Strategic Reserves for Winter 2017-18

Presentation of input data for Belgium for the next 3 winters

Public Consultation 19 September 2016 – 3 October 2016

Input data for Belgium are taken from the latest forecasts available

This following slides summarize the assumptions that will be taken for the volume calculation exercise for the next 3 winters (2017-18, 2018-19, 2019-20).

The assumptions were elaborated by Elia and the FOD Economie (as well as with input from the regions for the renewable production).

An Excel file containing all data and charts was also elaborated. This is the first time such consultation takes place.

Data for Belgium are presented in 3 categories

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- ✓ **Generation**
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  - Pump/turbine/Hydro
- ✓ **Interconnections**

Needs

- ✓ **Demand**
  - Hourly profile
  - Total demand growth
  - Market response
- ✓ **Balancing reserves**

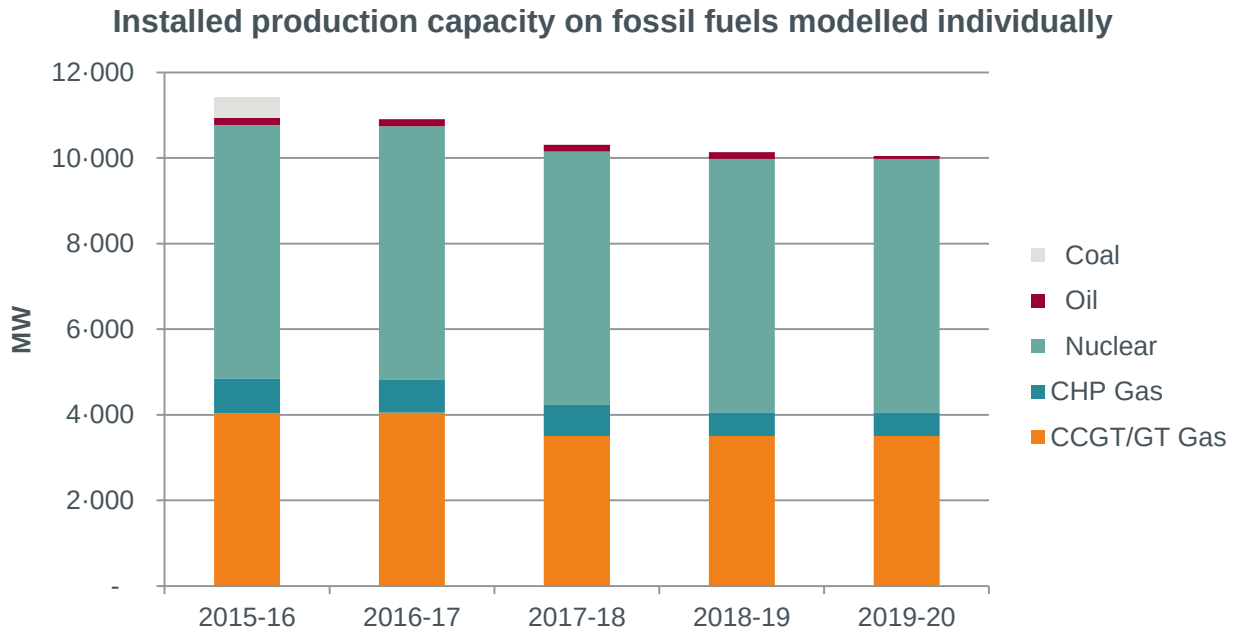
Variables

- ✓ **Climatological variables**
  - Solar
  - Wind
  - Temperature
  - Hydro
- ✓ **Outages**
  - Forced outages

No major changes are expected for CIPU thermal fossil fuel and nuclear production units

- Those units are modelled individually
- Latest info on closure/life-extension announcements was taken into account
- Alignment between FOD Economie and Elia on the installed capacities was also done. Elia also contacted producers to check and confirm every data and status

Over 10 GW of production capacity on fossil fuel modelled individually is considered for the next 3 winters.
Decrease of around 600 MW from winter 16-17 to 17-18 is expected. This decreases was already taken into account for winter 16-17 in the previous calculations.

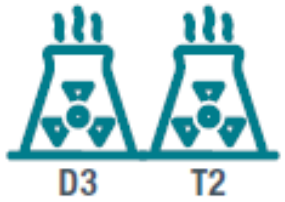


Nuclear installed capacity

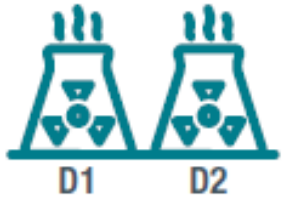
6 GW of nuclear are considered available for the next 3 winters (with draw on forced outages).

This assumption is taken following the extension of the life-time of D1 and D2 as well as the authorization of the reactors D3 and T2 to produce electricity.

