faced with problems to meet (n-1)-security rules affecting the violation of permitted voltage limits.

Where long periods of high temperatures occur, heat crises are also possible. Sustained hot and dry spells could lead to problems with cooling water for major power plants.

The power plant Moorburg/Hamburg will be commissioned in 2014. The operation tests started in February this year. The commercial operation is expected for autumn 2014. The power plant should make a contribution to the voltage control in the area of Hamburg.

German TSOs may be forced to cancel planned outages of network elements due to conditions worse than anticipated, especially if important nuclear power plants in southern Germany might trip. If necessary, German TSOs expect to make use of the full range of topological and market related remedial actions.

Temporary congestions may occur not only inside of control areas but also on tie-lines, e.g. tie-lines between 50Hertz Transmission (50HzT) and TenneT Germany (TTG).

### Most critical periods

Specifically, the time around Whitsunday could be critical for voltage problems in case of low demand, no PV feed-in in the south of Germany but a moderate feed-in of wind energy. More generally, a longer dry period could lead to problems with cooling water.

### Expected role of interconnections

The expansion of the International Grid Control Cooperative is ongoing. Therefore interconnectors are getting more important also for exchanging control energy.

Due to high renewable feed-in and a low regional (national) demand load flows on German interconnectors are increasing.

### Framework and methodology of the assessments

The data base includes TSO-connected generation and available DSO-connected generation. Percentages of non-usable capacity are based on statistical evaluation of historical data.



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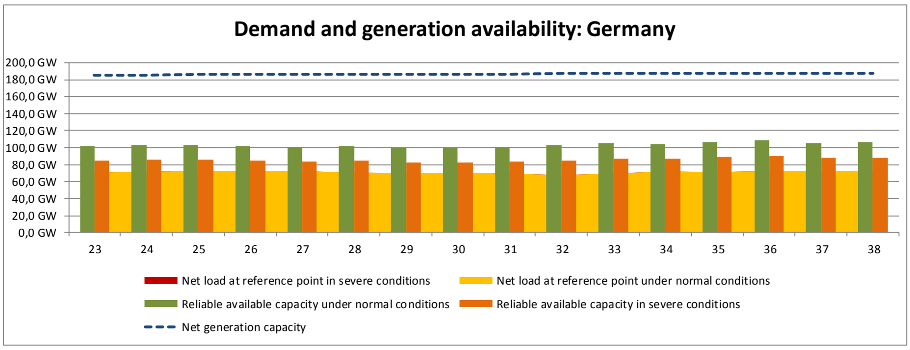
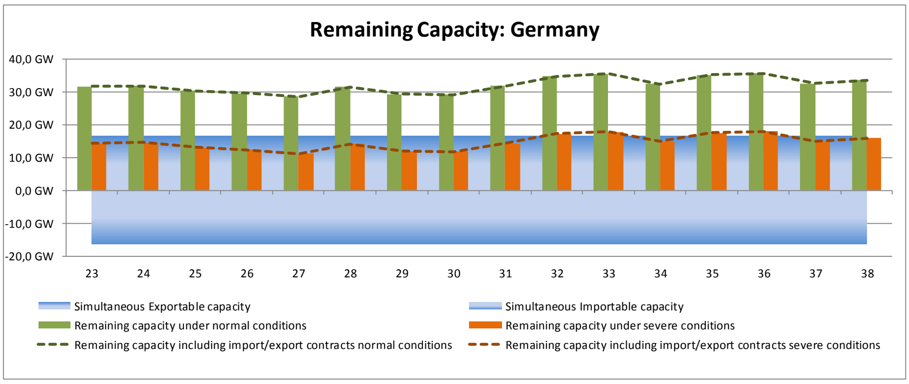
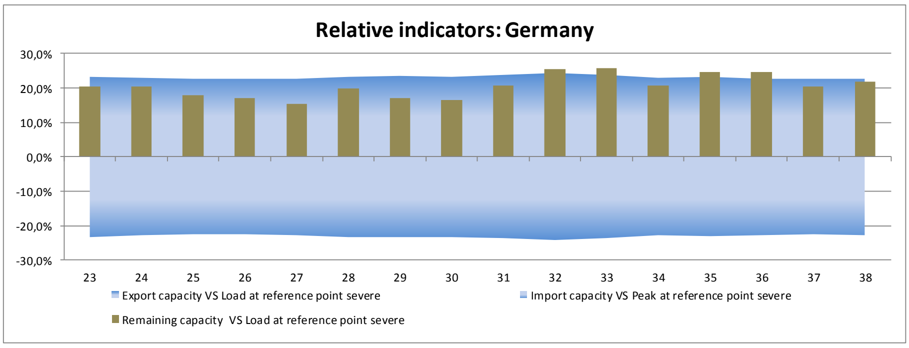
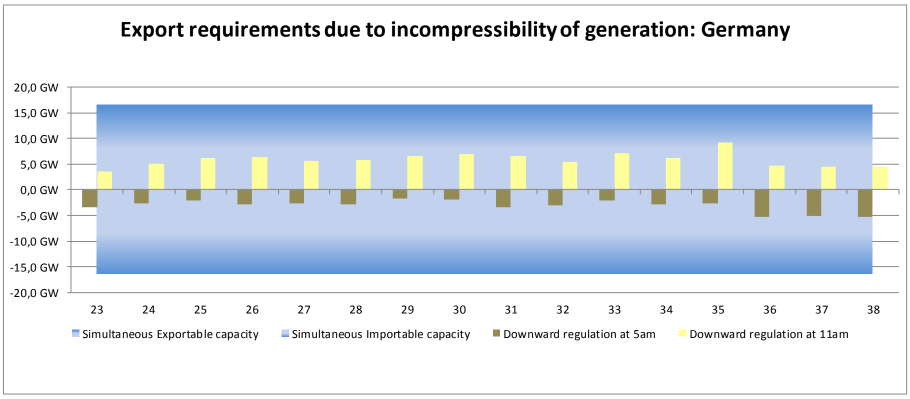

Demand and generation availability: Germany
200,0 GW
180,0 GW
160,0 GW
140,0 GW
120,0 GW
100,0 GW
80,0 GW
60,0 GW
40,0 GW
20,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity


Remaining Capacity: Germany
40,0 GW
30,0 GW
20,0 GW
10,0 GW
0,0 GW
-10,0 GW
-20,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions


Relative indicators: Germany
30,0%
20,0%
10,0%
0,0%
-10,0%
-20,0%
-30,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: Germany
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
-5,0 GW
-10,0 GW
-15,0 GW
-20,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## Great Britain

### Synopsis

Total generator capacity has remained static over the last year due to new wind farm capacity replacing coal plant closing under the terms of the LCPD. This effectively reduces generation availability due to the lower and variable load factor of wind farms. However demand levels are forecast to be up to 2GW lower than 2013 so the net result is that margins are forecast to be adequate for the coming summer under normal conditions. In addition, full interconnector exports could be delivered under normal conditions at all times apart from the first two weeks in July when the power station overhaul programme is at its peak.

Under severe conditions interconnector export capability would be restricted at varying levels down to float apart from the first two weeks in July when imports of up to 50% of the import capacity would be required to avoid an erosion of operating reserve. This should not be an issue as the net interconnector flow is expected to be a moderately high level of imports to GB throughout the summer. This is based on forward prices indicating a strong spread in favour of high import flows to GB across both IFA and BritNed partly offset by exports on both of the Irish interconnectors as usual. Further increases in renewable generation on both sides of the interconnectors mean that flows will become more dependent on renewable output in short term timescales.

Based on the 65% load factor assumed for wind given in the spreadsheet, our minimum demand analysis shows interconnectors would not be needed at any time to manage an excess of inflexible generation. In fact full imports could be accommodated with negative margins being maintained. However if the wind generation was closer to 100% then the ability to import would be restricted.

Some GB wind farms are flexible and can contribute to balancing supply with demand, which makes the situation better than indicated by the analysis.

2014 sees the continuation of major works associated with the Transmission Investment for Renewable Generation (TIRG) works. This work, being carried out by the relevant Transmission Owners, is to construct or rebuild major sections of the transmission system in Scotland and the North of England, to deliver additional transmission capacity to transport energy from new renewable generation in Scotland. The network outages to undertake the work will reduce the available transmission system capacity and is being conducted in parallel with the ongoing connection of new generation. This brings forward the decarbonisation benefit of the renewable generators being connected, but means that it is likely that wind generation output will continue to need to be curtailed going forwards.

### General situation

High levels of power station maintenance are due to occur in the first two weeks of July.

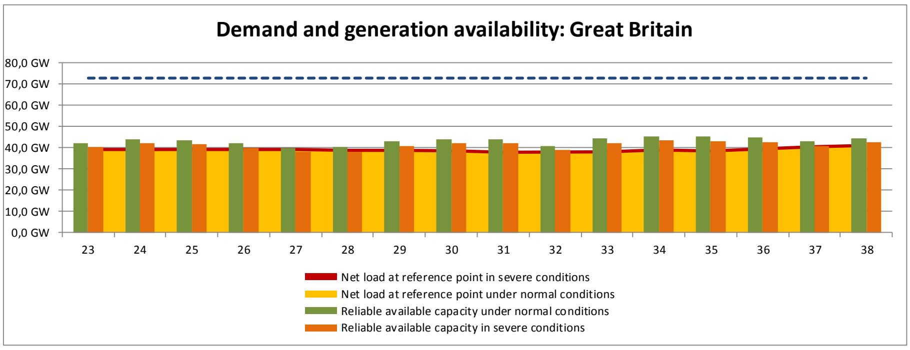
### Most critical periods

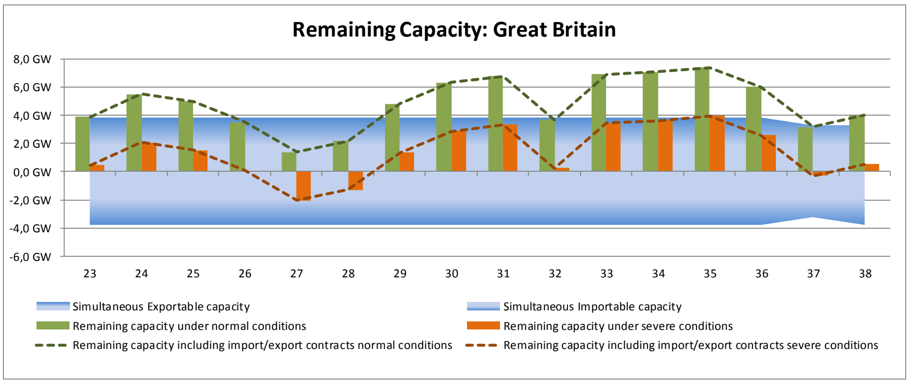
The first two weeks in July are the most critical due to the peak in the power station overhaul programme.

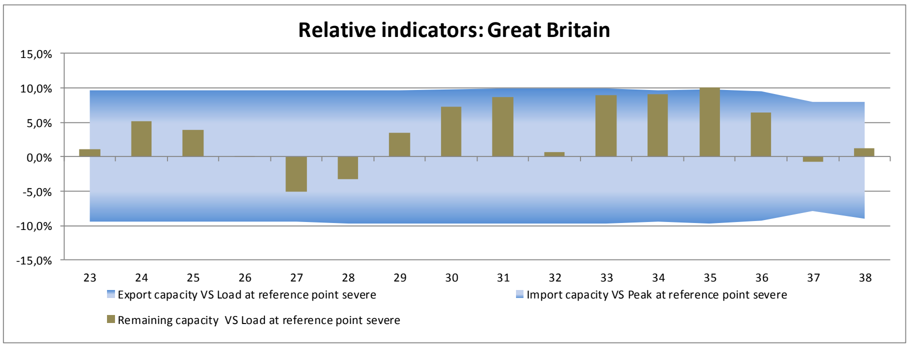
### Expected role of interconnections

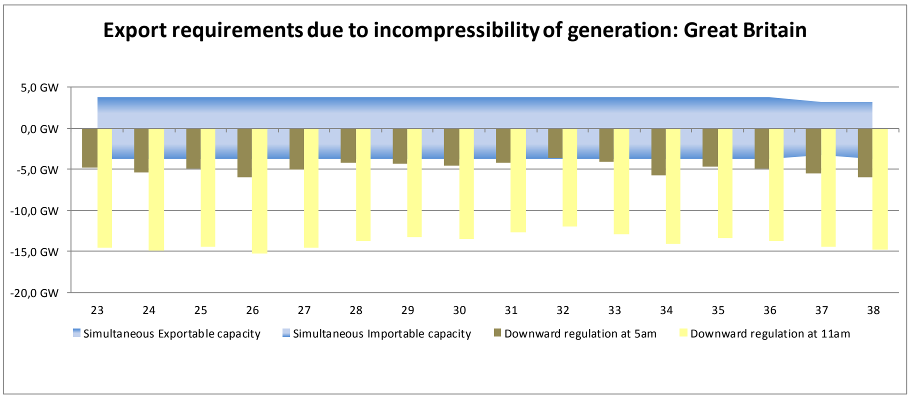
For the first two weeks in July interconnector imports of up to 50% of the import capacity would be required under severe conditions to avoid an erosion of operating reserve. Under normal conditions for this period, interconnector exports will be limited to about 50%. At all other times full exports could be delivered under normal conditions although under severe conditions export capability would be restricted. Forward prices indicate a strong spread in favour of flows to GB across both IFA and BritNed throughout the summer. Further increases in renewable generation on both sides of the interconnectors mean that flows will become more dependent on renewable output in short term timescales. We expect high levels of exports on both of the Irish interconnectors.

Based on the 65% load factor assumed for wind given in the spreadsheet, our minimum demand analysis shows that interconnectors would not be needed at any time to manage an excess of inflexible generation. In fact full imports could be accommodated with negative margins being maintained. However if the wind generation was closer to 100% then the ability to import would be restricted. Some GB wind farms are flexible and can contribute to balancing supply with demand, which makes the situation better than indicated by the analysis.





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## Greece

**Synopsis**

In general we will not schedule any maintenance during the summer period. Therefore there are no adequacy problems for the Greek System. So the import capacity is sufficient to meet the additional needs for the supply of the demand.

**General situation**

The hydro level at reservoirs expected lower but similar to the previous year without creating problems in the System.

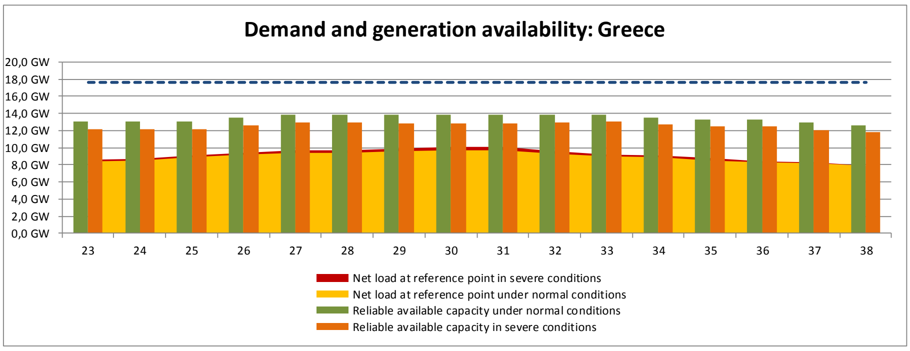
**Most critical periods**

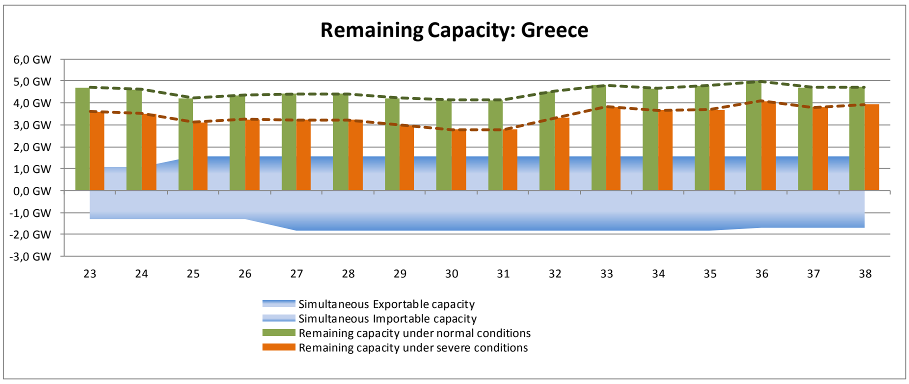
For this summer there is no week which will be critical due to adequate of installed capacity in our system. In general the most critical weeks are at the first half of July for the Greek System.

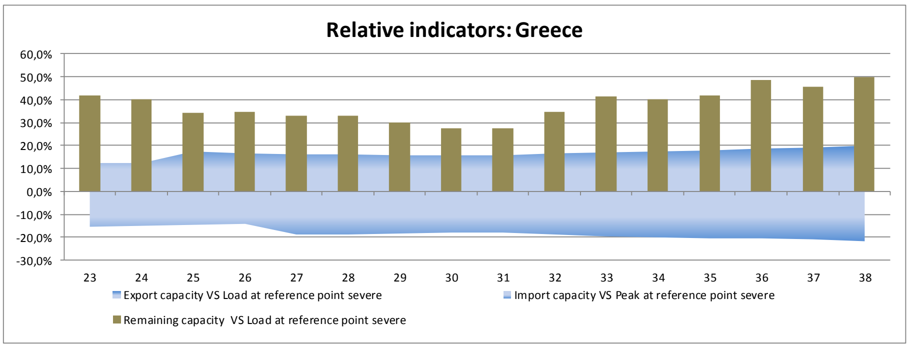
**Expected role of interconnections**

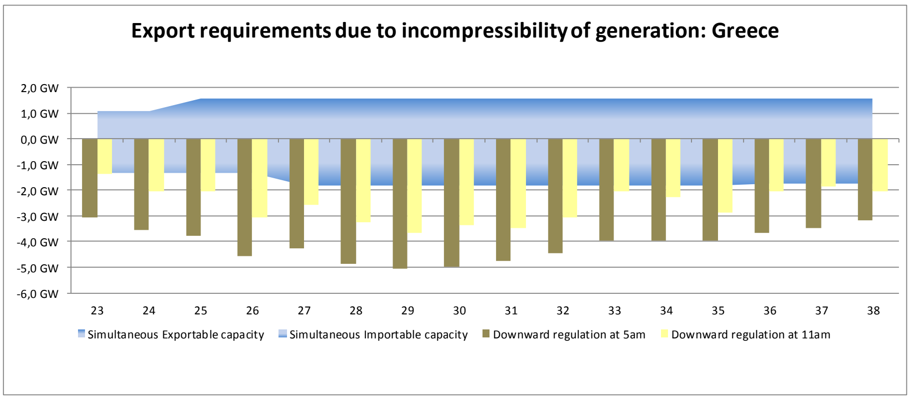
The interconnections can play a significant role especially in periods with large variations in System demand. In this case IPTO could export or import energy to other countries depending on demand. The HVDC Link Greece-Italy (500MW capacity) remains out of order from the beginning of January till the middle of forthcoming July due to the fault in the Italian side in the underground part.

The DC -link with Italy in normal operation is export so it is difficult to "help" to managing of inflexible generation at off peak-hours. For the north Interconnections, we expect the same behaviour due to the construction of their markets.


Demand and generation availability: Greece
20,0 GW
18,0 GW
16,0 GW
14,0 GW
12,0 GW
10,0 GW
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions


Remaining Capacity: Greece
6,0 GW
5,0 GW
4,0 GW
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions


Relative indicators: Greece
60,0%
50,0%
40,0%
30,0%
20,0%
10,0%
0,0%
-10,0%
-20,0%
-30,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: Greece
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
-4,0 GW
-5,0 GW
-6,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## Hungary

### Synopsis

In spite of the growing uncertainty on both generation and demand side, as a result of liberalisation on the one hand, and promotion of intermitted generation on the other, the Hungarian power system is expected to be on the safe side during the next summer period.

However, there are a few risks that must be carefully managed by the TSO. These risks are:

- Availability of the power plants during long-lasting hot summer period in case there is any problem with the cooling system of the power plants. The required level of remaining capacity can only be guaranteed by a certain amount of import, which is higher under severe conditions. Cross-border exchange is a matter of economy for market players. Their decision-making can be influenced by contractual conditions, e.g. on reserves.
- Overall cross-border capacity is satisfactory; however, allocation of cross-border capacity rights on the respective border sections may be an issue.

The reference adequacy margin at weekly peak is 0.5 GW, the capacity of the largest generation unit in the power system.

As matter stand the outcome of the Ukrainian crisis is possible to have significant impact on the Hungarian electricity system. In case the gas supply wanes or terminates, then the operation of gas-fired power plants is likely to become unpredictable, which in extreme conditions can cause even 4000 MW capacity outage in contribution with the decrease of import coming from Ukraine. The unavailability of the needed capacity in this rate for a relatively long period of time cannot be compensated neither by domestic sources, nor by additional import. In case there is no continuous supply, it is possible to run out of resources within 2 weeks. Moreover, it is necessary to take into consideration further decrease of import as a consequence of available capacity limitation in the gas-fired power plants of the adjacent electricity systems.

### General situation

The level of maintenance is relatively high during the summer, it is between 500 and 1000 MW, which is 5-10% of the Hungarian installed capacity. The most critical periods are the weeks of May, when the level of maintenance is over 1000 MW.

### Most critical periods

In accordance with the constantly growing demand, there is no period of time when the import could be ignored. The unavailable capacity is increasing, which strengthens the dependence on the import.

### Expected role of interconnections

After liberalisation, import is mainly an issue of the traders, available interconnection capacity is satisfactory. Access is possible via yearly, monthly, daily and even intraday capacity tenders, auctions. The only limitation is due to high transit flows through the interconnections.

Critical factors of the summer period are availability of generation capacities in large power plants due to planned maintenance, terminated operation of co-generation units, as well as uncertainties in operation strategy of intermittent generators (renewables, co-generation gas engines).



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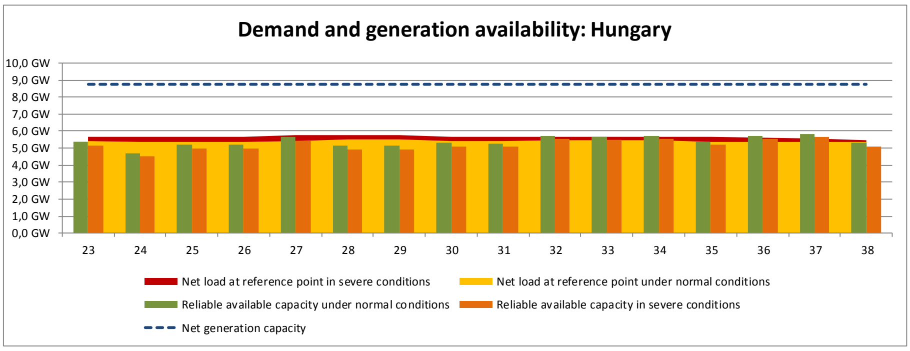


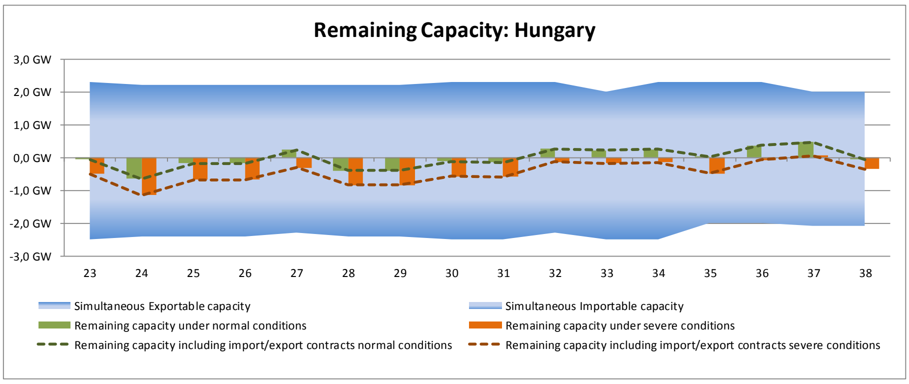


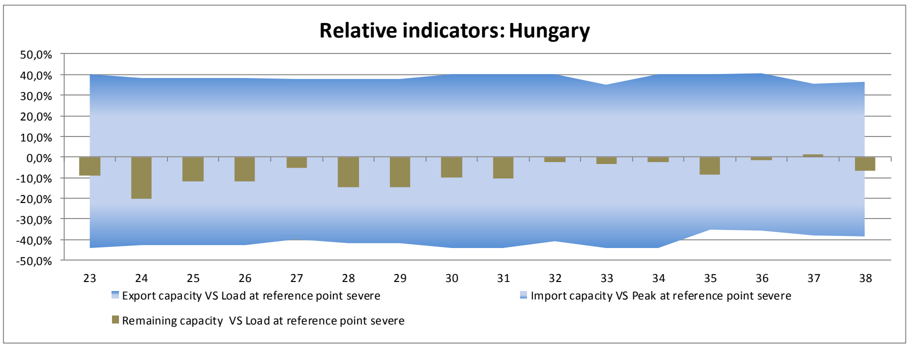


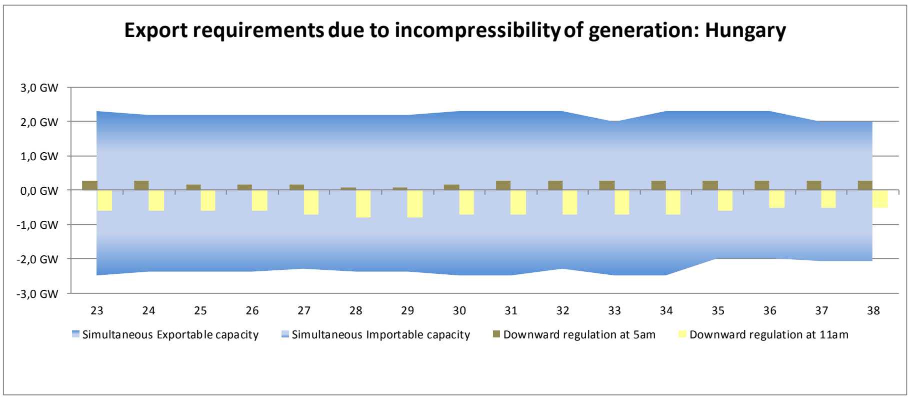




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## Ireland, Republic of

### General situation

A large portion of the hydro units will be on scheduled maintenance for large portions of the summer. However, as these form a small proportion of our overall system generation it should not have a detrimental effect on the system as a whole. August and early September is the period when the majority of scheduled outages for larger units will take place. Despite this, there should be no issues in meeting required demand levels and there will be a significant generation margin. As the year so far has been a relatively wet year in comparison to last year, it is not envisaged that there will be any low hydro level incidents.

### Most critical periods

The most critical period will be during Week 24 when approximately 968 MW, or 14% of our installed capacity, will be on scheduled outage.

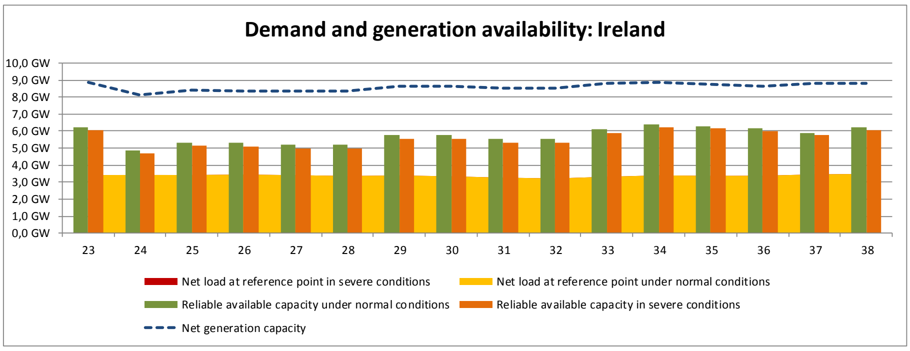
### Expected role of interconnections

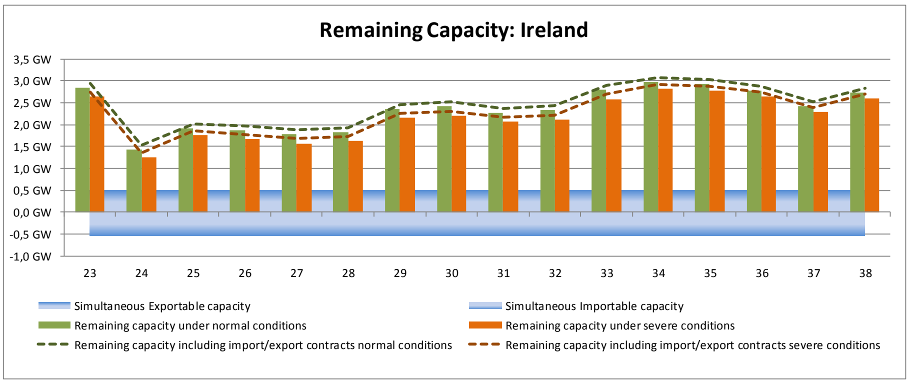
The East-West Interconnector (EWIC) should be fully available during the summer period with the exception of the 3 day outage in early September. This should provide Ireland with the capability to import 530 MW or export 500 MW of power. Due to current electricity prices in both Ireland and Great Britain, it is likely that that the flow on the interconnector will be primarily imports from Great Britain into Ireland.

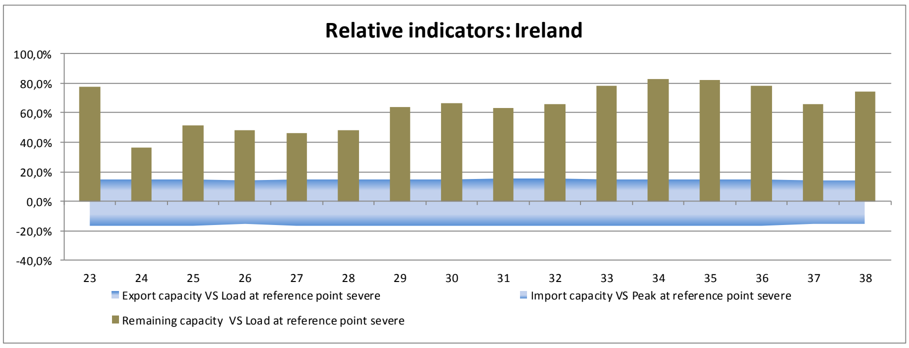
EWIC can export to the UK in times of minimum demand and high wind generation.

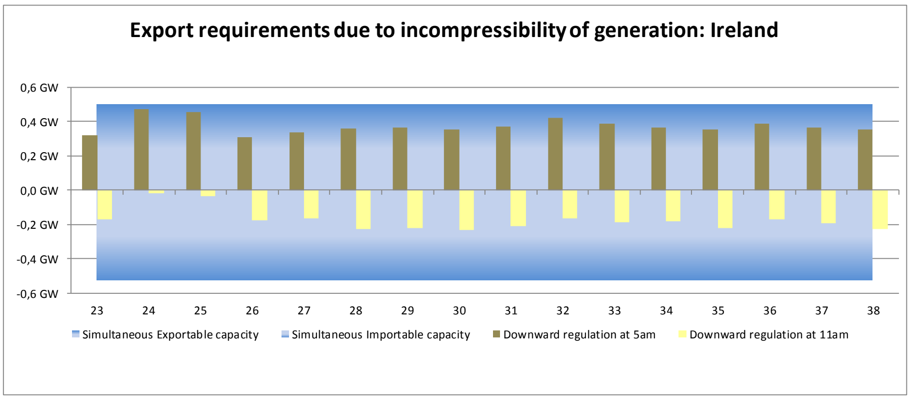
### Framework and methodology of the assessments

The generator capacities, generator margins and provisionally scheduled outages of generator units are stored in a Margins system. This system will export results for capacity margins and outages (both scheduled and forced) which have been included in this report. The forced outage probabilities used are generated each year based upon the generators availability over the past three years. Generator must run status is based on current operation policies and constraints.


Demand and generation availability: Ireland
10,0 GW
9,0 GW
8,0 GW
7,0 GW
6,0 GW
5,0 GW
4,0 GW
3,0 GW
2,0 GW
1,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity


Remaining Capacity: Ireland
3,5 GW
3,0 GW
2,5 GW
2,0 GW
1,5 GW
1,0 GW
0,5 GW
0,0 GW
-0,5 GW
-1,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions


Relative indicators: Ireland
100,0%
80,0%
60,0%
40,0%
20,0%
0,0%
-20,0%
-40,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: Ireland
0,6 GW
0,4 GW
0,2 GW
0,0 GW
-0,2 GW
-0,4 GW
-0,6 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

**Italy**

**General situation**

Margins are expected to be comfortable across the whole summer period in normal conditions with high PV infeed during daytime and conventional generation capacity that will cope well with the evening peak load (very high ramp rate in the evening could be an issue). During the last year we registered the decommissioning or mothballing of several old oil-fired power plants and some most recent combined cycle. This reduction of the available capacity is expected to continue in the coming months but the amount of capacity at risk is unknown.

Also under severe conditions the general situation expected in the summer is not critical, but some problems may arise in the Sicily Island.

There are some risk factors such as:

- Lack of adequate downward regulating capacity: high renewables production (wind and solar) during low load periods and decreasing of electricity demand on the national power grid recorded during the last periods, taking into account the level of the other inflexible generation, could lead to a lack of adequate downward regulating capacity;
- Voltage regulation problem and congestions: high voltage problems can arise especially in the south due to low load, reduced flows along EHV and high renewable production. Market and physical congestion, especially from South to North, will be common during the summer.
- Shortage of gas supply in case of concurrent unplanned outages of several import sources, which mainly can influence the availability of CCGT power plants that cover up to 50% of the demand.

In order to cope with this risks Terna prepares preliminary action and emergency plans and, in case of need, adopt the appropriate countermeasures (e.g. during high renewable/low load periods, in order to guarantee the system security could adopt enhanced coordination with DSO and special remedial actions, such as the curtailment of inflexible generation. Further special actions, such as some NTC reductions, could be planned in cooperation with neighbouring TSOs).

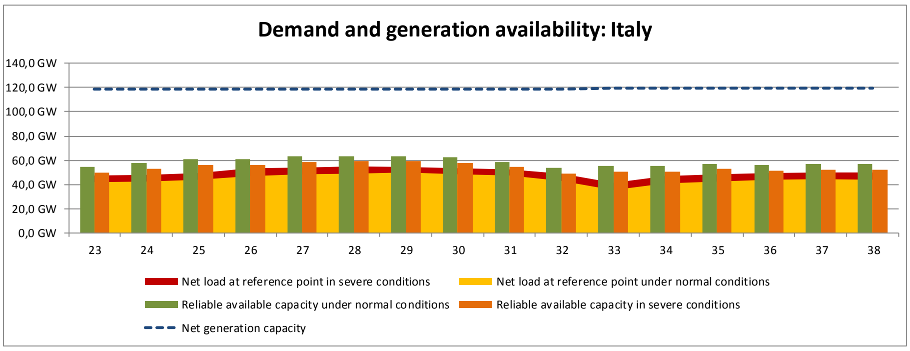
**Most critical periods**

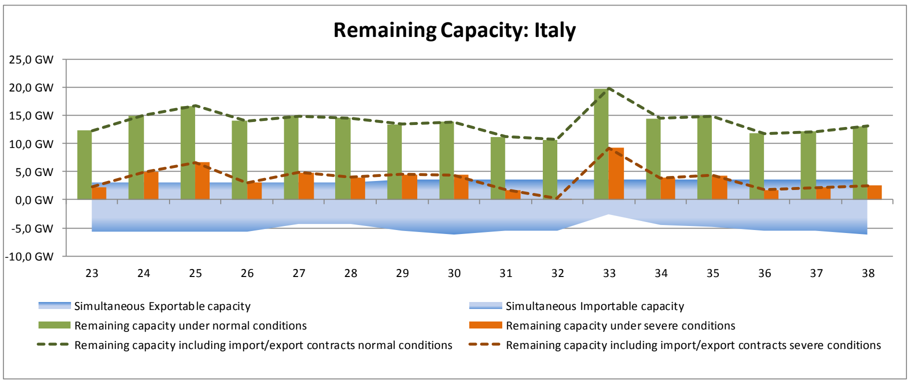
While week 32 is expected to be the most critical for upward regulation under severe conditions, with, generally, the evening peak more critical than the morning one, the worst weeks for downward regulation are expected to be the 32nd, the 33rd (also due to the bank holiday on the 15 August) and the 34th due to very low load levels.

