General remark: Final gas demand

The storylines for the respective scenarios as defined by ENTSOG have been intensely discussed during ENTSOG's stakeholder engagement process. The TSO's were provided default figures for the yearly demand incorporating these storylines and were given the possibility to provide adequate data during the data collection process.

General remark: Power demand

For the yearly power demand a general methodology has been defined along the TYNDP process.

One systematic reason for diverging from the general methodology, which is based on ENTSO-E data, are the assumptions regarding the usage of CHP: those facilities earn their money in both the heat and electricity market. While the ENTSO-E model appears to model their generation on a purely electricity-market-based view, the CHP power plants should be driven by the heat and power market. During winter, the CHP power plants have to run in several countries independent of the electricity market. The efficiency for the electricity generation is then by far lower than during an optimised electricity generation.

There are different assumptions on the climatic situation of the generation data between the defined probabilities of the high demand situations and those ones in the available information. ENTSO-E uses a specific climatic year, while the 2-week and peak demand cases are representing 1-in-20 or national design case situations. Therefore adequate data was requested by TSOs during the data collection process.

General remark: EU Green Revolution

Green Revolution represents a more EU-wide perspective on the energy transition, rather than the national perspective. As a result, more details on this methodology are provided in a TYNDP Annex.

AT (Austria)

Final gas demand

Data was submitted for final gas demand throughout the requested time frame.

Power generation – general methodology

The data submitted for peak and 2 week is identical with the design case, as data regarding peak and 2 week cases is not available. The submitted data is based on the source E-Control Austria.

BA (Bosnia Herzegovina)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The TSO submitted the inputs for the general methodology. No further comments have been reported.

Gasification

In addition to the gas demand evolution in the existing gas demand areas gasification figures for new demand areas have been reported. These figures are taken into account completely in the High infrastructure level.

GWh/d		2017	2020	2025	2030	2035
Used for modelling in High	yearly	0	2	4	8	26
	2-Week	0	2	4	9	27
	Peak	0	3	6	12	34

BE (Belgium)

Final gas demand

The TSO submitted the inputs for the different scenarios.
The data for final demand are in line with the Belgium Network Development Plan demand scenarios covering the period 2016-2025.

Power generation – general methodology

The Belgian power generation sector is facing an important transition phase with the announced closing of the nuclear power plants by 2025. As a result gas-fired power generation is believed to play an important role for the security of supply of Belgium, taking into account the intermittent character of renewables and the uncertain availability of excess electricity production in the neighbouring countries. This has been reflected in the peak demand scenarios for power generation submitted.

BG (Bulgaria)

Final gas demand

The TSO submitted the inputs for the different scenarios.
Please note that Bulgartransgaz EAD submitted inputs for the Blue Transition Scenario only and replicated the figures across the other scenarios.

Power generation – general methodology

The power generation from natural gas in Bulgaria is mostly within the combined heat and power generation, CHP, thus the data submitted comprises CHP. As a result, data submitted was not based on ENTSO-E derived information.

CH (Switzerland)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The general methodology does not fit well with the Swiss gas sector. The important role of electricity exchanges in Switzerland along with the lack of coal-fired power generation has led to a pragmatic approach in the estimation of the Swiss gas demand for power generation based on the installed capacities taken from the ENTSO-E visions.

CY (Cyprus)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The assessment of power generation in Cyprus was not carried out following the general methodology. The reported demand figures from Cyprus for gasification exceed the planned capacities in these projects. The adjusted demand figures which are representing the gas demand in Cyprus when modelling the network in the High and 2nd PCI list infrastructure levels are shown in the following table, along with the remaining demand following the reported figures:

GWh/d		2017	2020	2025	2030	2035
Used for modelling (High & 2nd PCI list)	yearly	0	0	18	18	18
	2-Week	0	0	18	18	18
	Peak	0	0	30	30	30
Remaining demand from reported figures	yearly	0	16	0	0	0
	Peak	0	32	31	31	31

CZ (Czech Republic)

Final gas demand

The TSO submitted the inputs for the different scenarios.
Demand is based on predictions from the Czech electricity and gas market operator (OTE, a.s.). The predictions are updated every year in November and contain three scenarios, which are similar to the Slow Progression, Blue Transition and Green Evolution ENTSOG scenarios.

