entsog
european network
of transmission system operators
for gas

1st Stakeholder Joint Working Session
13th January 2016

TYNDP 2017

Demand Scenarios

ENTSOG System Development

Image Courtesy of Thyssengas

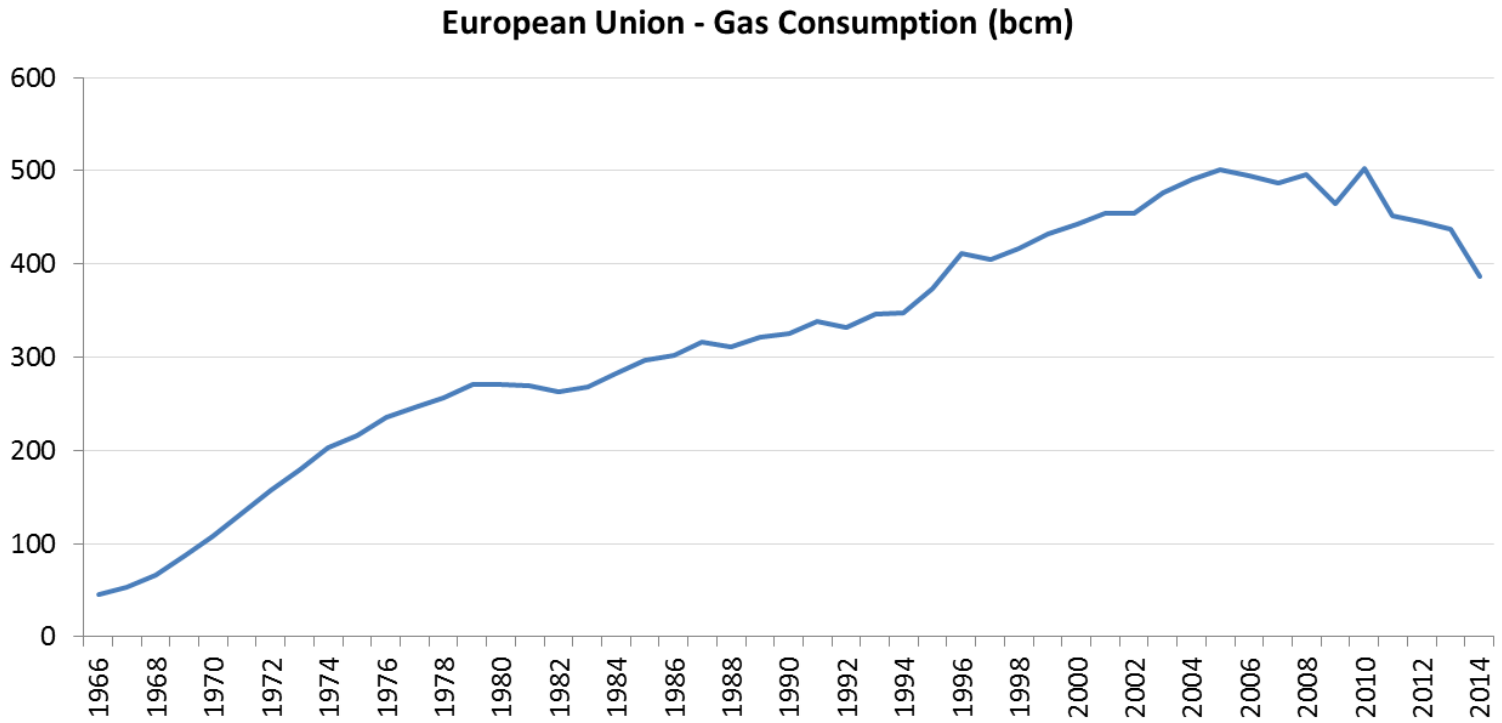
Introduction

- ***Looking back…***
- ***Three scenarios for TYNDP 2017 / Introduction of storylines***
- ***ENTSO-E: Scenario development for TYNDP 2016***
- ***Alignment ENTSOG-Scenarios / ENTSO-E-Visions***
- ***Different visions of gas demand***
- ***Sectoral Demand***
  - Final Demand
  - Gas for Power generation

Discussions are welcome.