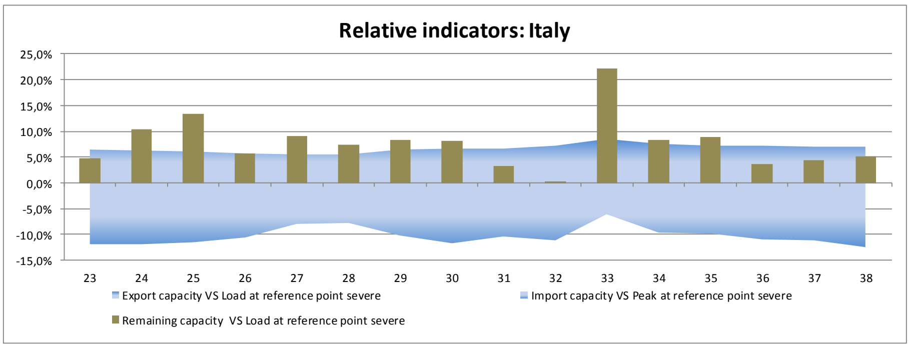
**Expected role of interconnections**

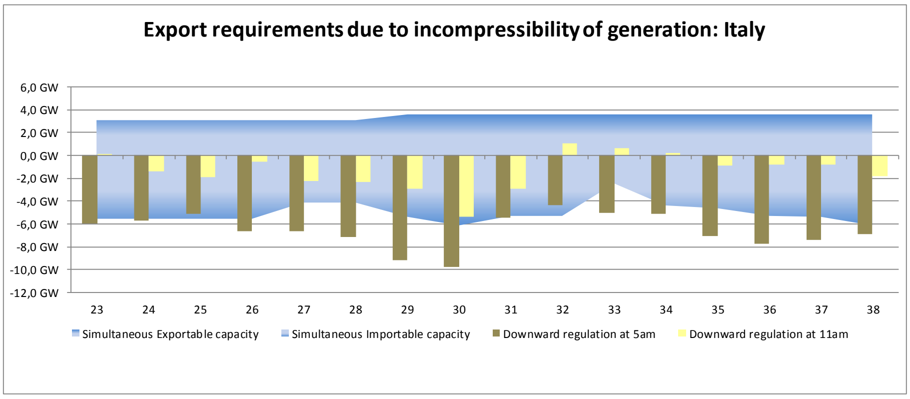
The Italian system is not dependent upon imports of electricity from neighbouring countries to meet the balance between generation and demand.

During high renewable/low load periods, in order to guarantee the system security Terna could adopt special remedial actions, such as the curtailment of not flexible generation and some NTC reductions, to be planned in cooperation with neighbouring TSOs. In some situation could arise the need of reducing the import of energy or, in extreme case of exporting to the neighbouring countries.

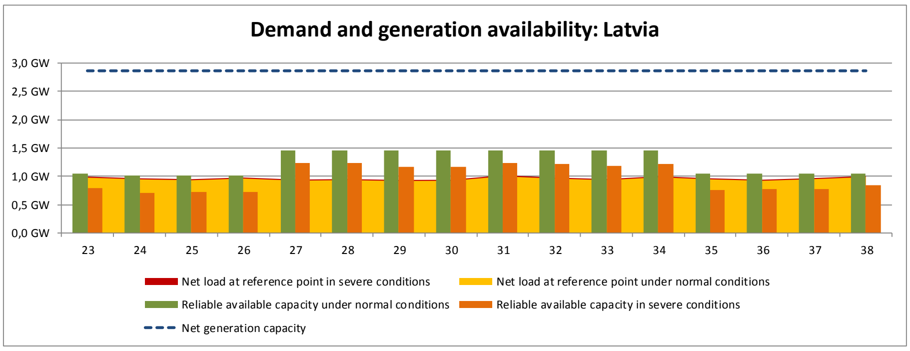

Demand and generation availability: Italy
140,0 GW
120,0 GW
100,0 GW
80,0 GW
60,0 GW
40,0 GW
20,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity


Remaining Capacity: Italy
25,0 GW
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
-5,0 GW
-10,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

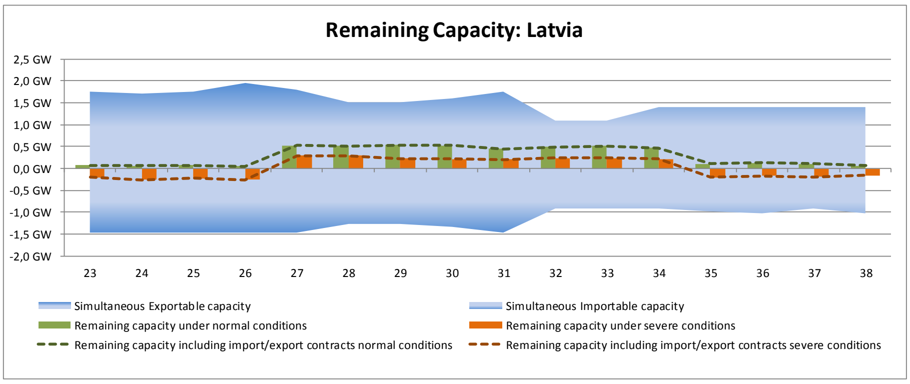

Relative indicators: Italy
25,0%
20,0%
15,0%
10,0%
5,0%
0,0%
-5,0%
-10,0%
-15,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: Italy
6,0 GW
4,0 GW
2,0 GW
0,0 GW
-2,0 GW
-4,0 GW
-6,0 GW
-8,0 GW
-10,0 GW
-12,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

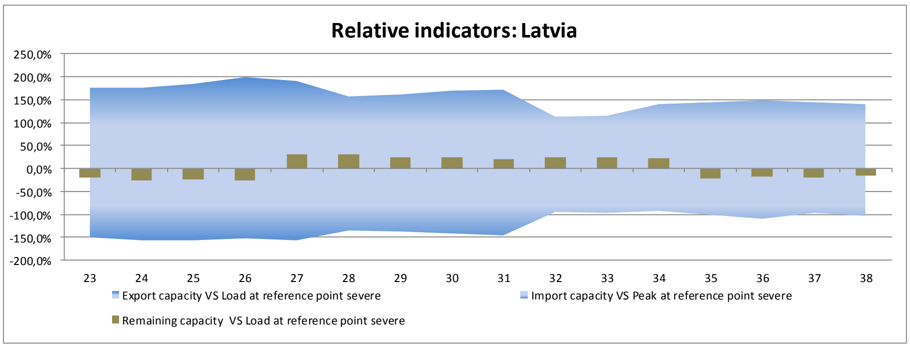
## Latvia



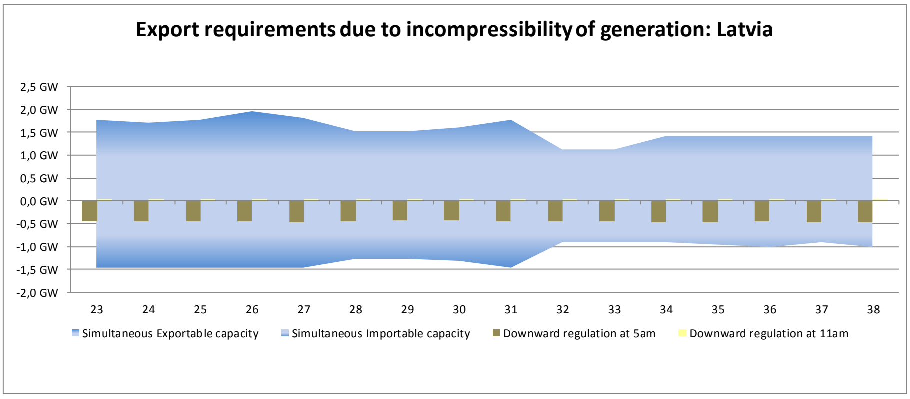
Demand and generation availability: Latvia
3,0 GW
2,5 GW
2,0 GW
1,5 GW
1,0 GW
0,5 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity

Remaining Capacity: Latvia
2,5 GW
2,0 GW
1,5 GW
1,0 GW
0,5 GW
0,0 GW
-0,5 GW
-1,0 GW
-1,5 GW
-2,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

Relative indicators: Latvia
250,0%
200,0%
150,0%
100,0%
50,0%
0,0%
-50,0%
-100,0%
-150,0%
-200,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

Export requirements due to incompressibility of generation: Latvia
2,5 GW
2,0 GW
1,5 GW
1,0 GW
0,5 GW
0,0 GW
-0,5 GW
-1,0 GW
-1,5 GW
-2,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

### Synopsis

For the base case Latvian TSO is expecting average weather conditions in area of Latvia when annual air temperature is 5.8 ˚C and average air temperature in summer is 14.6 ˚C. The air temperature in summer is main factor which is influencing consumption within the region. For this summer the expected increase of consumption could be around 1.5-2% in normal conditions but in severe conditions around 4-5% comparing to a load from previous summer. A weekly minimum demand is expected around 500 MW whole summer period.

### General situation

In the beginning of summer (June) available capacity of Rigas CHP2 is decreasing due to repair works of gas pipeline on first generation unit. The second generation unit is going on repair in the end of summer (September) and again the available capacity of gas will be reduced. From the point of view of system security of supply and adequacy TSO can use all net capacity of gas power plants independent on gas prices in market to cover a load in power system of Latvia. In normal conditions full amount of capacity of gas power plants is available but it is assumed that in severe conditions the available capacity of gas is reduced by 100 MW. The reason for that forecast could be high gas prices in Russia or limited gas imports from third countries. Historically the CHPs in Latvia are constructed to cover a base load but the hydro PPs on Daugava River are constructed for peak hours and system balance. According to annual water inflow in Daugava river it is foreseen that in normal conditions in summer the available capacity of HPPs could be around 400 MW but in severe conditions 200-300 MW. It shows that Latvia has huge amount of installed capacity of hydro (around 1578 MW) but actually the available capacity is much smaller. During the summer almost always approx. 400-600 MW of installed capacity of hydro is in maintenance. Latvian TSO is not expecting a dramatic increase of RES generation (wind and solar) during summer period; therefore production of RES cannot cause high unbalances in power system or make unpredictable stress situations on particular hour. In normal conditions the available capacity of wind can be around 20 MW but in severe conditions it is assumed that no generation of wind at all. The system service reserve is 100 MW and it is available whole year.

### Most critical periods

In normal conditions Latvian TSO is expecting to cover the load whole summer period but in severe conditions Latvian TSO is expecting to cover a load from July till August because in June (weeks 23, 24, 25, 26) and September (weeks 35, 36, 37, 38) Rigas CHP2 both units partially are going on repair and around 450 MW of installed capacity is reduced each month. The critical periods for Latvian power system will be beginning and end of summer when the lack of capacity vary from 160 MW till 260 MW.

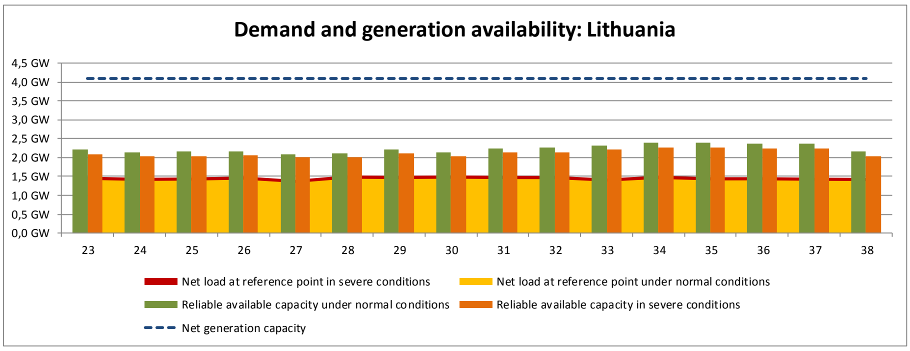
### Expected role of interconnections

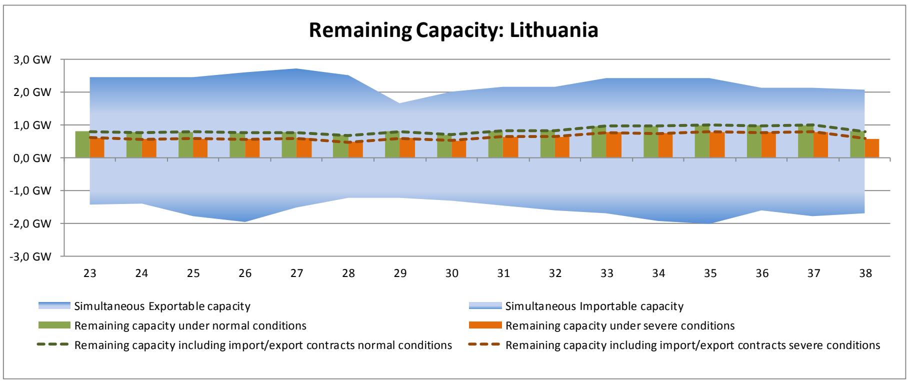
The risks with transmission capacities on cross-border Latvia-Lithuania did not experience usually and all cross-border trades are going according to plan. In the coming summer the cross-border capacity between Lithuania and Latvia will be decreased due to maintenance works on tie lines. Considering to the Lithuanian electricity deficit which is ongoing throughout the year and the large amount of electricity import from 3rd countries, the Latvian TSO is expecting congestion possibilities only on the border Estonia-Latvia. The overloads are happening due to unpredictable loop flows in Baltic States and Western part of Russia. Since January 2014 cross-border EE/RU/LV has been split in two parts EE-LV and LV-RU. According to one existing line between RU and LV Latvian TSO must give the rights to Russia traders play in electricity market of Baltic States. In this case to avoid of bottlenecks on border EE-LV all capacity what is left of trades between RU and LV has been allocated on border EE-LV. It helps to reduce the bottlenecks on border EE-LV. During the summer period the transmission capacity on the cross-border Estonia-Latvia will be limited and counter-trade between the Latvian and Estonian TSOs might be in place. To ensure the security of supply in Latvian power system and to solve the congestion possibilities on the Estonia-Latvia border, Latvian TSO has rights on the fast hydro reserves on Daugava River.

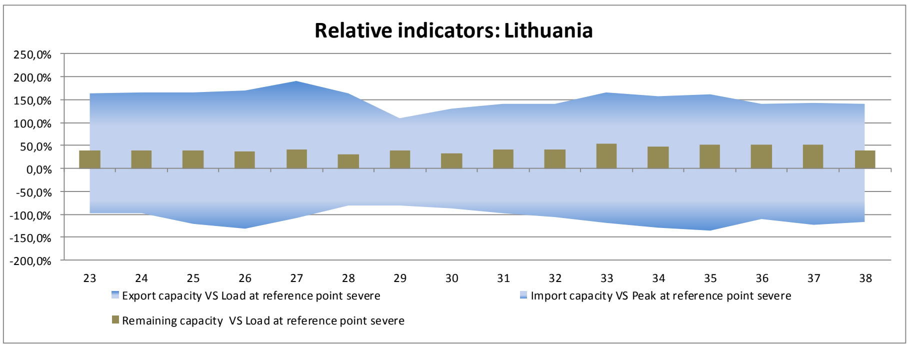
### Framework and methodology of the assessments

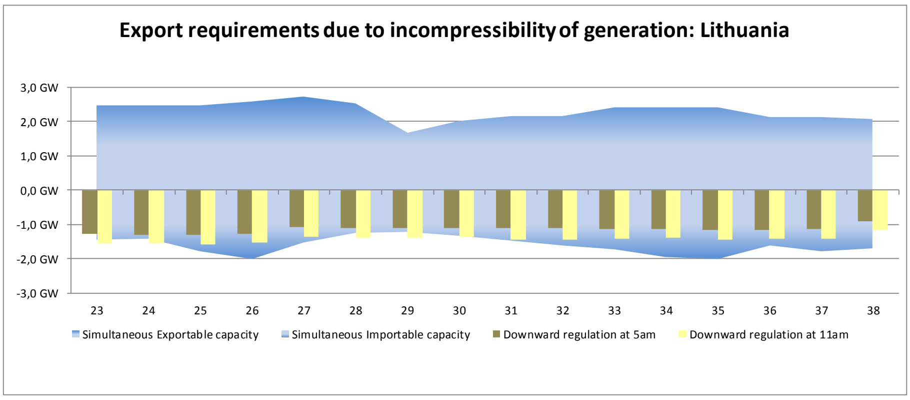
TSO uses annual data statistics and the information of previous years.

## Lithuania




### Synopsis

Generation

According to preliminary plans for the upcoming summer the generation portfolio will consist of 60% of gas fired PP, 8% - mix fuel PP, 6% - renewable PP, 15% - hydro PP, 8% - wind energy and 3% will be generated from solar. If any limitations of gas supply will occur, Lithuania has the possibility to switch 730 MW generation capacities to oil fuel, and respectively guarantees approximately 49% of peak load.

In upcoming summer we expect to produce more electricity from renewable power plants than in previous summer, due to new installations solar and biomass power plants. 12% of generation portfolio could be covered by wind when the highest utilization of installed wind capacity is reached. Nevertheless, the instability of wind generation is taken into account while assessing required system services in the system and adequacy level.

Demand

Peak load at the end of September for normal conditions is expected will be 1484 MW and for severe conditions is expected will be 1529 MW at the target time period. The minimum peak load is expected in the second half of June for normal conditions (780 MW). The demand load is expected will be the same as in previous summer.

**General situation**

In 2013 two units of 285 MW net generating capacity of Lithuanian power plant have mothballed (in total 570 MW of net generating capacity). There is a technical possibility to have these two units available in two months. Such amount of generating capacity cover the 14% of total installed net generating capacity.

For the coming summer season the maintenance schedule is not intensive, only 4% in average of net generating capacity will be on maintenance. According to the schedule the largest generation inaccessibility will be on weeks 27 and 28 due to yearly maintenance in the largest CHP power plants. However, no major risk is foreseen during this period.

The Lithuanian Power System also depends on hydrological circumstances. In drought case the low level of water in rivers reduce the generation of electricity in hydro power plants. According to previous years statistical data the lowest level of water in hydro power plants expected to be in the August and in the first half of September. The limited operation of HPP makes influence on Lithuanian's power balance and balancing reserves and can result in severe conditions.

**Most critical periods**

According to the last summer notices, the most critical period is when the interconnection lines are on maintenance. Due to insufficiency of infrastructure of interconnected lines, the electricity stakeholders not fully fulfil their load balances. The TSO have to be ready to activate the service reserves to cover the load imbalance.

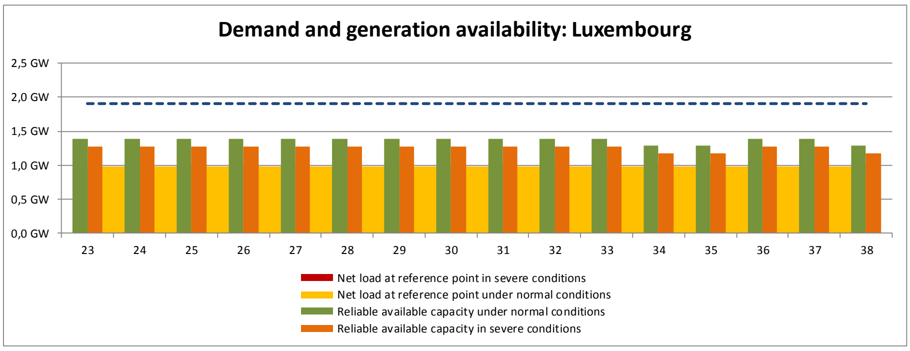
According to analysis, it is expected extraordinary week 26, due to holiday on Tuesday. It is foreseen that additional regulating reserves will be needed to cover potential consumption imbalances during this shorter week.

**Expected role of interconnections**

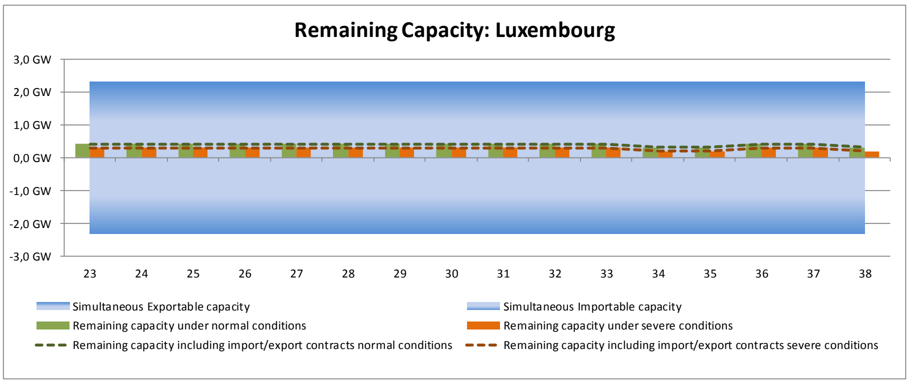
From system adequacy point of view capacity of interconnectors does not play an important role for Lithuania PS because available generation capacity is sufficient to cover system demand. However, available generation is usually not competitive in the wholesale market, therefore large amount of Lithuania PS demand is covered by imported electricity. All import volume from 3rd countries (Russia, Belarus) defined based on power flow calculation and allocated at Lithuania-Belarus interconnection. Import volume from 3rd countries highly depends on Estonia-Latvia interconnection capacity which is reduced during summer period due to higher ambient temperature and maintenance activities on the interconnection lines. This cause import restrictions from 3rd countries to Lithuania PS for whole summer period. Highest restrictions are foreseen from week 27 to week 31. In addition to this, import ability of Lithuania PS also depends on available generation in Kaliningrad region. Import restrictions are foreseen during weeks 23-24 when generation of Kaliningrad TPP is planned to be reduced due to maintenance activities.

Whereas Lithuania PS is an importing country with fairly low amount of installed renewables, role of interconnectors to manage an excess of inflexible generation is very low.

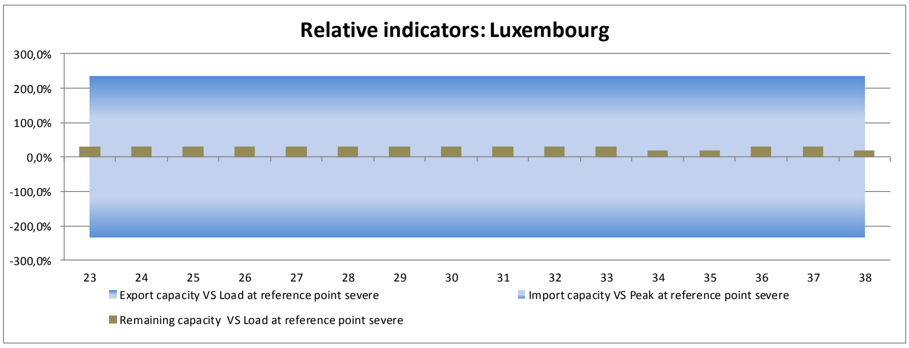
## Luxembourg



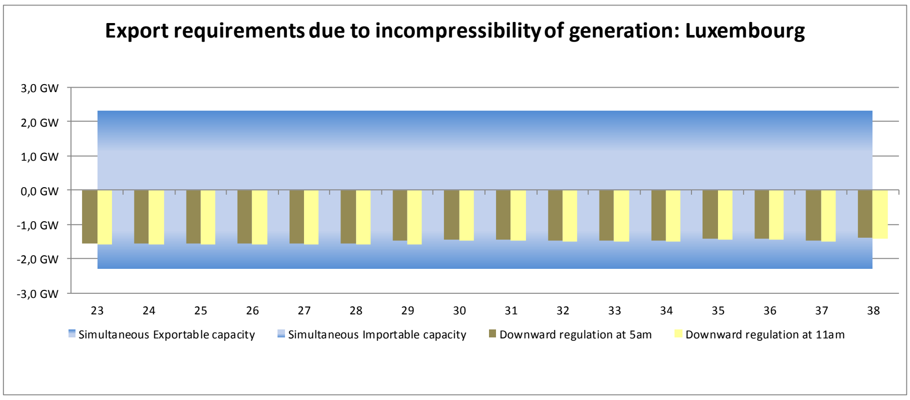
Demand and generation availability: Luxembourg
2,5 GW
2,0 GW
1,5 GW
1,0 GW
0,5 GW
0,0 GW
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions

Remaining Capacity: Luxembourg
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

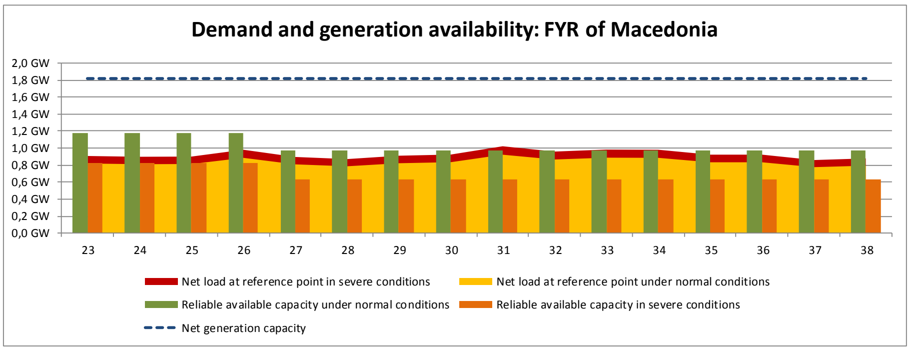



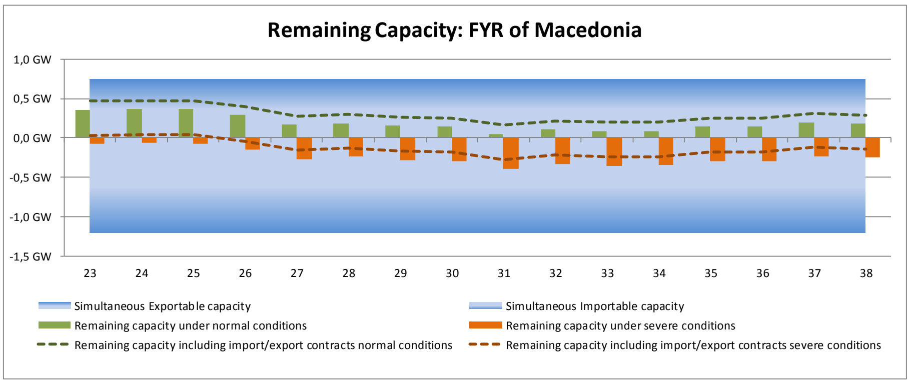
Relative indicators: Luxembourg
300,0%
200,0%
100,0%
0,0%
-100,0%
-200,0%
-300,0%
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

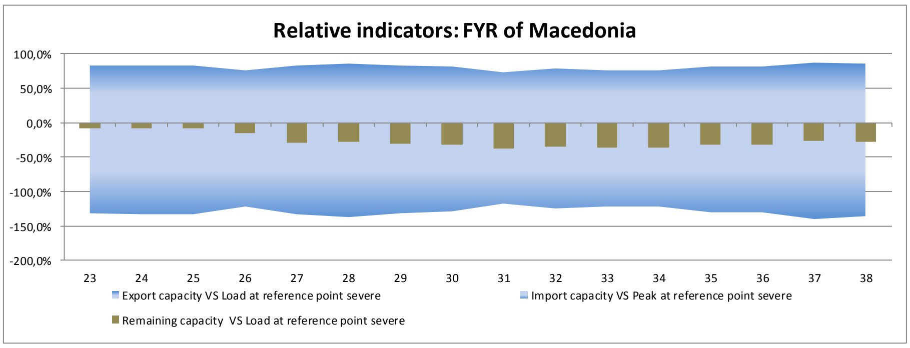



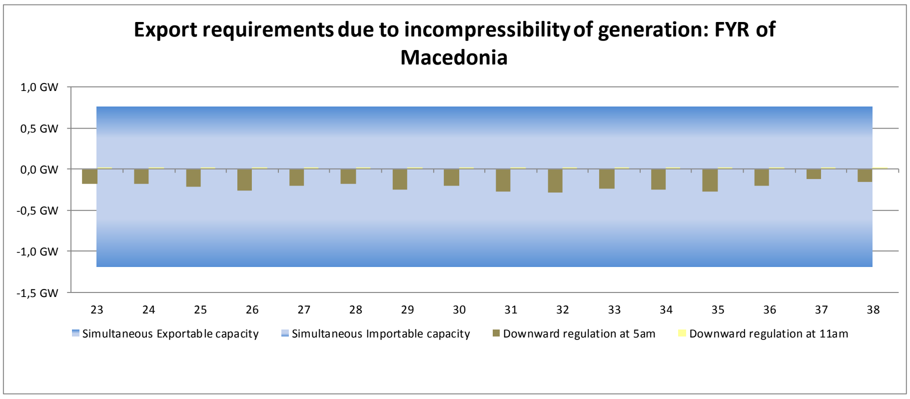
Export requirements due to incompressibility of generation: Luxembourg
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## FYR of Macedonia



**General situation**

According to information from hydrometeorological service the upcoming summer period will be with dry hydrology due to poor rainfall and snow in winter.

**Most critical periods**

The most critical period depends from the weather conditions and electricity consumption. The level of production and import are in big relationship with the level of winter and spring hydrology and atmosphere temperature during the summer.

**Expected role of interconnections**

Macedonian transmission network has well developed interconnections with neighbours: Serbia, Bulgaria and Greece. So, the operation of power system is secure. The overhauls of the interconnections and power plants will be according to the plans which were coordinated with the other countries in the SEE region. The data about NTC, are harmonized with our neighbours (BG, RS and GR). Due to the annual firm contracts the value of available capacity on a monthly and weekly basis will be reduced. On the day, the value may be higher or lower, according to harmonized calculations between neighbours and due to system conditions.

**Framework and methodology of the assessments**

Weekly peak load for a normal condition is obtained by scaling the realized load for the same period during the 2013 with 2.3%, for the season normal temperature that is about 30°C. This is the percentage increase in total energy consumption according to official Energy balance of the FYR of Macedonia in the period from 2014 to 2018. Weekly peak load for a severe condition is obtained by scaling the realized load for the same period during the 2013 with 10%, for the abnormal seasonal temperature of about 45°C.

## Montenegro

**General situation**

Most of maintenance and overhauls works are planned during summer period.

**Most critical periods**

The main period of stress is August 2014, when the load is maximal and the temperatures are high. The main factor can be high demand and bad hydrological conditions.

**Expected role of interconnections**

No major variations of the interconnection capacities are expected during the summer 2014.



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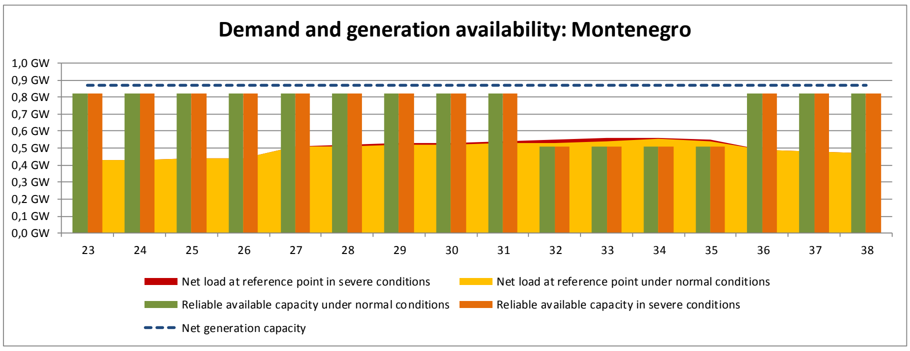


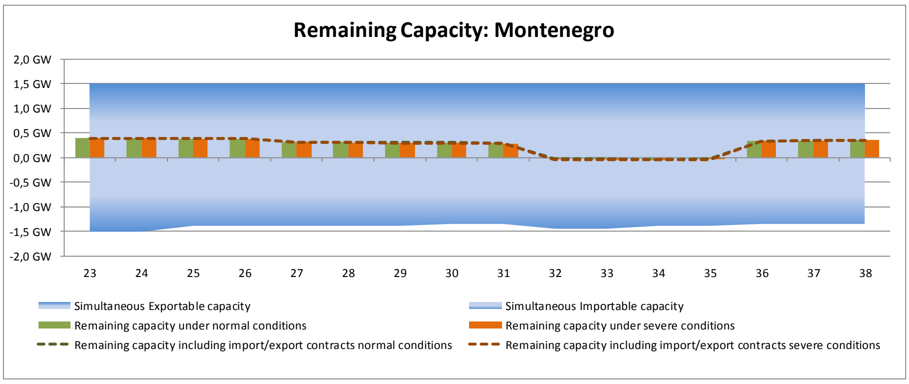


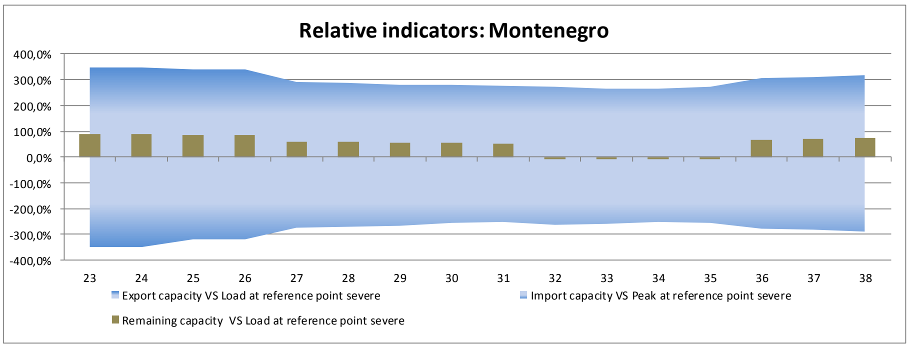


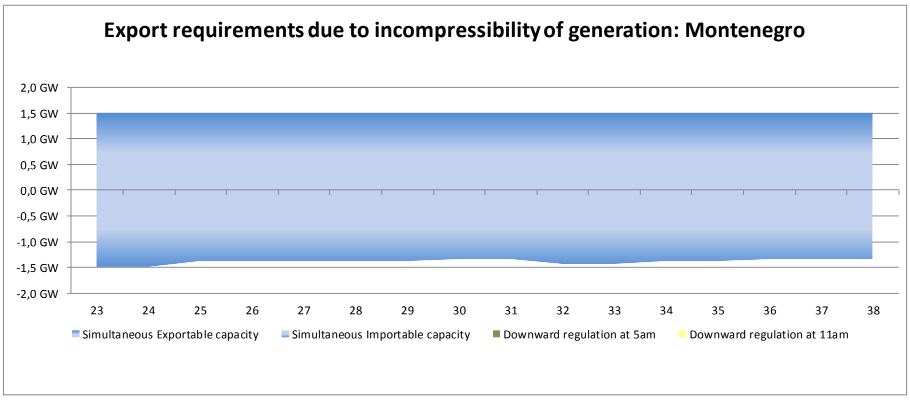




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## The Netherlands

### Synopsis

TenneT does not foresee any significant generation shortages during the summer of 2014. Sufficient generation capacity will be available and no large amount of outages during this period are reported.

Apart from this, sufficient export and or import capacity is available.

An official summer adequacy forecast is not done so far. To our opinion the supply-demand balance will be realized on the basis of the price-driven demand principle and it's not a task of the TSO to intervene in a good functioning market.

The specific TSO's task is balancing the system and supply emergency power when necessary.

Nevertheless, there is no indication of lack of power based on weather conditions in the following summer period.

TenneT TSO B.V. provides on behalf the Ministry of Economic Affairs the report on Monitoring of Security of Supply 15 years ahead (Monitoring Leveringszekerheid / Security of Supply). Visit our website for the latest report www.tennet.eu.

