An overview of scenario approaches and methodologies to model the EU gas balance

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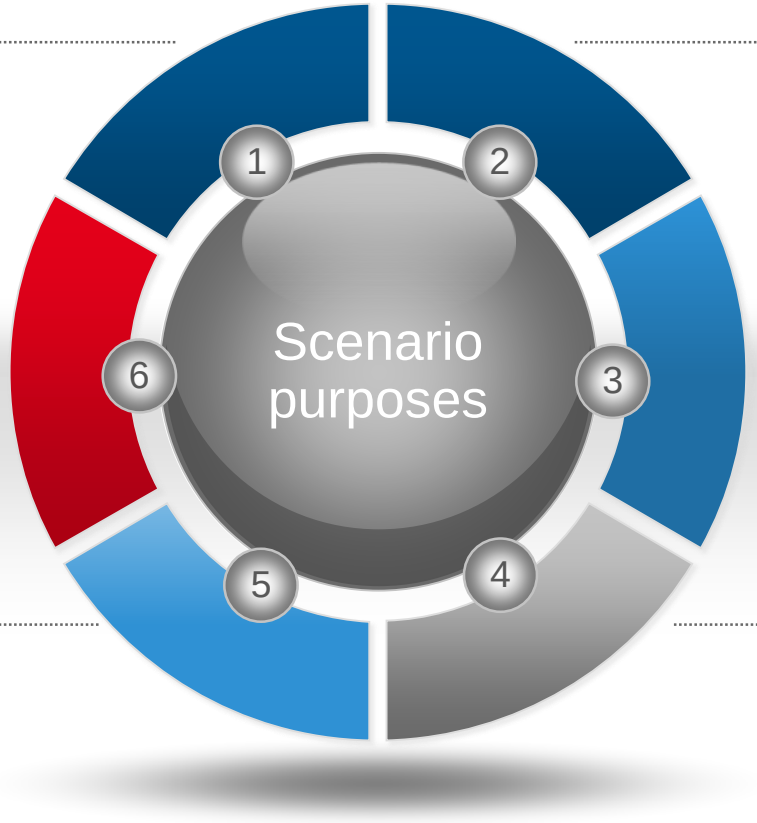
Scenarios are used for various purposes