Looking back…

Gas Demand Evolution



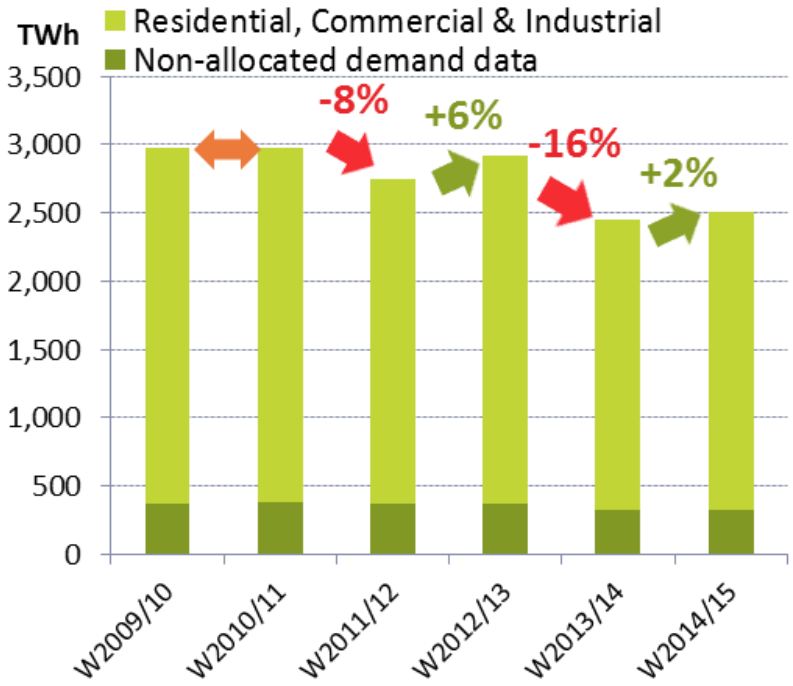
- Factors such as the global financial crisis, Fukushima and the resulting impact on global LNG, US shale affecting coal prices, renewable power generation development, carbon prices, efficiency development, along with the climatic conditions of the last two mild winters lead to decreasing gas demand in the EU in the recent years.
- Underlying capacity need is important for infrastructure design.

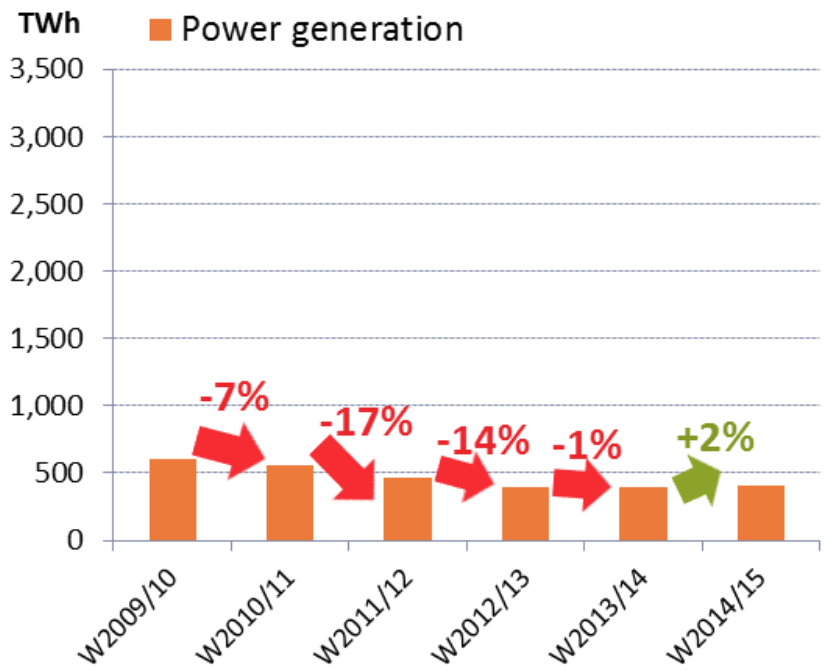
Data sourced from BP Statistical Review 2015

Demand Sectors

> Demand is dealt with in two main categories
  - **Final demand** consisting of residential, industrial and commercial usage
  - **Gas demand for power generation**