### General situation

In case of large wind generation in Germany, a cold winter, higher demands and relatively higher prices in France or an unexpected higher demand in Belgium, this could cause extra flows through the Dutch grid from the northern part towards the southern part in the Northwest European area, which could possibly result in an import and export reduction of interconnector capacity.

### Most critical periods

An official summer adequacy forecast is not done so far. To our opinion the supply-demand balance will be realized on the basis of the price-driven demand principle and it's not a task of the TSO to intervene in a good functioning market.

The specific TSO's task is balancing the system and supply emergency power when necessary.

Nevertheless, there is no indication of lack of power based on weather conditions in the following summer period.

### Expected role of interconnections

Sufficient export and or import capacity is available to fulfil the needs.

Sufficient export and or import capacity is available to fulfil the needs for managing the inflexible generation at demand minimum periods.



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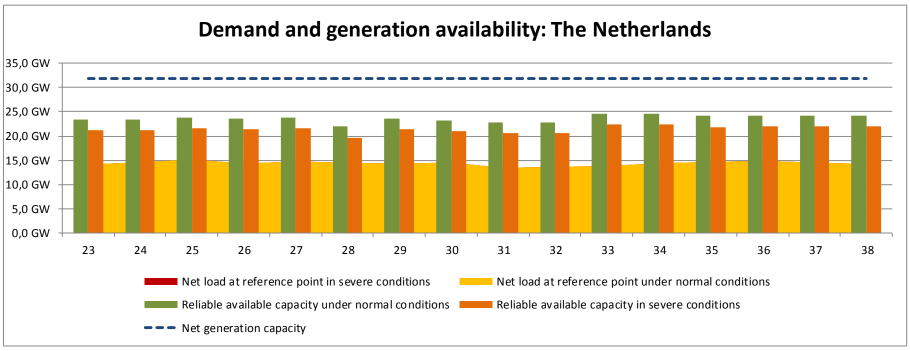
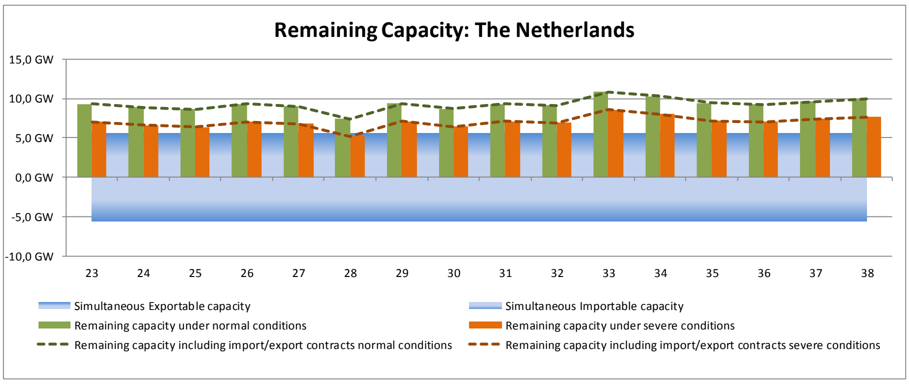
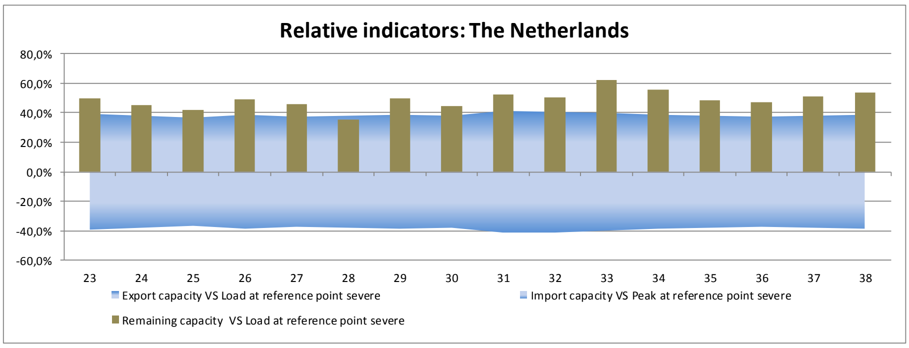
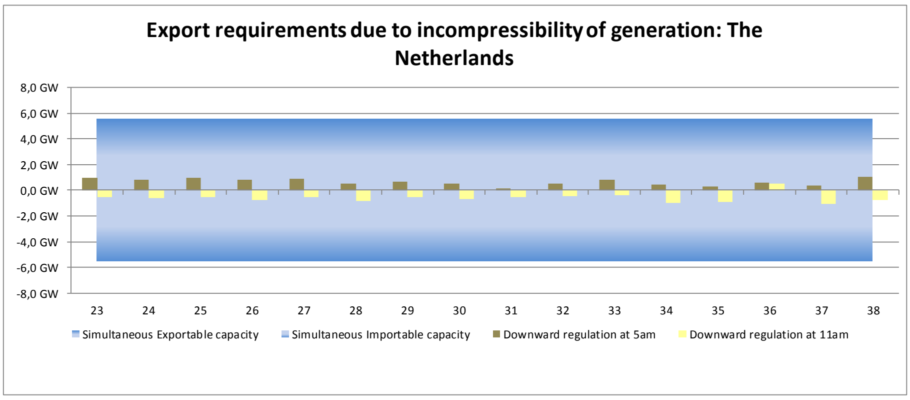

Demand and generation availability: The Netherlands
35,0 GW
30,0 GW
25,0 GW
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity


Remaining Capacity: The Netherlands
15,0 GW
10,0 GW
5,0 GW
0,0 GW
-5,0 GW
-10,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions


Relative indicators: The Netherlands
80,0%
60,0%
40,0%
20,0%
0,0%
-20,0%
-40,0%
-60,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: The Netherlands
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
-2,0 GW
-4,0 GW
-6,0 GW
-8,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

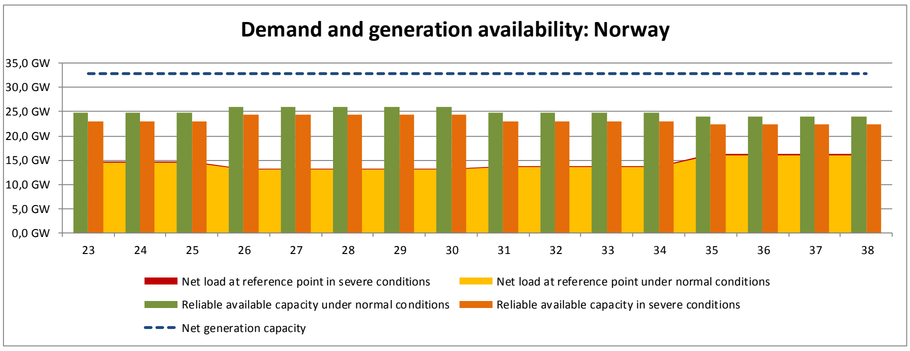
## Norway

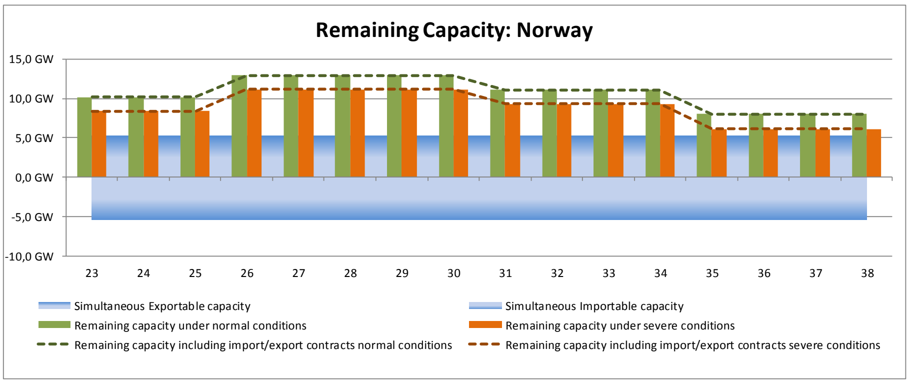
### Synopsis

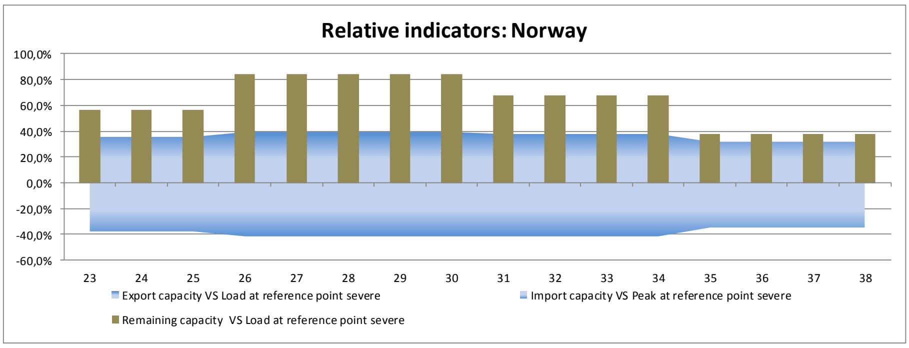
Statnett does not expect any critical situation during the summer 2014. The available generation capacity exceeds the expected peak load.

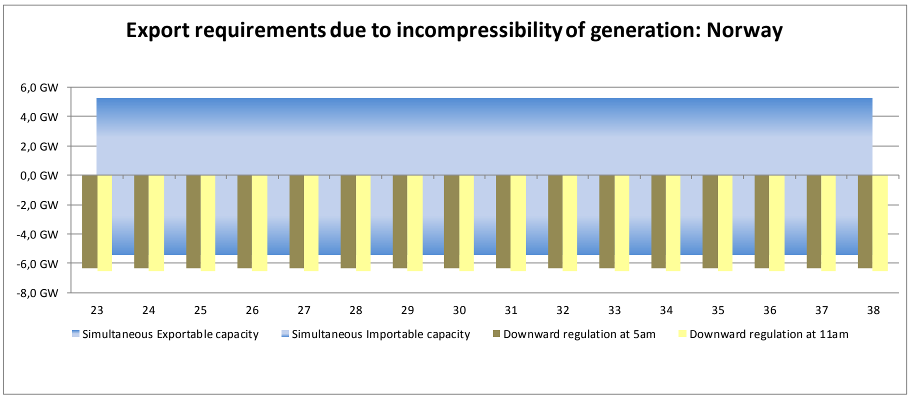
### General situation

Towards the summer period 2014 we expect that the hydrological balance will be normal.



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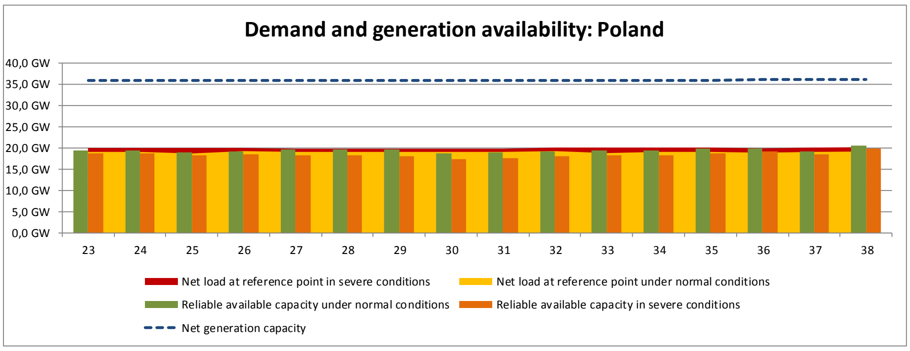
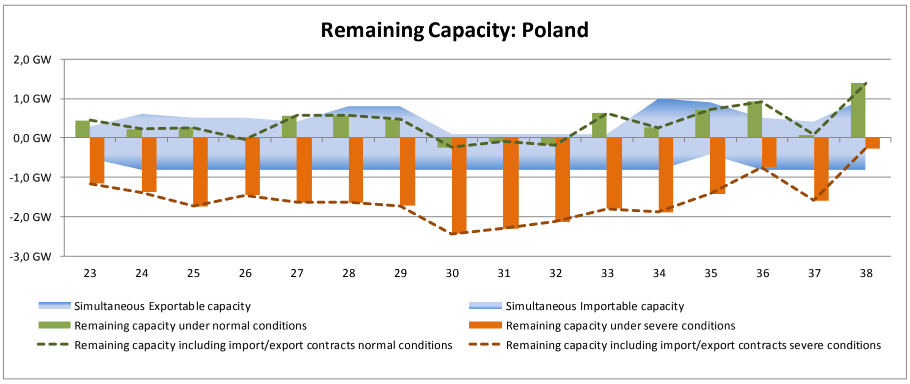
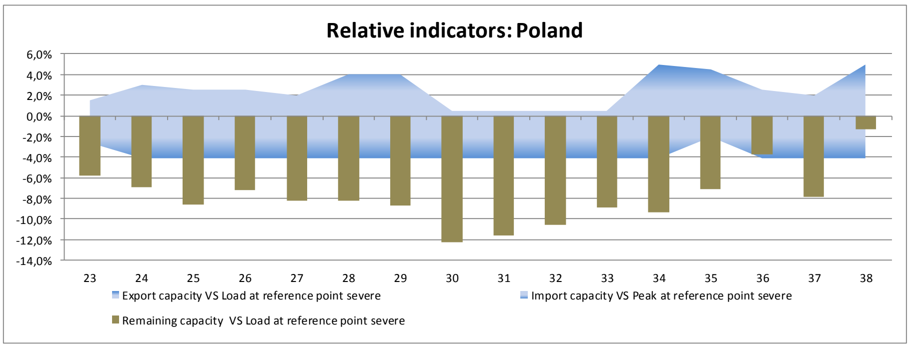
## Poland



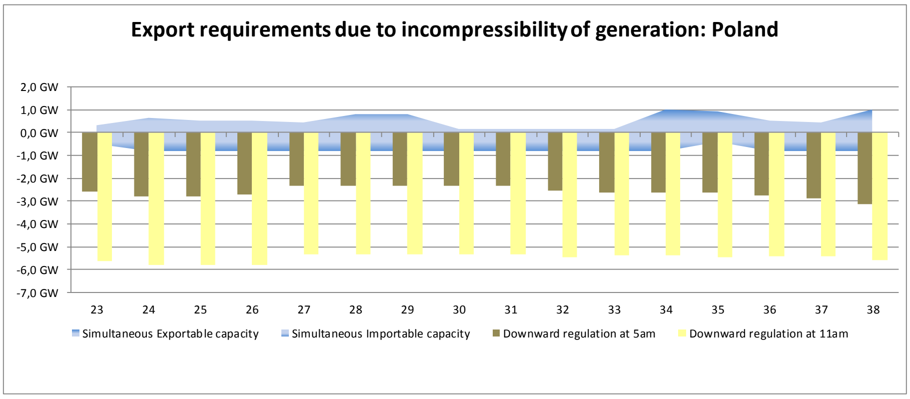
Demand and generation availability: Poland
40,0 GW
35,0 GW
30,0 GW
25,0 GW
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity

Remaining Capacity: Poland
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

Relative indicators: Poland
6,0%
4,0%
2,0%
0,0%
-2,0%
-4,0%
-6,0%
-8,0%
-10,0%
-12,0%
-14,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

Export requirements due to incompressibility of generation: Poland
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
-4,0 GW
-5,0 GW
-6,0 GW
-7,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## General situation

Power balance at 12:00 CET

In Poland forecast plans (yearly coordination plans) are done for the whole year on a monthly basis, till 30th November every year. Prepared data concerns average values from working days at peak time (during main summer months, means June, July and first half of August peak time in Poland is taking place between 12:00 and 13:00 CET (13:00 – 14:00 CEST). For second half of August and September peak load is taking place in the evening. On 26th every month PSE publishes monthly coordination plans, which include the precise information on power balance in peak time for all days of the next month. Further specification is done within the operational planning (weekly and daily).

Because of Outlook reports require weekly data, PSE has prepared special assessment for Summer Outlook, where weekly data of NGC, maintenances, load and "best estimate of NTC" are available. It is important to underline that, this is still an update of year-ahead plan. This assessment as well as coordination plans are coherent and based on information from producers (NGC, overhauls, non-usable capacity), and Polish TSO own analysis (load, outages, reserves, non-usable capacity, NTC). In normal conditions PSE classifies 90% of wind NGC as non-usable capacity, for severe conditions it is 100%. Peak load data includes the possible load reduction according to agreements concluded between PSE and major customers.

In normal conditions PSE does not expect any problems with balance the system this summer. Single day's unbalances which PSE expects, will be maintained under monthly and daily planning.

Under severe conditions, for all analysed reference points PSE observes a negative balance. Such forecast takes into consideration both high demand and low generation availability, which usually take place simultaneously in the Polish system under long lasting severe conditions (high temperature, hydrological constrains). Due to poor rainfall and snow in last winter, the hydrological constrains may be a key issue in the coming summer.

In addition, extremely severe balancing conditions in the summer period may take place in case of long lasting heat spells leading to significant deterioration of Polish power balance (increase of load with simultaneous decrease of generating capacities due to higher forced outage rate of generators, worse cooling conditions and increase in network constraints). In contradiction to previous years the risk of high unscheduled transit flows through the Polish system (from the west to the south) during such weather conditions cannot be considered low any more (as a result of development of solar generation in Germany). In such a situation, if necessary from power balance point of view (to recover minimum generating capacity reserve margin required) the import towards the Polish system can be realized under the condition of simultaneous multilateral redispatch action (with source and sink respectively south and west of Poland) taken at the same time to limit the unscheduled transit flows through the Polish system. It is estimated that ca 300 MW of such a redispatch (assuming source in Austria and sink in Germany) is necessary to allow 100 MW of import to Poland from Germany. A relevant framework for such a remedial action has been developed recently within TSC project.

Nevertheless, it is important to note that the negative balance means that necessary operational generating reserves are below required level but load is still fully covered.

Power balance at minimum demand conditions

PSE does not prepare forecast for downward regulation capabilities in yearly and monthly horizon (only during daily planning), so provided data is a kind of estimation only and this estimation based on quite pessimistic factor of usage onshore wind farms, amounted 85% of their NGC (no offshore wind farms at the moment, amount of solar is negligible). In general PSE can confirm that there can be some stress days during the year (especially during Christmas, Easter and holidays in May), when low demand and simultaneously high wind condition could cause the balance problem in Polish power system.

The national downward analysis at 5 a.m. CET with the high factor of wind usage show, that the system will be balanced almost for all reference points. Possible small surplus of generation will be manage during



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operational planning, when precise forecast of wind generation will be known (PSE has operational procedures to keep system at safe level, including wind farms switching off as a last resort).

PSE does not expect problems with balance at 11:00 a.m. in Sundays. Solar generation is not a problem due to fact that NGC of solar is negligible in Polish balance.

Operational conditions

Referring to network conditions, for years PSE S.A. has been affected by high unscheduled transit flows through the system from the west to the south. The flows limit capacity on the whole synchronous profile, which is offered to the market on the synchronous borders (lack of import capacity and significant reduction of export capacity) and on top of that, occasionally causes congestions on the western border (violation of n-1 rule). To keep system safe in such situations PSE will take the following actions:

- Activate DC loop flow (HVDC rescheduling) PL→DE→DK→SE→PL.
- Activate internal redispatching
- Activate cross-border redispatching.
- Activate multilateral redispatching.

**Interconnection capacities**

PSE provides aggregated NTC data for the whole 220/400 kV synchronous PL - DE/CZ/SK profile on the base of the Polish Grid Code that accounts for physical power flows in the interconnected systems of Continental Europe, i.e. unscheduled transit flows through Polish system from the west to the south. Additional Polish connections in use are: DC cable to Sweden, 220kV line to Ukraine, on which import only is possible (Ukrainian units are connected synchronously to the Polish system).

As the "best estimate of NTC" for Summer Outlook, PSE provides seasonal forecast of NTC, which takes into consideration unscheduled transit flows through PSE control area. The forecast include also the constraints caused by planned outages of the cross-border and / or internal lines (or other elements). Both factors limit the transmission capacity in Polish system in the yearly planning horizon.

For the whole analysed summer period (in fact during the whole year) yearly forecast of NTC in import direction on PL – DE/CZ/CK profile amounts to zero. This is caused by low level of TTC, which is calculated on the basis of N-1 criterion, simultaneously with high level of TRM, resulting from high unscheduled transit flows through Poland. In other words, all capacity possibly to be offered to the market players is already consumed by these unscheduled transit flows.

## Portugal

### Synopsis

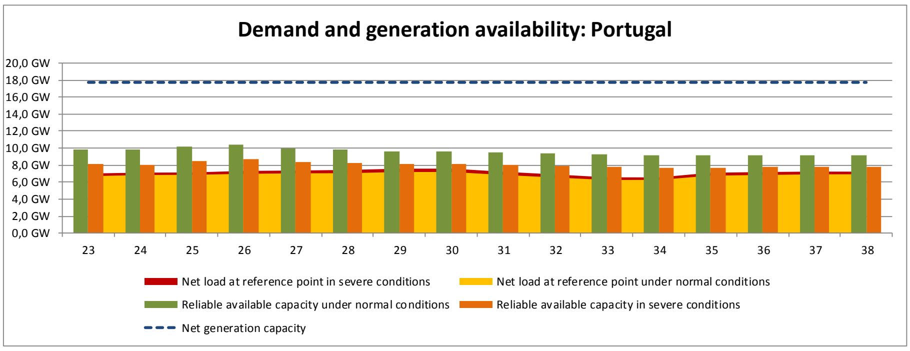
From our latest analysis, under normal conditions, the remaining capacity should be 15% of the installed capacity on average. In extreme conditions this margin could be as low as 7.2%, on week 30, but this still configures a comfortable situation.

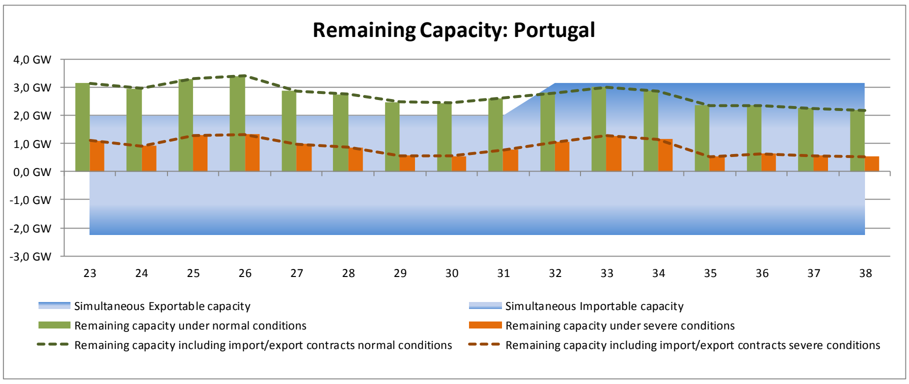
### General situation

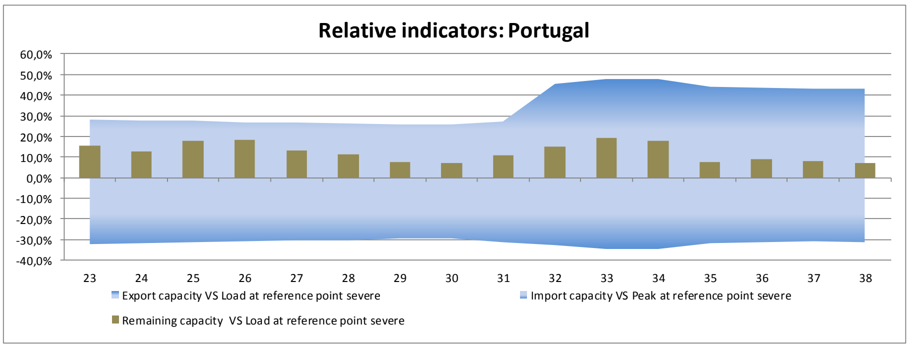
REN's outlook for the upcoming summer season is positive, as conditions are favourable to system adequacy. Hydro storage is actually in 95% of its maximum capacity (beginning of March) and thermal generating capacity is expected to be fully available from mid-June until the end of the period under analysis.

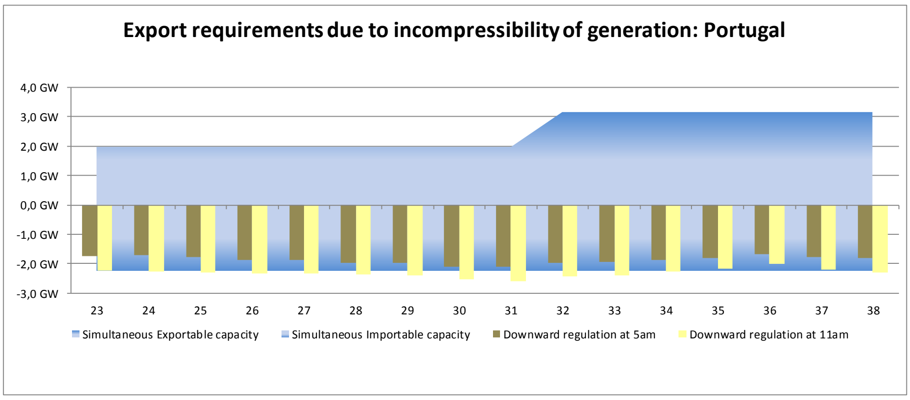
Uncertainty arising from situation in Ukraine does not also poses a risk, as natural gas supplies for the national system have origin in 51% in the Maghreb pipeline with the rest coming from different sources around the world in LNG cargo ships that unload in our facilities in Sines.

Our assessment of the downward regulation capability of the system also reveals a sufficient margin to deal with periods of high wind and low load.


Demand and generation availability: Portugal
20,0 GW
18,0 GW
16,0 GW
14,0 GW
12,0 GW
10,0 GW
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity


Remaining Capacity: Portugal
4,0 GW
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions


Relative indicators: Portugal
60,0%
50,0%
40,0%
30,0%
20,0%
10,0%
0,0%
-10,0%
-20,0%
-30,0%
-40,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: Portugal
4,0 GW
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## Romania

### Synopsis

The forecast for the becoming summer 2014 does not indicate any problem which could affect the Romanian Power System adequacy.

### General situation

The generation units' maintenance plan takes into account the requirements to cover the internal demand and to fulfil the system reserves amount in any time interval.

### Most critical periods

During the summer 2014, we do not expect critical time intervals even for heat wave circumstances.

### Expected role of interconnections

The interconnection capacities will be used in the range of the NTC values offered to the market. There are regional coordinated plans of the interconnectors' maintenance in order to avoid the interconnection safety jeopardising and to optimise the NTC values.

During the demand minimum periods with high generation level of renewable, it was observed an increased level of export schedules within the agreed NTC ranges.

However there are market rules and procedures in order to avoid unplanned exports when it could be an excess of inflexible generation at minimum demand hours.

### Framework and methodology of the assessments

Based on a Methodology issued by the National Energy Regulatory Authority, the consumption projection for the coming summer is approved by the Regulator before the beginning of the year, based on the hourly load forecasts delivered by the suppliers and distribution companies. According to the same Methodology, Transelectrica receives on behalf of producers also the planned maintenance / overhauls schedules and units technical and economic data for the next year, in order to perform the market analysis that will provide the input to the Regulator for establishing the regulated contracts. Also these data are used to assess the load and national generating capacity data for next summer adequacy outlook.

The best estimated NTC values was obtained based on the NTC profile for 2013, calculated monthly for time periods defined by maintenance schedules for both transmission network in the National Power System and in the neighbouring region.

The following algorithm was applied:

- the network elements limits for 2014 was checked in comparison with the 2013 ones;
- average NTC values for periods without significantly limiting disconnections from June till September 2013 were determined and set for the summer 2014 dates without significant disconnections;
- the disconnections of the lines in the National Power System and region, which determined significant modification of Romanian export/import NTC values in the summer 2013, were identified;
- the disconnection periods of these lines were identified in the 2014 national maintenance plan and in the regional maintenance schedules and correspondingly modified NTC values were declared for 2014 summer days with such significant disconnections.



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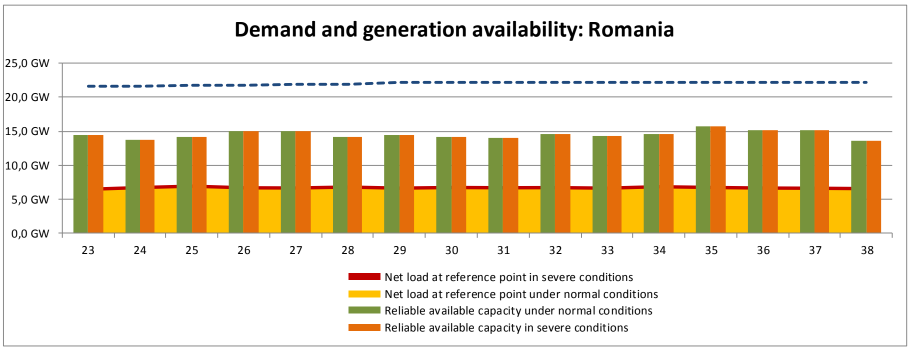


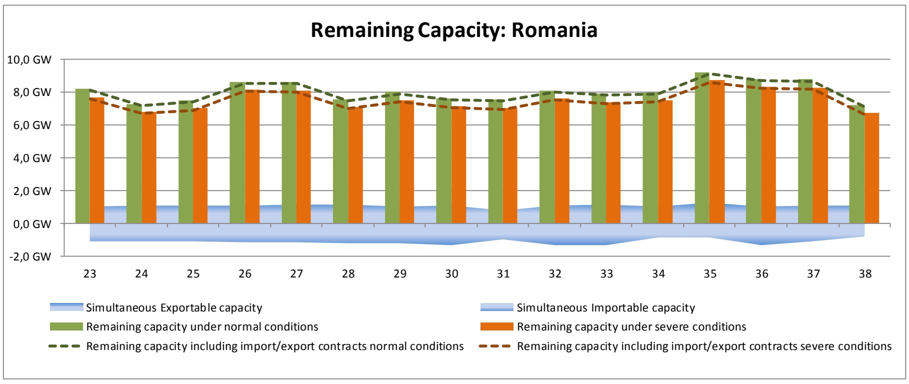


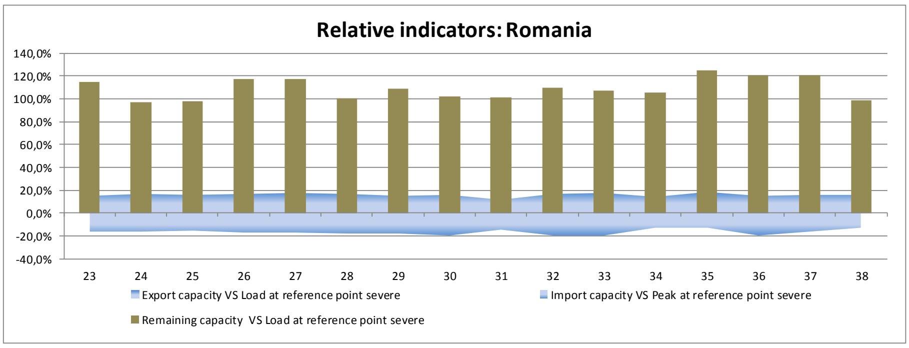


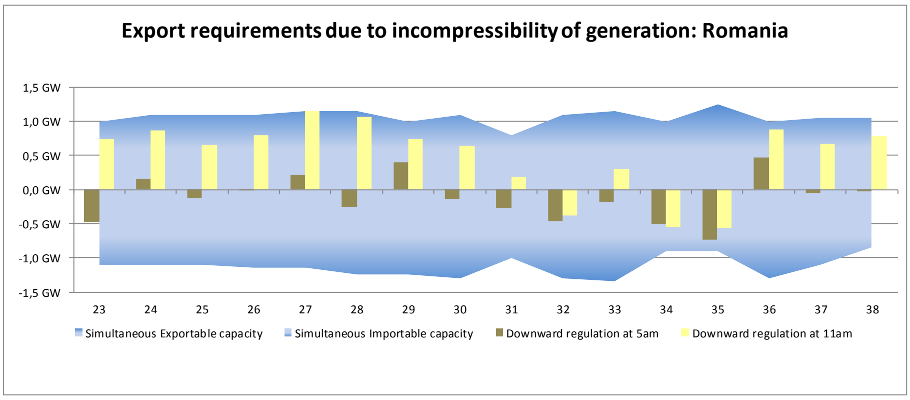




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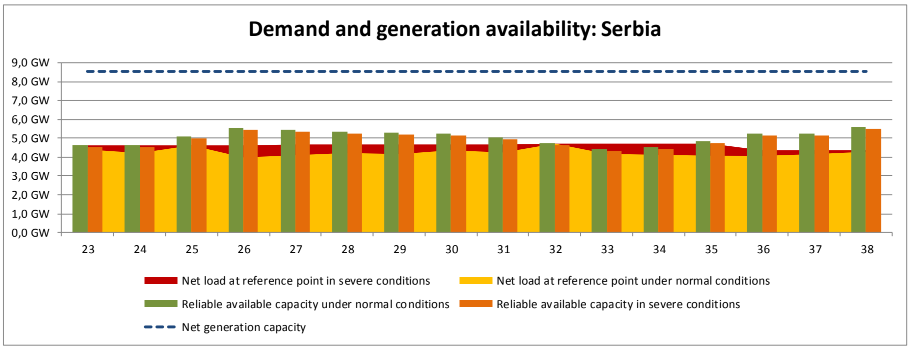
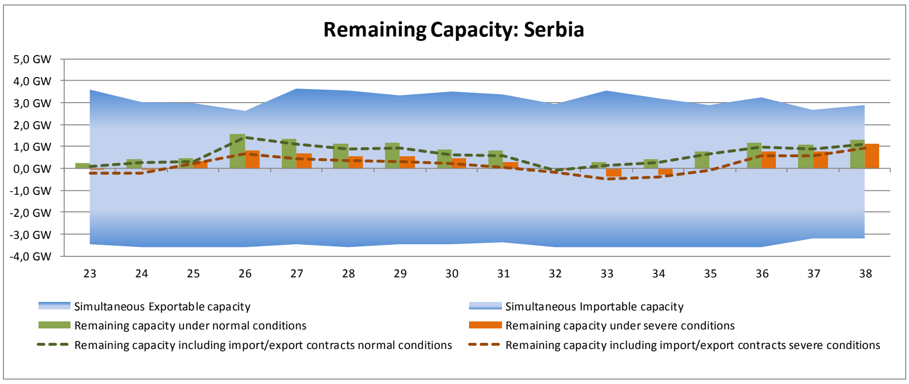
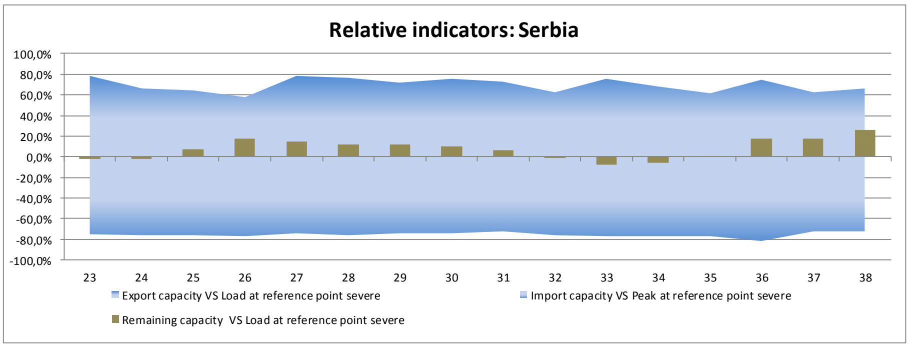
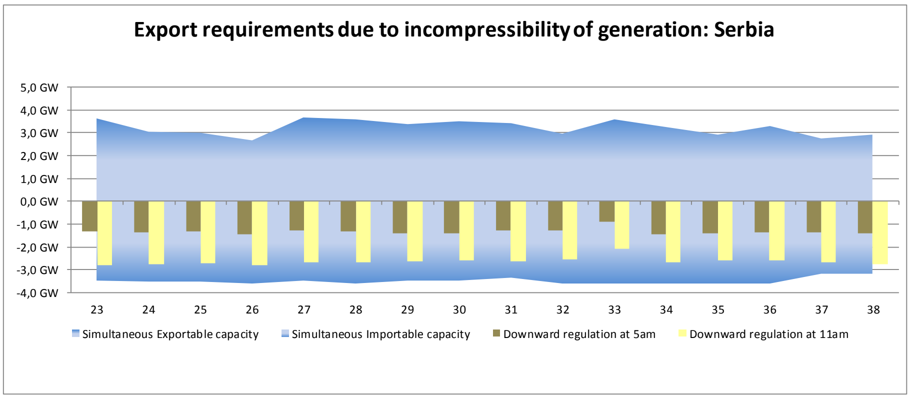
## Serbia




### Synopsis

Summer is not known as a critical period in the Serbian power system. Forecasted load and level of maintenance are similar compared to previous years.