Power generation – general methodology

For the short term, the forecast is based on real connection requests for the power plants. For the long-term, demand is based on predictions from the Czech electricity and gas market operator (OTE, a.s.).

DE (Germany)

Final gas demand

The TSO submitted the inputs for the different scenarios.
The yearly values for the final gas demand of the scenarios were determined as follows:
"Green Evolution": Based on "Szenario III" of the scenario framework for the German NDP 2015.
"Blue Transition": Based on "Szenario II" of the scenario frameworks for the German NDP 2015 and the German NDP 2016.
"Slow Progression": Based on "Szenario I" of the scenario framework for the German NDP 2015.
The final energy demand scenarios for the German NDP 2015 and 2016 are based on public studies developed by acknowledged institutes for the German Federal Ministry of Economics and Technology, notably on the "Energy Reference Forecast" of June 2014 and the "Target Scenario" of June 2014.

The peak day values for the final gas demand are derived from the yearly values by applying load factors for the different consumption sectors as determined in a study of the German TSOs and DSOs and published in the German NDP 2015.

The 2-week cold spell values for the final gas demand are determined with the help of a temperature-based linear interpolation between the peak day and yearly values.

Power generation – general methodology

The yearly gas demand for power generation for the scenarios "Green Evolution", "Blue Transition" and "Slow Progression" was determined with the help of the ENTSOG Thermal Gap Methodology.
In an analogous manner the peak day gas demand and the 2-week cold spell gas demand for power generation for the scenarios "Green Evolution" and "Slow Progression" was determined with the help of the ENTSOG Thermal Gap Methodology.
The peak day gas demand for power generation of the scenario "Blue Transition" was derived from the yearly gas demand for power generation given in the scenario frameworks for the German NDP 2015 and the German NDP 2016.
The 2-week cold spell gas demand for power generation of the scenario "Blue Transition" is determined by multiplying the ratio between the peak day and the 2-week cold spell value of the results of the ENTSOG Thermal Gap Methodology for the scenario "Blue Transition" with the peak day gas demand for power generation of the scenario "Blue Transition" as described above.
As a relevant share of CHP is expected, an overall efficiency factor of 45% for the electricity generation including CHP was applied in all cases described above where the ENTSOG Thermal Gap Methodology is used.

DK (Denmark)

Liquefaction plant in Frederikshavn

In Denmark, piped natural gas is widely available at market based prices. A liquefaction plant in Northern Denmark would be a price competitive access to tap into the growing LNG/LBG market compared to existing sources.

Bunker Holding, Port of Frederikshavn and Kosan Crisplant have formed a consortium to build and operate a LNG/LBG (Liquefies Bio Gas) liquefaction plant. A site in Port of Frederikshavn (Northern Jutland) is identified with easy access to both road network and with possibility to bunker ships directly.

The liquefaction plant will be modular, 50 tons for each module, with an expected capacity of 150-300 tonnes/day. It allows partial load production and fast delivery to present and future LNG/LBG costumers in Denmark and potentially also in Sweden, Norway and Northern Germany.

Compared to other supply chains, a local liquefaction plant offers advantages of lower cost price for the LNG, faster reaction/delivery time and control of the supply independent of present or future occupancy of third party terminals. Further a local liquefaction plant will be able to balance the gas and electric network, hence it will be possible to produce LNG when needed, and stop production within 30 minutes.

A liquefaction plant offers an opportunity to establish a base load in Denmark upon which an LNG provider would be able to establish a first-mover position with a limited risk and CAPEX.