REFERENCE



Available

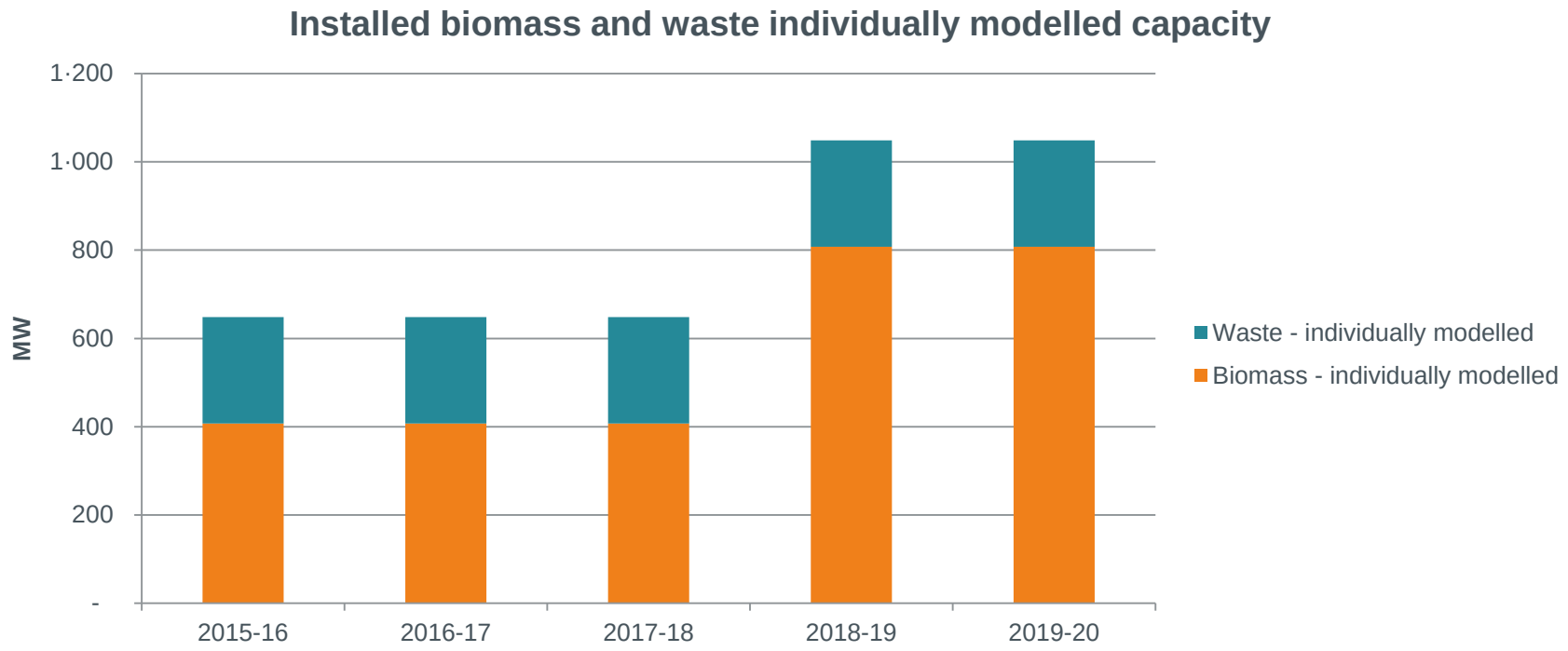


Available

New Langerlo biomass units are considered from winter 2018-19. Rest remains the same in the future for Waste and Biomass CIPU units.

Inclusion of Langerlo from winter 2018-2019 is considered. This inline with most recent information and following the consultation with the regions.

A **sensitivity** on this assumption will be assessed by removing Langerlo biomass for winters 2018-19, 2019-20.



Non-CIPU thermal production units are aggregated in 3 categories

CHP and Waste:

The installed capacity includes all units connected to the grid in Belgium and are coming from Elia's database which is updated with the latest information from DSOs.

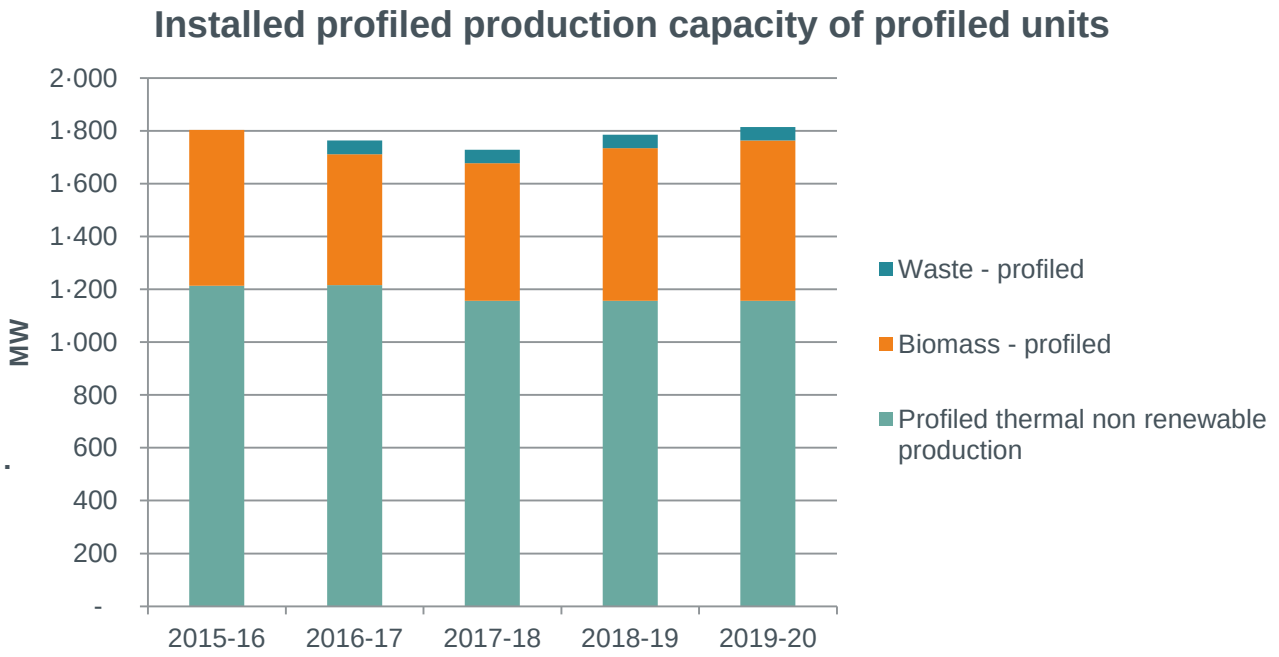
Those 2 types are modelled with historical production profiles (see next slide).

Slight decrease can be observed from winter 2016-17 to winter 2017-18 (around -60 MW).

Biomass:

Biomass data are coming from the latest forecast of the regions.
Slight increase (around +35 MW/year) is forecasted.

Note that split of waste/biomass was not made in 2015-16 and is now included.
In previous reports the waste capacity was reported as "biomass".