Depending on weather conditions, small amount of energy will be exported probably during the whole coming summer.

**General situation**

Taking into account planned level of maintenance and expected hydro levels, the Serbian power system is expected to be in balance in the forthcoming summer.

**Most critical periods**

Under severe weather conditions, i.e. extremely high temperatures and very low hydro levels, lack of energy from generation units within Serbian control area might happen in certain weeks (mostly in August), but this can be easily overcome by energy import, as Serbian market is operational and there is enough cross-border capacity to meet domestic and regional demand.

**Expected role of interconnections**

According to harmonized maintenance plan in South-East Europe, some of interconnectors will be unavailable due to maintenance. During the unavailability of interconnectors exchange of energy on these borders will be set to zero which will decrease total capacity for exchanging the energy. But taking into account that neither interconnector will be unavailable in August, which is expected to be the most risky month under severe condition, unavailability of interconnectors probably will not affect ability to exchange the energy.

In general, maintenance works are performed mainly with daily disconnection, therefore almost all interconnectors will be available overnight when generation exceeding at low demand might occur in Serbian Power System.

**Framework and methodology of the assessments**

Load scenario is based on statistical hourly data from previous years taking into account forecasted consumption growth for 2014.

Maintenance and overhauls values are calculated from the official maintenance plan of Serbian Generation Company.

## Slovakia

**General situation**

According to the firm maintenance program of the generation units, the maintenance of the nuclear unit (500 MW) is planned in the 25th and 26th weeks. The gas power plant (218 MW), that was in operation during the whole previous year, shall be out of operation probably during the whole summer. Another two units of thermal conventional power plant (2 x 110 MW) are declared out of operation in the year 2014. We do not expect any problems related with shortages of transmission capacities, although higher cross-border flows may occur.

**Most critical periods**

Remaining capacities under normal conditions are sufficient in all weeks. Remaining capacities under severe conditions in two weeks are negative that indicate necessity of import. The highest weekly peak load in severe conditions for this outlook report is foreseen in the 38th week, 3 780 MW (the same level as in the summer 2013). The last summer peak load was 3 664 MW, recorded on September 26, at 19:00. In the summer 2014 from 21th of July to 15th of August two tie-lines connecting Slovakia and Poland are out of operation. No new tie-lines and decommissioning of current interconnectors are planned in this summer. In case of electricity import, the cross-border capacities are sufficient in summer period.

**Expected role of interconnections**

In summer periods, the power system of Slovakia is usually dependent upon imports of electricity from neighbouring countries, and it will be probably the same also in the coming summer. Physical flows over Slovakia transmission system is usually from the north-west to the south-east direction, import from the Czech and Poland and export to the Hungary and the Ukraine.



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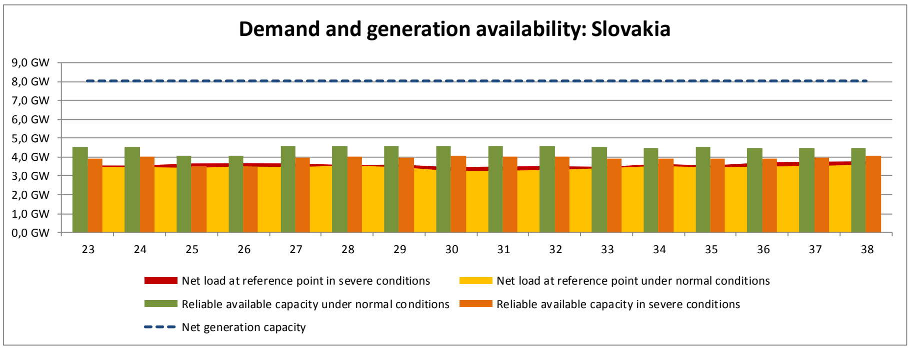
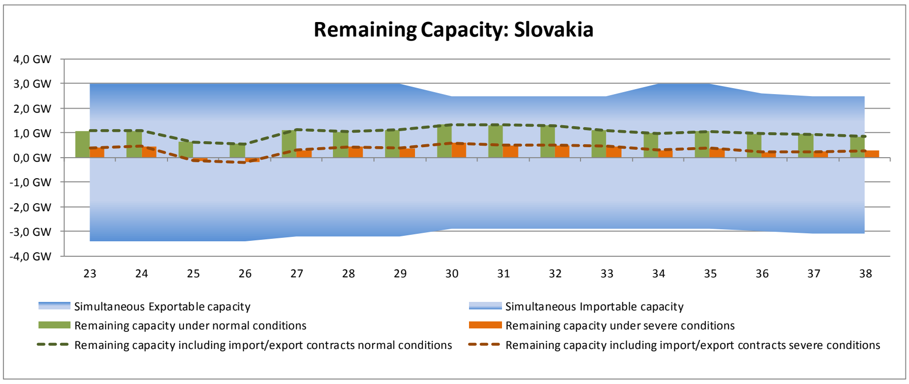
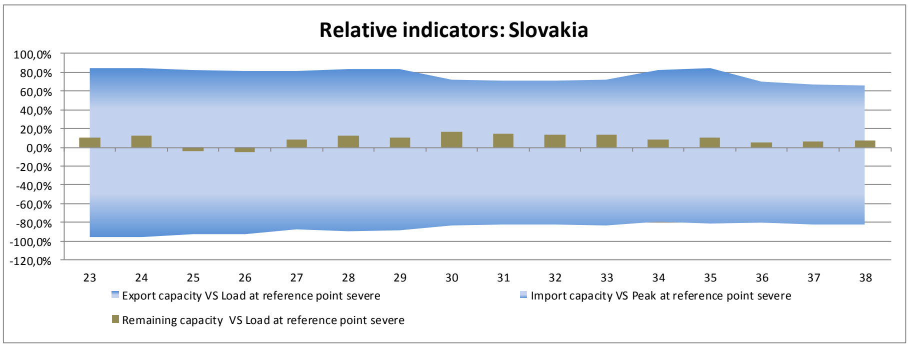
## Framework and methodology of the assessments

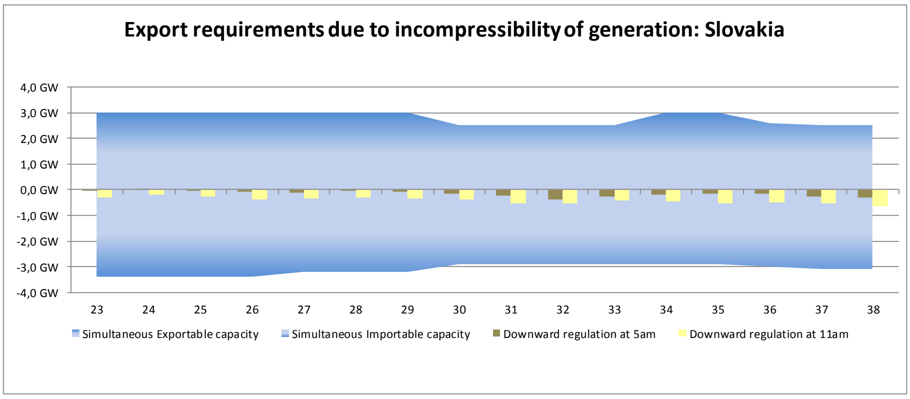
The statistics of the last years were used for evaluating the outage rates and peaks loads. Generation capacities reflect the situation as of the end of 2013. Operation of nuclear, thermal, hydroelectric and renewable sources was identified according to experience from previous years.

The given NTC values take into account the planned maintenances of transmission lines.

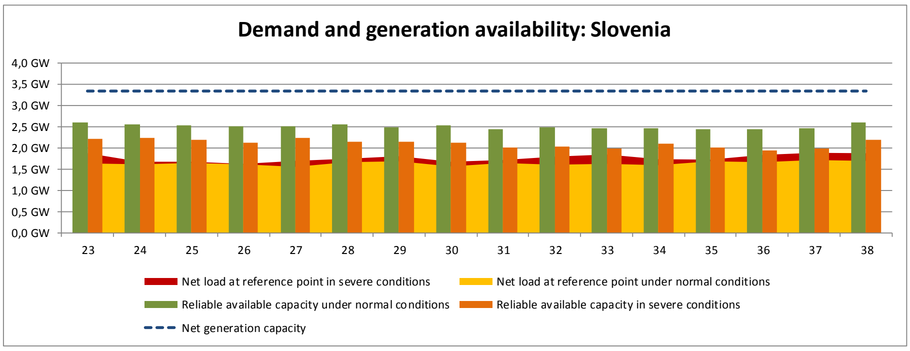


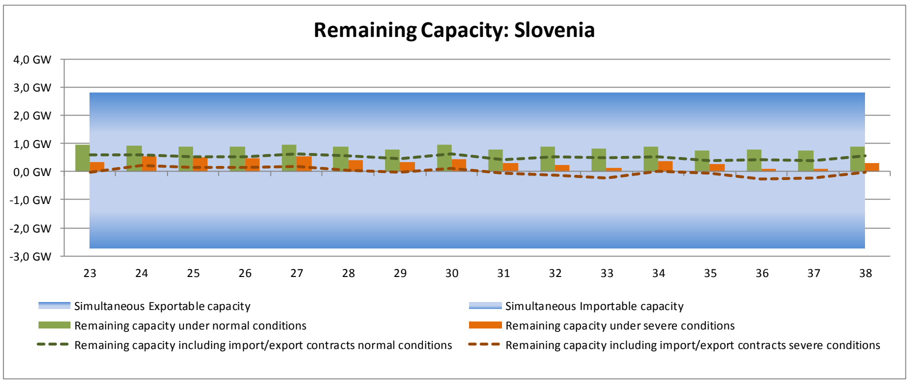



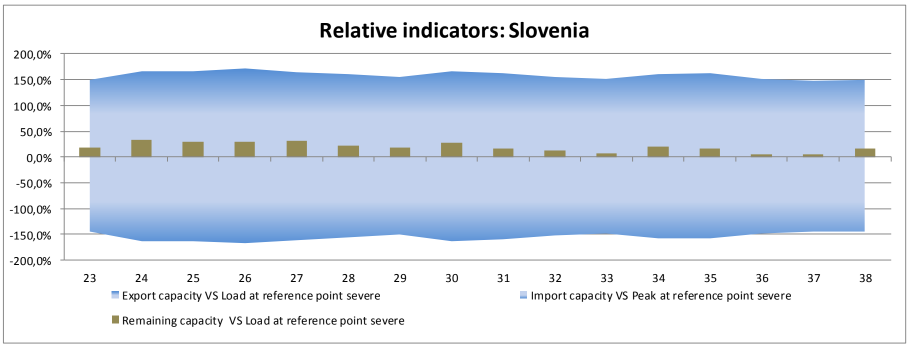



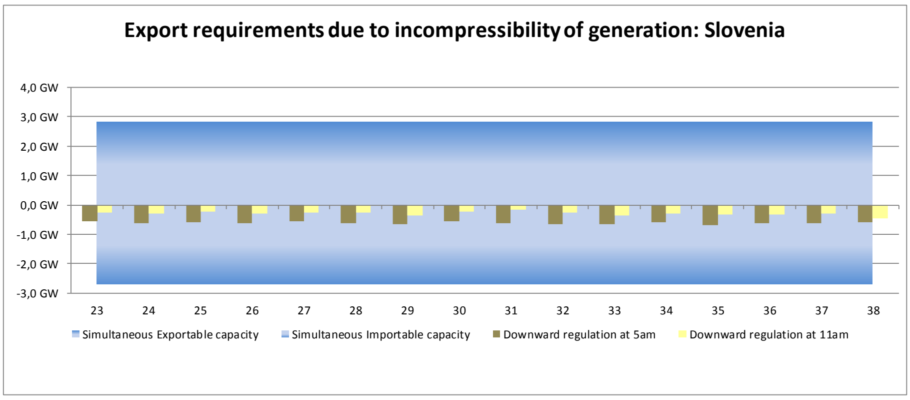



## Slovenia


Demand and generation availability: Slovenia
4,0 GW
3,5 GW
3,0 GW
2,5 GW
2,0 GW
1,5 GW
1,0 GW
0,5 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity


Remaining Capacity: Slovenia
4,0 GW
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions


Relative indicators: Slovenia
200,0%
150,0%
100,0%
50,0%
0,0%
-50,0%
-100,0%
-150,0%
-200,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: Slovenia
4,0 GW
3,0 GW
2,0 GW
1,0 GW
0,0 GW
-1,0 GW
-2,0 GW
-3,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## Spain

### Synopsis

From the point of view of generation adequacy, there's no detected risk situation in the Spanish peninsular system for the upcoming summer. Good generation/demand adequacy can be expected regardless imports from neighbouring countries. If average conditions are considered, remaining capacity will be over 17000 MW. In the case of simultaneous extreme peak demand, very low wind generation (less than 5% of wind installed capacity), drought conditions and a high thermal forced outage rate, assessed remaining capacity is still over 11000 MW

The demand values have been still decreasing during 2013 and the beginning of 2014, after the significant drop that took place during 2011 and 2012, due to the economic and financial crisis. It is expected that the demand in 2014 will slightly recover. Nevertheless, the demand peak values expected for summer, with high temperature values and a probability to be reached of 1 %, are the same as the expected for 2013.

The most important risk factors for the next summer in the Spanish system are wind conditions, sensitivity of load to temperature in extreme weather conditions and gas availability to combined cycle and gas thermal plants.

Generation-Demand Balance

Due to the high water inflows during the last winter in Spain, the hydro reserves are over their average level. Nevertheless, given the characteristics of the Spanish hydro system, with a great inter-annual and monthly variability regarding hydro flows, a conservative estimation of available hydro power is advisable. The 90% percentile is considered an accurate estimation.

The wind power covers a high amount of Spanish generation, being the installed wind power capacity about 20% of total generating capacity. For the assessing of the wind power generation under extreme conditions during summer, historical data were used. Wind generation assessed is around 5% of available capacity. Wind generation has been above this rate during summer periods with a frequency of 95%.

Solar energy is taken into account when calculating generation capacity for summer peak demand, given that installed capacity is higher than 6000 MW and summer peak demand values take place at noon. Solar generation considered is around 30 % of available capacity (95% when assessing the downward regulating capabilities).

The generating capacity of several power stations could be reduced due to network capacity constraints. However, these constraints have been significantly reduced with installation of operational inter-tripping equipment.

At minimum demand periods, with high amounts of renewable production, power surplus with spilling of RES can take place. In order to permanently keep balance and security of the system, the Spanish TSO has a specific control centre for renewable sources (CECRE), which is permanently monitoring the renewable production. Downward regulation reserves may be composed by renewable power plants; first thermal production is reduced upon security criteria compliance. If additional reduction is needed, RES Control Centre (CECRE) sends a new setpoint and supervises renewable production to maintain a balanced situation.

The export capacity of interconnectors is a key factor in order to avoid curtailment of renewable energy, mainly wind power. However, given the short exporting capacity from the Iberian Peninsula to north Europe, it's necessary to point out the importance of demand management and energy storage –mainly hydro pump storage plants- in order to properly manage the excess of inflexible power at minimum demand periods. Nowadays the installed capacity of hydro pump storage plants in Spain is around 5000 MW.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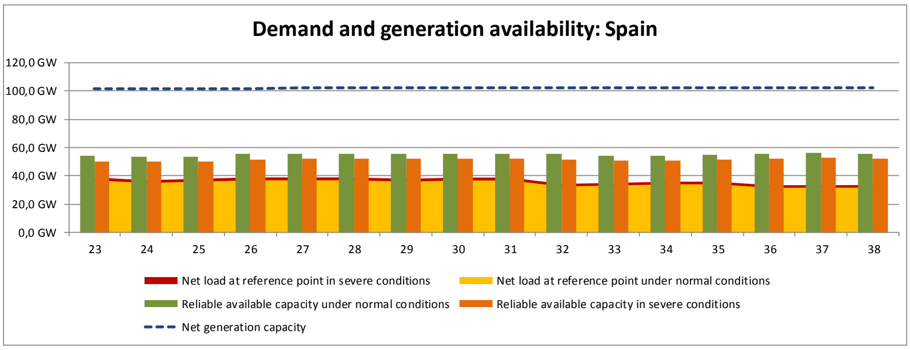
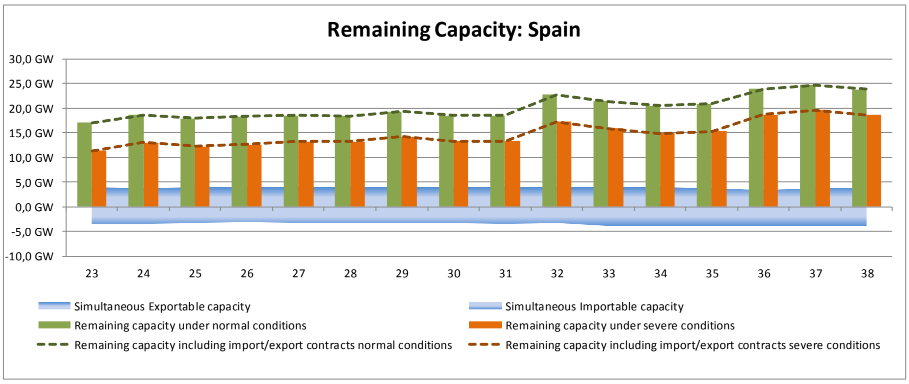
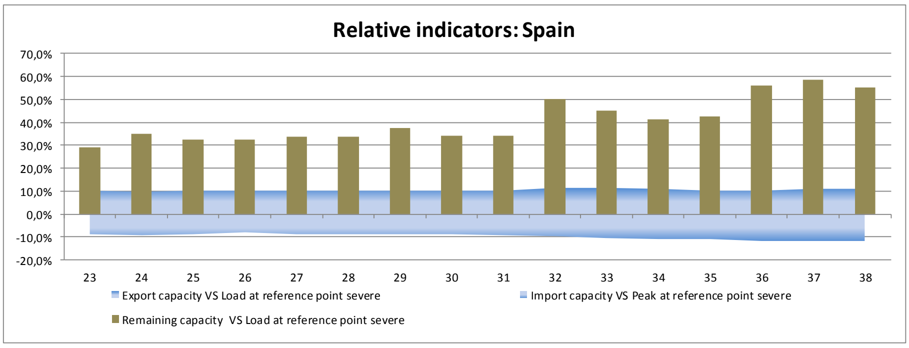
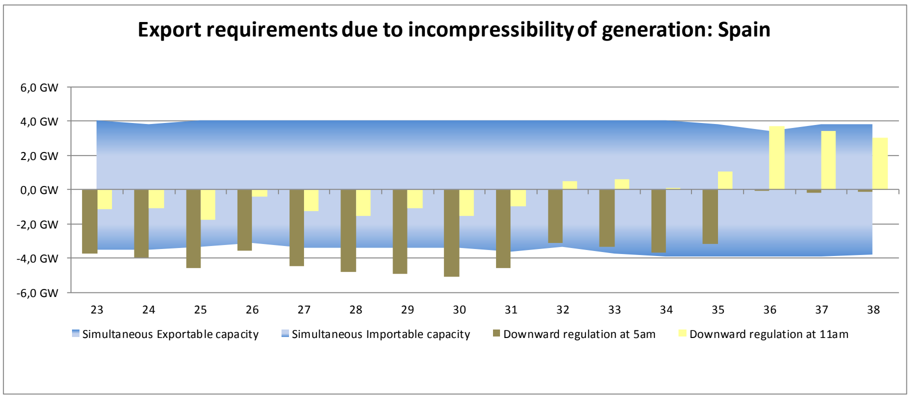

Demand and generation availability: Spain
120,0 GW
100,0 GW
80,0 GW
60,0 GW
40,0 GW
20,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity


Remaining Capacity: Spain
30,0 GW
25,0 GW
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
-5,0 GW
-10,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions


Relative indicators: Spain
70,0%
60,0%
50,0%
40,0%
30,0%
20,0%
10,0%
0,0%
-10,0%
-20,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe


Export requirements due to incompressibility of generation: Spain
6,0 GW
4,0 GW
2,0 GW
0,0 GW
-2,0 GW
-4,0 GW
-6,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## General situation

From the point of view of generation adequacy, there’s no detected risk situation in the Spanish peninsular system for the upcoming summer. If average conditions are considered, remaining capacity will be over 17000 MW. In the case of simultaneous extreme peak demand, very low wind generation (less than 5% of wind installed capacity), drought conditions and a high thermal forced outage rate, assessed remaining capacity is still over 11000 MW.

The demand values have been still decreasing during 2013 and the beginning of 2014, after the significant drop that took place during 2011 and 2012, due to the economic and financial crisis. It is expected that the demand in 2014 will slightly recover. Nevertheless, the demand peak values expected for summer, with high temperature values and a probability to be reached of 1 %, are the same as the expected for 2013.

The most important risk factors for the next summer in the Spanish system are wind conditions, sensitivity of load to temperature in extreme weather conditions and gas availability to combined cycle and gas thermal plants.

## Most critical periods

The lowest remaining capacity at peak demand hours is expected to be met during the first weeks of the summer period, especially if high temperatures are reached. Nevertheless, there's not a risk situation or a low capacity detected.

## Expected role of interconnections

Good generation/demand adequacy can be expected for peak demand hours regardless imports from neighbouring countries.

The export capacity of interconnectors is a key factor in order to avoid curtailment of renewable energy, mainly wind power. However, given the short exporting capacity from the Iberian Peninsula to north Europe, it’s necessary to point out the importance of demand management and energy storage –mainly hydro pump storage plants- in order to properly manage the excess of inflexible power at minimum demand periods. Nowadays the installed capacity of hydro pump storage plants in Spain is around 5000 MW.

## Framework and methodology of the assessments

Among other reports, every month, a medium term system adequacy forecast report for the next 12 months is produced by the Spanish TSO.

Medium term system adequacy forecast is carried out using a hydrothermal coordination model with stochastic dynamic programming that minimizes variable operation costs. The analysis is based on a probabilistic tool where hydro stochastic behaviour and unplanned thermal outages are considered. In addition, regional studies are performed looking for congestions.

The medium term forecast considers several hydro conditions, available thermal capacity and wind production scenarios.

All scenarios are built under the following assumptions:

– Overhaul planning notified by generators.
– Guaranteed fuel (gas) supply to combined cycle and gas thermal plants.
– Low wind conditions: wind generation considered is around 5-6% of available capacity. Wind generation has been above this rate with a probability of 95%.

Extremely severe conditions for the system are simulated as:

– Extreme demand due to severe weather conditions, typically very high temperatures
– No import capacity is considered in the study in severe conditions. So, it is not taken into account in the load – generation balance.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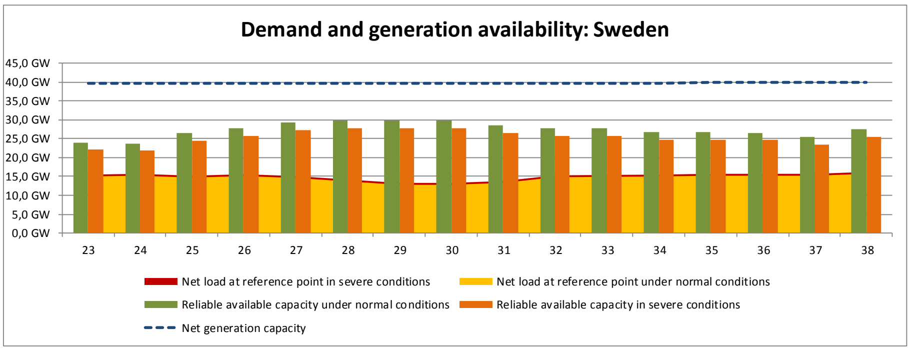
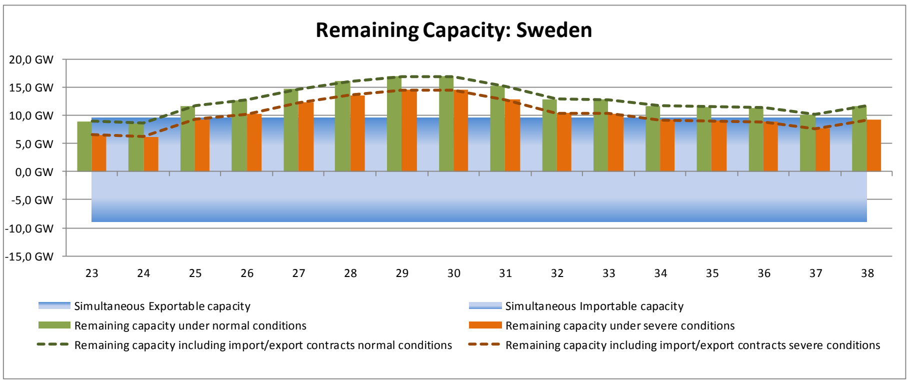
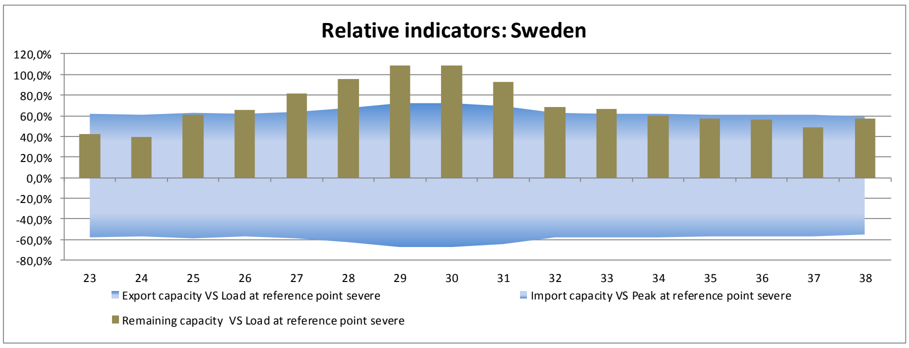
## Sweden



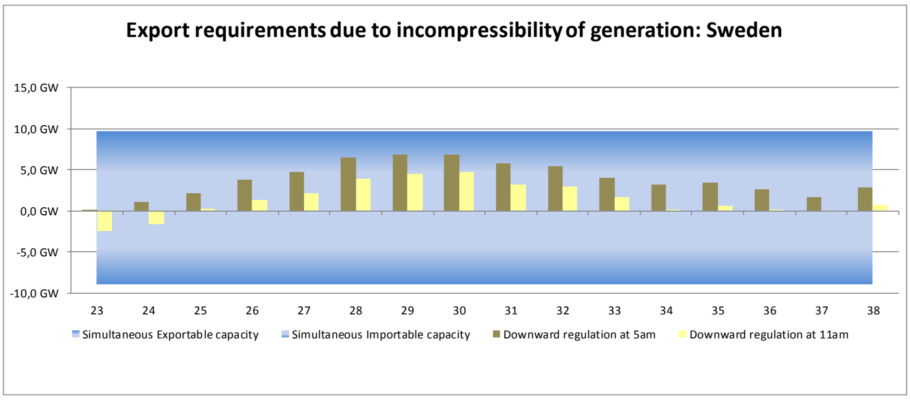
Demand and generation availability: Sweden
45,0 GW
40,0 GW
35,0 GW
30,0 GW
25,0 GW
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity

Remaining Capacity: Sweden
20,0 GW
15,0 GW
10,0 GW
5,0 GW
0,0 GW
-5,0 GW
-10,0 GW
-15,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

Relative indicators: Sweden
120,0%
100,0%
80,0%
60,0%
40,0%
20,0%
0,0%
-20,0%
-40,0%
-60,0%
-80,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

Export requirements due to incompressibility of generation: Sweden
15,0 GW
10,0 GW
5,0 GW
0,0 GW
-5,0 GW
-10,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

### Synopsis

No particular problems are foreseen the upcoming summer when it comes to adequacy of demand vs generation balance or inflexibility of generation. But a lot of grid maintenances are scheduled which require post fault remedial actions to be prepared to be able to cope with local problems (e.g. overload of remaining elements after fault) which shouldn't have any significant effect on any of the neighbouring countries.

### General situation

During summer, with a small exception during July, there is a lot of maintenance on both grid elements and production units. Net export from Sweden is nonetheless expected during the whole period. When it comes to grid elements taken out of service it is both due to maintenance of existing facilities and due to new investments. Other than that no particular problems are foreseen, although some maintenance is more critical than others.

### Most critical periods

The maintenance works is relatively evenly distributed over the period. Generally, situations with high voltages are to be expected (especially during nights) due to low load on long transmission lines. This could however be handled by disconnecting parallel lines, which is a standard procedure for voltage control in Sweden. This should not cause any problems for neighbouring countries.

Furthermore, during spring flood some overloads in the northern 220 kV grid may occur which requires reallocation of production and/or disconnection of lines. Beside this, the summer is also a period with increased probability of lightning strikes. As this is the most common cause of the faults in the Swedish national grid a Lightning Localization System is used.

In summary, no particular problems are foreseen although a lot of maintenance requires special attention due to local problems and with regard to the N-1 criterion.

### Expected role of interconnections

As Sweden is expected to export power during the whole summer period no adequacy issues related to the interconnectors are expected (in terms of security of supply for electricity consumers). However, it is worth mentioning that as the penetration of intermittent production in Sweden and its interconnected countries has increased there generally is less down regulation margin than before.

Export is expected during the whole summer period. The need for export is particularly high throughout July, due to low demand and high expected nuclear availability. This is the same situation as in the forecast for the previous summer (2013). When looking at the summer of 2013 one can see that Sweden was exporting most of the time but the net exchange was quite moderate. When it comes to inflexibility of generation, please see the figure on the following page.



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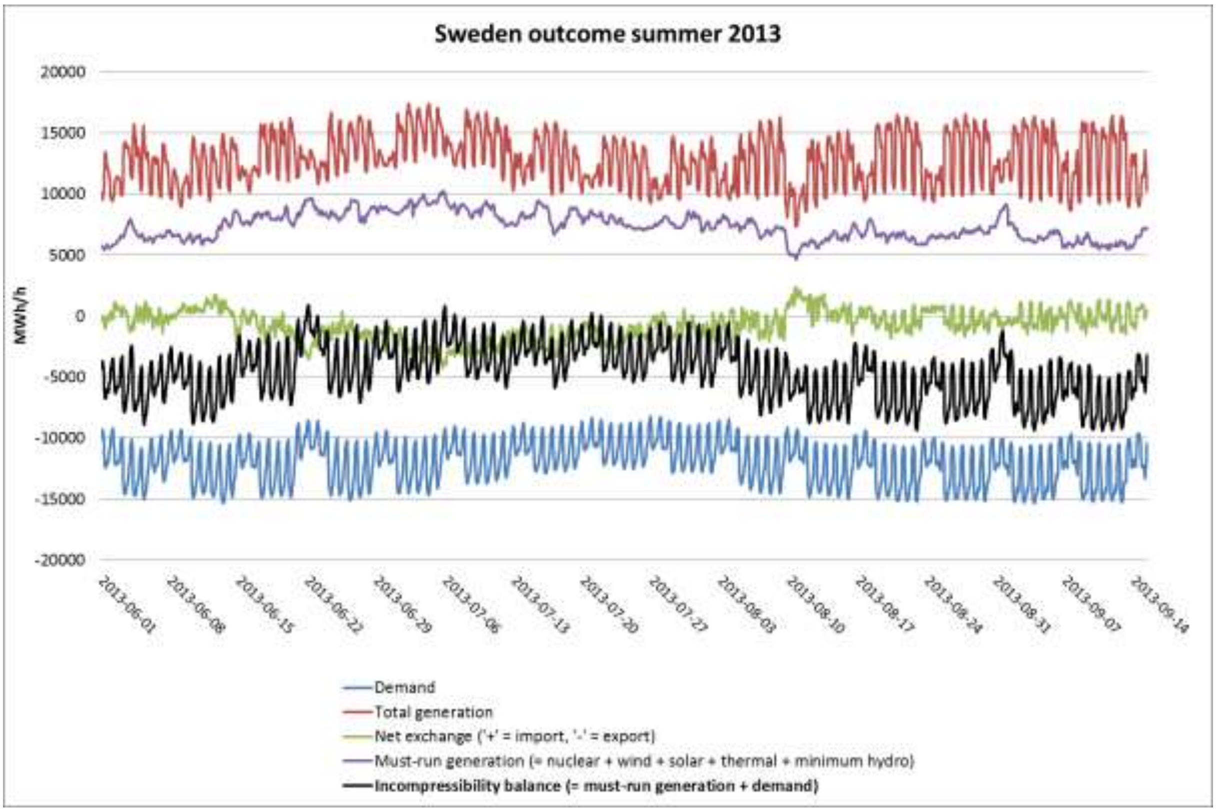



**Framework and methodology of the assessments**

- The outage rates have been estimated with help of historical data.
- Best estimate of NTC on interconnectors and planned availability of production units have been assessed with help of market messages at Nord Pool Spot (via Urgent Market Messages - UMMs) and historical data.
- Must-run generation has been evaluated based on historical data and the need of a certain level of production to meet system requirements (e.g. Frequency Containment Reserve - FCR, voltage regulation, etc.).
- Finally, demand figures are based on data from the previous years.

## Switzerland

**Synopsis**

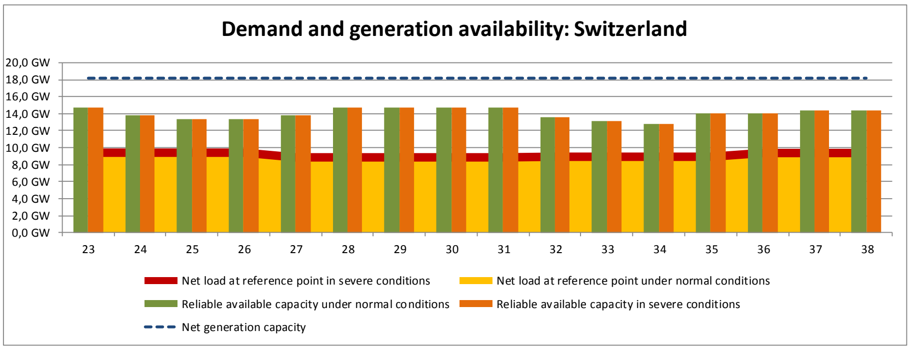
Using the current adequacy method, there are no periods of risk, and despite their continuous development, renewables still play a marginal role. Switzerland's strong interconnection with its neighbours also provides renewables transport capabilities.

**Most critical periods**

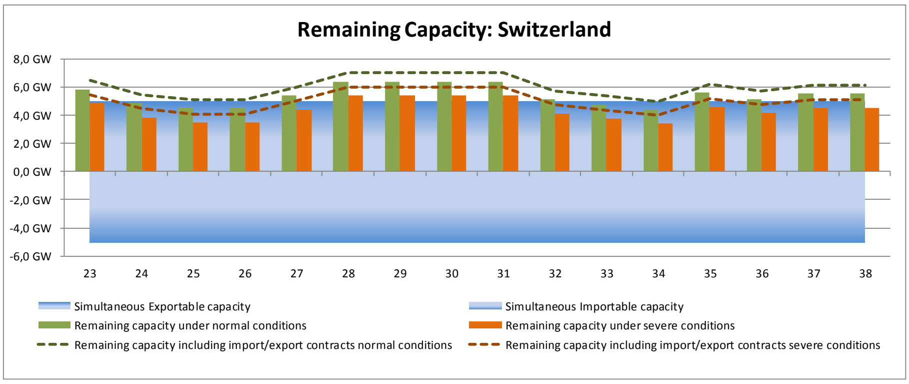
No weeks are considered critical.