For the TYNDP analyses, the average natural gas- consumption (from the grid) is estimated to be 0.7 GWh/d in 2018 with a linear increase to 4.0 GWh/d in 2037.

Liquefied Bio Natural Gas production in Hirtshals, Denmark

HMN Naturgas A/S, Fjord Lines A/S and Hirtshals Havn (a municipality owned harbor) is currently developing a LBNG (Liquefied Bio Natural Gas) project in Hirtshals Havn in Northern Jutland, Denmark. The liquefaction plant will mainly supply LBNG for Fjord Lines' ferries running between Hirtshals and destinations in Norway, but it is the intention to serve other ships in Hirtshals Havn and customers using road transport for LNG as well. Two of Fjord Lines' ferries are currently running on LNG.

It is the intention to commission the LBNG plant end 2018. Hirtshals Havn has allocated a site for the plant and local planning includes LBNG production.

Activities today include the investigation and optimization of high efficiency LBNG liquefiers to work as a balancing unit in the complex Danish power and gas grid.

The plant capacity will be approximately 160 tonnes/ day and the plant will include storage capacity of 3.000 m3, when the plant is fully implemented. The plant will probably be implemented in two steps to accommodate the expected increase in customer's offtake.

The yearly gas consumption (from the grid) is estimated to be approx. 550 GWh increasing to 900 GWh over the years.

For the TYNDP analyses, the average natural gas- consumption is estimated to be 1.5 GWh/d in 2018 with a linear increase to 2.5 GWh/d in 2037.

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The TSO submitted the inputs for the general methodology. No further comments have been reported.

EE (Estonia)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The TSO has provided its own data. Overall the share of gas used in power generation is very small and the TSO does not see any major changes for the forecasted period.

ES (Spain)

Final gas demand

The TSO submitted the inputs for the different scenarios.
The increase of the final demand is related to the expectation of new industrial costumers (gas replacing oil products) coming from the economic situation. The potential for efficiency gains in Spain is expected to be on moderate level. For the residential customers several fuel switches to gas are expected.

Power generation – general methodology

Blue Transition:

- *Shut-down coal fired power plants.*
- *In the thermal gap and ENTSO-E options, new solar and wind capacity is considered too high: 39,000 MW wind and 25,000 MW solar in 2030 (at the present: 23,000 wind and 7,000 solar). This view is due to Spanish regulation about renewable sources - elimination of subsidy payments.*
- *Increase of other non-RES considered too high (0 MW at the present -> 12,000 MW in 2030)*

Green Evolution:

- *In the thermal gap and ENTSO-E options, new solar and wind capacity is considered too high: 40,000 MW wind and 50,000 MW solar (at the present: 23,000 wind and 7,000 solar). Reason the same Blue Transition for new renewable capacity.*
- *Increase of other non-RES considered too high (0 MW at the present -> 12,000 MW in 2030)*

Slow Progression:

- *Very unlikely that gas consumption of CCGT in 2030 (45 TWh gas, efficiency 50%) would be 16 TWh lower than CCGT gas consumption in 2015 (61 TWh). This situation is due to other non-RES technologies (increase 0 to 46,000 GWh/y, which seems too high) and an increase of wind and solar (70,000 GWh/y in wind generation in this scenario, almost double than that of 2015 with the economic conditions more unfavourable).*

FI (Finland)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The TSO submitted the inputs for the general methodology. No further comments have been reported.

FR (France)

Final gas demand

The TSO submitted the inputs for the different scenarios.
Scenarios for final demand are consistent with the scenarios from TSO Ten year Network Development Plan 2015-2024, after adjustments to split final gas demand and power generation according to ENTSOG's methodology.
Slow Progression and Blue Transition: these scenarios take into account the regulation in force. Final gas demand is decreasing thanks to the enhancement of energy efficiency in households and the industrial sector.
Green Evolution: this scenario takes into account new environmental directives that would be established in order to reach the target to cut fossil fuel consumption by 30% by 2030.