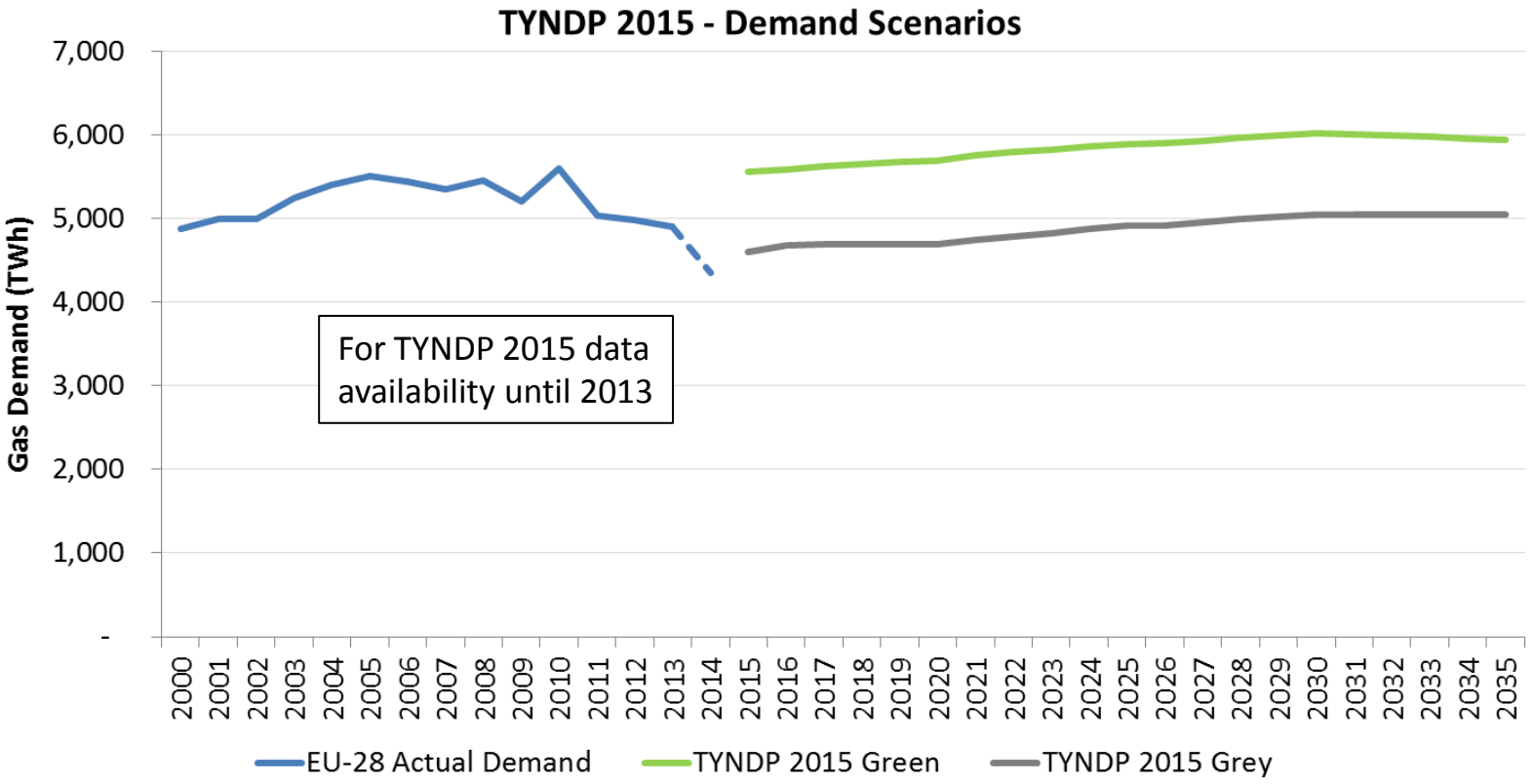
> The charts below from the ENTSOG Winter Review show the evolution of the **winter demand** over the last 6 years and the differing trends between the two





Total Demand = Final Demand + Demand for Power generation

TYNDP 2015



> TYNDP 2015 consisted of two demand scenarios – Green and Grey

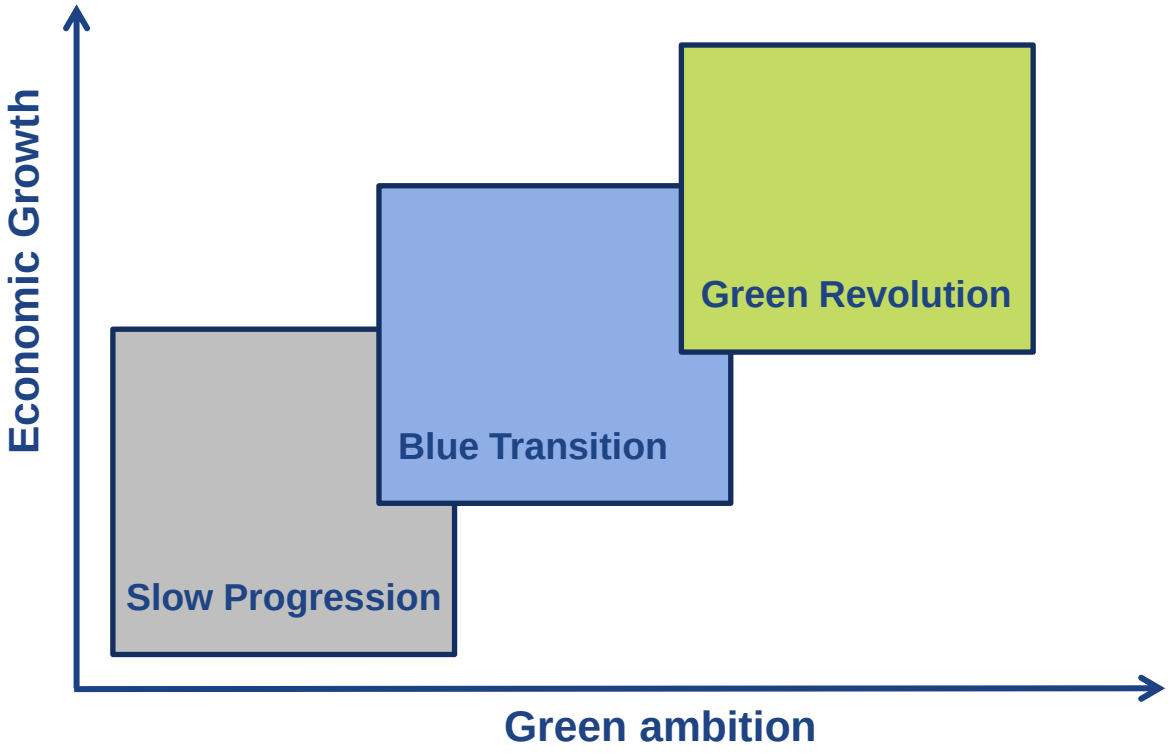
> These were defined by differing global contexts, scenarios for the evolution of final gas demand and for the power generation sector