**Expected role of interconnections**

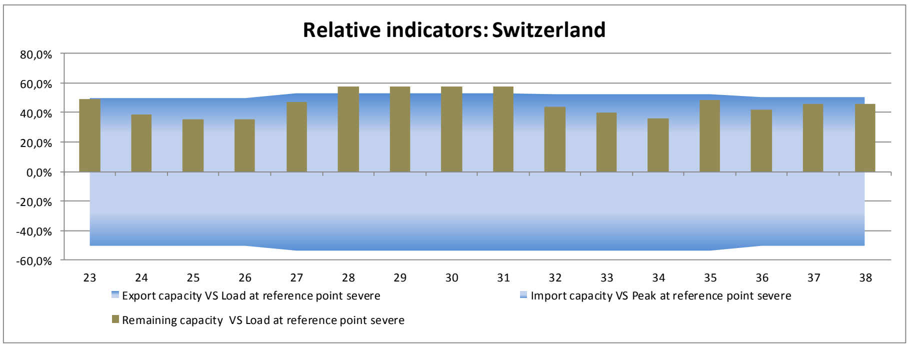
Interconnectors are vital for importing and exporting, as the Swiss balance varies strongly on a daily, weekly and yearly basis, not in order to maintain adequacy, but for commercial reasons.



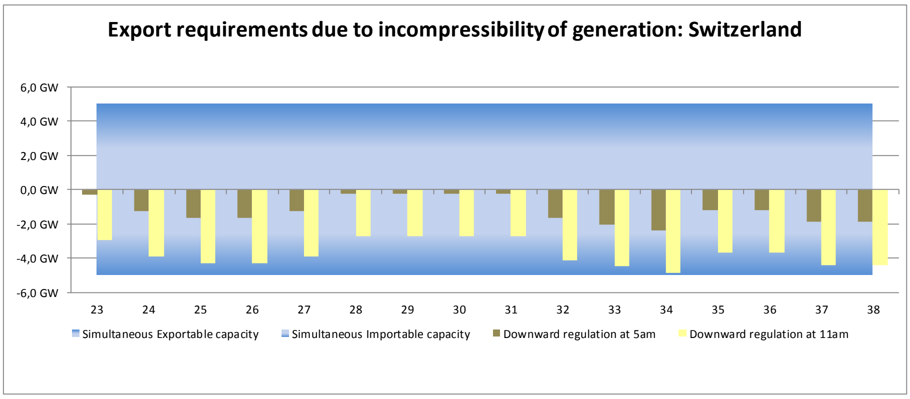
Demand and generation availability: Switzerland
20,0 GW
18,0 GW
16,0 GW
14,0 GW
12,0 GW
10,0 GW
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity

Remaining Capacity: Switzerland
8,0 GW
6,0 GW
4,0 GW
2,0 GW
0,0 GW
-2,0 GW
-4,0 GW
-6,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

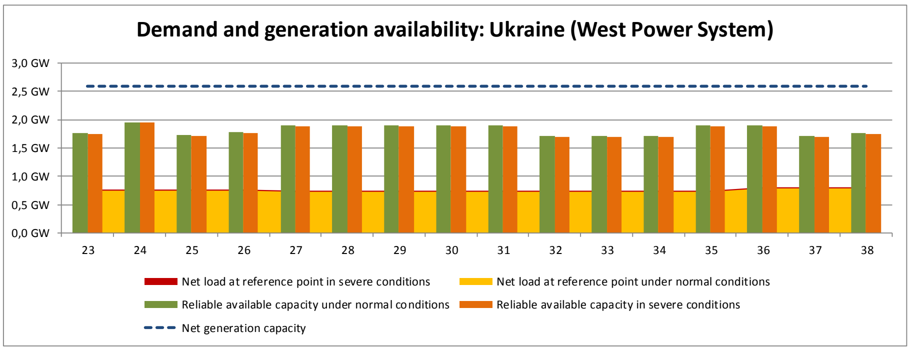



Relative indicators: Switzerland
80,0%
60,0%
40,0%
20,0%
0,0%
-20,0%
-40,0%
-60,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

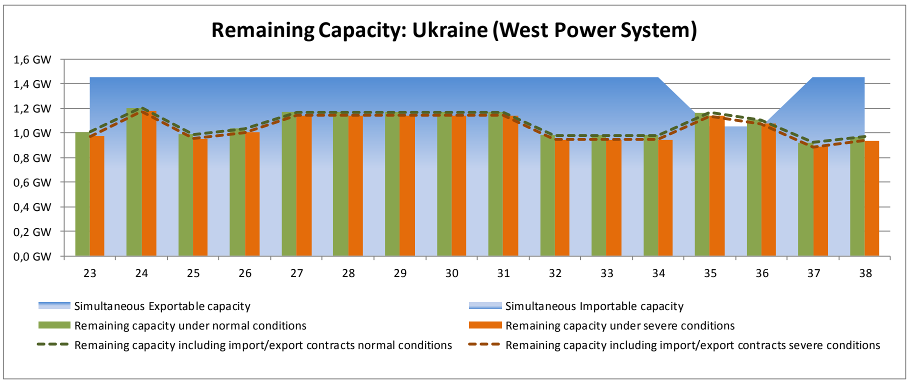



Export requirements due to incompressibility of generation: Switzerland
6,0 GW
4,0 GW
2,0 GW
0,0 GW
-2,0 GW
-4,0 GW
-6,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

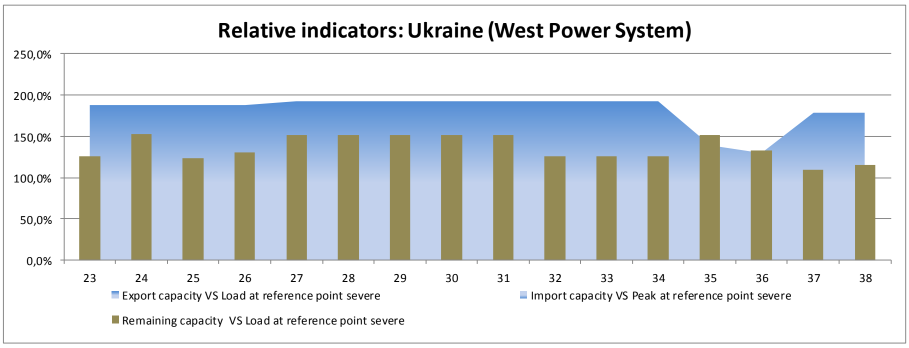
# Ukraine



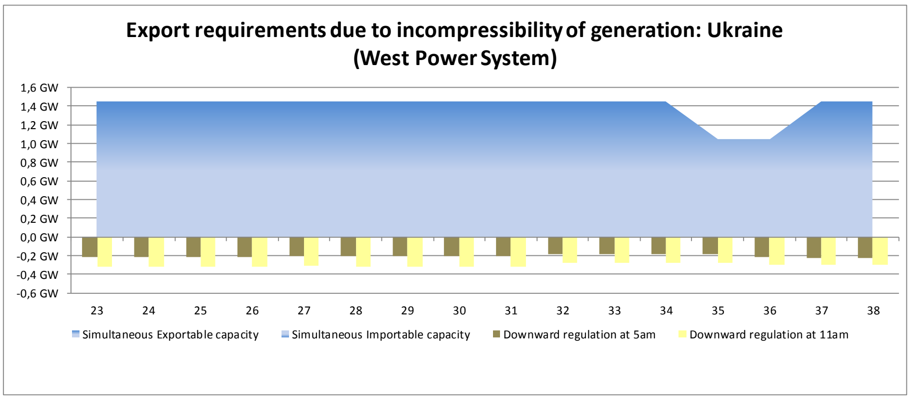
Demand and generation availability: Ukraine (West Power System)
3,0 GW
2,5 GW
2,0 GW
1,5 GW
1,0 GW
0,5 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Net load at reference point in severe conditions
Net load at reference point under normal conditions
Reliable available capacity under normal conditions
Reliable available capacity in severe conditions
Net generation capacity

Remaining Capacity: Ukraine (West Power System)
1,6 GW
1,4 GW
1,2 GW
1,0 GW
0,8 GW
0,6 GW
0,4 GW
0,2 GW
0,0 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Remaining capacity under normal conditions
Remaining capacity under severe conditions
Remaining capacity including import/export contracts normal conditions
Remaining capacity including import/export contracts severe conditions

Relative indicators: Ukraine (West Power System)
250,0%
200,0%
150,0%
100,0%
50,0%
0,0%
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Export capacity VS Load at reference point severe
Import capacity VS Peak at reference point severe
Remaining capacity VS Load at reference point severe

Export requirements due to incompressibility of generation: Ukraine (West Power System)
1,6 GW
1,4 GW
1,2 GW
1,0 GW
0,8 GW
0,6 GW
0,4 GW
0,2 GW
0,0 GW
-0,2 GW
-0,4 GW
-0,6 GW
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Simultaneous Exportable capacity
Simultaneous Importable capacity
Downward regulation at 5am
Downward regulation at 11am

## 6.2. Individual country responses to Winter Review

**Albania**

**General comments on the main trends and climatic conditions**

The last winter was relatively mild except some days at the end of November and beginning of December, compared with the respective period of a year ago. It can be say that we did not faced with severe conditions during that provided of the winter. Temperatures in the lower and coastal areas, where the most of electricity consumption is concentrated, did not exceed the foreseen values. The average temperature in these areas was about 7 degrees centigrade, and the low one was around 0 degrees centigrade. During that period there were poor precipitation and as a result there were poor inflows in reservoirs of Drini cascade power plants, the main source of generation in the country.

**Occurrence of the identified risks**

During the winter period, we did not face with the risk identified in the previous report of winter outlook.

**Unexpected situations**

Considering that winter was relatively mild, we did not faced with problems or difficulties relating to the transmission system, so we had no reduction in transmission capacity either in internal network or in interconnection network. Availability (transmission capacity) of import/ export was in the full capacity. Due to low inflows at Drini Cascade, the generation was somewhat lower than predicted, which was compensated by increasing import.

**Effects of external factors on demand**

It is not identified any influence of external factors on the electricity consumption in Albania, so we are not faced with reduced demand due to economic conditions, climate changes or energy efficiency initiatives. Except of December, the total consumption resulted lower than predicted due to the mild temperatures, which prevailed in most of the time, as shown in the attached graphs.

**Most stressed periods for system adequacy**

Most stressful period was the second part of December due to high demand for electricity.

**Specific events occurred during the winter**

Excluding the growth of domestic consumption and peak load mainly during the December, our power system did not face with specific events such as extreme temperatures, increased outage rates, and other events of this nature.

**Detailed review of the most stressed periods**

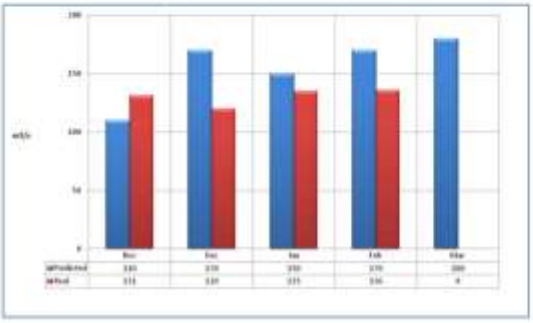
Average conditions of the foregoing winter, as mentioned above, did not exceed the forecasted one, primarily associated with ambient temperatures. Regarding energy parameters, as a result of low inflows in Drini cascade, the generation reduced to somewhat, and followed by import increase, in order to meet the demand for electricity.

In the next worksheet there are some graphics showing the implementation of key energy parameters, monthly basis, and comparison with the values previously planned by us. It should be noted that during the winter period we have had no problems of grid congestions because the maintenance works have been completed around the end of October. Meanwhile there have been some short-term supply interruptions for periods of several hours announced in advance, due to rehabilitation works that still continue in our 400 and 220 kV substation

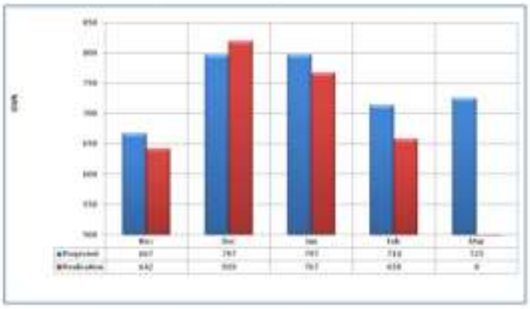
**Lessons learnt for next winter**

Lesson learnt: it is clear that we have to go ahead and accelerate the projects in Generation and Transmission system, in order to diversify generating sources and reduce the dependence from electricity import.

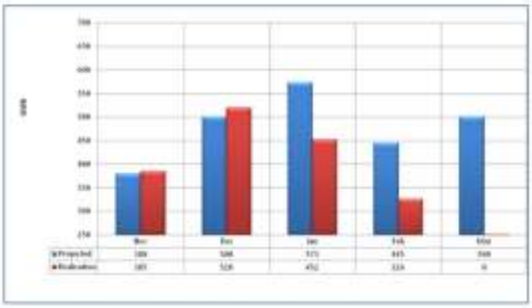
Monthly inflows at Fierza HPP



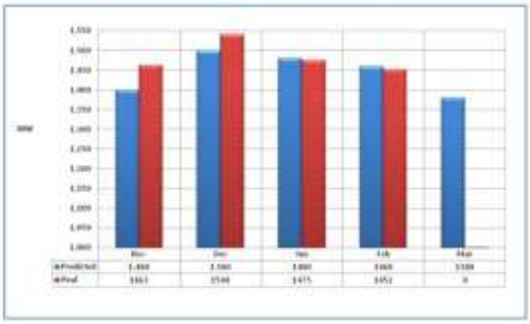
Monthly Consumption



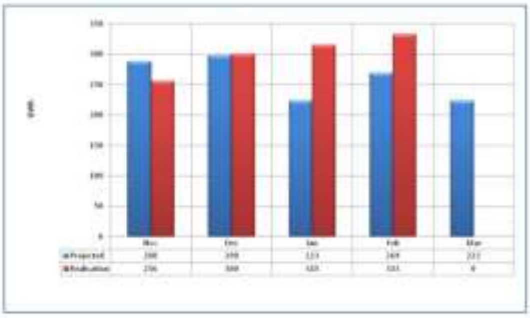
Monthly total production



Monthly Peak Load



Monthly import



## Austria

**General comments on the main trends and climatic conditions**

Winter 2013/2014 was mild compared to previous winters. Low thermal production lead to high imports throughout winter time.

**Occurrence of the identified risks**

In order to connect the increased wind power infeed in the eastern part of Austria two additional circuits between Dürnrohr and Sarasdorf were installed in the winter period 2013/2014. Winter was chosen for this work, as thermal units in the Viennese area (also used for district heating) will stabilize the grid. Redispatch was necessary to cope with the challenges.

High imports were recognized - as expected - during winter 2013/2014 due to increased renewable infeed in Germany.

**Effects of external factors on demand**

Only a slight increase of load compared to the previous winter situation were measured.

**Most stressed periods for system adequacy**

System adequacy was met over the full winter period.



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## Belgium

### General comments on the main trends and climatic conditions

Climatic conditions in Belgium were extraordinarily mild during winter 2013-2014. Temperatures were generally higher than average and only very few days with temperatures below zero were recorded. No periods with extreme weather conditions were experienced past winter.

### Occurrence of the identified risks

No issues regarding generation adequacy were experienced past winter, mainly due to the average consumption levels, low Forced Outage rates, and the sufficient availability of energy on the European markets.

### Unexpected situations

On Sunday 16 March, a phase shifting transformer at the Monceau substation caught fire, causing total destruction of the device and permanent unavailability of the 220kV interconnector Chooz-Monceau (~400MVA) between Elia (BE) and RTE (FR). Repair works will likely take most of 2014.

### Effects of external factors on demand

Between 2012 and 2013 a drop in demand was noticed of about 0.56%. This was probably mainly due to the economic conditions. From 2013 to 2014 a slight increase of 0.05% is expected at the moment.

### Most stressed periods for system adequacy

No stressed periods regarding system adequacy were experienced.

### Specific events occurred during the winter

No issues with generation adequacy occurred last winter

## Bosnia and Herzegovina

### General comments on the main trends and climatic conditions

During the winter period 2013/2014 there were not significant unusual events in the electric power system of Bosnia and Herzegovina. Maximum load occurred on December 24 at 18:00, and it was 2074 MW. Because of temperatures during the January and February were above average values, the load was lower than it was planned in Electric power balance for 2014. The maximum load on January 2014 was 1966 MW, registered on 28.01. at 18:00 h.

## Bulgaria

### General comments on the main trends and climatic conditions

There were no balancing problems during the past winter period.

The monthly consumption during the winter period compared with the same period of the previous year is as follows: increase by 0.1 % in December, decrease by 1.4 % in January and increase by 1.6 % in February

The highest load for the past winter period was observed on 31 January 2014 – 6915 MW. Compared with the peak load of the previous winter (6672 MW on 9 January 2013) the increase is by 3.6 %.

Water levels in the big reservoirs were quite below target levels because of insignificant snowfall and rainfall during the period.

Compared to the previous winter period, exports increased by 31.8 %.

There were no critical outages in the transmission network.

## Croatia

### General comments on the main trends and climatic conditions

During the winter 2013/2014 the average air temperatures were above the multi-annual average. In some parts of Croatia at the end of January and beginning of February 2014 snow and ice caused some difficulties and interruptions in supply.

### Occurrence of the identified risks

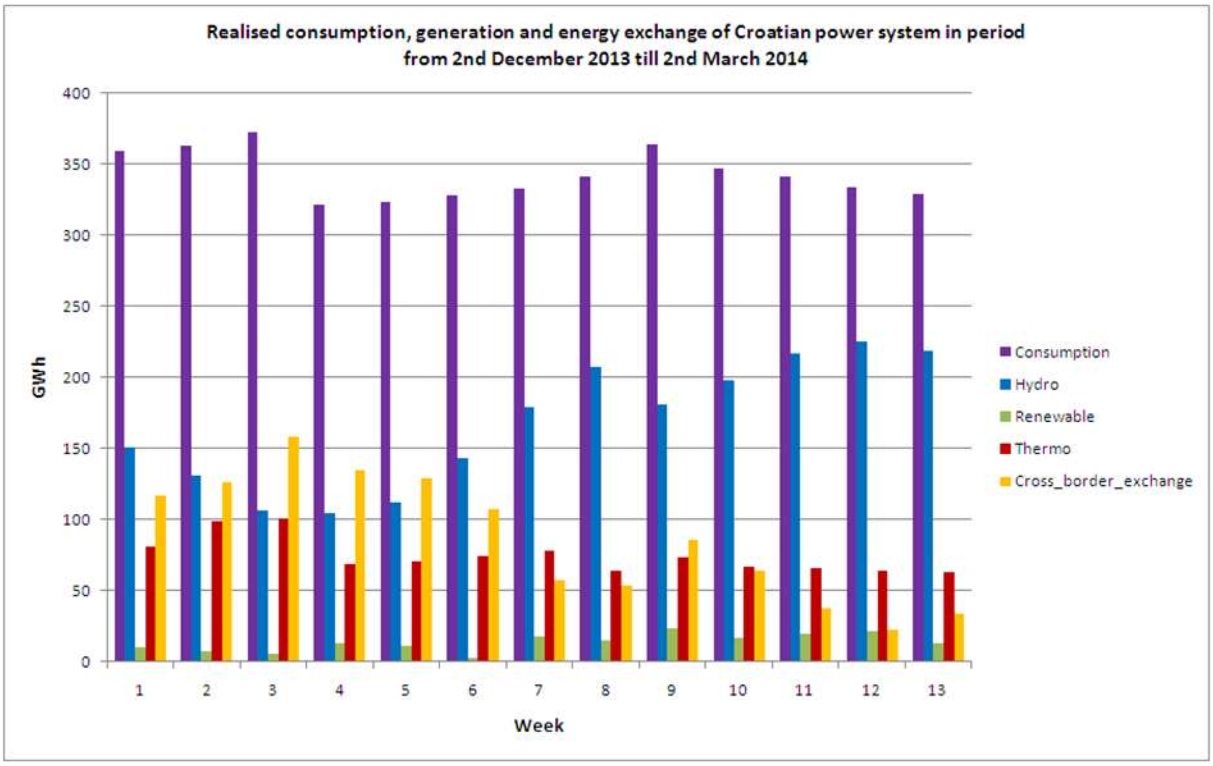
Possible problems with higher consumption in Croatian power system were mentioned in Winter Outlook 2013/2014 report. But, during the past period the consumption did not reach extremely high values. The favourable hydrological conditions facilitated also to achieve the generation-load balance.

### Unexpected situations

With exception of some interruptions in power supply caused by snow and ice, there was not any unexpected situation with negative effect on the power system.

### Detailed review of the most stressed periods

Weekly review of the situation in Croatian power system (Figure 1.) shows that the consumption was consistent during the most critical period considered in Winter Outlook 2013/2014. The supply was realised mainly from hydro power plants and imports. Cold weather followed by snow and ice at the end of January and beginning of February caused some difficulties in transmission network and interruption of supply. Extremely high demand did not occur this winter.



## Cyprus

**General comments on the main trends and climatic conditions**

Due to the effects of the financial crisis and also the mild weather conditions, the load demand was lower than the expected level and there were no problems on the electrical system to meet the load demand.

**Occurrence of the identified risks**

No.

**Unexpected situations**

Due to union strikes in EAC during the days 14, 25 and 26 of February 2014 the generation capacity available to TSO Cyprus was reduced from the generator. Since the demand was greater than the supply a cyclic load rejection programme disconnecting 11kV feeders supplying domestic and commercial load was executed.

**Effects of external factors on demand**

Due to the effects of the financial crisis the demand was kept at low levels.

**Most stressed periods for system adequacy**

No stressed periods were observed.

**Specific events occurred during the winter**

Specific cyclic events occurred during the 14, 25 and 26 of February 2014, due to the execution of the cyclic load rejection programme disconnecting 11kV feeders.

## Czech Republic

**General comments on the main trends and climatic conditions**

The main factors influencing winter conditions were significant fluctuations in weather conditions from December 2013 to February 2014. Temperatures were above the average during the winter 2013/2014. For example average temperature in January is -0.8 °C, but this winter it was slightly below 2 °C. This winter is also represented by the lack of snow and precipitation. This is related with the risk of low water inflows.

**Occurrence of the identified risks**

No significant risks were identified in the Winter Outlook report.

**Unexpected situations**

Unexpected situations were caused by changing weather conditions from December 2013 to February 2014, but they had no significant effect on the power system. There were no unexpected situations with an effect on the power system.

**Effects of external factors on demand**

Significant external factors were not with effects on demand in CZ.

**Most stressed periods for system adequacy**

Situations related with sudden ramping of RES output – solar in CZ, wind in neighbouring TSOs.

**Specific events occurred during the winter**

Specific events during the last winter period were significant fluctuations in weather from December 2013 to February 2014. Specific events during winter 2013/2014 were represented by temperatures above the average and lack of snow.

**Detailed review of the most stressed periods**

Significant fluctuations in weather were not expected from December 2013 to February 2014. However they did not have any significant effect on the power system. There were no stress periods with significant effect on the power system.

## Denmark

**General comments on the main trends and climatic conditions**

It was a winter with very windy weather and almost no frost and cold.

It has been a winter with a lot of wind and rain. It has virtually blown and rained most of the winter and the windy weather has also given rise to busyness. Two times, it has blown so much that it has given serious system disturbances.

First time on 28 October, where an outage of the HVDC connections and AC installation caused strained operation situations. In particular, the situation on Zealand was very strained, as the power situation was critical at one point. Breakdown of HVDC connections and shutdown of wind turbines were the cause of it.

Second time on 5-6 December where concurrent contingency in the 400 kV transmission grid also gave rise to a critical operation situation. The errors on 5-6 December were not only due to strong winds, but also a subsequent cold front causing galloping lines as a consequence of sleet on the lines.

Although the winter normally is a calm season when it comes to disconnections in the transmission grid, October, November and December have had a high level of activity. Particularly, the projects have been very active.

The Kassø-Tjele project runs according to plan and has required a couple of disconnections in November and December.

Cable laying of sections of the 400 kV lines to Funen (FSP Little Belt) was implemented in two stages in October and November respectively. Cable laying under the Little Belt went according to plan.

The conversion of the 150 kV substation Tjele including cable laying in Central Jutland has also given rise to several outages and relaying. The renovation of 150 kV Tjele is almost completed, while cable laying continues in central Den-mark.

The transfer of the 132 kV grid in Copenhagen is making slow progress. The plants must be transferred in February-March.

In addition to the above-mentioned works which primarily are project related, there has been quite a lot of review work in the transmission grid at both Jylland/Funen and Zealand during the period October to December.

Power balance during winter has been fine; finding power has not been a problem. Most central power stations have been in operation and the windy weather means the power balance has been fine.

However, the large amount of wind has during certain low-load periods caused very low prices (negative prices). However, there have been no periods with curtailment of bids in the spot market.

## Estonia

**General comments on the main trends and climatic conditions**

The winter 2013/2014 was warmer than usual. The peak load was 1510 MW which is 4% less than in previous winter. Peak load occurred in 30.01.14 when the temperature was -17.1 °C. The average temperature of winter (December until March) was -2.59 °C, for comparison in previous winter the same period it was -5°C. The coldest period was from mid-January to the beginning of February when temperatures were constantly below -10 °C and the demand was highest. The generation was sufficient to cover the load, even during peak load and the system was in net export.

**Occurrence of the identified risks**

There were now particular risks identified and no risks occurred.

**Unexpected situations**

No unexpected situations.

## Finland

**General comments on the main trends and climatic conditions**

Winter 2013 - 2014 was mild in Finland. Temperatures were 2 to 4 degrees above long term average. There was a two-week cold period which began in Mid-January. February was exceptionally warm in whole country.

Average snow depths were clearly below average, except in North Finland. If spring will be dry, weak spring floods can be expected and water reservoirs will remain low in southern and central parts of the country in summer.

**Occurrence of the identified risks**

No extreme temperatures were reached and no remarkable failures occurred at the time of peak load. However, available generation capacity was lower than estimated. One unit was mothballed earlier than informed and one unit was in maintenance several weeks in December and in January.

**Unexpected situations**

No remarkable failures occurred at the time of peak load. Transmission capacity between Finland and Estonia increased as expected.

**Effects of external factors on demand**

It appears that temperature dependency of the demand has risen lately. In winter 2013- 2014, higher peak load was registered in lower degrees in comparison with the winter 2012 - 2013.

**Most stressed periods for system adequacy**

Peak load was registered in week 4 at the end of the two-week cold period. Peak load was covered with domestic generation and import from neighbouring areas as in previous winters. Nearly all domestic generation capacity was in use. Import capacity from Sweden was fully utilized. Import from Estonia and Russia could have been increased.

**Specific events occurred during the winter**

No unexpected events happened during the winter.

**Detailed review of the most stressed periods**

A 14.2 GW peak demand was recorded in January at the end of the cold period. The peak demand was less than estimated 15 GW including 0.5 GW load reduction in severe conditions. In colder temperatures, higher demand values would have occurred.

Peak load was covered with domestic generation and import from neighbouring areas as in previous winters. Normal situation prevailed in power system operation. There were no remarkable failures and no need to start national peak load reserve at the time of peak load.

Domestic generation in peak demand hour was 11.6 GW whereas the estimation of the available generation capacity was 12.8 GW including 0.4 GW peak load reserve. One unit was mothballed earlier than informed in autumn and one unit was in maintenance several weeks in December and in January. Output of hydro power could have been higher. Wind power had quite high output at the time of peak load.

Import capacity from Sweden was fully utilized in peak demand hour. Import from Estonia and Russia could have been increased.

**Lessons learnt for next winter**

Possible higher temperature dependency of the demand should be taken into account in future.

## France

**General comments on the main trends and climatic conditions**

This winter was relatively warm from mid-November to mid-February, the average temperature was around 5.7°C : 0.8°C under normal conditions.

The average cloud coverage was mild for the whole winter. The lowest temperature registered was -1.4°C (-4.5°C winter 2012 - 2013) and the highest 14.1°C (14.5°C last winter).

**Occurrence of the identified risks**

In the winter outlook, middle of January 2013 was identified as the most strained period with a maximum forecast of consumption estimated at 85 200 MW (under normal conditions).

Maximum consumption has finally been recorded the 28/11/13 at 7:00 pm with 84 100 MW.

A moderate risk of supply shortage was predicted for this winter: it could happen only in case of a long period with temperatures from 6 to 8°C below seasonal norms, which did not occur.

**Unexpected situations**

No unexpected situation arose during this winter.

**Effects of external factors on demand**

From mid-November to the end of December demand increased by around 1% due to temperatures colder than 2012.

In January 2014, particularly warm temperatures during that period led to a strong drop in national consumption and a high monthly level of exchanges. In consequence, gross consumption was down by 8.1% with respect to January 2013.

The slowdown in the rise of electricity consumption by the residential and SMI / SME sectors, which was observed since October, has been confirmed. Consumption by the industrial sector (except offtakes by the energy sector) has fallen by 2.1% since February 2013. However, the trend towards stabilisation observed since the end of 2013 has been confirmed.

**Most stressed periods for system adequacy**

No stressed periods for system adequacy have been registered for this winter.

**Specific events occurred during the winter**

The main outage is the loss of the two nuclear units of Flamanville (2 x 1300 MW) due to a storm in Brittany. The situation returned to normal in the following hours.

Concerning the use of the interconnection capacity, the monthly balance of RTE was in export during all winter from mid-November to mid-February.

**Detailed review of the most stressed periods**

Winter was quite peaceful this year, no stressed periods have been registered.

Moderate national consumption combined with a high level of nuclear and hydro-power availability and a good availability of the interconnection lines have enabled France to have a calm winter.

The winter was in keeping with the winter outlook.

## FYR of Macedonia

### General comments on the main trends and climatic conditions

It is still early to comment on the forecasted load for this period winter 2013/2014, but we did not expect large deviations compared to forecasted.
There wasn't any unexpected situation during the winter period.

The operation of power system was secure and reliable over all winter period. Macedonian electricity system mainly depends upon imports of energy to reach adequate balance between consumption and production/import. From the point of view of system adequacy, load – generation balance was not at risk during the whole period of winter 2013/2014 in the Macedonian System.

## Germany

### General comments on the main trends and climatic conditions

On average so far a very mild winter especially in the western and southern parts of Germany with lower precipitation than average and little snowfall. Unusually high maximum temperatures in the south (nearly 20°C on 15th February in Munich) but also a cold spell in the northeast of Germany from mid to end of January. Mainly windy westerly weather situations with the hurricane Xaver at the beginning of December as an especially heavy storm.

### Occurrence of the identified risks

No longer and German-wide cold spell and no gas shortage have occurred in the last winter so far. During the period around Christmas there has been no such massive oversupply of the German control area as in the years before.

### Most stressed periods for system adequacy

The Holidays around Christmas and New Year's Eve.

### Detailed review of the most stressed periods

During hurricane Xaver a considerably higher probability for double line failures occurred in northern Germany. Winter storm Xaver: Conduction of market measures (redispatch and countertrade) to achieve n-2 security for several double circuit lines in northern Germany, whose tripping could potentially have a cascading impact other TSOs' grids. Very high wind feed-in during the storm Xaver. Up to 5000MW redispatch were necessary to adjust the grid feed-in.

### Lessons learnt for next winter

The Winter Storm Xaver could be handled with the for the TSOs available measures. Thereby, it was helpful that a share of curtailment of wind energy was done by the Distribution System Operators in the lower voltage levels.

## Greece

### General comments on the main trends and climatic conditions

The situation of the Greek System the last winter was in a normal level with wet winter and the average temperature was around to the 10 C. The peak was reached on the 12 of December 2013 19:00 around to 8560MW.

**Occurrence of the identified risks**

No risk occurred during last winter for the Greek System.

**Unexpected situations**

The only unexpected event that was arising during the winter was the fault on the HVDC Link Greece -Italy in the Italy side. This DC Link will be out of order till the middle of the July 2014.

**Most stressed periods for system adequacy**

The most stressed period for the system adequacy was the 49th and 50th week of 2013.

## Great Britain

**General comments on the main trends and climatic conditions**

Winter 2014 was an exceptionally stormy season, with at least 12 major winter storms affecting the UK in two spells from mid-December to early January, and again from late January to mid-February. This was the stormiest period of weather experienced by the UK for at least 20 years and resulted in severe flooding in many parts. Mean temperatures over the UK were well above the long-term average for all three months with a mean winter temperature of 5.2oC which is 1.5oC above the average. The winter peak demand occurred on the 25 November 2013. It was metered at 52,420 MW including station load but excluding exports and was below the forecast Average Cold Spell (ACS) of 56,300 MW. Over the winter there was sufficient generation available and demand was met in full and no system warnings were issued.

**Occurrence of the identified risks**

Wind levels were not at a low level over the peaks this winter which was highlighted as a risk.

**Unexpected situations**

Embedded solar generation also had an impact on demand this winter with installed capacity of circa 2500MW. Day-time levels were noticeably suppressed with respect to previous years. As a result, the overall weather corrected energy level tracks slightly below that of last year.

**Effects of external factors on demand**

Demands were lower than expected mainly due to higher than average temperatures. The level of customer demand management (CDM) at peak demands was thought to be up to 1,500 MW.

**Most stressed periods for system adequacy**

There were no substantial losses of generation throughout the winter and the system was not put under any additional stress. There was sufficient generation available and demand was met in full and no system warnings were issued.

**Specific events occurred during the winter**

Gas prices remained high over the winter and coal prices eased slightly, making coal significantly more economic than gas-fired generation. As a result, coal took a larger proportion of the total generation than gas.

## Hungary

### General comments on the main trends and climatic conditions

Winter of 2013-2014 was very calm for the Hungarian power system. There was no extremely high demand; the total demand was slightly lower than in the last year. Outages of generators were rather low. The grid was reliable and controllable. MAVIR, the Hungarian TSO procured the necessary amount of reserve power by concluding market maker contracts, which put an obligation on the market participants to offer their capacities on the daily market of ancillary services. This solution proved to be effective.

### Occurrence of the identified risks

We did not experience any significant event. Generator outages were under 500 MW in the whole winter period, excluding only a few days, but there was no need to make extra precautions on these days either.

### Unexpected situations

There weren't any unexpected situations.

### Effects of external factors on demand

The effects of external factors on demand:

- climate change
- holidays

### Specific events occurred during the winter

The imports from neighbouring states were higher than in the last year.

### Detailed review of the most stressed periods

There weren't any weeks, when the actual demand was more than 500 MW higher than the expected demand.

Generator outages were under 500 MW in the whole winter period, excluding only a few days (12.16-12.19.), when they were over 1000 MW.

## Ireland

### General comments on the main trends and climatic conditions

The winter in Ireland was wet and stormy. The spate of winter storms that swept across the country over the winter period caused multiple power outages across the country, with around 250,000 people without power on February 12th which caused the demand to drop by almost 500MW.

### Occurrence of the identified risks

The capacity margin in Ireland for the winter period remained well above critical levels. This was aided by the lack of major planned generator outages occurring during the winter. The East-West Interconnector experienced some unexpected forced outages in November and December but this did not impact significantly on the overall security of supply.

### Unexpected situations

The East-West Interconnector experienced some unexpected forced outages in November and December but this did not impact significantly on the overall security of supply. When the interconnector was available, it was capable of 530MW import capacity 500MW export capability. It usually operated in an import capacity which made it the largest single infeed and, as a consequence, provided greater security of supply. The generation and transmission capacity for the period was adequate for the predicted demand levels. The storms throughout the winter had the greatest impact on the power system, particularly at distribution level. Storm Darwin caused numerous trippings on the transmission system; high winds caused conductor clashing, poleset damage and trees to fall onto power lines.