Power generation – general methodology

The TSO submitted the inputs for the general methodology.
A 72%/28% split has been used for the North and South zones of GRTgaz. TIGF have no gas demand for power generation.
GRTgaz uses its own set of data which is consistent with the GRTgaz development plan and the French Ministry energy transition scenario for the Blue Transition and Green Evolution scenarios.

For the scenarios Slow Progression and Top-down Green Evolution, TSO use their lowest trajectory, with a stagnation of power generation from 2020 to 2030.
These scenarios have been built in coordination with RTE, the French electricity TSO.

GR (Greece)

Final gas demand

The TSO submitted the same input for the different scenarios.
Final gas demand is based on:
1) Historical data of the daily consumption of each metering station of the National Natural Gas System,
2) Historical data and estimations regarding the current and future consumer connections on distribution networks, by consumption category,
3) Temperature data from previous years by the National Athens Observatory,
4) Projections about the development of GDP, as published by international organizations.
DESFA, based on the above mentioned data, carried out a study to forecast the gas consumption for industrial and for residential and commercial use for the next ten years per day. DESFA proceeded on a thorough analysis of data and examined the daily evolution of gas consumption per metering station and per sector (big industry, small industry, chemical use, residential use, small and big commercial) and evaluated also the effect of temperature in the final consumption of each category of users. The study was conducted for the period of 2017-2026 therefore the data for the period 2027 onwards are equal to those for 2026.

Power generation – general methodology

In order to forecast the gas consumption used for power generation, DESFA carried out a study in cooperation with the Aristotle University of Thessaloniki. In the study a simulation of the Greek Wholesale Power Market was performed for the period of 2017-2026 taking into consideration the specificities of each mechanism for the clearing of the market (mandatory pool for year 2017 and simple power exchange for years 2018-2026). Further to that, the following input data/assumptions were used for the calculation of gas consumption for power plants: evolution of RES, commissioning/withdrawal of production units, unit techno-economic data, fuel prices, mandatory and non-mandatory injections from hydraulic power plants, imports and exports. The study was conducted for the period of 2017-2026 therefore the data for the period 2027 onwards are equal with the forecasted data for 2026.

HR (Croatia)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The TSO submitted the inputs for the general methodology. No further comments have been reported.

HU (Hungary)

Final gas demand

The TSO submitted the inputs for the different scenarios. The first 10 years of demand data are estimated by the TSO in the case of temperature dependent DSO exit points (the estimated data was confirmed by DSOs) and industrial customers.

Power generation – general methodology

The first 10 years of gas demand related to gas fired power generation are estimated by the directly connected existing and planned power plants, furthermore there are some DSO connected power plants as well; their demand was estimated by DSOs.

The second 10 years of demand was estimated by the TSO with extrapolation.

IE (Ireland)

Final gas demand

The TSO submitted the inputs for the different scenarios.
Final gas demand figures are based on the output of the Grey and Green scenarios presented in Gas Networks Ireland's Network Development Plan 2015. For the residential sector demand growth is driven by GNI's projections in terms of new connections numbers. However, this growth is impacted upon by energy efficiency measures and initiatives. In the industrial & commercial sectors growth in gas demand is proportional to GDP growth projections with some incremental allowance for new connections also.

Power generation – general methodology

Power generation figures are based on the output of the Grey and Green scenarios presented in GNI's Network Development Plan 2015. The main assumptions in terms of the development of the electricity demand are taken from Eirgrid's Generation Capacity Statement 2015. The grey and green demand scenarios use Eirgrid's low and median demand forecasts respectively. These assumptions are used in GNI's power generation despatch model to calculate gas demand in the power generation sector.