Three Scenarios

Demand Scenarios

Scenarios are possible story lines for the EU energy sector in the future

> ENTSOG sees **3 scenarios**



Slow Progression (1)

General conditions

- Limited economic growth
- Actions disaligned from green ambitions
- Difficulties in financing green solutions
- EU targets until 2050 out of sight
- Low CO2 price
- Low level of cooperation between member states

Residential sector

- New buildings insulated as legally required, heated by
  1. District heating
  2. Heat pumps
  3. Gas
- Continuity in stock

Slow Progression (2)

Industrial & Commercial sector

- Limited growth
- Slow improvements in energy efficiency

Electricity sector

- Moderate electricity demand increase
  - Limited efficiency gains
  - Limited growth in most sectors
- Continuation of recently observed market behavior (Coal before gas)

Transport sector

- LNG more popular as fuel for smaller ships
- Cars and commercial fleets mostly run on oil products
- Some electrification (cars) and LNG usage (HGV/HDV)

Blue Transition (1)

General conditions

- Moderate economic growth
- Efficient approach for achieving green ambitions
- RES development, Public acceptance for required infrastructure
- Mainly on track EU targets until 2050
- Moderate CO2 price
- Energy market well functioning, cooperation and individuality

Residential sector

- New buildings better insulated, heated by
  1. District heating
  2. Heat pumps
  3. Gas
- Affordable solutions in stock (condensing boilers)

Blue Transition (2)

Industrial & Commercial sector

- Moderate growth
- Improvements in energy efficiency

Electricity sector

- Moderate electricity demand increase
  - Efficiency gains
  - Moderate growth in most sectors
- National regulation inclined to close the old coal plants and less likely to approve new ones
- (Hydro-) storages developed on national levels

Transport sector

- LNG main fuel for ships
- Support for electric cars and natural gas vehicles (private cars and commercial fleets)
- Significant market shares of oil are replaced

Green Revolution (1)

General conditions

- Favorable economic conditions
- High green ambitions
- High RES development, Public acceptance for required infrastructure
- In line with EU targets until 2050
- Highest CO2 price
- Energy market well functioning, strong cooperation

Residential & Commercial sector

- Access to district heating and heat pumps
- Cost intensive solutions for device replacement
- High rate of house insulation
- Popularity of carbon-neutral buildings

} High performance in energy certificates

Green Revolution (2)

Industrial sector

- High efficiency/lower energy intensity
- Energy from biomass, electrification
- Carbon Capture Storage or utilisation

Electricity sector

- Heating (+)
- Electric cars (+)
- Energy efficiency (-)

} Increased electricity demand (highest)

- Highest penetration of Renewables (backup: gas)
- Centralized hydro-storages

Transport sector

- LNG main fuel for ships and HGV/HDV
- Cars run (mainly) on electricity
  - Strong financial support
  - Replacement of oil in sight