Scenario purposes

1. Policy design

2. Impact analyses of policy approaches or measures



3. Market analysis for businesses

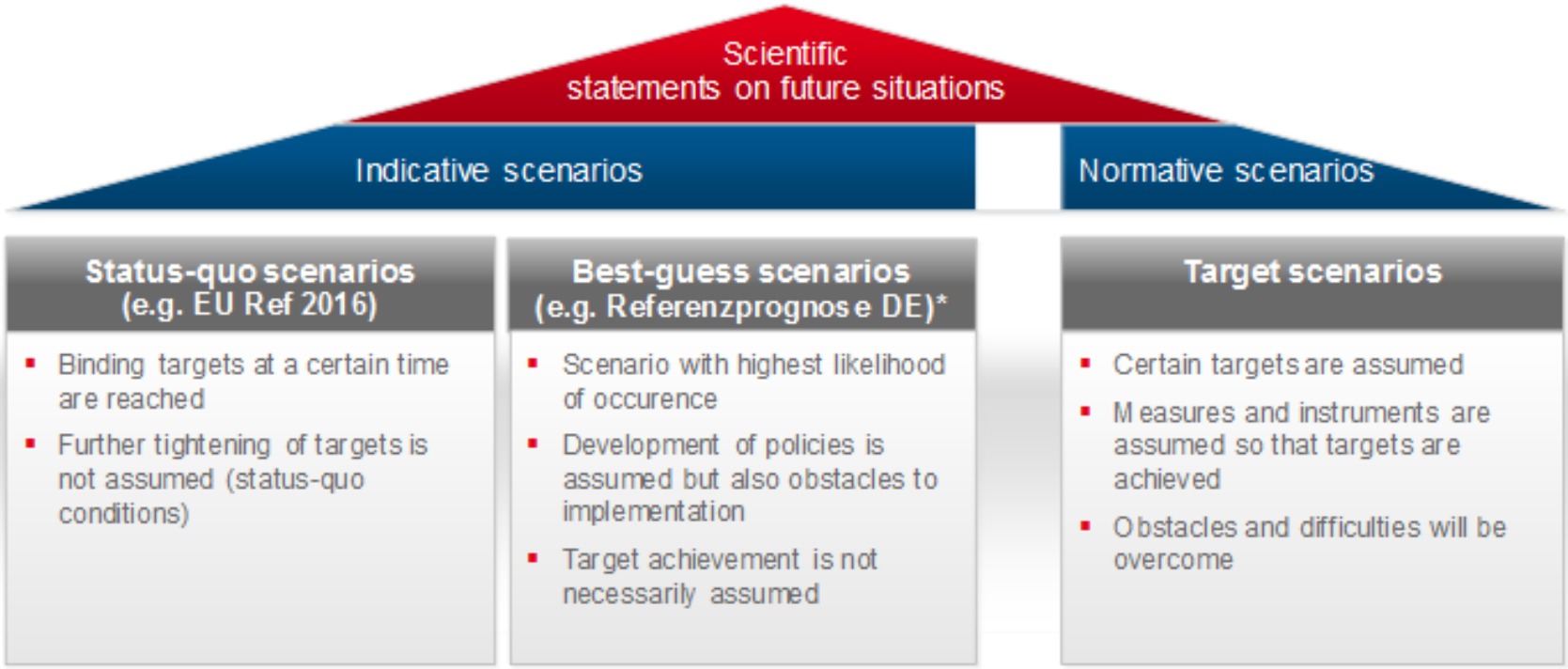
4. Risk analyses

5. Scientific questions

6. Infrastructure planning

Classification of scientific forecasts

Indicative scenarios adress the question „What if…?“, normative scenarios: „What to do, so that…?“



Source: EU Ref 2016, Prognos

Assumptions of the EU Reference Scenario 2016: 2020 targets will be reached, but no further targets