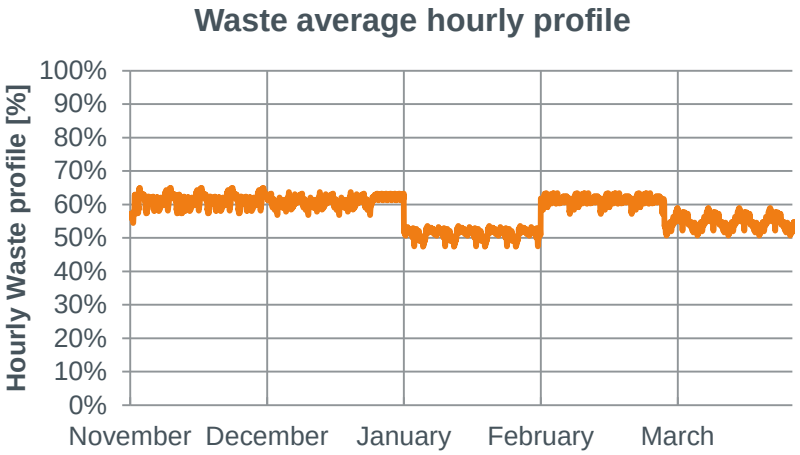


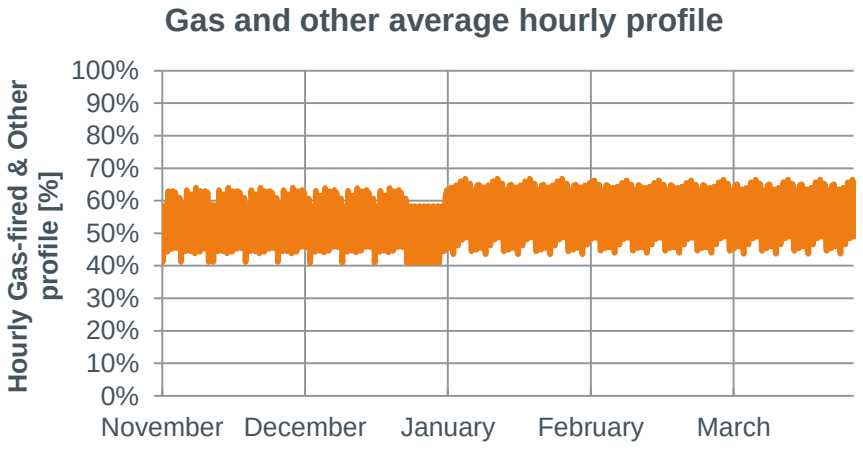
Non-CIPU thermal production units are modelled with historical production profiles on which random outage draws will be applied

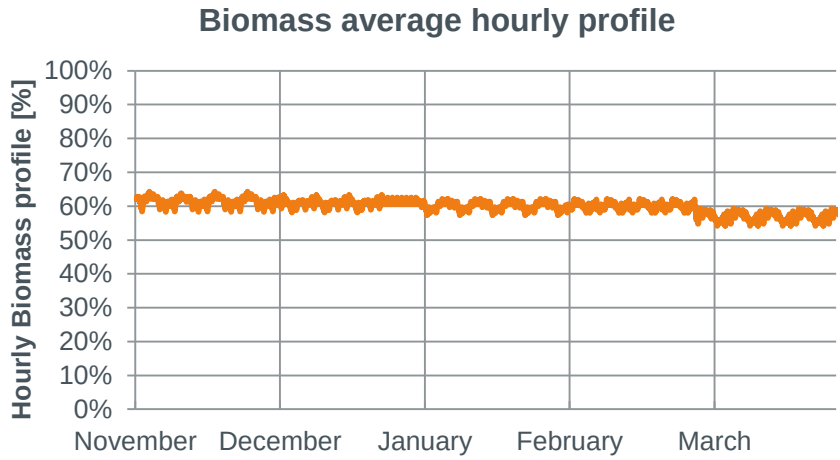
Historical profiles based on 3 year data were calculated. Those profiles were calculated depending on the seasonality and day/night cycle of the units.

Outage draws as for CIPU units will be applied (this is an improvement from last year's modelling). This allows to take better into account random outages of those units.

The profiles shown on the charts are the average normalised production profiles for the 3 categories.







The charts show the average profiles. For every future state a new draw on outages is made. It results in higher or lower availability for some hours. This way, outages on profiled units are better taken into account.

Onshore wind is based on the most recent forecast from the regions

Consultation of the regions on their forecast of wind onshore was performed during the summer by the FOD Economie. The data show an increase of around +180 MW/year.