**Effects of external factors on demand**

The peak on the system in winter 2013 occurred on Thursday 5th December at 17:30 with the peak coming in at 4516MW. This is a reduction on the 2012 winter system peak of 73MW. Despite the heavy rainfall and stormy weather, it was still a mild winter compared to recent years.

**Most stressed periods for system adequacy**

The most stressed time on the system occurred on 5th December during the highest demand period of the system. However on this day demand remained 364MW below that predicted for the Winter Outlook in 2013. Therefore the system was well equipped to deal with the highest demand period of the year.

## Italy

**General comments on the main trends and climatic conditions**

*Most remarkable events*

The adequacy evaluations for 2013-2014 winter period has not evidenced particular risks for capacity adequacy and peak load cover as well as with the national supply system's. A winter season with average temperatures slightly higher compared to the previous period with an only exception during November. In addition high hydro conditions marked first part of 2014: values above the multi-year average capability factor were recorded, confirming a rainy period.

*Review of the situation by monthly period*

generation conditions : generation overhaul (planned, unplanned), gas/oil/availability, hydro output, wind conditions, specific events or most remarkable conditions (please precise the date)

Any to remark for generation availability respect to the planned maintenance. The installed generating capacity remain essentially steady

Demand: actual versus expectations, peak periods, summary of any demand side response used, reduction/disconnections….

During winter period load requirements were lower respect same period. Record power peak normally got in winter was not exceeded in this period. The only exception of November when, caused by a bad weather, national power peak reached the highest value equal to 52 053 MW (+6.3%). A monthly consumption also marked a significant decrease over these months.

*Transmission infrastructures outages, reinforcement realised*

Low changes in the numbers of new realizations in the transmission network.

Rearrangements in the electricity grid have been made in order to improve the reliability of the existing connections.

Use of interconnections: import/export level, reliance on imports from neighbouring countries (you can refer to ETSO Vista)

Italian northern interconnection has been characterized, for the most of the time, by import conditions from the four neighbouring systems bordering at the northern interconnection. In terms of physical flows, the interconnection recorded a variable performance of import/export balance of energy. The HVDC cable interconnecting Italy with Greece has been basically characterized by prevalent import conditions towards the Italian system.

Summary of market conditions (low/high power market prices in specific periods) in the context of the above conditions



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**Specific events occurred during the winter**

The total net production registered a decreased of 2.4% while the balance of energy exchanged with foreign countries decrease of 4.0%. Monthly hydroelectric capability factor has showed a constant decrease in the first part of the winter period with percentage values above below the corresponding values recorded in the previous period. These values have been balanced in the second part with figure essentially higher. Same result for the fullness factor of hydro reservoirs.

## Latvia

Load during the whole observed period was lover as expected in normal conditions and severe conditions. The difference is in range from 1.6 % till 29 % comparing to load in normal conditions. In sever load conditions the difference is even higher. The main reason for so big difference was average air temperature in December in Latvia which was 2.2 ˚C and what is also approx. 4 degrees higher as normal air temperature in December (-2.7 ˚C). In January the air temperature was lower as normal by 1 ˚C but in rest of analysed months the temperature was higher than normal. It caused very high deviations in consumption pattern. According to deviations in weather conditions consumption usually can fluctuate +/- 10 % but in this winter the fluctuation was up to 30 %. The winter period was without any stress periods for system adequacy as TSO has been expected and all deliverables have been going by schedule. Due to the current economic situation in Latvia and total growth rate increase after economics crises, is planning that total load and consumption by the definition should increase but due to mild weather conditions the increase of peak load was not observed. The installed capacity in Latvian power system was as planned without any additions. 16 % of observed winter period Latvian power system was net exporter, but 84 % of observed winter period Latvian power system was net importer.

Past winter was without any dramatic and serious emergency cases and events for Latvia power system. No one big power plant has been stopped regarding damages or disturbances in the operational mode.

According to the 110 kV network statistics in this winter we had 12 unexpected transmission line faults, 1 unexpected line fault with unknown reason, 3 unexpected transformer disconnections and 2 unexpected events regarding voltage drop. According to the 330 kV network disconnection statistics 2 faults in autotransformers have been recognized due to problems in 110 kV side.

## Lithuania

**General comments on the main trends and climatic conditions**

The weather in winter 2013/2014 was warmer than in last winter. The average temperature during December and January in 2013/2014 was -2.1°C while in winter 2012/2013 at the same period was -5.5°C. Due to warmer weather in winter 2013/2014 the load decreased by 3.7%. The maximum load was reached in the second half of January as was expected in 2013/2014 Winter Outlook. The maximum load was 1834 MW as it was expected under normal conditions (1828 MW forecast). The maximum load was reached in week 4 when the average daily temperature was -16.6°C. The average winter balance portfolio consisted of 38 % of local generation and 62 % of imports from Latvia, Estonia, Kaliningrad area, Belarus and Russia. The largest amount of electricity was imported from Latvia.

16 % of electricity balance was covered by renewable PP during December and January months; 9 % of load portfolio was covered by wind energy. This winter was windier comparing with previous winter.

**Occurrence of the identified risks**

The risk related with ice turbine icing did not occur. The weather was warm and the favourable environment for icing did not occur.

**Unexpected situations**

There were no unexpected situations for system adequacy during the last winter period.



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**Effects of external factors on demand**

The main reason influencing the variable load demand is the climate change. The weather this winter was on average 3 degrees warmer than last year. There are no any identified effects for demand changing.

**Most stressed periods for system adequacy**

There were no stressed periods for system adequacy during the winter period

## Montenegro

**General comments on the main trends and climatic conditions**

The electric power balance for this period was positive due to good hydrological conditions.

**Occurrence of the identified risks**

We did not face with risk identified in previous reports.

**Unexpected situations**

No

## The Netherlands

**General comments on the main trends and climatic conditions**

Last winter was a relatively warm winter, in which no difficulties appeared within the Dutch grid. The peak was reached on the 11th of December at 18,409 MW (17-18 hrs). The lowest load during this period was reached on the 26th of December (9,069 MW).

**Occurrence of the identified risks**

TenneT didn't identify any risk in the winter outlook and no risk occurred during last winter. As reported before TenneT was investigating the possibility to enlarge the cross border capacity made available for the market during the intraday capacity trading per 1-1-2014; a first step is made to make 100 MW available on the intraday market, this is being agreed upon between the neighbouring TSO's on a daily basis.

**Unexpected situations**

No situations occurred which had an effect on the power system during last winter period.

**Effects of external factors on demand**

This is not directly identifiable in the Dutch grid. What can be identified within the Dutch market is that there is a lower availability from Gas power plants

**Most stressed periods for system adequacy**

In most years the peak load happened in the winter period in the late afternoon hours (17 – 18 hrs) in December or January, the historical peak load still remains within the calculated peak load under severe or normal conditions and under the total amount of installed capacity within the Netherlands.

**Specific events occurred during the winter**

During the storm on the 21st of October, the converter station in Eemshaven was severally damaged and therefore the NorNed cable was out of operation until the 20th of December. This didn't lead to any difficulties within the Dutch grid. It occurred during a lower demand period and could be solved within normal operational conditions.

## Norway

### General comments on the main trends and climatic conditions

December, January and February were about 2-5 °C warmer than normal and with higher precipitation than normal. High temperature, especially in the consumption areas in the south of Norway, resulted in low demand. High inflow and low production resulted in normal reservoir levels. It was mostly net export during the winter period.

### Occurrence of the identified risks

There were no risks identified in the winter outlook.

### Detailed review of the most stressed periods

The energy balance can change very fast, from a high surplus before the winter period, to a deficit at the end. This can be worse if the spring period arrives some weeks later than normal.

## Poland

The winter 2013/2014 was – generally speaking – mild. No balancing problems, special events, risks or stressed periods occurred, except for problems on distribution level due to Xavier hurricane, which hit Poland on 4-6 December 2013.

## Portugal

### General comments on the main trends and climatic conditions

The electricity demand in December, driven by low temperatures and, in a small part, by the economic recovery, registered a 3.8% growth from the values observed in the previous year. This winter season peak load occurred on the 9th day of this month (8317 MW) and was also the maximum of 2013, however still remained 1000 MW below the historical record. In December the hydro inflows were only 81% of the average values and wind availability was just average so, for market reasons, about 7% of demand resorted on imports. Thermal generation has presented a low level of utilization.

In January the hydro inflows were particularly strong (the third highest since 1971) and wind availability was also the highest ever for this month.

This high availability from hydro and wind capacity, combined with above the average temperatures in January and February, resulted in an exchange balance strongly exporter (about 17% of national demand) and have favoured the occurrence of some remarkable figures.

On 6th February the daily energy produced in Portugal exceeded the 200 GWh (about 204 GWh) hitting a record that comes from 2010. On the same day, the energy generated only by renewable energy sources totalized 178 GWh, almost as much as the national demand record.

Just two days before, on 4th February at 20:30 CET, the Portuguese grid had transmitted the highest level of power generation ever registered in the country: 10348 MW.

### Occurrence of the identified risks

In a conservative way, the Winter Outlook Report has pointed out the possibility of the remaining margins could be lower than usual on weeks from 1 to 8 of 2014, but the conditions for that to happen were not met.

### Unexpected situations

Although this winter season was particularly severe in terms of the meteorological conditions, there were no situations with a major impact on generation/demand balance or transmission capacity.

## Romania

### General comments on the main trends and climatic conditions

In December 2013 the temperature had higher values than normal ones and the total precipitation amounts were lower than the annual average. Also in January 2014 the average temperature was higher than normal values. From the second half of January 2014 the precipitation appeared as rainfalls turned into sleet and snow gradually with snowstorm during some days. In February 2014, the average air temperature values were higher than normal in most of the country and total amounts of precipitation were lower than normal in most areas. As a conclusion, there were not special phenomena during the last winter.

### Occurrence of the identified risks

The Winter Outlook Report 2013-2014 did not identify any risk in terms of adequacy. Also, during the last winter 2013-2014 any risk did not occur in terms of adequacy.

### Unexpected situations

There were not any situations that could have affected the power system adequacy during the winter 2013-2014.

### Detailed review of the most stressed periods

During the last winter the interconnectors were used to facilitate the exchange schedule (export/import) according to the allocated NTC values on the market.

## Serbia

### General comments on the main trends and climatic conditions

In general, winter 2013/2014 in Serbia was dry and very mild with temperatures much higher than previous years. Actual load was much below forecasted even for the normal weather conditions.

Cold wave followed by stormy wind and ice, which hit the region in early February and caused serious problems to neighbouring system, didn't significantly affect the Serbian power system.

### Unexpected situations

Although it was previously purchased energy to cover peak load, there were significant commercial exports during the whole winter due to unexpectedly high temperature for this period of year.

### Effects of external factors on demand

In Serbian power system demand is very sensitive to climate change.

## Slovakia

### General comments on the main trends and climatic conditions

The winter 2013/2014 was warmer than in the previous year. Average temperature during winter months from December to February was 2.1 °C (the year before it was -1.0 °C). All months of the winter period were very warm, the average temperatures were following: December 1.2 °C, January 1.9 °C and February 3.1 °C (in the last year: December -1.9 °C, January -1.9 °C and February 0.9 °C). Apart from warm weather, the winter 2013/2014 was also poor on snowfall.

The temperature still has main impact on the consumption. There was decrease of consumption (-3.54 %) and high decrease of production (-9.46 %) of electricity in Slovakia from December 2013 to February 2014, in comparison to the same period of winter 2012/2013. Slight increase of production was from nuclear (0.2 %) and non-identifiable (3.6 %) power plants, contrariwise decrease of production was from thermal conventional (-29.2 %), hydro (-23.5 %) and solar (-7.6 %) power plants. The winter peak load was recorded on Thursday, 17th December 2013 at 17:00, 4 175 MW (51th week), the predicted value of the winter peak was 4 350 MW in the 50th week.

The electricity was imported in all winter months 2013/2014 to the power system of Slovakia. The share of imported electricity on the consumption in winter 2013/2014 was about 4.8 %. Import of electricity (in total it was about 360 GWh) significantly increased in comparison to winter months 2012/2013. Winter before there was a small import of electricity only in December 2012 (28 GWh), while in January and February 2013 there was an export (in total 79 GWh). These imports were caused not by the lack of generation in Slovakia but because of the activities on the electricity markets.

There were no critical outages and situations in the transmission network during the whole period.

## Spain

### General comments on the main trends and climatic conditions

In general, the temperatures were slightly higher than average values during winter. Wind production was higher than the average. Water inflows increased considerably.

Month by month:

December 2013:

Temperatures have been similar to average.

Water inflows in reservoirs were lower than average (69% of average).

Lower wind production than in December 2012 (decrease of 9.3%). Wind production during December 2012 had been significantly high.

January 2014:

Average temperatures have been higher than average.

Water inflows in reservoirs were higher than the average level (40% higher).

The wind production was higher than in January 2013, which had been already high. (increase of 3.9% from 2013 to 2014 and previous increase of 73% from 2012 to 2013)

February 2014:

Temperatures have been slightly higher than average.

Water inflows in reservoirs were much higher than average (70% higher).

The wind production was higher than in February 2012 (increase of 11.8%)

### Occurrence of the identified risks

Not significant operational risks had been foreseen. System operation and system adequacy functioned without any larger problems during winter 2013-14.

### Effects of external factors on demand

The demand values have been slightly lower than last year, although during December they were higher. The temperature had a positive effect on demand during December (0.4%), and a negative effect on January (-0.6%) and February (-0.76%).

### Most stressed periods for system adequacy

There has not been significant stress level for the system adequacy.

**Detailed review of the most stressed periods**

Actual demand was slightly lower than expected for the months of winter. Nevertheless, the demand monthly forecasts had a suitable accuracy (the error was lower than 3 %).

The winter peak demand was lower than the estimation for extreme conditions, and it was reached on the first half of February 2014 (38.948 MW). However, this winter peak demand was much lower than the historical peak demand (44900 MW, reached during winter 2007).

High wind production together with the very high water inflows have caused curtailment of RES, as expected, but spilling was quite low considering the high RES values which were introduced in the system. The balance of the system was kept without major problems.

## Sweden

**General comments on the main trends and climatic conditions**

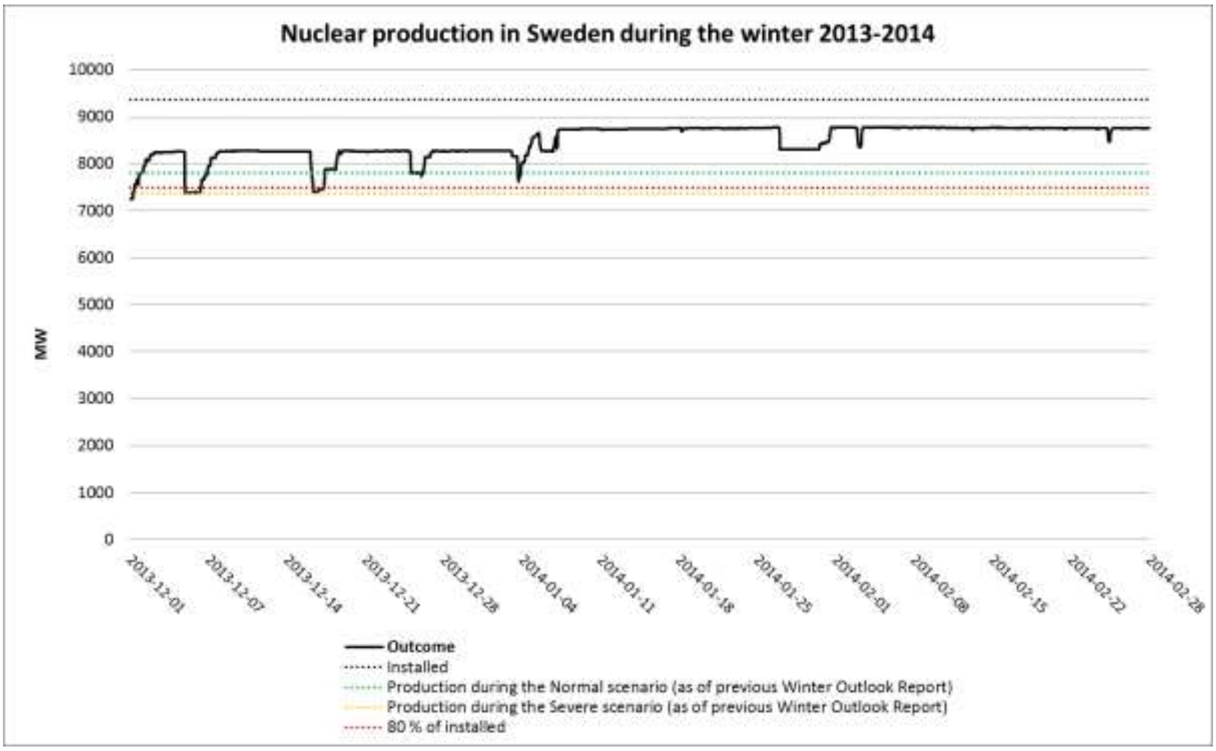
The winter of 2013/2014 was, in most parts of Sweden, a very mild winter compared to normal. There was a period of 2-3 weeks in January dominated by high pressures which led to cold weather and snowfall in almost all of Sweden. Therefore, the demand has been modest and the Peak Load Reserve was never activated.

**Occurrence of the identified risks**

The biggest risk outlined in the Winter Outlook Report regarding the power balance in Sweden was the availability of the nuclear units and the hydro reservoir levels.

• The reservoir levels were at a bit low in the end of November (at about 70 %, where 80 % is normal), but reached normal levels in the beginning of January.

• The average availability of the nuclear units has been 88 %. The availability has been over 80 % almost all winter, except for a few days in December. Please see Figure below.




This together with the mild weather this winter resulted in a stable power balance.

**Unexpected situations**

Several storms hit the Nordic countries in November and December. The storm “Sven” had the largest impact on the Swedish power system and is to be seen as the most stressed period during the winter.

**Effects of external factors on demand**

When looking at temperature-compensated demand, the rolling average for a two year period has been more or less constant during recent years. In other words, no significant change (or trend) in general demand is evident.

**Specific events occurred during the winter**

The storm “Sven” hit the Swedish west coast in early December (between the 5th and the 6th) and caused large power unbalances due to tripping of lines, production units and HVDC cables. Several thousands of households were without electricity.

During “Sven” a part of the Peak Load Reserve was put into hot standby (with a time for synchronization within 2 hours). But since the weather was mild, and the demand was relatively low, there were a lot of commercial up-regulation resources which was used for restoring the frequency. Therefore the Peak Load Reserve was never put into operation.

## Switzerland

**General comments on the main trends and climatic conditions**

December 2013: Temperatures were above average in the mountains and below average in the lowlands.

January 2014: Temperatures were exceptionally high. In the south of the Alps, there were lots of snow; and in the other parts of the country there was less snow than usual.

February 2014: Temperatures were clearly above average. There was heavy snowfall in the Alps, especially on the southern side.

**Occurrence of the identified risks**

No risks were identified, and nothing special occurred.



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# Appendix 1: Questionnaire for SOR 2014 and WR 2013/14

## FOREWORD

The "Summer Outlook 2014 and Winter Review 2013/14 Report" will be published on ENTSO-E web-site and communicated to the Electricity Cross-Border Committee of the European Commission[5].

If any information (figures or comments) are to be kept confidential for use within ENTSO-E only, please identify them clearly and they won't be made available to other parties.

The proposed plan for the report is significantly different from previous reports. The spreadsheet for data collection has been changed to increase transparency and bring it more into line with the terminology as used in the long term adequacy reporting. Average generator outages rates for normal and severe conditions are requested to check consistency across regions and to provide a more robust analysis.

It is also intended to carry out a flow based analysis using submitted NTC values to give a level of confidence that countries that require imports to meet summer peak demands are able to source these across neighbouring regions under both normal and severe conditions. Hence the requirement for TSOs to give an indication of their **best estimate of NTC values** between countries is essential for this analysis. It is recognised that these NTC values may be different than previous submitted values by a TSO.

Across the analysis period it is also proposed to also highlight any European "downward regulation" issues where excess inflexible generators output exceeds overnight minimum demands. Similar to the peak demand analysis, the submitted NTC values will be used to give a level of confidence that countries that require exports to manage inflexible generation are able to export these to neighbouring regions who are not in a similar situation. The reason for this analysis is that a number of TSO's have expressed concern that this is a growing problem for system operation.

The format of the final report "Summer Outlook 2014 and Winter Review 2013/14 Report" will be:

- **Main Report** (about 15 pages)
- Executive Summary
- Introduction and methodology
- Winter Review 2013/14
- Summer Outlook 2014 (including comments per Regions)
- Flow based NTC analysis across EU (including comments on areas of concern) for Summer peak demands
- Lessons learnt
- **Appendix** (about 3 pages per country and when available per Region) on a country by country basis with graphs illustrating the generation-load balance and comments provided by each country.

The information provided should reflect the actual state of the analysis made by the TSO and should be based on the available materials.
**For your reference, previous seasonal outlook reports are available at:**
https://www.entsoe.eu/resources/publications/system-development/outlook-reports/

Guidelines for data collection are indicated in this document. There is also a "Guidelines for System Adequacy forecast data collection" that is available on the ENTSO-E extranet site which gives definitions and explanations of terminology.

[5] "The EC Cross Border Committee acts in accordance with Regulation (EC) No 1228/2008 of the European Parliament and of the Council of 26 June 2003 on conditions for access to the network for cross-border exchanges in electricity (Article 13), replaced by Regulation EC n. 714/09 . It consists of Member States' representatives.

## INPUT FROM EACH COUNTRY

The input expected from each country comprises 3 main parts included in the same excel workbook:

- **One or two paragraphs** emphasizing the TSO's appreciation of the generation – load balance for the coming summer. It should also highlight any issues of excess inflexible generation at times of minimum demand; this synopsis will be included in the main report. No common form is suggested in order to fit with each country's specific case.

- **A table with quantitative elements** with a common format; this table will not be published but sent only to those TSOs taking part in the exercise; the data will be used for building graphs attached in appendix to the report and illustrating the Summer outlook for the country. In addition, the NTC data in this table will be analysed against all other regions to determine adequacy across the EU with a focus on those regions that require imports under normal or severe conditions. Finally, it is envisaged that graphs of downward regulation will be presented as a high level European Overview.

- **A synopsis and comments** on the generation-load adequacy for the coming summer that will be included in the Appendix of the report. In order to facilitate the production and use of these comments, common guidelines are provided hereafter.

## QUANTITATIVE ELEMENTS

Please fill in the Excel spreadsheet available on extranet.

The data is requested for synchronous time each Wednesday (19:00 CET) in order to allow meaningful analysis when determining cross border flows. It is recognised that this may not be the peak demand in every region in the summer but 19:00 is chosen to allow a consistent analysis.

If weekly data is not available for any TSO then the data for the third Wednesday of July should be the minimum that is available to countries of the Regional Groups "Continental Europe" (as provided in the framework of the system adequacy forecast). It is therefore requested that a TSO that is unable to provide weekly data provide the data for the third Wednesday of July with updates in order to take into account the increased knowledge of the situation since the last SO&AF (outages, status of hydro reserves, etc.).

An additional requirement is in PART E of the Excel spreadsheet to provide minimum demand data, downward reserve requirement, level of inflexible plant, pumped storage demand in order to allow an European overview of the need for countries to export across borders at times of high levels of inflexible generation such as wind or solar. Two separate assessments are performed, each one targeting downward adequacy reference points. First point is synchronous time of each Sunday 05:00 CET, the expected minimum demand for the considered period. At overnight minimum demand periods, there is a possibility of high wind infeed, so the problems with downward regulation can occur in certain number of European TSOs. The second reference point for which the assessment will be performed is synchronous time of each Sunday 11:00 CET. At this time point high amounts of solar generation is expected. The difference in load between this two time points may be less than the solar infeed, thus downward adequacy is relevant in both cases.


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## GUIDELINES FOR COMMENTS

All comments are be included in the excel spreadsheet. Each TSO is requested to provide the following information:

**Contribution to the main report**

A few lines on the main results of the assessment including:

– General situation highlighting specifics such as high levels of maintenance in certain weeks, low hydro levels, low gas storage, sensitivity to commissioning generation etc.

– Most critical periods for the TSO and in particular which weeks are considered as most critical.

– Expected role of interconnectors in relation to maintaining adequacy and the ability to import or export.

– Expected role of interconnectors to managing an excess of inflexible generation at minimum demand periods

**Synopsis**

This qualitative assessment should stress the main critical periods and the main factors of risk. It would be useful to indicate, if any, which level of remaining capacity they consider as necessary when making this forecast in order to ensure a secure operation for the summer (i.e. what is the reference adequacy margin) and the role of renewables. In addition, the qualitative assessment should consider the role of interconnectors in allowing excess inflexible generation (such as wind) to be accommodated on the power system.

**Short explanation of the framework and the method used for making the summer adequacy assessment**

The framework used is to determine adequacy under normal and severe conditions for each TSO. This is based on data that is submitted by each TSO. The analysis then checks if the countries that rely on imports, have enough transmission capacity to import energy from neighbouring countries. To do this analysis, each TSO is requested to give its best **estimate of the NTC** that it anticipates will be available.

The analysis is based on a spreadsheet that takes remaining capacity (under normal and severe conditions) from all the TSO submitted spreadsheets with all the submitted NTC values. **If there are 2 countries that submit different NTC values on the same border, then the analysis will be completed taking the minimum submitted value.** Based on the outcome of the analysis, additional questions may be asked from the relevant TSOs if particular country boundaries are considered critical.

In addition for the specific Summer Outlook Report, the analysis will consider the minimum demand periods with potential maximum inflexible generation to determine that countries that are required to export excess generation can do so.



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## GUIDELINES FOR COMPLETING THE SPREADSHEET

The analysis is country based and not control area nor bid area based. It is recognised that this does cause issues for completing the spreadsheet and the guidelines below have attempted to resolve these issues.

If this Generation – Demand balance is considered at risk for the system i.e. too low, then please provide an explanation of the main risk factors (e.g. availability of generation, load sensitivity to temperature, low hydro levels, low wind etc.) and how this risk is to be managed by the TSO. This part will only be included in the appendix if the TSO wants it to be included.

According to the degree of available data please fill in the spreadsheets:

– for each week of the considered period, namely Wednesday of each week at 19:00 CET;

– for each week of the considered period, namely Sunday of each week at 05:00 and 11:00 CET;

– for each month of the considered period namely the third Wednesday of each month at 19:00 CET;

– for each month of the considered period namely the Sunday before the third Wednesday of each month at 05:00 and 11:00 CET;

– for typical weeks or days (at least the third Wednesday of July) at 19:00 CET;

– for typical weeks or days (at least the Sunday before the third Wednesday of July) at 05:00 and 11:00 CET.

**PART A: INDIGINEOUS NATIONAL GENERATION (Lines 1 to 7):**

The total generation capacity notified to the TSO as being installed for each week for the same period. The requested data on fuel types has been modified to better reflect the long term adequacy reports and in order to increase transparency in reporting.

The available generation capacity should be calculated according to a methodology directly derived from the one used for the former ETSO system adequacy forecast report and within the former UCTE for generation adequacy assessment.

**It is noted that certain countries may have generators that are located in neighbouring countries and consider them as part of their capacity due to firm contracts or grid topology. Where this exists, please highlight so as for regional analysis it is important not to double account generation.**

The following specific data is requested:

– **Net generating capacity** (lines 1 to 5): installed capacity by fuel type. The fuel types are similar as found in the long term adequacy reporting in order to increase consistency between long term and short term adequacy reporting.

– **Net generating capacity** (line 6): corresponds to the generating capacity as calculated from data input in lines 1 to 5.

– Please note that a change from previous year’s submissions is that a “Normal Average Outage Rate” and a “Severe Average Outage Rate” is requested in order to increase transparency and allow comparisons across regions. This percentage outage rate can be used to automatically calculate the Outages in **lines 10 and 19** (formulae are included in the spreadsheet: for example if the outage rate is



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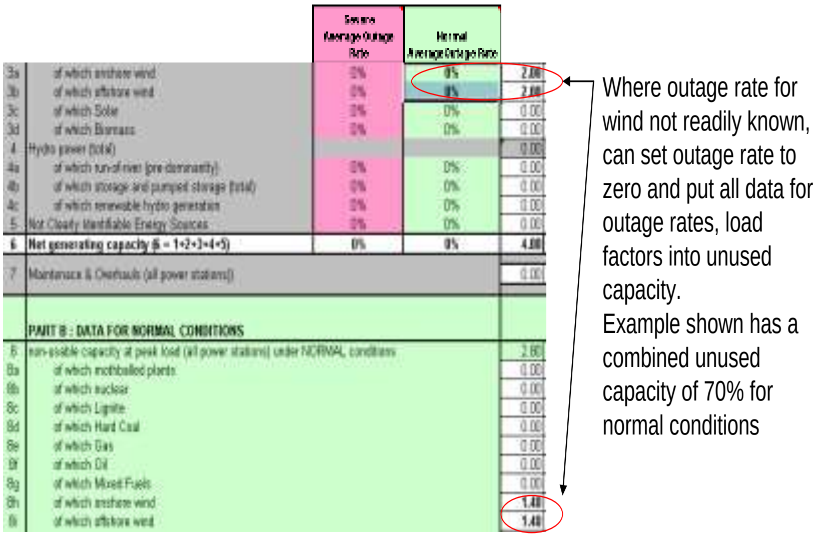
set at 10% and the capacity is 2GW, then the spreadsheet will automatically calculate an outage value of 200MW).

– Alternatively, the user can overwrite the formula in lines 10 and 19 with more detailed weekly forecasted outage rates. For example, the user may wish to do this if they calculate outages rates at a weekly level. However, we do ask that you indicate a figure for the average outage rate percentage to allow comparison with other neighbouring regions.

– It is recognised that some regions may not calculate percentage average outage rates for some plant types and may wish to bundle all the data into unused capacity. An example may be Wind where the outage rate is unknown across the fleet. An acceptable approach would be to set the average outage rate to zero but to combine outages and maintenances in unused capacity for Wind in PART B and C.
In this way the remaining capacity is still calculated correctly which is inherently what the spreadsheet is forecasting. This is shown in the picture opposite.




– **Maintenance & Overhauls (all power stations) (line 7)**: as notified by generators to TSOs at the time of completing the spreadsheet and hence the most up to date information is requested. In case of lack of information from generators, TSOs should include an estimate value based on historical data.

**PART B: DATA FOR NORMAL CONDITIONS (Lines 8 to 16):**

The following data is required for normal conditions which are defined as those conditions that correspond to normal demands on the system e.g. normal weather conditions resulting in normal wind, hydro output and normal outages:

– **Non-usable capacity at peak load under NORMAL conditions** (**line 8a to 8o**): resulting from lack of primary sources (hydro, wind), insufficient fuel availability due to actual contracts, mothballed plants not in operation during the summer. This part has significantly changed from previous submissions in terms of being broken down by fuel type. The reasons for this change is to increase transparency and to bring reporting more into line with long term reporting and to allow TSOs to give a fuller picture of where the non-usable capacity is on their respective system.

– **Available capacity under NORMAL conditions (line 9):** automatically calculated from data submitted above.

– **Outages (line 10):** as discussed above (section 5.1), this will automatically be calculated based on the percentage outage rate in PART A but can also be overwritten if required. There are standard normal outage rates published for nuclear and fossil fuels which are based on the Data Collection Guidelines published by WG SAMM but it is anticipated that most TSOs will have actual outage rates for their system based on historical analysis.



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- **System services reserves under NORMAL conditions (line 11)**: the amount of capacity required by the TSO to provide operating response/reserves. It corresponds to the level required one hour before real time (additional short notice breakdowns are already considered in the amount of outages). In some market structures, market participants may provide reserve however for the avoidance of doubt, the figure requested is the total amount of reserves that the country requires at 1 hour ahead.

- **Planned reliably available capacity under NORMAL conditions (line 12):** is automatically calculated from the data given above.

- **Weekly peak load for NORMAL conditions (line 13):** peak load excluding any demands on interconnectors and net of any demand management/demand price response in normal weather conditions for the period from 4 December to 16 April. Possible load reductions in normal conditions should be mentioned (line 14). It results in the Net weekly peak load for NORMAL conditions (line 15).

- **Remaining capacity for NORMAL conditions (line 16)** corresponds to the generating capacity available above net demand and is the basis of the TSO's appreciation of the generation adequacy for the current week. It is used for the flow based NTC analysis with data from PART D.

**PART C: DATA FOR SEVERE CONDITIONS (Lines 17 to 25):**

The data format for Severe conditions is the same format as PART B DATA FOR NORMAL CONDITIONS.

Severe conditions are related to what each TSO would expect under a 1 in 10 year scenario. For example the demand will be higher than normal conditions and in certain regions the output from certain generating units such as wind may be very low or there may be higher-than-normal outage rates expected under extreme ambient temperatures.

In terms of average outage rate, regions may experience a higher outage rate than under normal conditions due to the lower temperatures and it is intended that this is captured by a severe outage rate that is input in PART A and/or the non-usable capacity in PART C.

It is difficult to be very specific and hence a description of the scenario being considered should be described by each TSO and if a TSO is not using a 1 in 10 year scenario e.g. only calculates at a 1 in 20 year demand level then this should be highlighted.

Where users do not submit data for severe conditions, a percentage reduction may be applied to the normal conditions (*figure as yet to be determined*).

**FIRM IMPORT AND EXPORT CONTRACTS (Lines 26 and 27)**

For countries where firm import/export contracts are notified to the TSO, their influence on the remaining capacity should be mentioned. Information on the possibility of export reduction or import increases will give a more complete view of the situation. It is important that a country that has a firm import contract from a neighbouring country ensure that the neighbouring country has also included the contract as an export contract.

**It is also important that if a firm import contract is assumed from a country then the NTC value is reduced to reflect that some of the capacity is being used.**

**PART D: ADDITIONAL INFORMATION FOR INTERCONNECTORS (Lines 31 and 32).**


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Additional data on interconnector capacity between countries is requested to allow analysis to be completed across the EU in order to check that countries that are relying on imports (under severe conditions in particular) have neighbouring countries that are able to provide exports.

It is recognised that this data is available via NTC tables but TSOs are requested to submit the NTC data in this spreadsheet. **The NTC data requested is the TSOs best estimate NTC and may be different from what is publicly published**. It is recognised that on the day the value may be higher or lower due to system conditions but this analysis is to get a confidence around the capability of interconnectors to contribute to maintaining generation-demand balance.

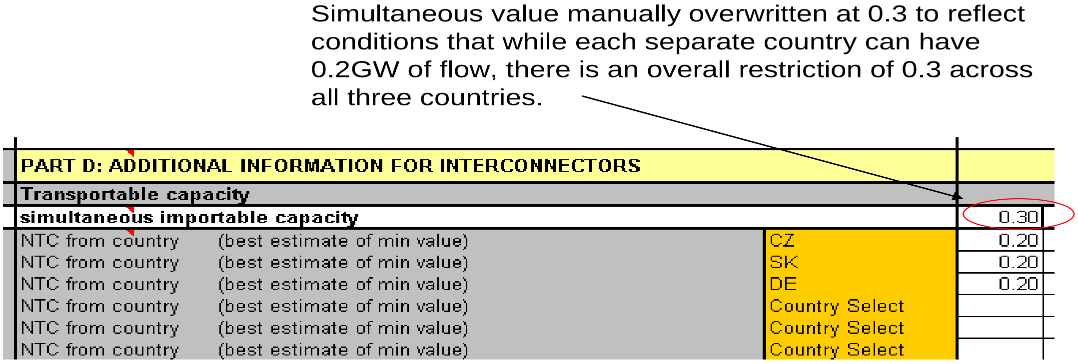
**It should be stressed that there is no Grid model being developed for the analysis and it is not a market simulation either.** Rather, it is a confidence test on highlighting where the most important country boundaries exist based on the data submitted by TSOs.

For that purpose the following items should be covered:

– **Simultaneous importable capacity (line 31) and Simultaneous exportable capacity (line 32):** Importable and Exportable capacity with other national systems expected to be available each week and a range of possible outcomes for Interconnection power flow. It is recognised that for many TSOs, it is not possible to calculate weekly values and hence a best estimate on the value taking into account known variables (such as planned maintenances) is requested.