IT (Italy)

Final gas demand

Consistently with the storylines defined by ENTSOG for TYNDP 2017, Snam has provided different scenarios for final demand.
In all scenarios natural gas demand in residential & commercial and industrial sectors is expected to decrease, mainly because of improvements in energy efficiency that fully compensates the impact of, depending on the scenario considered, an economic growth.
When compared to residential & commercial and industrial trends, natural gas consumption in the transport sector increases in all scenarios. The Blue Transition scenario is the only one showing an overall moderate growth of final demand. In this scenario the expected reduction in the sectors residential & commercial and industrial is in fact offset by the increase in the transport sector.

Power generation – general methodology

When compared to Snam scenarios for gas consumption for power generation elaborated for TYNDP 2017, the power methodology developed by ENTSOG and based on inputs from ENTSO-E TYNDP 2016 shows, for 2030, similar results, especially in Slow Progression and Green Evolution.

Yearly electricity demand from Vision 3 (used as input in ENTSOG power methodology to derive natural gas consumption in its Blue Transition scenario) reveals to be the lowest one among ENTSO-E TYNDP 2016 Visions for Italy. This results in conflict with the storyline defined by ENTSOG for the Blue Transition scenario.

Therefore, in order to guarantee a complete consistency between final demand and power generation demand, Snam has adopted its own figures for yearly gas-fired power generation consumption in the Blue Transition scenario, as well as in the other scenarios where internal projections seem to be more accurate than the linear interpolation applied by ENTSOG methodology.

In accordance with ENTSOG data collection, Snam has then internally elaborated daily peak and 2 week gas demand for power generation taking into account the potential contribution of intermittent renewables and the impact of a particular cold situation on electricity demand and imports.

LT (Lithuania)

Final gas demand

The availability of multiple final gas demand forecasts for Lithuania are limited to one possible scenario.

Power generation – general methodology

The forecasts of the gas demand for power generation in Lithuania is based on the data from ENTSO-E.

LU (Luxembourg)

Final gas demand

Creos Luxembourg submitted the inputs for the different scenarios in line with the TYNDP 2017 scenarios as defined by ENTSOG and discussed in the stakeholder joint working sessions. No further comments are to be reported on the final gas demand.

Power generation – general methodology

Creos Luxembourg submitted the inputs for the gas demand for power generation. As Creos Luxembourg did not have any firm capacity reserved, zero values were provided for each scenario.

LV (Latvia)

Final gas demand

No Latvian data was submitted during the data collection. The final demand for the TYNDP 2017 was calculated based on the available information from previous publications, but due to this the final demand figures have been replicated across all scenarios.

Power generation – general methodology

See above, due to lack of information, the default option of the Thermal Gap approach of the power generation methodology was used to generate data.

MK (FYROM)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.
Final demand data submission exceeded system capacity submitted, due to this the results were capped and excess demand moved to gasification data that can be assessed when projects are introduced at the relevant infrastructure levels.

Power generation – general methodology

The TSO submitted the inputs for the general methodology. No further comments have been reported.
Power demand data submission exceeded system capacity submitted, see above.

Gasification

The reported gasification demand figures have been adjusted to the available infrastructures in the respective infrastructure levels according to the project submission. The following figures are used for the network modelling:

GWh/d		2017	2020	2025	2030	2035
Used for High Infrastructure Level	yearly	0	16	27	31	32
	2-Week	0	21	36	48	56
	Peak	0	25	41	54	61
Share of reported gasification demand		0%	78%	100%	100%	74%

GWh/d		2017	2020	2025	2030	2035
Used for 2nd PCI list Infrastructure Level	yearly	0	0	23	20	19
	2-Week	0	0	31	31	32
	Peak	0	0	35	35	35
Share of reported gasification demand		0%	0%	85%	65%	43%

MT (Malta)

Gasification

Final gas demand

The Maltese Ministry for Energy and Health submitted the inputs for the 'Blue Transition' scenario which is the most relevant case for Malta's gasification. Final gas demand projections submitted for non-network and transport are based on the Malta Gas Connection Feasibility Study completed in April 2015. No infrastructure is currently in place for land transport/maritime bunkering and inland market. It is being assumed that the required infrastructure will be in place by 2025. Projections are preliminary and will need to be updated following detailed studies and market development