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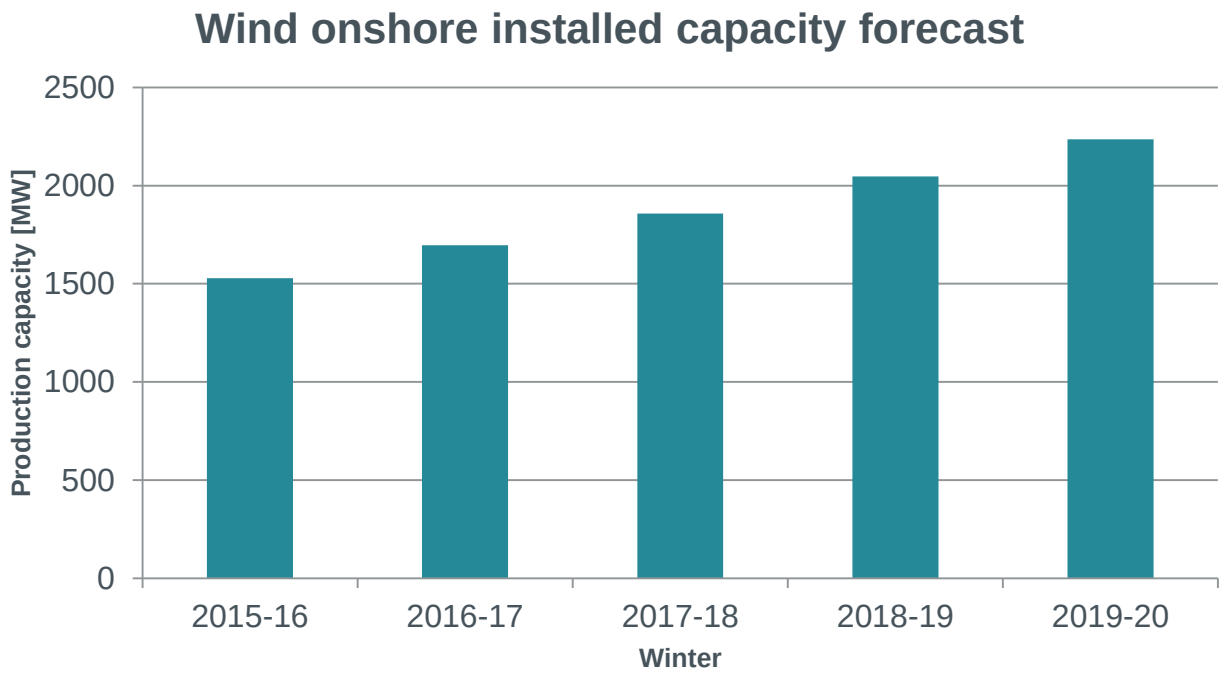
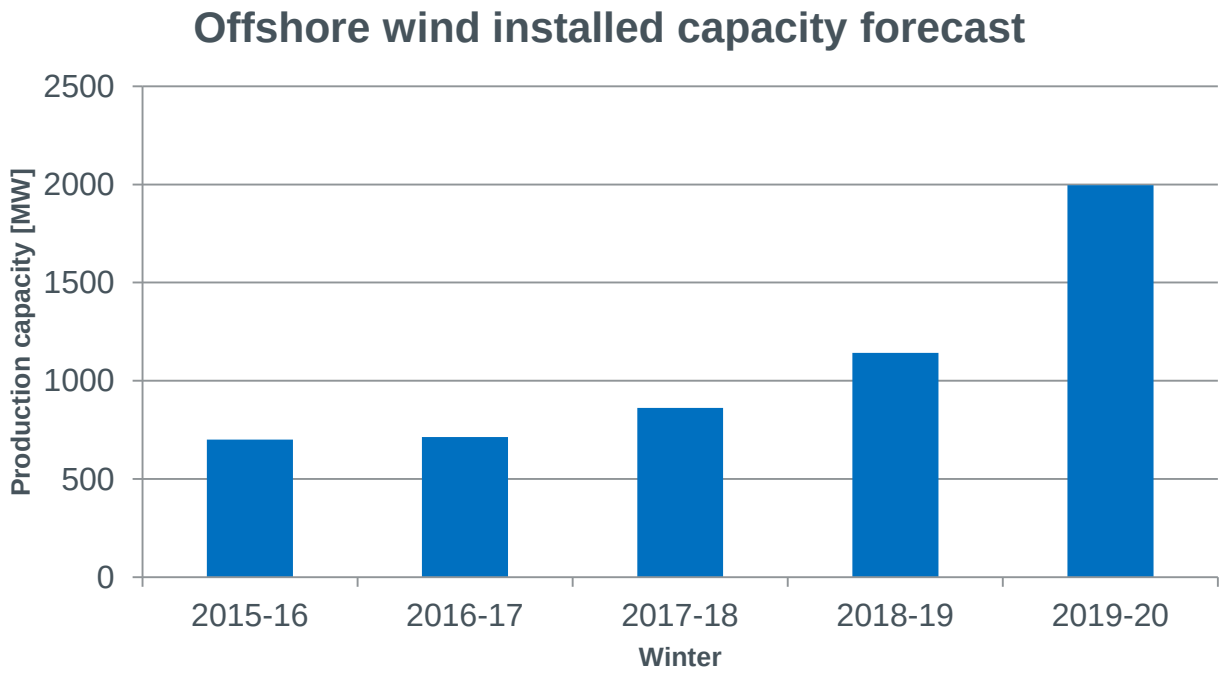


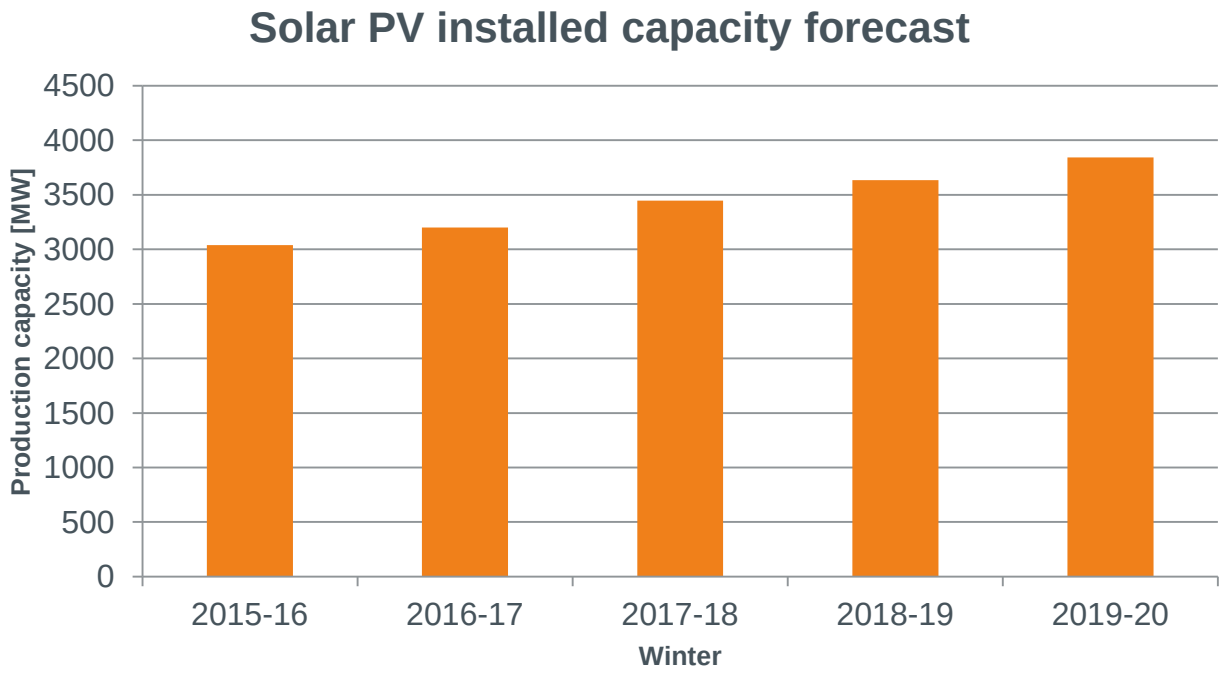
Offshore wind is based on the most recent forecast from Elia

The forecast is based on the latest information that Elia has based on the future connections planned in the North Sea. Main increase is expected after winter 2018-19.