Demand Scenarios: the story lines

TYNDP 2017 Scenarios	Slow Progression	Blue Transition	Green Revolution
Energy Policies/ Regulation	2050 targets not realistically reachable	Mainly on track with 2050 targets [closure of coal-fired power plants (regulation)]	On track with 2050 targets
Economic conditions	Limited growth	Moderate growth	Strong growth
Green ambitions	Lowest	Moderate	Highest
CO2 price	Lowest CO2 price (limited spread of carbon taxes)	Moderate CO2 price (carbon taxes mainly spread)	Highest CO2 price (carbon taxes well spread)
Fuel prices	Highest fuel prices [expected gas price>coal price]	Moderate fuel prices [expected gas price>coal price]	Lowest fuel prices [expected gas price>coal price]
Internal energy market	Well functioning, low MS cooperation	Well functioning, moderate MS cooperation	Well functioning, strong MS cooperation
Renewables develop.	Lowest	Moderate	Highest
Gas in heating sector			
Energy Efficiency	Slowest improvement	Moderate improvement	Fastest improvement
Competition with electricity	Limited gas displacement by elec. (new buildings)	Limited gas displacement by elec. (new buildings)	Gas displaced by electricity (district heating, heat pumps)
Electrific. of heating	Lowest	Moderate	Highest
Gas in power sector			
Gas vs Coal	Coal before Gas	Gas before Coal (on regulatory basis)	Gas before Coal (on regulatory basis)
Gas in transport			
Gas in transport	Lowest penetration	Highest penetration	Moderate penetration
Electricity in transport	Lowest penetration	Moderate penetration	Highest penetration
Expectations regarding EU overall gas demand	Expected to remain stable	Expected to increase	Expected to decrease