– It is recognised that due to loop flows or transit flows, it may be difficult for TSOs to be specific as a high flow across one boundary results in a lower capacity across another etc. It would be helpful if TSOs could provide a comment if this is the case in order to assist the analysis and to reflect the limitation via the simultaneous importable/exportable capacity (see below).

Transportable capacity is asked for as a per country value as well as a simultaneous value. The per country values are mandatory for the analysis. It is noticed that some countries may be divided into more than one Bid Area (Norway, Denmark …) then only the sum of the NTCs to/from these Bid Areas should be provided. The simultaneous value should always be smaller or equal to the sum of all per country values. When not completed, it is assumed to be equal to the sum of all per country values and the spreadsheet will automatically calculate the sum of all values unless it is manually overwritten in lines 31 and 32. The picture below gives an example where the simultaneous value is overwritten.




| | | | |
|---|---|---|---|
| PART D: ADDITIONAL INFORMATION FOR INTERCONNECTORS | | | |
| Transportable capacity | | | |
| simultaneous importable capacity | | | 0.30 |
| NTC from country | (best estimate of min value) | CZ | 0.20 |
| NTC from country | (best estimate of min value) | SK | 0.20 |
| NTC from country | (best estimate of min value) | DE | 0.20 |
| NTC from country | (best estimate of min value) | Country Select | |
| NTC from country | (best estimate of min value) | Country Select | |
| NTC from country | (best estimate of min value) | Country Select | |

If the simultaneous capacity is manually overwritten, the analysis of flows will take this restriction into account.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Country codes are as found on the ENTSO-E website[6]. In cases where NTC codes do not exist, there is the ability to overwrite. A map of the ENTSO-E countries is included in the spreadsheet.

**PART E: INFORMATION FOR DOWNWARD REGULATION CAPABILITIES (Lines 33 and 37).**

The above described in 5.1 to 5.5 will be familiar to users who completed the previous Summer Outlook data request. For the Summer Outlook report, an additional PART E, divided into two sections, has been added with 4 additional data items requested. The intention is to analyse the level of inflexible generation against minimum demand levels. For countries that have an excess of generation, the analysis will increase exports to regions that have more flexibility in order to solve. Hence, it is anticipated that the analysis will determine which countries are required to export under high renewables. The data items requested are shown below:

| | Time (CET) | 5:00 |
|---|---|---|
| | PART E: ADDITIONAL INFORMATION FOR MIN DEMAND CONDITIONS | |
| 33 | Weekly Minimum Demand (overnight valley minimum) | |
| 34 | Must Run Generation (excluding wind/solar/run of river, renewables) | |
| 35 | Run of river generation (Must Run) | |
| 36 | Downward Regulating Reserve | -1.00 GW |
| 37 | Pumping Storage Capacity available | |
| 38a | Highest expected proportion of installed onshore wind generation running (for national analysis only) | 65% |
| 38b | Highest expected proportion of installed offshore wind generation running (for national analysis only) | 65% |
| 39 | DOWNWARD REGULATION CAPABILITIES: 39 = (33+37)-(34+35+36+38a*3a+38b*3b)) | 1 |

**Overnight 05:00 CET is selected as minimum demand reference point for the first downward regulation assessment**

| | Time (CET) | 11:00 | 11:00 |
|---|---|---|---|
| | PART E: ADDITIONAL INFORMATION FOR MIN DEMAND CONDITIONS | | |
| 40 | Weekly Minimum Demand (Sunday low peak + solar) Hour 12 (noon)* | 40.00 GW | |
| 41 | Must Run Generation (excluding wind/solar/run of river, renewables) | 30.00 GW | |
| 42 | Run of river generation (Must Run) | 3.00 GW | |
| 43 | Downward Regulating Reserve | 1.50 GW | |
| 44 | Pumping Storage Capacity available (Power) | 3.00 GW | -1.00 GW |
| 45 | Highest expected proportion of installed solar operating capacity (PV and thermal, national analysis only) | 95% | 95% |
| 46a | Highest expected proportion of installed onshore wind generation running (for national analysis only) | 45% | 65% |
| 46b | Highest expected proportion of installed offshore wind generation running (for national analysis only) | 65% | 65% |
| 47 | DOWNWARD REGULATION CAPABILITIES: 47 = (40+44)-(41+42+43+45*3c+46a*3a+46b*3b)) | -5.5745 | -1 |

A description of what information is requested is:

– **Weekly Minimum Demand (overnight valley minimum)** (line 33): this is requested for 05:00 CET on each Sunday. If weekly data is not available, then please provide information on minimum demand that will be experience in the second weekend in March.

– **Weekly Minimum Demand (Sunday low peak+solar) Hour 11** (line 40) is requested for 11:00 CET on each Sunday. If weekly data is not available, then please provide information on minimum demand that will be experience in the second weekend in March.

– **Must Run Generation** (lines 34 and 41): the data should include the level of inflexible (i.e. not sensitive to price) generation that is anticipated to be running across the minimum demand periods. Thus it is anticipated that for most TSOs this will include a level of nuclear generation, CHP, Biomass and Coal and Gas generation that is always on the system to maintain overall system security and

[6] https://www.entsoe.eu/fileadmin/template/other/images/map_entsoe.png



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voltage regulation. The user is specifically asked not to include wind/solar as the analysis that is carried out will use generation data in PART A/B/C to calculate potential output from these generation sources.

– **Run of River** (lines 35 and 42): the data should include the level of inflexible run of river generation that is anticipated to be running across the minimum demand periods.

– **Downward Regulation** (lines 36 and 43): this is the minimum level of generation flexibility that is required by the TSO to be able to reduce output on the system.

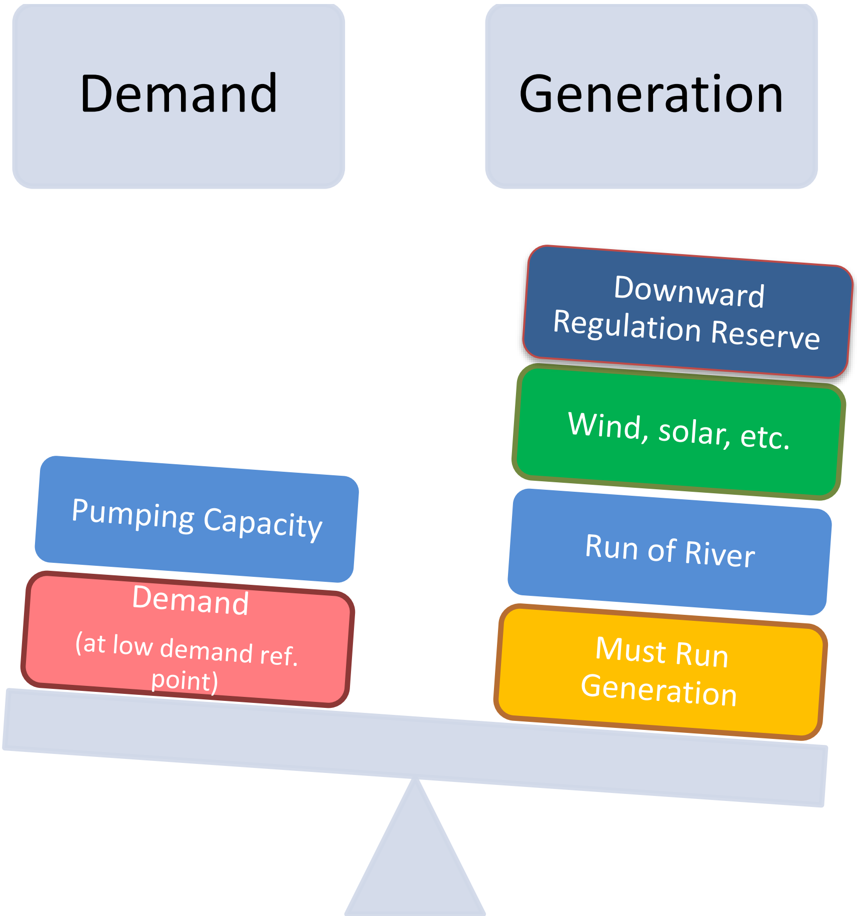
– **Pumping Storage Capacity** (lines 37 and 44): this is the level of pumped storage capacity.

– Highest expected proportion of installed onshore wind generation running (for national analysis only) (lines 38a and 46a): this data is set to 65% and can be modified according to the national specificities. It will be used for national assessment only.

– Highest expected proportion of installed offshore wind generation running (for national analysis only) (lines 38b and 46b): this data is set to 65% and can be modified according to the national specificities. It will be used for national assessment only.

– Highest expected proportion of installed solar operating capacity (PV and thermal, national analysis only) (line 45): this data is set to 95% and can be modified according to the national specificities. It will be used for national assessment only.

The intention of the analysis is to look at high wind, run of river, solar renewable scenario (details of which to be determined). The levels of exports that a country may require when added to the "must run generation" will be compared against the demand, pumped storage capability and downward regulation for each country. If a country requires exports to maintain balance, the analysis will use submitted NTC values to determine if there is a solution. This is described graphically below:




It is anticipated that the coloured maps that were developed for the previous Summer Outlook report (and what will be used for the peak demand overview) will also be employed to give an overview of countries that may be required to export surplus energy under a high renewables production scenario.

## QUESTIONS AND COMMENTS

The main areas for comments that TSOs are asked to consider:

1. Please provide feedback on improvements that can be made to the spreadsheet and what difficulties the user had in completing the data. In particular, did you have any problems in providing data for the new PART E?

2. Please indicate how the outage rates for both Normal and Severe conditions have been calculated for the spreadsheet.

3. Please indicate how the submitted NTC values have been derived.

4. Treatment and amount of mothballed plants. Under what circumstances (if any) could they be made available?

5. Issues, if any, associated with utilising interconnection capacity e.g. existence of transmission constraints affecting interconnectors for export or import at time of peak load (such as maintenance or foreseen transit or loop flows)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6. Are there any energy constraint issues particularly for hydro based systems?
7. Any other fuel supply issues which could affect availability e.g. gas supply issues?
8. Do you expect any event that may affect the adequacy during the Summer? If yes, what actions do you plan to activate?
9. Do you foresee any issue with inflexible plant across minimum demand periods e.g. high level of wind and must run generation?
10. Any other issues of relevance that are not covered above?

## Winter Review 2013/14 Introduction and Questionnaire

Following the publication of the Summer Outlook report, ENTSO-E will be publishing a Winter Review Report.

The objective of the report is to present what happened during this winter as regards weather conditions and other factors and their consequences on the power system (temperatures, hydro and wind conditions), availability of generating units, market conditions, use/availability of interconnections and imported energy, and to compare what happened in reality with the risks identified in the Winter Outlook.

The report will be based on **narrative that will be collected in the excel for the data collection**; however, quantitative data to illustrate how the Winter out-turned against what was forecast would be appreciated (e.g. actual peak load and difference compared with forecast in normal and extreme conditions, major disturbances and their effect on generation or transmission capability etc.). For a synchronized view of the European system any information on the critical periods would be appreciated.

**Please indicate if any of your answers should be regarded as confidential and/or commercially sensitive so that this information can be aggregated or withheld from publication.**

**If you are unable to provide quantitative data, then it would be very helpful if you could still provide some commentary in answer to the questions. It is understood that not all TSOs will have access to all the requested information.**

The Winter Outlook Report (published in November 2013) is available to view at:

https://www.entsoe.eu/resources/publications/system-development/outlook-reports/



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# Questionnaire on Winter Review 2013/14 to be answered in the data collection excel

### General Commentary on Winter Conditions

Recalling main features and risks factors of the Winter Outlook Report, please provide a brief overview of Winter 2013/14:

- General comments on the main trends and climatic conditions (temperatures (average and lowest compared with forecast), precipitation, floods/snow/ice).
- Did the risks identified in the Winter Outlook Report actually occur?
- Did unexpected situations arise during the winter which had an effect on the power system (generation/demand balance; transmission capacity; interconnection capacity; availability of imported energy etc.)?
- Is it possible to identify (and quantify) the effects of external factors on demand (e.g. demand reduction as a result of economic conditions; climate change; energy efficiency initiatives etc.)?
- An indication of the most stressed periods for system adequacy.

### Specific Events Occurred during the Winter 2013/14

Please report on specific events occurred during the last winter period (i.e. extreme temperatures, increased outage rates, others)

### Detailed Review of the Most Stressed Periods

Describe the actual versus expected and average conditions for the most stressed periods of the winter (June to September). For each statement please specify the period considered (Month(s), week(s) or even day(s) whichever is easiest – if possible, please use the spreadsheet provided to provide week-by-week quantitative details on generation conditions and demand at weekly peak). Please specify which measures you applied to manage remarkable events or stressed conditions:

- Description of remarkable event(s)/cause(s) of system stress (e.g. hotter than expected weather conditions, low/high wind in-feed etc.) and the duration of the situation.
- Description of any measures applied to overcome the events/system stress (e.g. Interruptible customers, load shedding, curtailments any other).
- generation conditions: generation overhaul (planned, unplanned), gas/oil/availability, hydro output, wind conditions (above or below expectations, extended periods of calm weather), specific events or most remarkable conditions (please specify dates)
- demand: actual versus expectations, peak periods, summary of any demand side response used by TSOs, reduction/disconnections/other special measures e.g. use of emergency assistance, higher than expected imports from neighbouring states
- Transmission infrastructure: outages (planned/unplanned), reinforcement realised, notable network conditions (local congestion, loop flows etc.)
- Use of interconnections: import/export level, reliance on imports from neighbouring countries to meet demand (you can refer to http://www.entsoe.net/); commentary on interconnector availability and utilisation.

### Lessons Learned for Winter 2014

- Relevant key points for the next winter.
- Feedback on the use of the Outlook Reports.
- Feedback on format and content of this report.



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## Appendix 2: Load factors used for the renewable in-feed for upward regulation analyses

| | Wind Onshore | | | | Wind Offshore | | | | Solar | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | June | July | August | September | June | July | August | September | June | July | August | September |
| **AT** | 2% | 3% | 2% | 3% | 0% | 0% | 0% | 0% | 56% | 56% | 54% | 47% |
| **BA** | 3% | 2% | 2% | 4% | 0% | 0% | 0% | 0% | 57% | 56% | 56% | 52% |
| **BE** | 2% | 3% | 3% | 4% | 12% | 15% | 14% | 19% | 55% | 54% | 49% | 35% |
| **BG** | 3% | 3% | 3% | 4% | 0% | 0% | 0% | 0% | 56% | 56% | 56% | 55% |
| **CH** | 3% | 3% | 2% | 3% | 0% | 0% | 0% | 0% | 55% | 55% | 53% | 49% |
| **CZ** | 3% | 5% | 3% | 4% | 0% | 0% | 0% | 0% | 57% | 56% | 54% | 43% |
| **DE** | 4% | 5% | 4% | 5% | 20% | 17% | 20% | 27% | 56% | 54% | 50% | 37% |
| **DK** | 10% | 6% | 8% | 11% | 25% | 18% | 21% | 31% | 58% | 55% | 50% | 41% |
| **EE** | 11% | 5% | 8% | 12% | 13% | 7% | 11% | 18% | 58% | 55% | 51% | 30% |
| **ES** | 6% | 6% | 6% | 7% | 14% | 15% | 15% | 18% | 52% | 52% | 50% | 45% |
| **FI** | 12% | 9% | 8% | 14% | 14% | 10% | 11% | 20% | 56% | 51% | 41% | 19% |
| **FR** | 5% | 6% | 5% | 7% | 10% | 12% | 12% | 17% | 51% | 50% | 46% | 38% |
| **GB** | 8% | 8% | 8% | 13% | 15% | 15% | 17% | 26% | 44% | 40% | 31% | 21% |
| **GR** | 12% | 15% | 16% | 13% | 5% | 8% | 13% | 12% | 57% | 57% | 57% | 56% |
| **HR** | 3% | 3% | 2% | 6% | 0% | 0% | 0% | 0% | 56% | 56% | 54% | 52% |
| **HU** | 5% | 6% | 3% | 5% | 0% | 0% | 0% | 0% | 57% | 56% | 55% | 53% |
| **IE** | 10% | 7% | 7% | 12% | 12% | 10% | 10% | 16% | 39% | 31% | 24% | 14% |
| **IT** | 3% | 3% | 3% | 5% | 9% | 8% | 7% | 11% | 55% | 55% | 54% | 52% |
| **LT** | 8% | 5% | 7% | 8% | 0% | 0% | 0% | 0% | 58% | 55% | 53% | 36% |
| **LU** | 0% | 1% | 0% | 1% | 0% | 0% | 0% | 0% | 55% | 54% | 50% | 26% |
| **LV** | 6% | 4% | 5% | 7% | 13% | 8% | 10% | 14% | 58% | 54% | 51% | 31% |
| **ME** | 2% | 1% | 1% | 2% | 0% | 0% | 0% | 0% | 58% | 58% | 57% | 55% |
| **MK** | 2% | 2% | 1% | 3% | 0% | 0% | 0% | 0% | 57% | 57% | 56% | 55% |
| **NI** | 8% | 7% | 6% | 12% | 14% | 13% | 11% | 21% | 0% | 0% | 0% | 0% |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NL** | 4% | 5% | 4% | 6% | 17% | 16% | 17% | 22% | 56% | 55% | 49% | 36% |
| **NO** | 6% | 6% | 7% | 16% | 15% | 14% | 14% | 32% | 52% | 46% | 38% | 26% |
| **PL** | 9% | 8% | 7% | 8% | 13% | 10% | 12% | 17% | 58% | 55% | 54% | 43% |
| **PT** | 5% | 5% | 5% | 5% | 0% | 0% | 0% | 0% | 49% | 49% | 47% | 38% |
| **RO** | 5% | 5% | 4% | 6% | 0% | 0% | 0% | 0% | 56% | 55% | 54% | 52% |
| **RS** | 3% | 2% | 2% | 3% | 0% | 0% | 0% | 0% | 56% | 55% | 55% | 53% |
| **SE** | 11% | 8% | 8% | 15% | 18% | 14% | 15% | 24% | 55% | 47% | 38% | 25% |
| **SI** | 3% | 4% | 3% | 7% | 0% | 0% | 0% | 0% | 57% | 57% | 55% | 52% |
| **SK** | 4% | 4% | 3% | 5% | 0% | 0% | 0% | 0% | 58% | 56% | 55% | 51% |

*Table 9: LOAD FACTORS USED FOR THE NORMAL CONDITIONS UPWARD ADEQUACY ANALYSIS*[7]

| | **Wind Onshore** | | | | **Wind Offshore** | | | | **Solar** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | June | July | August | September | June | July | August | September | June | July | August | September |
| **AT** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 43% | 43% | 36% | 27% |
| **BA** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 47% | 47% | 47% | 28% |
| **BE** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 26% | 28% | 19% | 9% |
| **BG** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 52% | 52% | 52% | 42% |
| **CH** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 38% | 39% | 33% | 26% |
| **CZ** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 42% | 40% | 35% | 16% |
| **DE** | 0% | 0% | 0% | 1% | 3% | 2% | 3% | 5% | 42% | 39% | 31% | 15% |
| **DK** | 0% | 0% | 0% | 0% | 3% | 1% | 2% | 3% | 31% | 27% | 19% | 9% |
| **EE** | 1% | 0% | 0% | 1% | 1% | 0% | 0% | 1% | 40% | 36% | 21% | 9% |
| **ES** | 2% | 2% | 1% | 2% | 5% | 4% | 4% | 5% | 41% | 42% | 38% | 30% |
| **FI** | 2% | 1% | 1% | 2% | 2% | 1% | 1% | 2% | 45% | 37% | 21% | 9% |
| **FR** | 1% | 1% | 1% | 1% | 1% | 1% | 2% | 3% | 37% | 37% | 31% | 21% |
| **GB** | 1% | 1% | 1% | 3% | 3% | 3% | 3% | 6% | 25% | 22% | 16% | 7% |
| **GR** | 3% | 5% | 4% | 3% | 0% | 0% | 0% | 0% | 55% | 54% | 55% | 50% |

[7] Values that are statistically expected to be exceeded in 50% of the relevant hours.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HR** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 50% | 50% | 47% | 35% |
| **HU** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 52% | 51% | 50% | 38% |
| **IE** | 0% | 0% | 0% | 1% | 1% | 1% | 1% | 2% | 14% | 12% | 8% | 3% |
| **IT** | 0% | 0% | 0% | 0% | 1% | 1% | 1% | 1% | 50% | 51% | 48% | 41% |
| **LT** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 38% | 34% | 26% | 11% |
| **LU** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 20% | 19% | 13% | 7% |
| **LV** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 41% | 38% | 24% | 10% |
| **ME** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 45% | 49% | 48% | 30% |
| **MK** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 51% | 51% | 51% | 44% |
| **NI** | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 2% | 0% | 0% | 0% | 0% |
| **NL** | 0% | 0% | 0% | 0% | 1% | 2% | 2% | 2% | 34% | 35% | 19% | 9% |
| **NO** | 1% | 1% | 1% | 4% | 2% | 1% | 1% | 4% | 40% | 34% | 27% | 15% |
| **PL** | 2% | 1% | 1% | 1% | 0% | 0% | 0% | 1% | 47% | 41% | 38% | 18% |
| **PT** | 1% | 1% | 1% | 1% | 0% | 0% | 0% | 0% | 28% | 30% | 25% | 17% |
| **RO** | 1% | 1% | 1% | 1% | 0% | 0% | 0% | 0% | 51% | 50% | 49% | 40% |
| **RS** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 49% | 47% | 49% | 36% |
| **SE** | 2% | 2% | 2% | 3% | 4% | 3% | 3% | 6% | 43% | 31% | 21% | 10% |
| **SI** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 48% | 49% | 41% | 26% |
| **SK** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 48% | 46% | 45% | 28% |

*Table 10: LOAD FACTORS USED FOR THE SEVERE CONDITIONS UPWARD ADEQUACY ANALYSIS*[8]

[8] Minimum values that are statistically expected to be exceeded in 90% of the relevant hours.

## Appendix 3: Load factors used for the renewable in-feed for downward regulation analyses

| | Wind Onshore | | | | Wind Offshore | | | | Solar | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | 6 | 7 | 8 | 9 | 6 | 7 | 8 | 9 | 6 | 7 | 8 | 9 |
| AT | 21% | 22% | 25% | 27% | 0% | 0% | 0% | 0% | 60% | 60% | 57% | 54% |
| BA | 19% | 19% | 15% | 26% | 0% | 0% | 0% | 0% | 60% | 60% | 59% | 57% |
| BE | 18% | 28% | 23% | 25% | 52% | 74% | 72% | 95% | 58% | 58% | 54% | 47% |
| BG | 17% | 18% | 14% | 23% | 0% | 0% | 0% | 0% | 60% | 60% | 59% | 59% |
| CH | 16% | 17% | 18% | 22% | 0% | 0% | 0% | 0% | 61% | 60% | 58% | 55% |
| CZ | 23% | 23% | 22% | 28% | 0% | 0% | 0% | 0% | 61% | 60% | 57% | 53% |
| DE | 21% | 23% | 19% | 23% | 71% | 66% | 64% | 86% | 59% | 58% | 55% | 48% |
| DK | 42% | 32% | 35% | 52% | 78% | 66% | 76% | 91% | 62% | 59% | 56% | 50% |
| EE | 44% | 28% | 35% | 54% | 52% | 37% | 45% | 76% | 62% | 59% | 56% | 50% |
| ES | 21% | 17% | 19% | 21% | 41% | 39% | 37% | 41% | 54% | 53% | 52% | 48% |
| FI | 38% | 34% | 28% | 49% | 50% | 53% | 53% | 79% | 60% | 57% | 53% | 42% |
| FR | 16% | 21% | 18% | 21% | 52% | 68% | 59% | 71% | 55% | 54% | 51% | 46% |
| GB | 28% | 29% | 32% | 45% | 50% | 52% | 57% | 73% | 51% | 47% | 41% | 32% |
| GR | 35% | 38% | 45% | 44% | 35% | 49% | 65% | 69% | 59% | 59% | 59% | 59% |
| HR | 27% | 25% | 19% | 35% | 0% | 0% | 0% | 0% | 59% | 59% | 57% | 56% |
| HU | 28% | 28% | 22% | 26% | 0% | 0% | 0% | 0% | 60% | 59% | 57% | 56% |
| IE | 39% | 34% | 31% | 59% | 53% | 49% | 48% | 82% | 51% | 47% | 39% | 30% |
| IT | 20% | 18% | 18% | 27% | 34% | 34% | 29% | 45% | 58% | 58% | 56% | 55% |
| LT | 38% | 30% | 36% | 44% | 0% | 0% | 0% | 0% | 62% | 59% | 57% | 52% |
| LU | 17% | 23% | 19% | 25% | 0% | 0% | 0% | 0% | 60% | 58% | 55% | 50% |
| LV | 35% | 21% | 29% | 43% | 54% | 38% | 57% | 82% | 62% | 59% | 57% | 50% |
| ME | 18% | 18% | 14% | 31% | 0% | 0% | 0% | 0% | 62% | 62% | 60% | 59% |
| MK | 18% | 16% | 15% | 23% | 0% | 0% | 0% | 0% | 61% | 61% | 60% | 59% |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NI** | 37% | 35% | 33% | 66% | 60% | 58% | 60% | 91% | 0% | 0% | 0% | 0% |
| **NL** | 22% | 31% | 27% | 36% | 56% | 69% | 68% | 89% | 59% | 58% | 54% | 48% |
| **NO** | 26% | 20% | 23% | 41% | 57% | 48% | 58% | 79% | 58% | 53% | 45% | 33% |
| **PL** | 28% | 25% | 23% | 29% | 72% | 57% | 52% | 75% | 61% | 59% | 57% | 52% |
| **PT** | 25% | 21% | 26% | 26% | 0% | 0% | 0% | 0% | 52% | 52% | 50% | 46% |
| **RO** | 23% | 22% | 15% | 27% | 0% | 0% | 0% | 0% | 59% | 59% | 57% | 56% |
| **RS** | 18% | 17% | 15% | 19% | 0% | 0% | 0% | 0% | 60% | 59% | 58% | 57% |
| **SE** | 31% | 27% | 28% | 43% | 51% | 47% | 51% | 69% | 59% | 55% | 47% | 38% |
| **SI** | 29% | 28% | 26% | 44% | 0% | 0% | 0% | 0% | 60% | 60% | 58% | 56% |
| **SK** | 27% | 25% | 22% | 26% | 0% | 0% | 0% | 0% | 61% | 60% | 58% | 56% |

*Table 11: LOAD FACTORS USED FOR THE DAYTIME DOWNWARD ADEQUACY ANALYSIS*[9]

| | **Wind Onshore** | | | | **Wind Offshore** | | | |
|---|---|---|---|---|---|---|---|---|
| **Country** | 6 | 7 | 8 | 9 | 6 | 7 | 8 | 9 |
| **AT** | 25% | 28% | 29% | 31% | 0% | 0% | 0% | 0% |
| **BA** | 28% | 26% | 23% | 30% | 0% | 0% | 0% | 0% |
| **BE** | 25% | 27% | 28% | 32% | 69% | 79% | 77% | 97% |
| **BG** | 26% | 29% | 23% | 28% | 0% | 0% | 0% | 0% |
| **CH** | 26% | 26% | 26% | 30% | 0% | 0% | 0% | 0% |
| **CZ** | 26% | 26% | 25% | 31% | 0% | 0% | 0% | 0% |
| **DE** | 23% | 23% | 22% | 26% | 72% | 66% | 68% | 86% |
| **DK** | 35% | 29% | 33% | 42% | 76% | 70% | 75% | 88% |
| **EE** | 36% | 27% | 34% | 47% | 51% | 43% | 47% | 73% |
| **ES** | 35% | 30% | 31% | 30% | 39% | 35% | 35% | 41% |
| **FI** | 33% | 28% | 28% | 45% | 56% | 50% | 47% | 80% |
| **FR** | 27% | 26% | 24% | 28% | 59% | 72% | 61% | 74% |

[9] Maximum values that are statistically not expected to be exceeded in more than 10% of the relevant hours.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **GB** | 30% | 29% | 32% | 45% | 57% | 53% | 59% | 75% |
| **GR** | 50% | 54% | 53% | 52% | 41% | 55% | 75% | 77% |
| **HR** | 34% | 33% | 28% | 40% | 0% | 0% | 0% | 0% |
| **HU** | 39% | 38% | 33% | 36% | 0% | 0% | 0% | 0% |
| **IE** | 38% | 35% | 31% | 58% | 51% | 51% | 51% | 78% |
| **IT** | 42% | 42% | 36% | 41% | 40% | 37% | 34% | 45% |
| **LT** | 36% | 30% | 33% | 43% | 0% | 0% | 0% | 0% |
| **LU** | 32% | 31% | 28% | 31% | 0% | 0% | 0% | 0% |
| **LV** | 27% | 22% | 27% | 36% | 50% | 36% | 42% | 74% |
| **ME** | 28% | 30% | 27% | 35% | 0% | 0% | 0% | 0% |
| **MK** | 30% | 30% | 27% | 30% | 0% | 0% | 0% | 0% |
| **NI** | 37% | 34% | 35% | 55% | 61% | 59% | 66% | 85% |
| **NL** | 26% | 29% | 28% | 37% | 67% | 68% | 70% | 90% |
| **NO** | 26% | 22% | 26% | 42% | 56% | 47% | 54% | 77% |
| **PL** | 32% | 29% | 31% | 36% | 74% | 59% | 58% | 77% |
| **PT** | 42% | 41% | 44% | 39% | 0% | 0% | 0% | 0% |
| **RO** | 31% | 30% | 27% | 36% | 0% | 0% | 0% | 0% |
| **RS** | 27% | 26% | 25% | 30% | 0% | 0% | 0% | 0% |
| **SE** | 32% | 26% | 28% | 42% | 52% | 43% | 47% | 66% |
| **SI** | 44% | 42% | 38% | 49% | 0% | 0% | 0% | 0% |
| **SK** | 34% | 30% | 27% | 32% | 0% | 0% | 0% | 0% |

*Table 12: LOAD FACTORS USED FOR THE NIGHTTIME DOWNWARD ADEQUACY ANALYSIS*[10]

[10] Maximum values that are statistically not expected to be exceeded in more than 10% of the relevant hours.

## Appendix 4: Load and generation constraints under severe conditions[11]

| Week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Albania** | | | | | | | | | | | | | | | | |
| Net generation capacity | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 | 1,60 |
| RAC (normal conditions) | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 | 1,14 |
| RAC (severe conditions) | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 | 1,09 |
| Net load (normal c.) | 1,05 | 1,05 | 1,05 | 1,05 | 1,10 | 1,15 | 1,15 | 1,20 | 1,20 | 1,20 | 1,20 | 1,20 | 1,20 | 1,15 | 1,10 | 1,05 |
| Net load (severe c.) | 1,08 | 1,08 | 1,08 | 1,08 | 1,13 | 1,18 | 1,18 | 1,23 | 1,23 | 1,23 | 1,23 | 1,23 | 1,23 | 1,18 | 1,13 | 1,08 |
| **Austria** | | | | | | | | | | | | | | | | |
| Net generation capacity | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 | 23,80 |
| RAC (normal conditions) | 12,58 | 12,53 | 12,90 | 12,81 | 12,62 | 12,51 | 12,47 | 12,44 | 12,44 | 12,40 | 12,31 | 11,38 | 11,30 | 10,47 | 10,97 | 10,67 |
| RAC (severe conditions) | 9,50 | 9,45 | 9,89 | 9,92 | 9,83 | 9,81 | 9,83 | 9,83 | 9,83 | 9,83 | 9,83 | 9,05 | 9,14 | 8,50 | 9,15 | 8,98 |
| Net load (normal c.) | 9,39 | 9,81 | 9,64 | 9,62 | 10,16 | 9,99 | 9,13 | 9,62 | 9,33 | 9,15 | 9,15 | 10,12 | 9,68 | 9,80 | 9,92 | 9,48 |
| Net load (severe c.) | 9,85 | 10,30 | 10,12 | 10,10 | 10,66 | 10,49 | 9,59 | 10,10 | 9,80 | 9,61 | 9,61 | 10,63 | 10,16 | 10,29 | 10,41 | 9,96 |
| **Belgium** | | | | | | | | | | | | | | | | |
| Net generation capacity | 21,69 | 21,71 | 21,72 | 21,74 | 21,76 | 21,76 | 21,77 | 21,77 | 21,78 | 21,78 | 21,79 | 21,80 | 21,80 | 21,81 | 21,81 | 21,82 |
| RAC (normal conditions) | 12,52 | 12,67 | 12,33 | 11,72 | 11,52 | 11,93 | 11,93 | 11,94 | 11,98 | 11,89 | 11,90 | 12,21 | 11,98 | 11,00 | 10,96 | 11,17 |
| RAC (severe conditions) | 10,57 | 10,71 | 10,37 | 9,75 | 9,68 | 10,09 | 10,09 | 10,10 | 10,14 | 10,08 | 10,08 | 10,39 | 10,16 | 9,29 | 9,24 | 9,45 |
| Net load (normal c.) | 10,85 | 10,50 | 10,39 | 10,66 | 10,43 | 10,07 | 9,46 | 9,09 | 9,08 | 9,88 | 9,76 | 10,27 | 10,05 | 10,66 | 10,04 | 10,15 |
| Net load (severe c.) | 11,12 | 10,76 | 10,65 | 10,92 | 10,54 | 10,19 | 9,58 | 9,21 | 9,19 | 9,99 | 9,87 | 10,38 | 10,16 | 10,89 | 10,27 | 10,38 |
| **Bosnia and Herzegovina** | | | | | | | | | | | | | | | | |
| Net generation capacity | 3,63 | 3,63 | 3,63 | 3,63 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,63 | 3,63 | 3,63 | 3,63 | 3,63 | 3,63 | 3,63 |
| RAC (normal conditions) | 3,08 | 3,08 | 3,08 | 3,08 | 2,80 | 2,80 | 2,80 | 2,80 | 2,80 | 3,08 | 3,08 | 3,08 | 3,08 | 3,08 | 3,08 | 3,08 |
| RAC (severe conditions) | 3,08 | 3,08 | 3,08 | 3,08 | 2,80 | 2,80 | 2,80 | 2,80 | 2,80 | 3,08 | 3,08 | 3,08 | 3,08 | 3,08 | 3,08 | 3,08 |
| Net load (normal c.) | 1,70 | 1,70 | 1,70 | 1,70 | 1,80 | 1,80 | 1,80 | 1,80 | 1,80 | 1,80 | 1,80 | 1,80 | 1,70 | 1,70 | 1,70 | 1,70 |
| Net load (severe c.) | 1,75 | 1,75 | 1,75 | 1,75 | 1,85 | 1,85 | 1,85 | 1,85 | 1,85 | 1,85 | 1,85 | 1,85 | 1,85 | 1,85 | 1,85 | 1,85 |