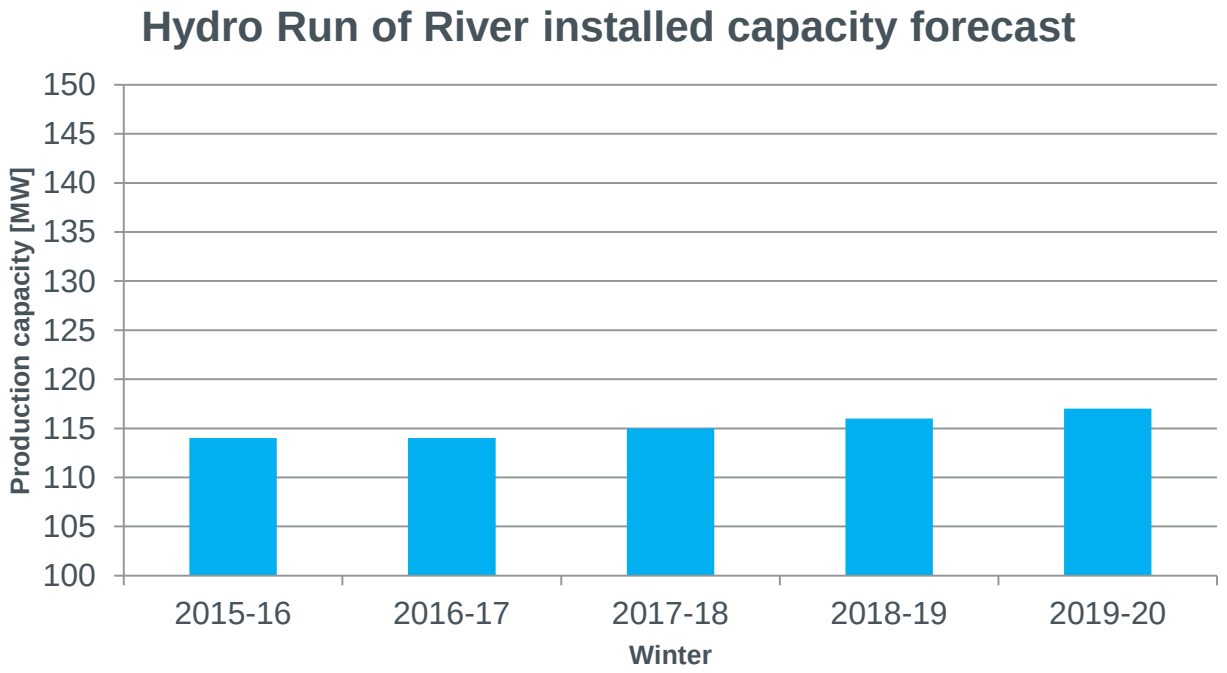
Solar PV is based on the most recent forecast from regions

Consultation of the regions on their forecast of wind onshore was performed during the summer by the FOD Economie. The data shown an increase of around +210 MW/year.



Hydro Run of River is modelled with 40 historical production profiles

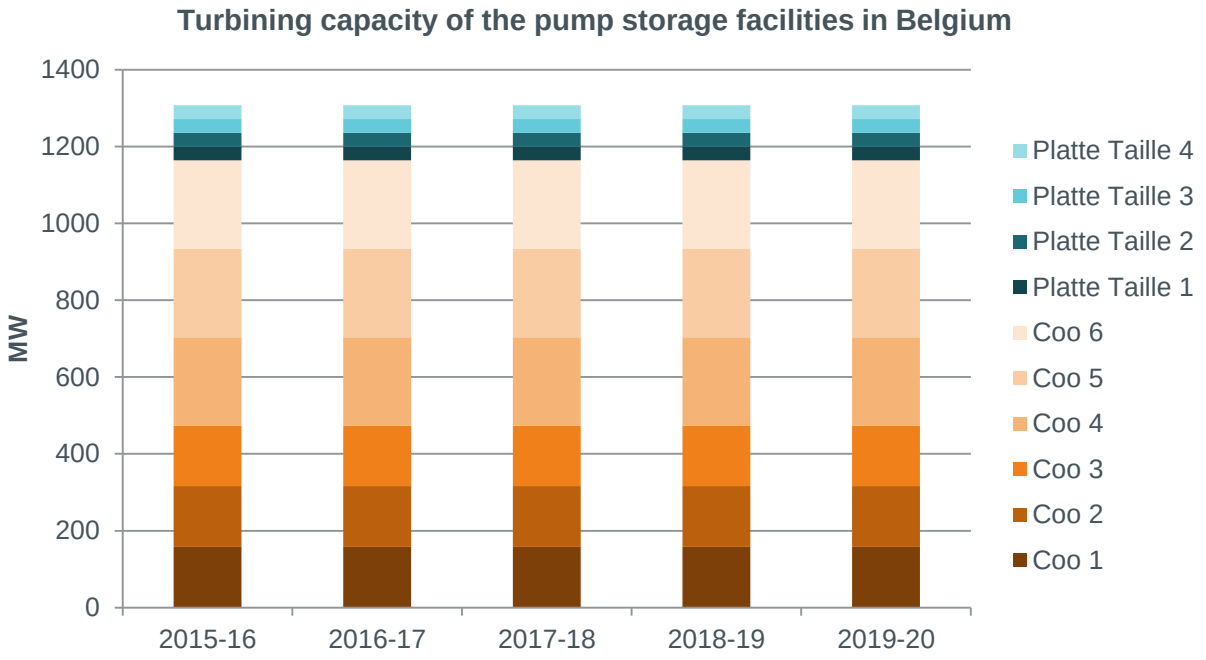
Hydro Run of River remains stable over the future (very small projects lead to a total of 3 MW increase until winter 2019-20).



Hydro Pump Storage units in Belgium are modelled with a daily reservoir optimisation. Outages on those units are taken into account.

1308 MW of turbining capacity is available in Belgium from Pump Storage facilities.
No change in this capacity is assumed for future winters.
Note that this year no derating of this capacity will be done in the model, instead a draw on the available capacity due to outages (such as for the individual production units) will be made. This is an improvement in the modelling.

The total pump storage reservoir capacity for Belgium equals **5800 MWh**.
A derating of this reservoir is taken into account by **removing 500 MWh due to constraints related to ancillary services**.