ENTSO-E TYNDP 2016 Visions

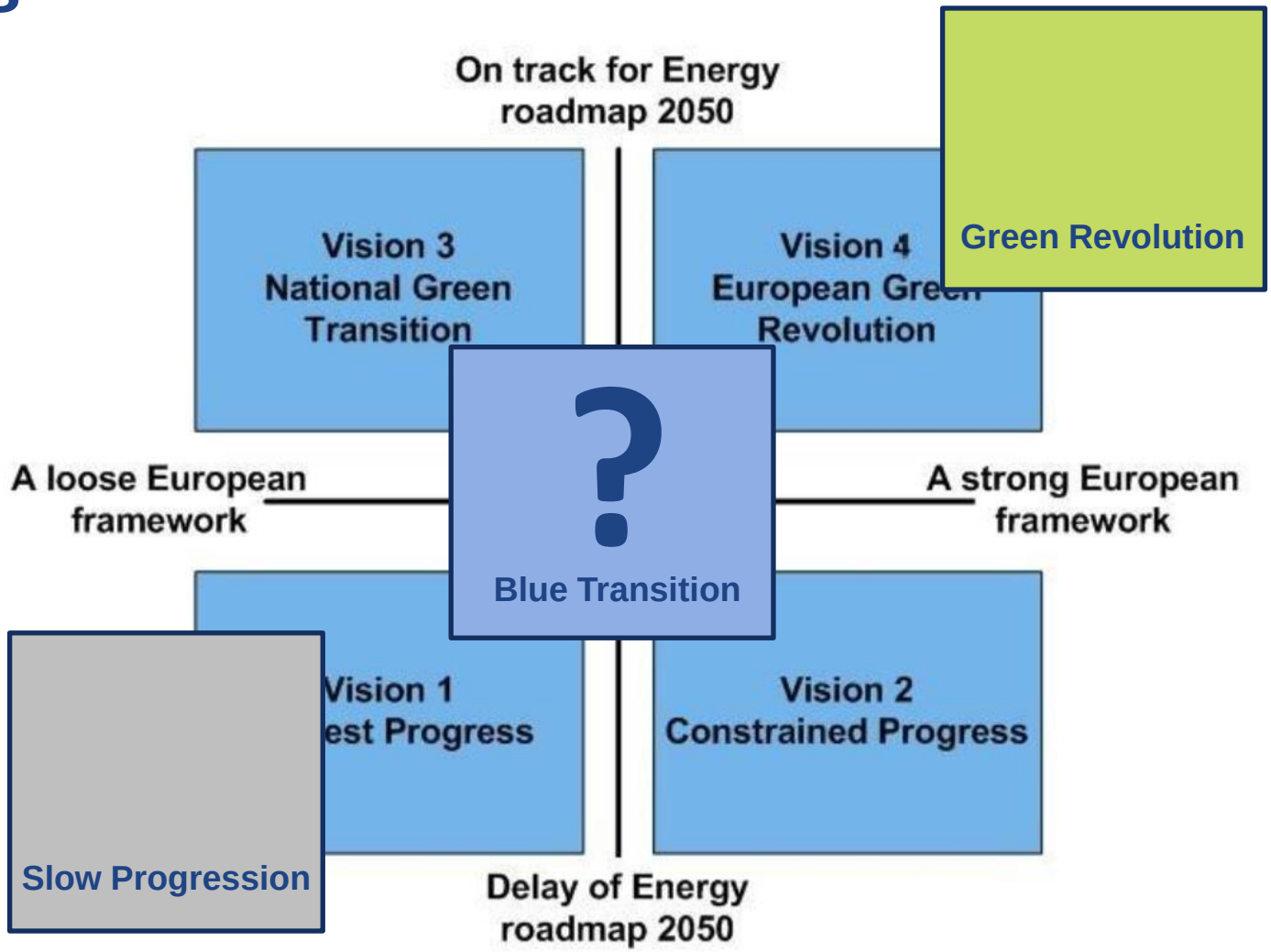
ENTSO-E Visions for e-TYNDP 2016

To be presented by ENTSO-E

Detailed information available on the ENTSO-E website:
www.entsoe.eu

Alignment – Scenarios / Visions

Alignment…


On track for Energy roadmap 2050
Vision 3 National Green Transition
Vision 4 European Green Revolution
Green Revolution
A loose European framework
?
Blue Transition
A strong European framework
Vision 1 est Progress
Vision 2 Constrained Progress
Slow Progression
Delay of Energy roadmap 2050

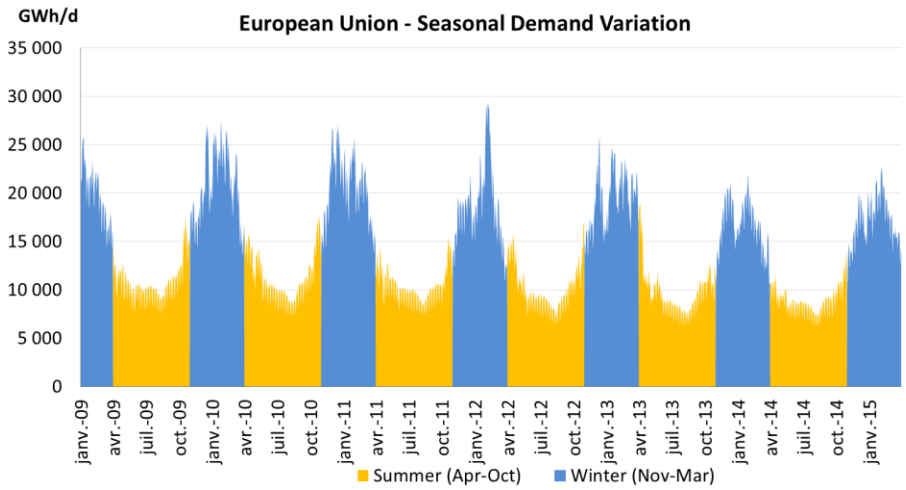
Different visions of demand

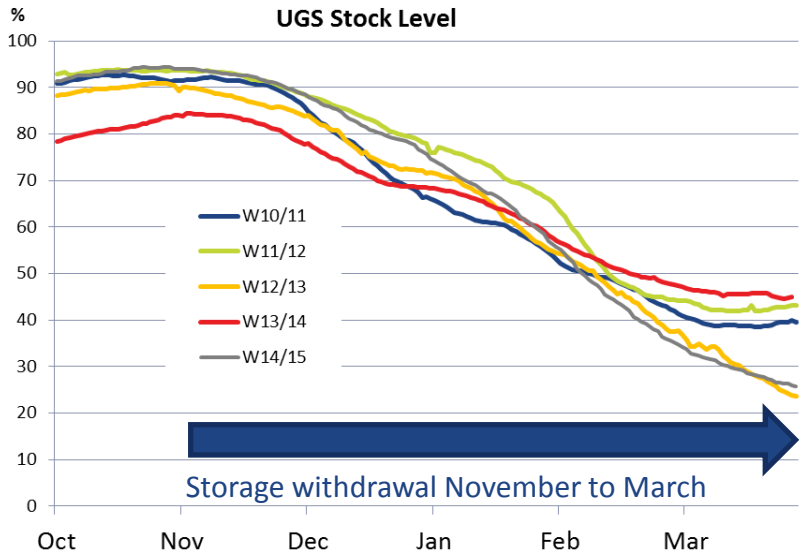
Different visions of demand (1)

Over the whole year: seasonal approach

- Seasonal demand will be modelled through average daily demand over a 7-month Summer period (Apr to Oct) and 5-month Winter period (Nov to Mar)

- This allows to properly consider storage behavior



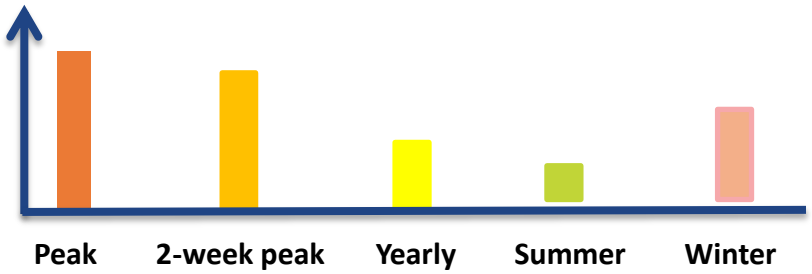


Different visions of demand (2)