Power generation – general methodology

The Maltese Ministry for Energy and Health submitted the inputs for the 'Blue Transition' scenario which is the most relevant case for Malta gasification for power generation. The assessment of power generation in Malta was not carried out following the general methodology in view that gasification of the country will start towards the end of 2016 through an LNG infrastructure which will consist of a Floating Storage Unit and on-shore regasification facility. This is an intermediate solution until the Malta-Italy gas interconnection is in place.
The 2-week maximum and peak day gas demand for power generation is expected to occur in the summer and not in the winter period.
The reported gasification demand from Malta is used completely in the modelling of the infrastructure levels High and 2nd PCI list in 2030 and 2035 according to the submitted projects.

GWh/d		2017	2020	2025	2030	2035
Used for modelling (High & 2nd PCI list)	yearly	0	0	0	13	14
	2-Week	0	0	0	16	19
	Peak	0	0	0	17	20

NL (The Netherlands)

The data submitted by the TSO stems from the figures in GTS Network Development Plan 2015.

- *ENTSOG Green Evolution corresponds to GTS Green Focus*
- *ENTSOG Blue Transition corresponds to GTS Cooperative Growth*
- *ENTSOG Slow Progression corresponds to GTS Limited Progress.*

Final gas demand

The TSO submitted the inputs for the general methodology.
In the Green Evolution scenario, where heating appliances will partly be electrified, and investment in energy efficiency will accelerate, demand for gas will decline especially in terms of yearly volumes. The rate of decline in gas capacity demand will be moderated owing to the entry into the market of hybrid heat pumps. These hybrid heat pumps switch to gas in case of high heating demand, thus avoiding a peak in electricity demand (which would require expensive reinforcement of electricity infrastructure) but maintaining a high peak gas demand. In the Netherlands this scenario envisages a roll-out of hybrid heat pumps at a rate of up to 100,000 per year.

In the Blue Transition scenario, on the one hand there will be a decline in demand due to the continuing trend of energy awareness, insulation and efficiency in households. On the other hand, against a background of continued economic growth, the domestic market will be characterised by a large number of smaller households with comparatively more residential space per person, and the number of economic agents in the commercial sector will increase.

In the Slow Progression scenario, there is a similar continuation of the trend of recent years in households towards more insulation, greater energy awareness and installation of high-efficiency boilers. The difficult financial and economic situation will lead to a general decline in industrial activity.

Power generation – general methodology

The data provided is based on the ENTSOG thermal gap approach (and as such it is based on ENTSO-E figures). The requirement of gas in the power sector depends on the position of gas in the merit order for dispatch of electricity. Although the intermittent sources, solar and wind, may generate large amounts of electricity in volume terms, the firm availability of these sources at times of peak power demand (which is also likely to be a time of peak gas demand) will remain very limited.

Only the fraction of the installed capacity that is available under all conditions (so called capacity credit) can be considered as available in peak conditions. GTS has adopted the following values:

- *For solar power — 0%: peak demand for both electricity and heat arises when it is dark and the sun is not shining.*

- *For wind power — 10%: this is in line with the European Wind Energy Association report "Trade Wind, Integrating Wind".*

This means that non-intermittent energy sources for power generation (gas, coal, biomass, nuclear) need to be available in peak demand situations.

In both the Green Evolution and the Blue Transition scenarios (where gas is assumed before coal in the merit order), there will be an increase in demand for gas capacity in the power sector. Only in the Slow Progression scenario will demand for gas capacity decline in this sector, driven by low rates of economic growth and a strong continuing role for coal.