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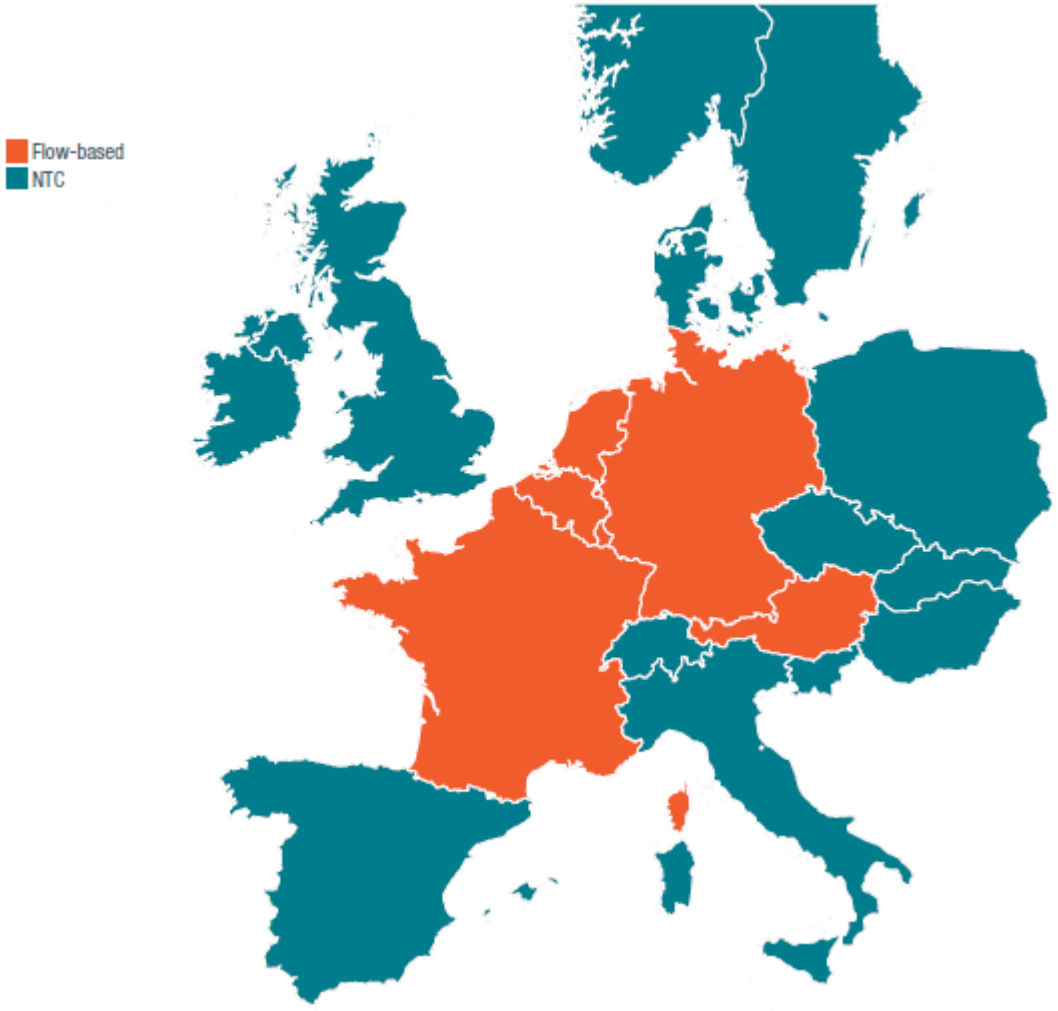
Interconnections modelling

The possible exchanges between countries are modelled as in today's day-ahead market.
This means that:

- The **Flow based zone** (BE,DE(+AT,LU),FR, NL) is taken into account with flow based domains
- The rest of the possible exchanges between other countries and between this zone and other countries is taken into account with **NTC** (Net Transfer Capacities) which are fixed commercial maximum capacities.



Interconnections capabilities of the CWE zone will be modelled with 3 flow based domains

An **improved flow based methodology** will be taken into account for this calculation.
This includes the use of **3 flow based domains based on typical winter days observed during the year 2015.**

3 day types were chosen:

- Weekend day
- Windy weekday
- Low wind weekday

Additional assumptions:

- The **hour 18** was chosen to build the future domains as this is the hour when the load is the highest and therefore the most representative for adequacy.
- The **same domain will be used for winters 2017-18, 2018-19 and 2019-20**.
- Note that **NEMO interconnection will be taken into account for the winter 2019-20** as it is planned to be commissioned in 2019. NEMO will be taken into account as an additional possible exchange of 1000 MW from Great Britain on top of the flow based domain possibilities (therefore modelled as an NTC).
- **Current rules** of flow based calculation are used.

Changes applied to the historical domains in order to take into account the expected changes in the grid

Changes were performed to the original domains in order to taken into account the planned changes in the grid for the next winters:

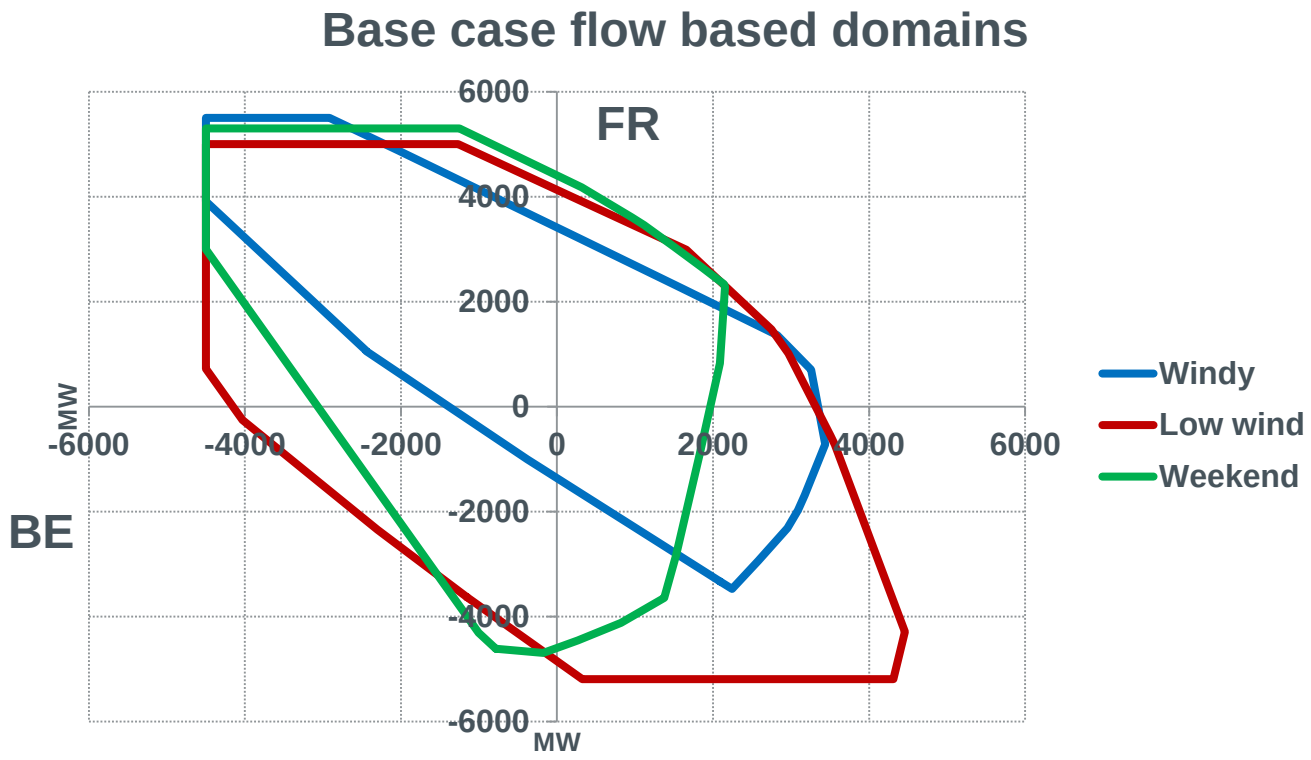
- All nuclear units in Belgium were set to maximum output
- Line 380.26 between Doel and Zandvliet was added (and line 380.12 between Gramme and Van Eyck in the Day 1 "Low Wind" as it was not yet in operation)
- Dynamic line rating taken into account
- Use of PST taps to max 6 taps each according to the operational rules to calculate the flow based domain for day-ahead
- N-state with full N-1 computation. The N-state taken into account is the one of the historical day. Therefore lines that were in outage and topology are taken from the historical days.