High demand situations

> Design case: 1-day level of demand used for the design of the network in each country

> 2-week case: average daily level of demand reached on 14 consecutive days once every twenty years in each country, considered to happen in February



Final Demand

Final Demand (Residential, commercial industrial and transport) – Bottom Up

1. Definition of scenarios (Qualitative approach)

European level

3. Data usage
   - Supply Adequacy Outlook
   - Assessment of the system

2. Determining Demand (Quantitative approach)

National level (TSOs)

Total Demand = Final Demand + Demand for Power generation

Gas for Power Generation

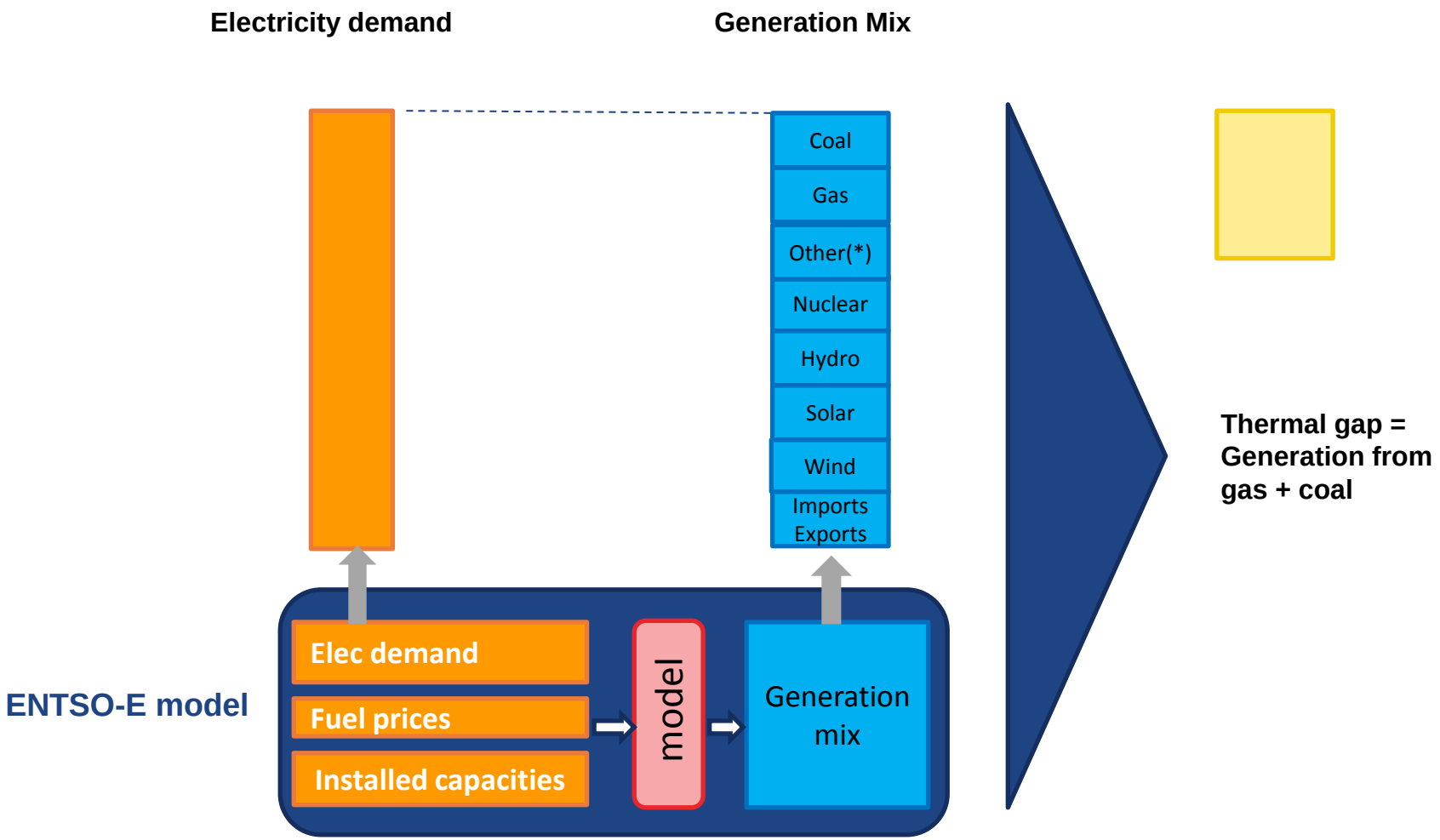
Gas for Power Generation

Using ENTSO-E TYNDP 2016 data to help create more consistent scenarios for power generation from gas