[11] All data in GW

| Week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bulgaria** | | | | | | | | | | | | | | | | |
| Net generation capacity | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 | 13,73 |
| RAC (normal conditions) | 8,98 | 8,98 | 9,03 | 9,23 | 9,43 | 9,33 | 8,98 | 8,98 | 9,18 | 9,08 | 8,18 | 8,25 | 8,28 | 8,18 | 7,78 | 8,18 |
| RAC (severe conditions) | 8,23 | 8,23 | 8,28 | 8,48 | 8,68 | 8,57 | 8,23 | 8,23 | 8,43 | 8,33 | 7,43 | 7,49 | 7,53 | 7,43 | 7,03 | 7,43 |
| Net load (normal c.) | 3,55 | 3,74 | 3,92 | 4,01 | 3,95 | 4,13 | 4,15 | 4,36 | 4,37 | 4,42 | 4,38 | 4,35 | 4,25 | 4,02 | 3,93 | 3,78 |
| Net load (severe c.) | 3,58 | 3,81 | 4,03 | 4,17 | 4,19 | 4,46 | 4,57 | 4,88 | 4,90 | 4,95 | 4,81 | 4,70 | 4,51 | 4,18 | 4,01 | 3,81 |
| **Croatia** | | | | | | | | | | | | | | | | |
| Net generation capacity | 4,17 | 4,17 | 4,17 | 4,17 | 4,17 | 4,17 | 4,17 | 4,19 | 4,19 | 4,19 | 4,19 | 4,19 | 4,21 | 4,21 | 4,21 | 4,21 |
| RAC (normal conditions) | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,37 | 3,37 | 3,37 | 3,37 | 3,37 | 3,39 | 3,29 | 3,29 | 3,29 |
| RAC (severe conditions) | 3,20 | 3,20 | 3,20 | 3,20 | 3,20 | 3,20 | 3,20 | 3,22 | 3,22 | 3,22 | 3,22 | 3,22 | 3,24 | 3,14 | 3,14 | 3,14 |
| Net load (normal c.) | 2,17 | 2,16 | 2,62 | 2,15 | 2,35 | 2,45 | 2,43 | 2,60 | 2,81 | 2,79 | 2,48 | 2,55 | 2,42 | 2,39 | 2,36 | 2,33 |
| Net load (severe c.) | 2,28 | 2,27 | 2,75 | 2,26 | 2,47 | 2,57 | 2,55 | 2,73 | 2,95 | 2,93 | 2,60 | 2,68 | 2,54 | 2,51 | 2,48 | 2,45 |
| **Cyprus** | | | | | | | | | | | | | | | | |
| Net generation capacity | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 | 1,67 |
| RAC (normal conditions) | 1,41 | 1,41 | 1,43 | 1,43 | 1,43 | 1,43 | 1,43 | 1,43 | 1,43 | 1,43 | 1,43 | 1,43 | 1,43 | 1,43 | 1,39 | 1,39 |
| RAC (severe conditions) | 1,35 | 1,35 | 1,37 | 1,37 | 1,37 | 1,37 | 1,37 | 1,37 | 1,37 | 1,37 | 1,37 | 1,37 | 1,37 | 1,37 | 1,31 | 1,31 |
| Net load (normal c.) | 0,68 | 0,71 | 0,76 | 0,79 | 0,82 | 0,86 | 0,89 | 0,91 | 0,91 | 0,87 | 0,80 | 0,83 | 0,87 | 0,80 | 0,74 | 0,71 |
| Net load (severe c.) | 0,75 | 0,78 | 0,83 | 0,87 | 0,90 | 0,94 | 0,98 | 1,00 | 1,00 | 0,96 | 0,88 | 0,91 | 0,95 | 0,88 | 0,81 | 0,78 |
| **Czech Republic** | | | | | | | | | | | | | | | | |
| Net generation capacity | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 | 20,52 |
| RAC (normal conditions) | 10,71 | 9,46 | 10,50 | 10,51 | 9,25 | 9,09 | 9,38 | 9,37 | 9,73 | 9,70 | 9,56 | 9,81 | 10,07 | 10,15 | 10,28 | 10,65 |
| RAC (severe conditions) | 10,19 | 8,94 | 9,98 | 9,98 | 8,73 | 8,56 | 8,85 | 8,84 | 9,21 | 9,17 | 9,03 | 9,29 | 9,54 | 9,62 | 9,76 | 10,12 |
| Net load (normal c.) | 8,03 | 8,01 | 7,95 | 7,88 | 7,70 | 7,64 | 7,67 | 7,64 | 7,51 | 7,65 | 7,69 | 7,86 | 7,88 | 8,04 | 7,92 | 8,07 |
| Net load (severe c.) | 8,03 | 8,01 | 7,95 | 7,88 | 7,70 | 7,64 | 7,67 | 7,64 | 7,51 | 7,65 | 7,69 | 7,86 | 7,88 | 8,04 | 7,92 | 8,07 |
| **Denmark** | | | | | | | | | | | | | | | | |
| Net generation capacity | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 | 12,87 |
| RAC (normal conditions) | 2,63 | 2,63 | 3,18 | 3,16 | 3,16 | 3,16 | 3,16 | 3,16 | 3,16 | 2,61 | 2,20 | 2,20 | 2,20 | 3,59 | 3,19 | 2,76 |
| RAC (severe conditions) | 2,63 | 2,63 | 3,18 | 3,16 | 3,16 | 3,16 | 3,16 | 3,16 | 3,16 | 2,61 | 2,20 | 2,20 | 2,20 | 3,59 | 3,19 | 2,76 |

| Week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Net load (normal c.) | 4,64 | 4,89 | 4,85 | 4,72 | 4,71 | 4,39 | 4,15 | 4,11 | 4,34 | 4,66 | 4,77 | 4,76 | 4,80 | 4,79 | 4,99 | 4,86 |
| Net load (severe c.) | 4,84 | 5,11 | 5,06 | 4,93 | 4,92 | 4,58 | 4,33 | 4,29 | 4,53 | 4,87 | 4,98 | 4,97 | 5,01 | 5,00 | 5,21 | 5,07 |
| **Estonia** | | | | | | | | | | | | | | | | |
| Net generation capacity | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 | 2,74 |
| RAC (normal conditions) | 1,84 | 1,65 | 1,65 | 1,65 | 1,65 | 1,81 | 2,01 | 2,01 | 2,01 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,84 | 1,84 |
| RAC (severe conditions) | 1,64 | 1,44 | 1,44 | 1,44 | 1,44 | 1,61 | 1,80 | 1,80 | 1,80 | 1,61 | 1,61 | 1,61 | 1,61 | 1,61 | 1,64 | 1,64 |
| Net load (normal c.) | 0,99 | 0,98 | 0,98 | 0,97 | 0,95 | 0,93 | 0,93 | 0,93 | 0,95 | 0,95 | 0,95 | 0,97 | 0,97 | 0,98 | 0,99 | 0,99 |
| Net load (severe c.) | 0,99 | 0,98 | 0,98 | 0,97 | 0,95 | 0,93 | 0,93 | 0,93 | 0,95 | 0,95 | 0,95 | 0,97 | 0,97 | 0,98 | 0,99 | 0,99 |
| **Finland** | | | | | | | | | | | | | | | | |
| Net generation capacity | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 | 17,22 |
| RAC (normal conditions) | 8,49 | 9,69 | 9,49 | 9,19 | 9,09 | 9,69 | 9,39 | 9,39 | 8,99 | 9,39 | 9,39 | 9,59 | 9,19 | 9,19 | 9,19 | 9,19 |
| RAC (severe conditions) | 8,21 | 9,41 | 9,21 | 8,91 | 8,81 | 9,41 | 9,11 | 9,11 | 8,71 | 9,11 | 9,11 | 9,31 | 8,91 | 8,91 | 8,91 | 8,91 |
| Net load (normal c.) | 9,40 | 9,30 | 9,00 | 9,00 | 9,00 | 8,90 | 8,80 | 8,80 | 8,90 | 9,30 | 9,40 | 9,40 | 9,40 | 9,50 | 9,50 | 9,60 |
| Net load (severe c.) | 9,70 | 9,40 | 9,30 | 9,30 | 9,10 | 8,90 | 8,90 | 9,00 | 9,40 | 9,60 | 9,60 | 9,60 | 9,60 | 9,70 | 9,70 | 9,80 |
| **France** | | | | | | | | | | | | | | | | |
| Net generation capacity | 121,97 | 121,97 | 121,97 | 121,97 | 121,85 | 121,85 | 121,85 | 121,85 | 121,85 | 121,85 | 121,85 | 121,85 | 121,85 | 121,96 | 121,96 | 121,96 |
| RAC (normal conditions) | 71,63 | 72,59 | 73,05 | 74,09 | 73,80 | 76,57 | 73,39 | 76,19 | 75,01 | 72,63 | 73,31 | 71,93 | 70,90 | 68,75 | 70,42 | 70,41 |
| RAC (severe conditions) | 65,83 | 66,64 | 66,35 | 67,21 | 66,94 | 69,41 | 66,20 | 68,38 | 67,19 | 64,89 | 65,02 | 62,20 | 60,47 | 57,67 | 59,42 | 59,41 |
| Net load (normal c.) | 54,13 | 54,29 | 54,46 | 54,57 | 54,70 | 54,76 | 54,75 | 54,64 | 53,82 | 49,41 | 47,48 | 49,96 | 53,67 | 53,83 | 54,03 | 54,40 |
| Net load (severe c.) | 55,59 | 55,90 | 56,19 | 56,37 | 56,54 | 56,63 | 56,63 | 56,53 | 55,71 | 51,29 | 49,35 | 51,78 | 55,42 | 55,46 | 55,42 | 55,46 |
| **FYR of Macedonia** | | | | | | | | | | | | | | | | |
| Net generation capacity | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 | 1,81 |
| RAC (normal conditions) | 1,17 | 1,17 | 1,17 | 1,17 | 0,97 | 0,97 | 0,97 | 0,97 | 0,97 | 0,97 | 0,97 | 0,97 | 0,97 | 0,97 | 0,97 | 0,97 |
| RAC (severe conditions) | 0,83 | 0,83 | 0,83 | 0,83 | 0,63 | 0,63 | 0,63 | 0,63 | 0,63 | 0,63 | 0,63 | 0,63 | 0,63 | 0,63 | 0,63 | 0,63 |
| Net load (normal c.) | 0,82 | 0,81 | 0,81 | 0,89 | 0,81 | 0,79 | 0,82 | 0,83 | 0,92 | 0,87 | 0,89 | 0,89 | 0,83 | 0,83 | 0,78 | 0,79 |
| Net load (severe c.) | 0,91 | 0,90 | 0,90 | 0,98 | 0,90 | 0,87 | 0,91 | 0,92 | 1,02 | 0,96 | 0,98 | 0,98 | 0,92 | 0,92 | 0,86 | 0,88 |
| | | | | | | | | | | | | | | | | |

| Week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Germany** | | | | | | | | | | | | | | | | |
| Net generation capacity | 185,12 | 185,12 | 185,88 | 185,88 | 186,55 | 186,55 | 186,55 | 186,55 | 186,55 | 187,19 | 187,19 | 187,19 | 187,19 | 187,82 | 187,82 | 187,82 |
| RAC (normal conditions) | 102,17 | 103,51 | 102,97 | 102,26 | 100,81 | 102,26 | 99,41 | 99,74 | 101,18 | 102,41 | 104,99 | 104,36 | 106,41 | 108,13 | 105,37 | 105,97 |
| RAC (severe conditions) | 84,95 | 86,29 | 85,75 | 85,03 | 83,44 | 84,89 | 82,04 | 82,37 | 83,81 | 84,89 | 87,47 | 86,84 | 88,89 | 90,48 | 87,72 | 88,32 |
| Net load (normal c.) | 70,62 | 71,68 | 72,70 | 72,69 | 72,32 | 70,77 | 70,14 | 70,62 | 69,47 | 67,65 | 69,61 | 72,02 | 71,32 | 72,53 | 72,82 | 72,46 |
| Net load (severe c.) | 70,62 | 71,68 | 72,70 | 72,69 | 72,32 | 70,77 | 70,14 | 70,62 | 69,47 | 67,65 | 69,61 | 72,02 | 71,32 | 72,53 | 72,82 | 72,46 |
| **Great Britain** | | | | | | | | | | | | | | | | |
| Net generation capacity | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 | 72,63 |
| RAC (normal conditions) | 42,30 | 43,91 | 43,39 | 41,92 | 39,80 | 40,17 | 42,82 | 44,12 | 43,88 | 40,90 | 44,20 | 45,27 | 45,09 | 44,73 | 42,85 | 44,30 |
| RAC (severe conditions) | 40,35 | 41,96 | 41,44 | 39,97 | 37,85 | 38,22 | 40,87 | 42,17 | 41,93 | 38,95 | 42,25 | 43,32 | 43,14 | 42,78 | 40,90 | 42,34 |
| Net load (normal c.) | 38,40 | 38,40 | 38,40 | 38,40 | 38,40 | 38,00 | 38,00 | 37,80 | 37,10 | 37,20 | 37,30 | 38,20 | 37,70 | 38,70 | 39,70 | 40,30 |
| Net load (severe c.) | 39,90 | 39,90 | 39,90 | 39,90 | 39,90 | 39,50 | 39,50 | 39,30 | 38,60 | 38,70 | 38,80 | 39,70 | 39,20 | 40,20 | 41,20 | 41,80 |
| **Greece** | | | | | | | | | | | | | | | | |
| Net generation capacity | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 | 17,58 |
| RAC (normal conditions) | 13,11 | 13,11 | 13,11 | 13,55 | 13,82 | 13,82 | 13,82 | 13,82 | 13,82 | 13,82 | 13,82 | 13,56 | 13,29 | 13,29 | 12,90 | 12,63 |
| RAC (severe conditions) | 12,21 | 12,21 | 12,21 | 12,65 | 12,92 | 12,92 | 12,89 | 12,89 | 12,89 | 12,92 | 13,02 | 12,76 | 12,49 | 12,49 | 12,10 | 11,83 |
| Net load (normal c.) | 8,40 | 8,50 | 8,90 | 9,20 | 9,40 | 9,40 | 9,60 | 9,70 | 9,70 | 9,30 | 9,00 | 8,90 | 8,50 | 8,30 | 8,20 | 7,90 |
| Net load (severe c.) | 8,60 | 8,70 | 9,10 | 9,40 | 9,70 | 9,70 | 9,90 | 10,10 | 10,10 | 9,60 | 9,20 | 9,10 | 8,80 | 8,40 | 8,30 | 7,90 |
| **Hungary** | | | | | | | | | | | | | | | | |
| Net generation capacity | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 | 8,78 |
| RAC (normal conditions) | 5,36 | 4,71 | 5,19 | 5,19 | 5,66 | 5,12 | 5,12 | 5,30 | 5,27 | 5,73 | 5,68 | 5,72 | 5,39 | 5,74 | 5,83 | 5,31 |
| RAC (severe conditions) | 5,16 | 4,51 | 4,99 | 4,99 | 5,46 | 4,92 | 4,92 | 5,10 | 5,07 | 5,53 | 5,48 | 5,52 | 5,19 | 5,54 | 5,63 | 5,11 |
| Net load (normal c.) | 5,42 | 5,37 | 5,37 | 5,37 | 5,42 | 5,52 | 5,52 | 5,42 | 5,42 | 5,47 | 5,47 | 5,47 | 5,37 | 5,37 | 5,37 | 5,37 |
| Net load (severe c.) | 5,67 | 5,67 | 5,67 | 5,67 | 5,77 | 5,77 | 5,77 | 5,67 | 5,67 | 5,67 | 5,67 | 5,67 | 5,67 | 5,62 | 5,57 | 5,47 |
| **Ireland** | | | | | | | | | | | | | | | | |
| Net generation capacity | 8,85 | 8,15 | 8,39 | 8,34 | 8,34 | 8,34 | 8,62 | 8,62 | 8,52 | 8,52 | 8,81 | 8,87 | 8,78 | 8,61 | 8,81 | 8,81 |
| RAC (normal conditions) | 6,25 | 4,86 | 5,33 | 5,32 | 5,19 | 5,19 | 5,76 | 5,76 | 5,54 | 5,55 | 6,12 | 6,39 | 6,30 | 6,15 | 5,87 | 6,21 |
| RAC (severe conditions) | 6,07 | 4,68 | 5,18 | 5,12 | 4,99 | 4,99 | 5,56 | 5,56 | 5,33 | 5,34 | 5,91 | 6,23 | 6,15 | 6,02 | 5,75 | 6,08 |

| Week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Net load (normal c.) | 3,42 | 3,43 | 3,42 | 3,45 | 3,41 | 3,36 | 3,40 | 3,34 | 3,27 | 3,22 | 3,32 | 3,40 | 3,37 | 3,38 | 3,46 | 3,49 |
| Net load (severe c.) | 3,42 | 3,43 | 3,42 | 3,45 | 3,41 | 3,36 | 3,40 | 3,34 | 3,27 | 3,22 | 3,32 | 3,40 | 3,37 | 3,38 | 3,46 | 3,49 |
| **Italy** | | | | | | | | | | | | | | | | |
| Net generation capacity | 118,54 | 118,58 | 118,62 | 118,66 | 118,70 | 118,74 | 118,78 | 118,82 | 118,86 | 118,90 | 118,94 | 118,98 | 119,02 | 119,06 | 119,10 | 119,14 |
| RAC (normal conditions) | 54,27 | 57,48 | 60,66 | 60,99 | 63,36 | 63,51 | 63,46 | 62,34 | 58,69 | 53,67 | 55,30 | 55,44 | 57,35 | 55,81 | 56,68 | 57,07 |
| RAC (severe conditions) | 49,76 | 52,95 | 56,15 | 56,51 | 58,87 | 59,03 | 59,02 | 57,89 | 54,23 | 49,17 | 50,72 | 50,92 | 52,83 | 51,29 | 52,16 | 52,56 |
| Net load (normal c.) | 42,00 | 42,50 | 44,00 | 47,00 | 48,50 | 49,00 | 50,00 | 48,50 | 47,50 | 43,00 | 35,50 | 41,00 | 42,50 | 44,00 | 44,50 | 44,00 |
| Net load (severe c.) | 47,50 | 48,00 | 49,50 | 53,50 | 54,00 | 55,00 | 54,50 | 53,50 | 52,50 | 49,00 | 41,50 | 47,00 | 48,50 | 49,50 | 50,00 | 50,00 |
| **Latvia** | | | | | | | | | | | | | | | | |
| Net generation capacity | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 | 2,9 |
| RAC (normal conditions) | 1,1 | 1,0 | 1,0 | 1,0 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,1 | 1,1 | 1,1 | 1,1 |
| RAC (severe conditions) | 0,8 | 0,7 | 0,7 | 0,7 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 0,8 | 0,8 | 0,8 | 0,8 |
| Net load (normal c.) | 1,0 | 0,9 | 0,9 | 1,0 | 0,9 | 0,9 | 0,9 | 0,9 | 1,0 | 1,0 | 0,9 | 1,0 | 0,9 | 0,9 | 1,0 | 1,0 |
| Net load (severe c.) | 1,0 | 1,0 | 1,0 | 1,0 | 0,9 | 1,0 | 0,9 | 0,9 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 0,9 | 1,0 | 1,0 |
| **Lithuania** | | | | | | | | | | | | | | | | |
| Net generation capacity | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 | 4,08 |
| RAC (normal conditions) | 2,20 | 2,14 | 2,17 | 2,17 | 2,09 | 2,11 | 2,22 | 2,14 | 2,24 | 2,25 | 2,32 | 2,39 | 2,39 | 2,37 | 2,38 | 2,17 |
| RAC (severe conditions) | 2,09 | 2,03 | 2,05 | 2,06 | 2,00 | 2,00 | 2,11 | 2,04 | 2,15 | 2,15 | 2,21 | 2,26 | 2,26 | 2,24 | 2,24 | 2,04 |
| Net load (normal c.) | 1,41 | 1,38 | 1,39 | 1,42 | 1,33 | 1,44 | 1,43 | 1,44 | 1,43 | 1,43 | 1,36 | 1,44 | 1,40 | 1,40 | 1,39 | 1,38 |
| Net load (severe c.) | 1,49 | 1,46 | 1,47 | 1,50 | 1,41 | 1,53 | 1,52 | 1,53 | 1,52 | 1,51 | 1,45 | 1,52 | 1,48 | 1,48 | 1,47 | 1,46 |
| **Luxembourg** | | | | | | | | | | | | | | | | |
| Net generation capacity | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 | 1,91 |
| RAC (normal conditions) | 1,39 | 1,39 | 1,39 | 1,39 | 1,39 | 1,39 | 1,39 | 1,39 | 1,39 | 1,39 | 1,39 | 1,29 | 1,29 | 1,39 | 1,39 | 1,29 |
| RAC (severe conditions) | 1,28 | 1,28 | 1,28 | 1,28 | 1,28 | 1,28 | 1,28 | 1,28 | 1,28 | 1,28 | 1,28 | 1,18 | 1,18 | 1,28 | 1,28 | 1,17 |
| Net load (normal c.) | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 |
| Net load (severe c.) | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 | 0,98 |
| | | | | | | | | | | | | | | | | |

| Week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Montenegro** | | | | | | | | | | | | | | | | |
| Net generation capacity | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 | 0,87 |
| RAC (normal conditions) | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,51 | 0,51 | 0,51 | 0,51 | 0,82 | 0,82 | 0,82 |
| RAC (severe conditions) | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,82 | 0,51 | 0,51 | 0,51 | 0,51 | 0,82 | 0,82 | 0,82 |
| Net load (normal c.) | 0,43 | 0,43 | 0,44 | 0,44 | 0,51 | 0,51 | 0,52 | 0,52 | 0,53 | 0,53 | 0,54 | 0,56 | 0,54 | 0,49 | 0,48 | 0,47 |
| Net load (severe c.) | 0,43 | 0,43 | 0,44 | 0,44 | 0,51 | 0,52 | 0,53 | 0,53 | 0,54 | 0,55 | 0,56 | 0,56 | 0,55 | 0,49 | 0,48 | 0,47 |
| **The Netherlands** | | | | | | | | | | | | | | | | |
| Net generation capacity | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 | 31,84 |
| RAC (normal conditions) | 23,46 | 23,46 | 23,82 | 23,64 | 23,79 | 21,93 | 23,66 | 23,23 | 22,79 | 22,79 | 24,67 | 24,67 | 24,08 | 24,15 | 24,15 | 24,15 |
| RAC (severe conditions) | 21,22 | 21,22 | 21,58 | 21,39 | 21,54 | 19,69 | 21,42 | 20,98 | 20,55 | 20,55 | 22,42 | 22,42 | 21,83 | 21,91 | 21,91 | 21,91 |
| Net load (normal c.) | 14,18 | 14,58 | 15,19 | 14,34 | 14,77 | 14,51 | 14,32 | 14,54 | 13,46 | 13,67 | 13,84 | 14,39 | 14,68 | 14,90 | 14,52 | 14,27 |
| Net load (severe c.) | 14,18 | 14,58 | 15,19 | 14,34 | 14,77 | 14,51 | 14,32 | 14,54 | 13,46 | 13,67 | 13,84 | 14,39 | 14,68 | 14,90 | 14,52 | 14,27 |
| **Norway** | | | | | | | | | | | | | | | | |
| Net generation capacity | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 | 32,89 |
| RAC (normal conditions) | 24,69 | 24,69 | 24,69 | 25,99 | 25,99 | 25,99 | 25,99 | 25,99 | 24,69 | 24,69 | 24,69 | 24,69 | 24,04 | 24,04 | 24,04 | 24,04 |
| RAC (severe conditions) | 23,08 | 23,08 | 23,08 | 24,38 | 24,38 | 24,38 | 24,38 | 24,38 | 23,08 | 23,08 | 23,08 | 23,08 | 22,43 | 22,43 | 22,43 | 22,43 |
| Net load (normal c.) | 14,50 | 14,50 | 14,50 | 13,10 | 13,10 | 13,10 | 13,10 | 13,10 | 13,60 | 13,60 | 13,60 | 13,60 | 16,00 | 16,00 | 16,00 | 16,00 |
| Net load (severe c.) | 14,73 | 14,73 | 14,73 | 13,26 | 13,26 | 13,26 | 13,26 | 13,26 | 13,78 | 13,78 | 13,78 | 13,78 | 16,30 | 16,30 | 16,30 | 16,30 |
| **Poland** | | | | | | | | | | | | | | | | |
| Net generation capacity | 35,82 | 35,87 | 35,87 | 35,87 | 35,92 | 35,92 | 35,92 | 35,92 | 35,92 | 35,99 | 35,99 | 35,99 | 35,99 | 36,13 | 36,13 | 36,13 |
| RAC (normal conditions) | 19,35 | 19,13 | 18,80 | 19,05 | 19,47 | 19,47 | 19,37 | 18,67 | 18,81 | 18,91 | 19,25 | 19,16 | 19,62 | 19,64 | 18,97 | 20,38 |
| RAC (severe conditions) | 18,67 | 18,45 | 18,10 | 18,38 | 18,01 | 18,01 | 17,92 | 17,21 | 17,35 | 17,79 | 18,13 | 18,04 | 18,50 | 18,99 | 18,33 | 19,74 |
| Net load (normal c.) | 19,15 | 19,15 | 18,78 | 19,33 | 19,15 | 19,15 | 19,15 | 19,15 | 19,15 | 19,33 | 18,87 | 19,15 | 19,15 | 18,96 | 19,15 | 19,24 |
| Net load (severe c.) | 20,07 | 20,07 | 20,07 | 20,07 | 19,89 | 19,89 | 19,89 | 19,89 | 19,89 | 20,17 | 20,17 | 20,17 | 20,17 | 19,98 | 20,17 | 20,26 |
| **Portugal** | | | | | | | | | | | | | | | | |
| Net generation capacity | 17,70 | 17,70 | 17,70 | 17,70 | 17,72 | 17,72 | 17,72 | 17,72 | 17,72 | 17,74 | 17,74 | 17,74 | 17,74 | 17,75 | 17,75 | 17,75 |
| RAC (normal conditions) | 9,85 | 9,79 | 10,17 | 10,38 | 9,90 | 9,80 | 9,67 | 9,64 | 9,45 | 9,35 | 9,27 | 9,13 | 9,13 | 9,19 | 9,17 | 9,11 |
| RAC (severe conditions) | 8,11 | 8,04 | 8,43 | 8,65 | 8,35 | 8,29 | 8,15 | 8,13 | 8,00 | 7,96 | 7,85 | 7,72 | 7,64 | 7,83 | 7,81 | 7,76 |

| Week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Net load (normal c.) | 6,70 | 6,84 | 6,87 | 6,98 | 7,04 | 7,06 | 7,20 | 7,20 | 6,85 | 6,55 | 6,26 | 6,27 | 6,77 | 6,84 | 6,92 | 6,93 |
| Net load (severe c.) | 7,01 | 7,12 | 7,14 | 7,32 | 7,37 | 7,44 | 7,59 | 7,59 | 7,23 | 6,91 | 6,57 | 6,56 | 7,11 | 7,19 | 7,25 | 7,23 |
| **Romania** | | | | | | | | | | | | | | | | |
| Net generation capacity | 21,67 | 21,67 | 21,79 | 21,79 | 21,92 | 21,92 | 22,12 | 22,12 | 22,12 | 22,15 | 22,15 | 22,15 | 22,15 | 22,16 | 22,16 | 22,16 |
| RAC (normal conditions) | 14,40 | 13,74 | 14,17 | 15,06 | 15,01 | 14,11 | 14,38 | 14,10 | 13,97 | 14,56 | 14,27 | 14,57 | 15,69 | 15,20 | 15,12 | 13,52 |
| RAC (severe conditions) | 14,40 | 13,74 | 14,17 | 15,06 | 15,01 | 14,11 | 14,38 | 14,10 | 13,97 | 14,56 | 14,27 | 14,57 | 15,69 | 15,20 | 15,12 | 13,52 |
| Net load (normal c.) | 6,21 | 6,47 | 6,68 | 6,43 | 6,40 | 6,54 | 6,38 | 6,48 | 6,44 | 6,46 | 6,38 | 6,59 | 6,48 | 6,40 | 6,37 | 6,31 |
| Net load (severe c.) | 6,71 | 6,97 | 7,18 | 6,93 | 6,90 | 7,04 | 6,88 | 6,98 | 6,94 | 6,96 | 6,88 | 7,09 | 6,98 | 6,90 | 6,87 | 6,81 |
| **Serbia** | | | | | | | | | | | | | | | | |
| Net generation capacity | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 | 8,54 |
| RAC (normal conditions) | 4,64 | 4,64 | 5,07 | 5,55 | 5,45 | 5,34 | 5,32 | 5,23 | 5,06 | 4,76 | 4,45 | 4,54 | 4,85 | 5,22 | 5,25 | 5,59 |
| RAC (severe conditions) | 4,54 | 4,54 | 4,97 | 5,45 | 5,35 | 5,24 | 5,22 | 5,13 | 4,96 | 4,66 | 4,35 | 4,44 | 4,75 | 5,12 | 5,15 | 5,49 |
| Net load (normal c.) | 4,40 | 4,22 | 4,62 | 3,98 | 4,10 | 4,22 | 4,16 | 4,36 | 4,25 | 4,72 | 4,17 | 4,12 | 4,08 | 4,07 | 4,16 | 4,29 |
| Net load (severe c.) | 4,62 | 4,62 | 4,62 | 4,62 | 4,67 | 4,67 | 4,67 | 4,67 | 4,67 | 4,72 | 4,72 | 4,72 | 4,72 | 4,36 | 4,36 | 4,36 |
| **Slovakia** | | | | | | | | | | | | | | | | |
| Net generation capacity | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 | 8,01 |
| RAC (normal conditions) | 4,56 | 4,56 | 4,06 | 4,05 | 4,59 | 4,59 | 4,59 | 4,60 | 4,59 | 4,61 | 4,52 | 4,50 | 4,51 | 4,47 | 4,47 | 4,46 |
| RAC (severe conditions) | 3,94 | 4,01 | 3,53 | 3,48 | 3,97 | 4,00 | 3,97 | 4,05 | 4,00 | 4,01 | 3,94 | 3,93 | 3,92 | 3,93 | 3,98 | 4,05 |
| Net load (normal c.) | 3,47 | 3,47 | 3,43 | 3,50 | 3,47 | 3,55 | 3,47 | 3,26 | 3,28 | 3,32 | 3,42 | 3,53 | 3,45 | 3,50 | 3,52 | 3,61 |
| Net load (severe c.) | 3,55 | 3,55 | 3,66 | 3,67 | 3,66 | 3,58 | 3,60 | 3,47 | 3,50 | 3,52 | 3,48 | 3,64 | 3,55 | 3,71 | 3,75 | 3,78 |
| **Slovenia** | | | | | | | | | | | | | | | | |
| Net generation capacity | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 | 3,35 |
| RAC (normal conditions) | 2,59 | 2,55 | 2,53 | 2,50 | 2,52 | 2,56 | 2,48 | 2,53 | 2,43 | 2,49 | 2,46 | 2,47 | 2,43 | 2,44 | 2,46 | 2,59 |
| RAC (severe conditions) | 2,21 | 2,23 | 2,19 | 2,12 | 2,23 | 2,14 | 2,14 | 2,13 | 2,01 | 2,04 | 1,98 | 2,10 | 2,01 | 1,94 | 2,00 | 2,19 |
| Net load (normal c.) | 1,64 | 1,62 | 1,65 | 1,62 | 1,56 | 1,67 | 1,69 | 1,57 | 1,65 | 1,61 | 1,63 | 1,60 | 1,69 | 1,67 | 1,72 | 1,70 |
| Net load (severe c.) | 1,88 | 1,68 | 1,68 | 1,63 | 1,70 | 1,75 | 1,81 | 1,68 | 1,72 | 1,80 | 1,85 | 1,74 | 1,73 | 1,84 | 1,89 | 1,88 |
| | | | | | | | | | | | | | | | | |

| Week | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Spain** | | | | | | | | | | | | | | | | |
| Net generation capacity | 101,90 | 101,91 | 101,92 | 101,93 | 101,95 | 101,96 | 101,97 | 101,98 | 101,99 | 102,00 | 102,01 | 102,02 | 102,03 | 102,04 | 102,05 | 102,06 |
| RAC (normal conditions) | 54,02 | 53,64 | 53,92 | 55,30 | 55,48 | 55,34 | 55,35 | 55,36 | 55,37 | 55,39 | 54,60 | 54,61 | 55,02 | 55,64 | 56,48 | 55,61 |
| RAC (severe conditions) | 50,38 | 50,00 | 50,28 | 51,66 | 52,19 | 52,20 | 52,21 | 52,22 | 52,23 | 51,72 | 50,92 | 50,93 | 51,34 | 52,27 | 53,10 | 52,22 |
| Net load (normal c.) | 36,95 | 35,05 | 36,00 | 36,95 | 36,95 | 36,95 | 36,00 | 36,84 | 36,84 | 32,63 | 33,20 | 34,10 | 34,10 | 31,73 | 31,73 | 31,82 |
| Net load (severe c.) | 39,00 | 37,00 | 38,00 | 39,00 | 39,00 | 39,00 | 38,00 | 38,88 | 38,88 | 34,45 | 35,05 | 36,00 | 36,00 | 33,50 | 33,50 | 33,60 |
| **Sweden** | | | | | | | | | | | | | | | | |
| Net generation capacity | 39,64 | 39,64 | 39,64 | 39,64 | 39,69 | 39,69 | 39,69 | 39,69 | 39,74 | 39,74 | 39,74 | 39,74 | 39,79 | 39,79 | 39,79 | 39,79 |
| RAC (normal conditions) | 23,98 | 23,79 | 26,38 | 27,77 | 29,31 | 29,74 | 29,74 | 29,74 | 28,54 | 27,68 | 27,68 | 26,69 | 26,68 | 26,53 | 25,35 | 27,38 |
| RAC (severe conditions) | 22,04 | 21,85 | 24,44 | 25,83 | 27,36 | 27,79 | 27,79 | 27,79 | 26,59 | 25,73 | 25,73 | 24,74 | 24,72 | 24,57 | 23,39 | 25,42 |
| Net load (normal c.) | 15,00 | 15,20 | 14,70 | 15,10 | 14,60 | 13,70 | 12,80 | 12,80 | 13,30 | 14,80 | 14,90 | 15,00 | 15,20 | 15,20 | 15,20 | 15,70 |
| Net load (severe c.) | 15,50 | 15,70 | 15,20 | 15,60 | 15,10 | 14,20 | 13,30 | 13,30 | 13,80 | 15,30 | 15,40 | 15,50 | 15,70 | 15,70 | 15,70 | 16,20 |
| **Switzerland** | | | | | | | | | | | | | | | | |
| Net generation capacity | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 | 18,21 |
| RAC (normal conditions) | 14,75 | 13,77 | 13,40 | 13,40 | 13,77 | 14,75 | 14,75 | 14,75 | 14,75 | 13,56 | 13,19 | 12,82 | 14,01 | 14,01 | 14,39 | 14,39 |
| RAC (severe conditions) | 14,75 | 13,77 | 13,40 | 13,40 | 13,77 | 14,75 | 14,75 | 14,75 | 14,75 | 13,56 | 13,19 | 12,82 | 14,01 | 14,01 | 14,39 | 14,39 |
| Net load (normal c.) | 8,91 | 8,91 | 8,91 | 8,91 | 8,36 | 8,36 | 8,36 | 8,36 | 8,36 | 8,43 | 8,43 | 8,43 | 8,43 | 8,87 | 8,87 | 8,87 |
| Net load (severe c.) | 9,91 | 9,91 | 9,91 | 9,91 | 9,36 | 9,36 | 9,36 | 9,36 | 9,36 | 9,43 | 9,43 | 9,43 | 9,43 | 9,87 | 9,87 | 9,87 |
| **Ukraine (West Power System)** | | | | | | | | | | | | | | | | |
| Net generation capacity | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 | 2,59 |
| RAC (normal conditions) | 1,76 | 1,96 | 1,74 | 1,79 | 1,90 | 1,90 | 1,90 | 1,90 | 1,90 | 1,71 | 1,71 | 1,71 | 1,89 | 1,89 | 1,71 | 1,76 |
| RAC (severe conditions) | 1,74 | 1,95 | 1,72 | 1,77 | 1,89 | 1,89 | 1,89 | 1,89 | 1,89 | 1,70 | 1,70 | 1,70 | 1,89 | 1,89 | 1,70 | 1,75 |
| Net load (normal c.) | 0,75 | 0,75 | 0,75 | 0,75 | 0,73 | 0,73 | 0,73 | 0,73 | 0,73 | 0,73 | 0,73 | 0,73 | 0,73 | 0,79 | 0,79 | 0,79 |
| Net load (severe c.) | 0,77 | 0,77 | 0,77 | 0,77 | 0,75 | 0,75 | 0,75 | 0,75 | 0,75 | 0,75 | 0,75 | 0,75 | 0,75 | 0,81 | 0,81 | 0,81 |