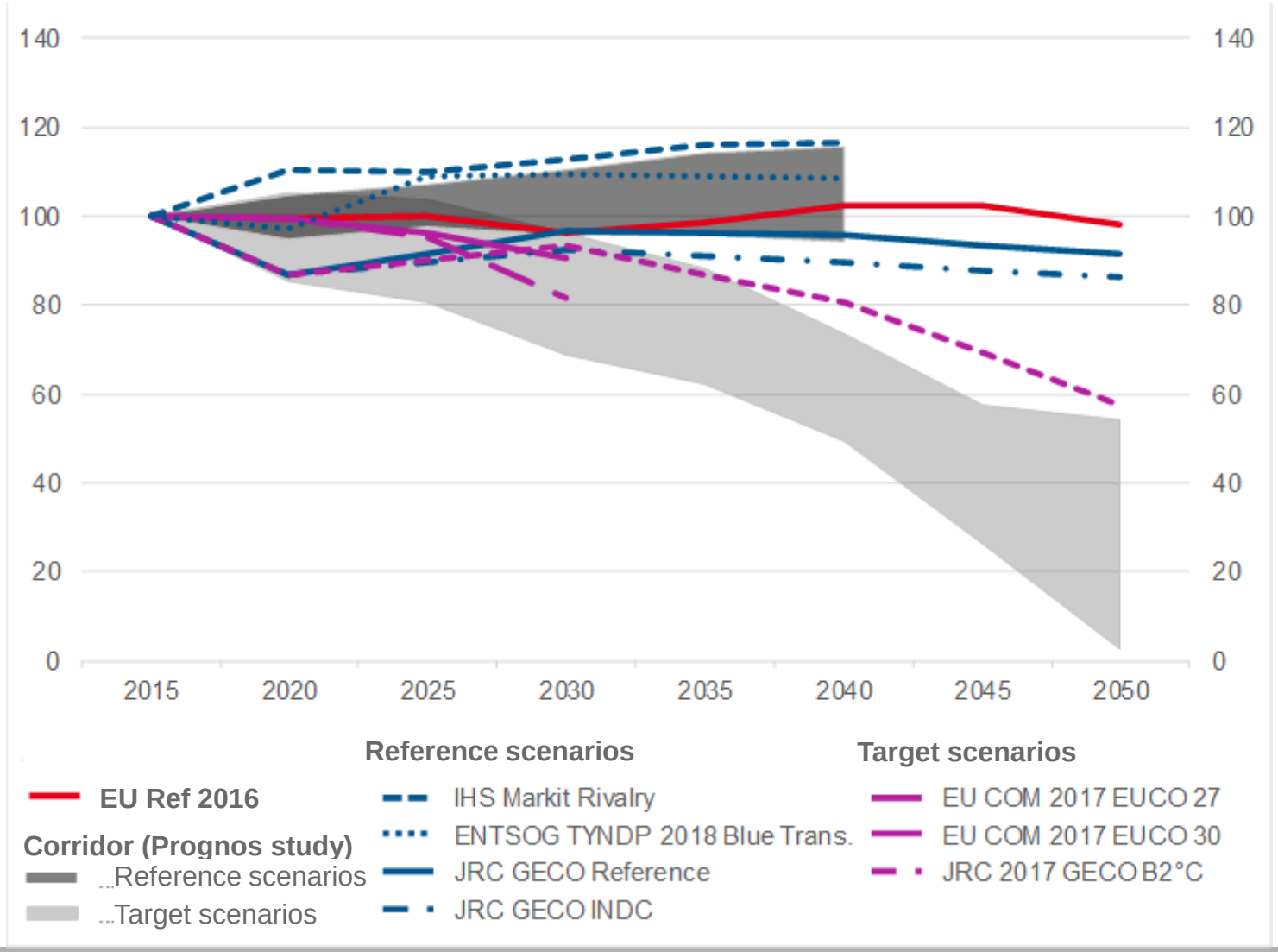
- The EU reference scenario EU Ref 2016 provides a possible future development under status-quo conditions.
- EU Ref 2016 assumes, that binding targets for GHG emissions and RES targets for 2020 will be reached. However, the efficiency target (reduction of energy consumptioon by 20 % against reference 2007) missed by a short distance.
- EU Ref 2016 assumes that measure on which EU and member states have agreed on until December 2014, will actually be implemented.
- The impact of the Paris agreement from December 2015 has not been considered.

From the summary of EU Ref 2016, page 1:

"REF2016 provides a consistent approach in projecting long term energy, transport and climate trends across the EU and is a key support for policy making. However, it is not a forecast since, as with any such exercise, there are several unknowns. These range from macroeconomic growth, fossil fuel prices, technological costs, and the degree of policy implementation across EU. Moreover, REF2016 does not include the politically agreed but not yet legally adopted 2030 climate and energy targets."