- Electricity demand
- Installed capacities
- Thermal efficiency
- Hourly granularity of utilisation produced by ENTSO-E modelling

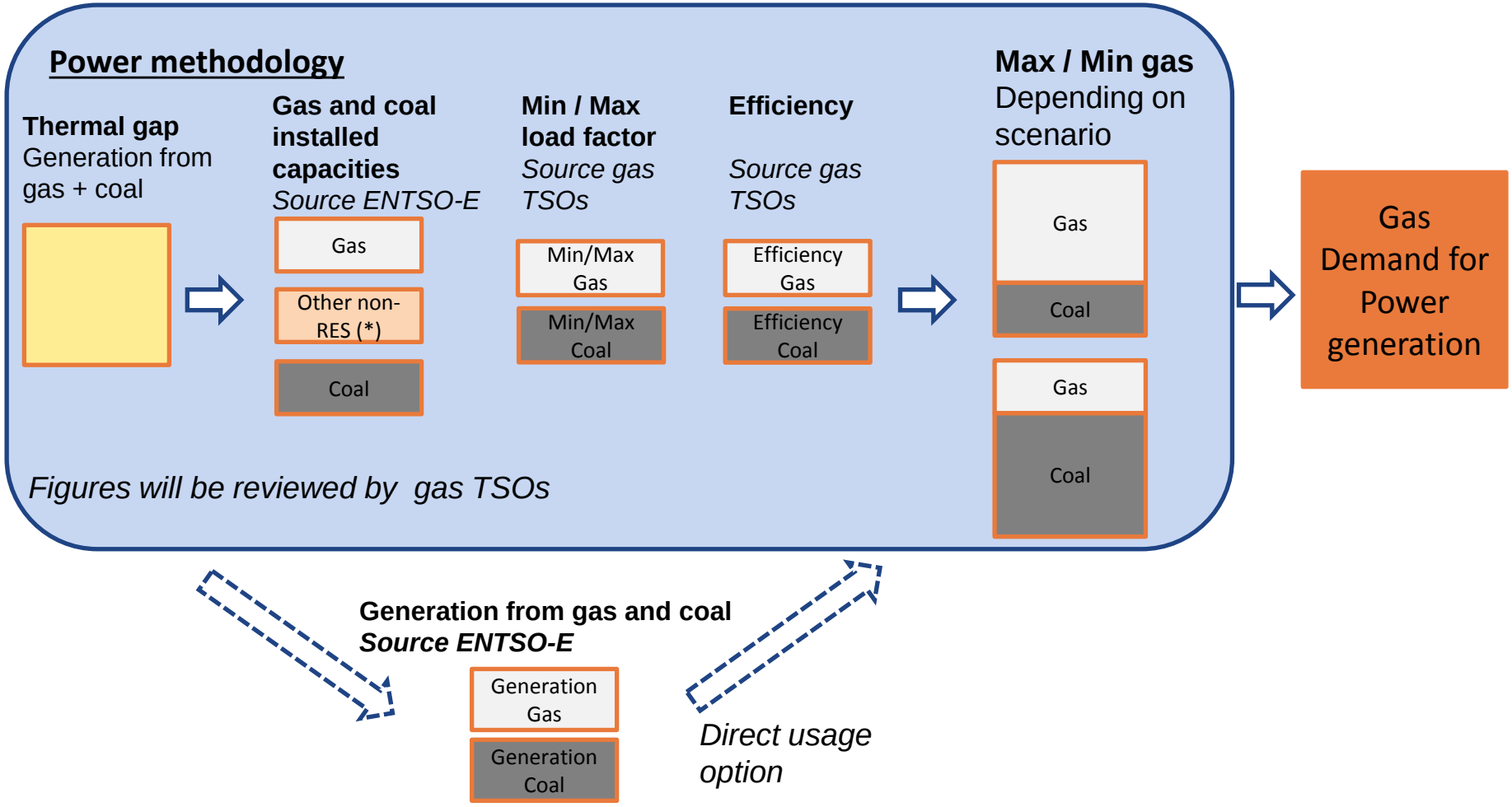
This data is used to calculate anticipated load factors, demand (peak day, 2 week, winter/summer averages) and incorporated into the power generation methodology produced by ENTSOG, which has been developed from that used in TYNDP 2015

Thermal Gap



(*) Other non-RES installed capacities: can possibly include gas-fired generation

Power methodology



(*) Other non-RES installed capacities can include gas-fired generation.
TSOs will be able to consider these capacities for gas generation where needed

To conclude…

To conclude…

- ***ENTSOG develops three scenarios for TYNDP 2017***
- ***ENTSOG closely cooperates with ENTSO-E on gas demand for power generation***
- ***Stakeholder feedback is welcome***
- ***Conclusions of the discussions will be reflected in the next SJWSs***