PL (Poland)

Final gas demand

The TSO submitted the inputs for the different scenarios.
The final demand forecast for the Polish market under the Slow Progression scenario shows a moderate increase in the residential and industrial sectors. The upward trend in these two sectors is due to gasification of new areas in the country as well as substitution of coal fired-furnaces with the ones supplied with gas.
The final demand under the Blue Transition scenario shows a more dynamic increase in the residential and industrial sectors in comparison to the Slow Progression and Green Evolution scenarios. The expected difference between scenarios results from enhanced gasification of new regions and a quicker transition from coal to gas in the households.

Power generation – general methodology

Scenarios about gas demand for power generation are prepared based on knowledge about investments in gas capacity in the energy sector.
A significant growth in the gas consumption in the electricity sector is anticipated. Gas power generation constitutes only a small fraction of installed power capacity in Poland. In order to meet EU emission policy goals there are a number of Combined Heat and Power Plants that are under construction and under consideration. The projects, where FID is highly likely, are included under the Slow Progression scenario. The Blue Transition scenario embraces a higher number of projects, as it reflects favourable market conditions in power generation based on gas. A more moderate approach is applied in the Green Evolution scenario due to the development of renewable sources of supply in the electricity generation.

PT (Portugal)

Final gas demand

Regarding the methodology and assumptions that REN has used in 2015 for the demand forecast in the three different scenarios, the main drivers for the demand estimation are national policy, GDP (Gross Domestic Production), GVA (Gross Value Added) of the different sectors of the economy, the available income of the families and the extension of the NG networks in the country.

In spite of not applying the assumptions described in the ENTSOG's story lines in detail and to their full extent, REN considers that the results obtained fulfil ENTSOG's request and are in line with the other countries forecasts also. As a result, the forecast of each scenario in the Portuguese case leads to:

1. *Slow Progression is the REN medium demand scenario;*
2. *Blue Transition is the REN high demand scenario;*
3. *Green Evolution is the REN medium demand scenario.*

Power generation – general methodology

The Portuguese electricity sector is characterized by the decommissioning of all coal-fired power generation by 2030. Due to the lack of competing thermal technology, the general methodology provides different values for the Portuguese gas demand in the power generation sector that depend on the objectives of energy policy defined by the Government, which include the electricity sector demand forecast, the information on the power installed capacity for electricity production, and the fuel and CO_2 prices.

From 2017 to 2030, the main driver for gas consumption in the power generation sector is the year when the two existing coal-fired power plants will be decommissioned, which will be determined by the energy policy defined by the Government. As such, in the Slow Progression scenario these two coal-fired power plants were considered in operation until 2025 and shall be decommissioned in 2029, where in the Blue Transition and Green Evolution scenarios the two coal-fired power plants shall be decommissioned between 2017 and 2022. For CHP the main drivers of the forecast are the power capacity installed, the number of working hours per year of the units and the rate of the progressive replacement of the fuel oil and gasoil units for natural gas and RES production ones.

REN decided not to use either the Thermal Gap or the ENTSO-E results. Two main reasons determined REN's option:

1. *The results of these two methodologies cover only the year 2030. For the reasons explained above, the use of the results of either these methodologies will give higher values in some of the transition years between 2017 and 2025, that would be difficult to support;*
2. *The input data used for these two methodologies might be outdated as the collection process for the TYNDP 2016 of ENTSO-E was based on 2014 assumptions.*

Nevertheless, REN was able to compare its results with the results of the methodologies proposed for the year 2030, and considers that the results are quite aligned with the ENTSO-E Visions 1, 3 and 4, and will not influence the results of the simulations that will be done for the TYNDP.