Flow based domains representation

Projection of the 3 flow based domains on the BE and FR net position in CWE are shown on the following chart. In all domains the maximum possible import capacity is set to 4500 MW.

This chart only represents the net position in CWE. This means that FR can also import energy from IT, ES, CH and the UK (this not being represented in the chart).

A sensitivity on those domains will be made with the loss of a grid element.



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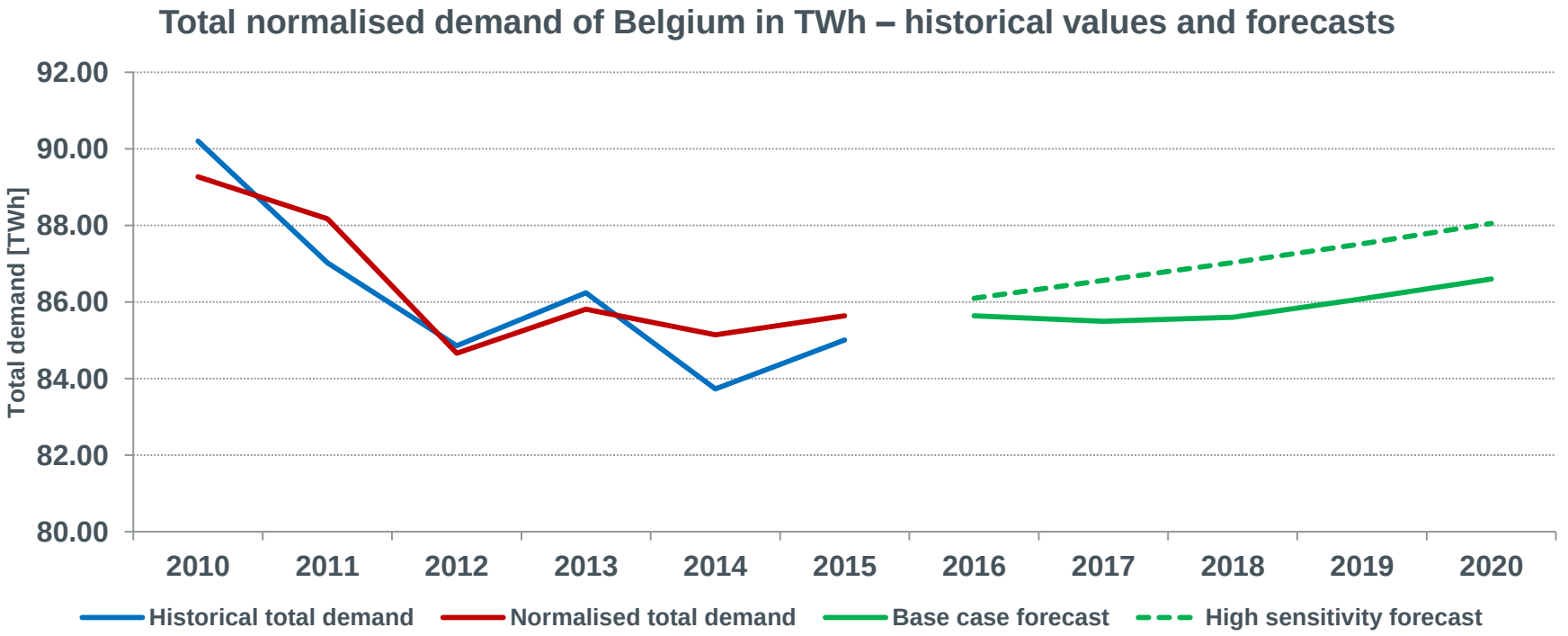
Demand growth is taken from the latest IHS CERA forecast
A sensitivity with a higher demand was also created

Following the latest update on growth in August 2016 that takes into account the latest economical forecasts (including Brexit) the following figures apply for Belgium.

This leads to a **stable total demand for the next 3 years**. A high sensitivity is also assessed (at least +0.54 %/y growth).



Balancing reserves on production units forecast is taken from the approved by the CREG report on reserve sizing for 2017

The balancing reserves on production units are taken into account to calculate the needed volume of strategic reserve. This capacity is reserved to ensure balancing of the grid and cannot participate in the market.

Data for the next winters are based on the approved by the CREG proposal of balancing reserve needs for 2017.

FCR

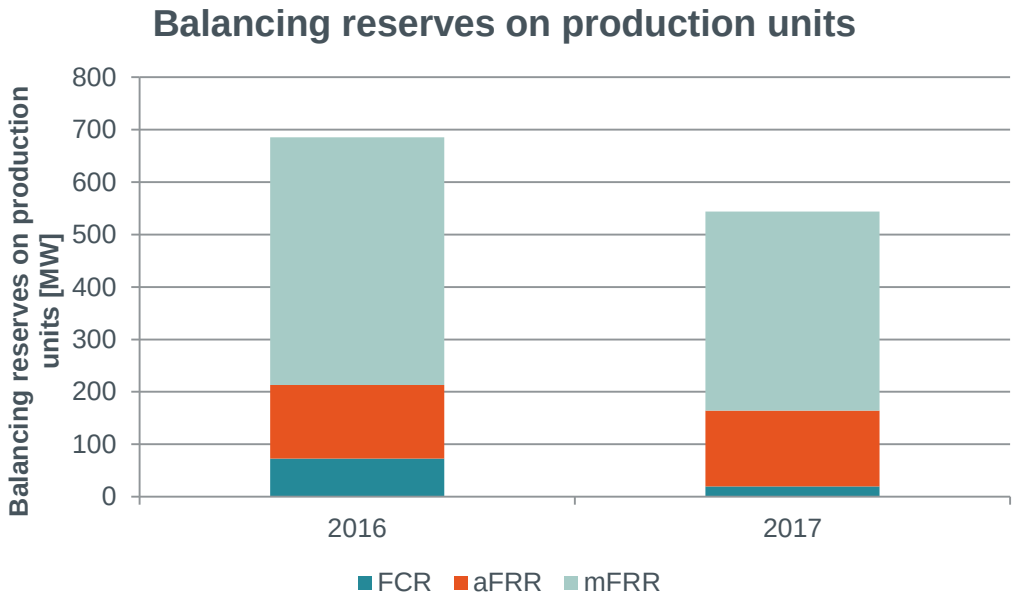
Around 80 MW for Belgium (decision within ENTSO-E still pending). A part is considered to be provided by load and since mid-2016, can be sourced abroad. **20 MW** are therefore considered to be sourced on Belgian production units in the future.

aFRR

144 MW provided exclusively by production units.

mFRR

380 MW provided by production units.



LINK to the report: http://www.creg.info/pdf/Decisions/B1526FR.pdf

Market response data is taken from the updated study performed this summer by Pöyry.

See Pöyry slides for more information.

Market response is taken into account in the model with its activations limitations identified in the study.

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40 historical years of meteorological variables are used.

Draw on forced outages are performed.

Ensoleillement horaire, température	▶	Production solaire horaire
Vitesse du vent horaire	▶	Production éolienne horaire
Production hydraulique mensuelle	▶	Production horaire décidée par le modèle en minimisant les coûts du système
Température journalière	▶	Consommation horaire en tenant compte de la thermosensitivité
Probabilité et durée de défaillance	▶	Tirage aléatoire par le modèle de chroniques journalières de disponibilité

N future states will be evaluated (amount depends on convergence of results)

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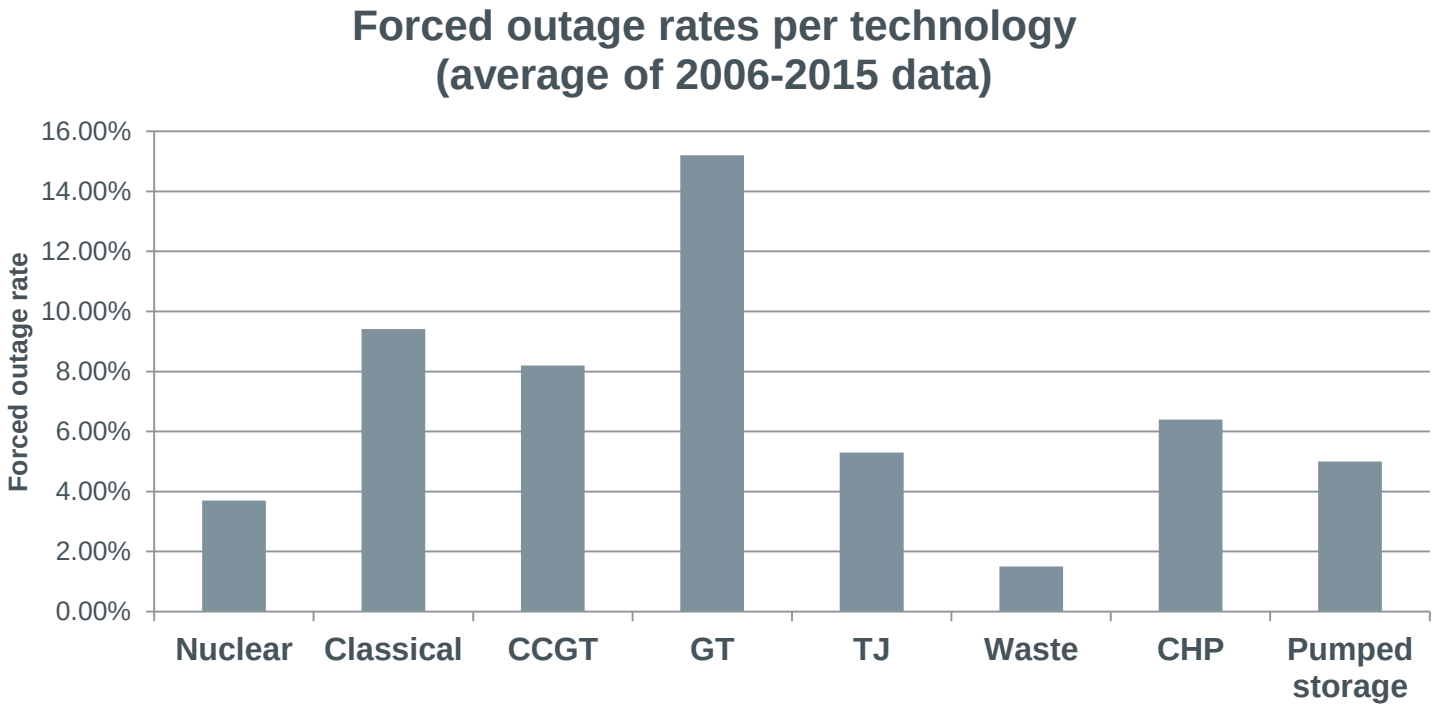
Forced outage rates are calculated by Elia based on the historical availability of units in the latest 10 years

Forced outage rates are calculated on the status of each unit for each day.

The following figure gives the average forced outages for each type of unit that will be used for the calculation.



Nuclear forced outages
Sensitivity is planned due to the high value obsered in 2015

Due to the high forced outage rate observed in 2015 on nuclear units, a **sensitivity is planned with this value** (around 11% instead of 3.7%).