As a result, the forecast of each scenario in the Portuguese case leads to:

1. *Slow Progression (ENTSO-E Vision 1) is the scenario with later decommissioning of the two existing coal-fired power plants and medium electricity demand;*
2. *Blue Transition (ENTSO-E Vision 3) is the scenario with earlier decommissioning of the two existing coal-fired power plants (gas before coal) and high electricity demand;*
3. *Green Evolution (ENTSO-E Vision 4) is the scenario with earlier decommissioning of the two existing coal-fired power plants (gas before coal) and medium electricity demand to account for a faster efficiency improvement, higher renewables contribution and decentralized electricity production when compared with the Blue Transition scenario.*

Final Remarks

REN decided to keep consistency with the national methodologies and forecasted data jointly constructed in 2015 with the Portuguese Competent Authority, which are the base for the national TYNDPs and other reports, like security of supply reports, risk assessment reports, etc.

The assumptions described in the ENTSOG's story lines are covered by REN's assumptions on its scenarios and the results obtained are in line with the other countries forecasts also.

REN is a TSO of both gas and electricity networks and the forecasts are made based on the most updated information available. The general assumptions are defined at the same time for both the electricity and gas sectors in Portugal and the assumptions considered in the final gas demand and power generation forecasts must be kept consistent along the period considered.

RO (Romania)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The TSO submitted the inputs for the general methodology. No further comments have been reported.

RS (Serbia)

Final gas demand

No Serbian data was submitted during the data collection. The total Serbian demand for the TYNDP 2017 was calculated based on the available information about gas exports to Serbia during the years 2014 and 2015 in the ENTSOG Transparency Platform. For all scenarios the average yearly demand is the average export, the figures for the 2-week case are the maximum observed during 14 consecutive days and the Peak is the daily maximum. The figures representing the total demand are categorized as final demand.

Power generation – general methodology

See above.

SE (Sweden)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The TSO has submitted its own data for the scenarios.

SI (Slovenia)

Production Data

At the moment in Slovenia there is no natural gas production facility in operation delivering gas to the transmission system. Based on the existing status of investments and considering estimated capacities and possible economical aspects of operation of natural gas production facilities, so far for the TSO, it is not possible to prepare a reliable estimation of yearly produced quantities. The prediction of yearly quantities will be possible based on the development of the first Slovenian project in the field of natural gas production.

Final gas demand

The TSO submitted the inputs for the different scenarios. The estimation of gas demand considers realistic growth of consumption in the range from 0.5 to 2 %/year up to the year 2025 and remain stable or slowly decrease (depending on the scenario) after the year 2026 within the range 0.5 %/year.

Power generation – general methodology

The prediction of natural gas demand for power generation was done starting with existing position of natural gas on the Slovenian electricity market and assuming one additional CHP power plant to be put into operation in the year 2019. In the current transition period the future development and role of natural gas on the Slovenian electricity market is difficult to predict, other possible power generation projects were not included yet – a more reliable estimation is expected to be available for next development plan.

SK (Slovakia)

Final gas demand

The TSO submitted the inputs for the different scenarios.
Future final demand data is predicted up to the end of2025, therefore only this set of demand could be provided. The TSO has no information on non-network demand.

Power generation – general methodology

The TSO submitted the inputs for the general methodology.
Data for gas demand for power generation is predicted up to the end of 2025. Until that moment, the TSO proposes to use own data. From 2026 onwards the thermal gap data is used.

UK (United Kingdom)

Final gas demand

The TSO submitted the inputs for the different scenarios. No further comments have been reported.

Power generation – general methodology

The TSO submitted the inputs for the general methodology.
For all scenarios the ENTSO-E data is the closest to TSO data for yearly average figures. For Slow Progression and Blue Transition the data is quite close to this TSO data.
For Green Evolution, all the other sources are significantly above TSO data. This would have been based on Future Energy Scenarios 2014 whereas FES 2015 is used for the TYNDP 2017 submission.
While, for the purposes of consistency the TSO would be happy to use the ENTSO-E data, this would result in large inconsistencies with the peak data. For some years the annual is over twice the size of the 2 week peak figure.
For this reason the only option is to use TSO data for Green Evolution.
For the 2 week and the peak data using TSO data is appropriate due to the differences in the method of calculating these elements.