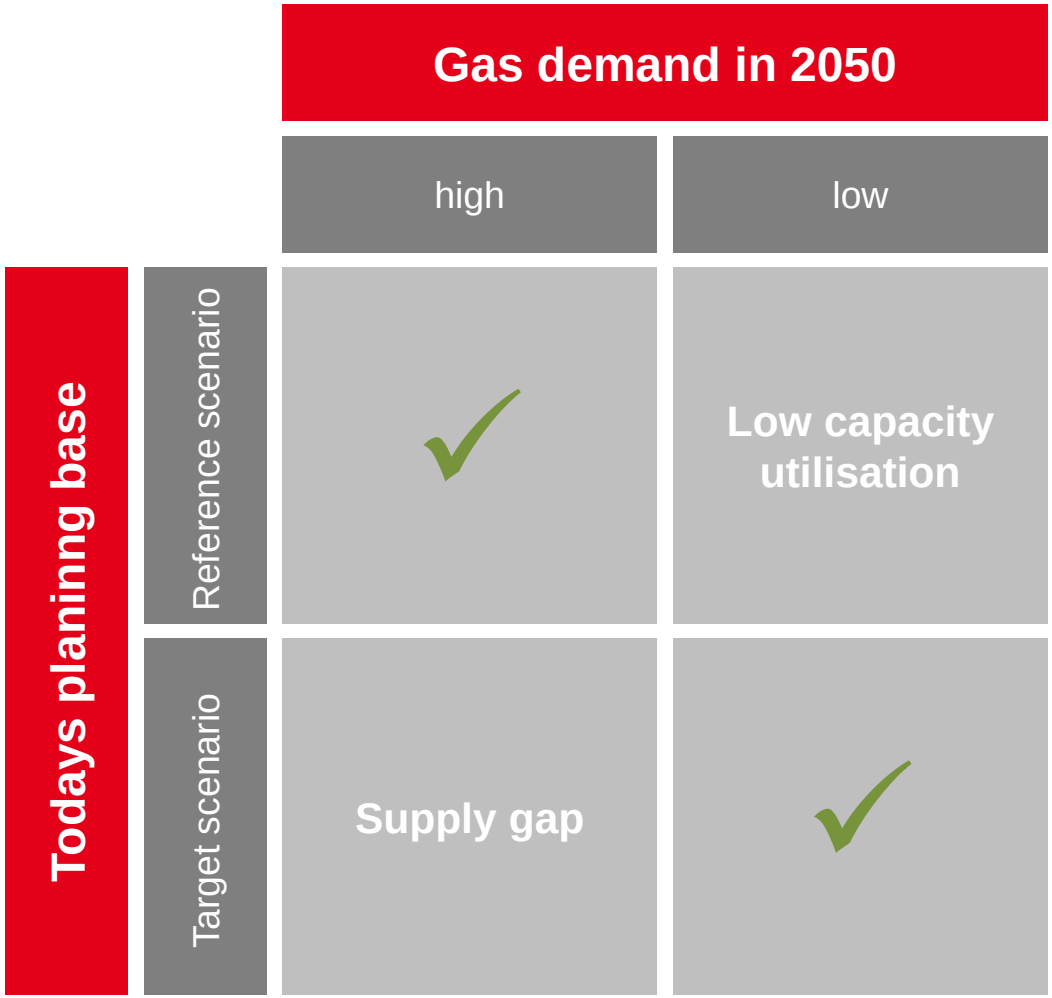
Source: EU Ref 2016

Scenarios for European Gas demand (indexed, 2015 = 100)



Note:

Classification of risks when using different scenario types for infrastructur planning



Questions for discussion

- What are adequate scenarios for the planning of large gas infrastructure?
- Does infrastructure influence market behaviour of consumers (and thus consumption)?
- Should infrastructure planning be an instrument of
  - Increasing security of supply?
  - Geopolitics?
  - Climate policy?
  - or should market players and infrastructure operators decide freely?

When modelling a gas balance, please be aware of definitions…

Defined in...	Temperature	Pressure	Note
DIN 1343	273.15 Kelvin (0° Celsius)	1.0135 bar	“Normal cubic meter”
DIN 2533	288.15 Kelvin (15° Celsius)	1.0135 bar	“Standard cubic meter”
DIN 6358	293.15 Kelvin (20° Celsius)	1.0 bar	Corresponds to the Russian standard

Sources: (IEA, Energy Statistics Manual), (Gazprom, PJSC Gazprom Annual Report , 2015)

And whether the source refers to net or gross calorific value…

"The calorific value of natural gas is the amount of heat released by the complete combustion of a unit quantity of fuel under specified conditions, e.g. kcal/m3, or megajoule (MJ/m3).

Values may be quoted either gross or net. The difference between gross and net calorific value is the latent heat of vaporisation of the water vapour produced during combustion of the fuel. For natural gas, the net calorific value is on average 10% less than the gross value."

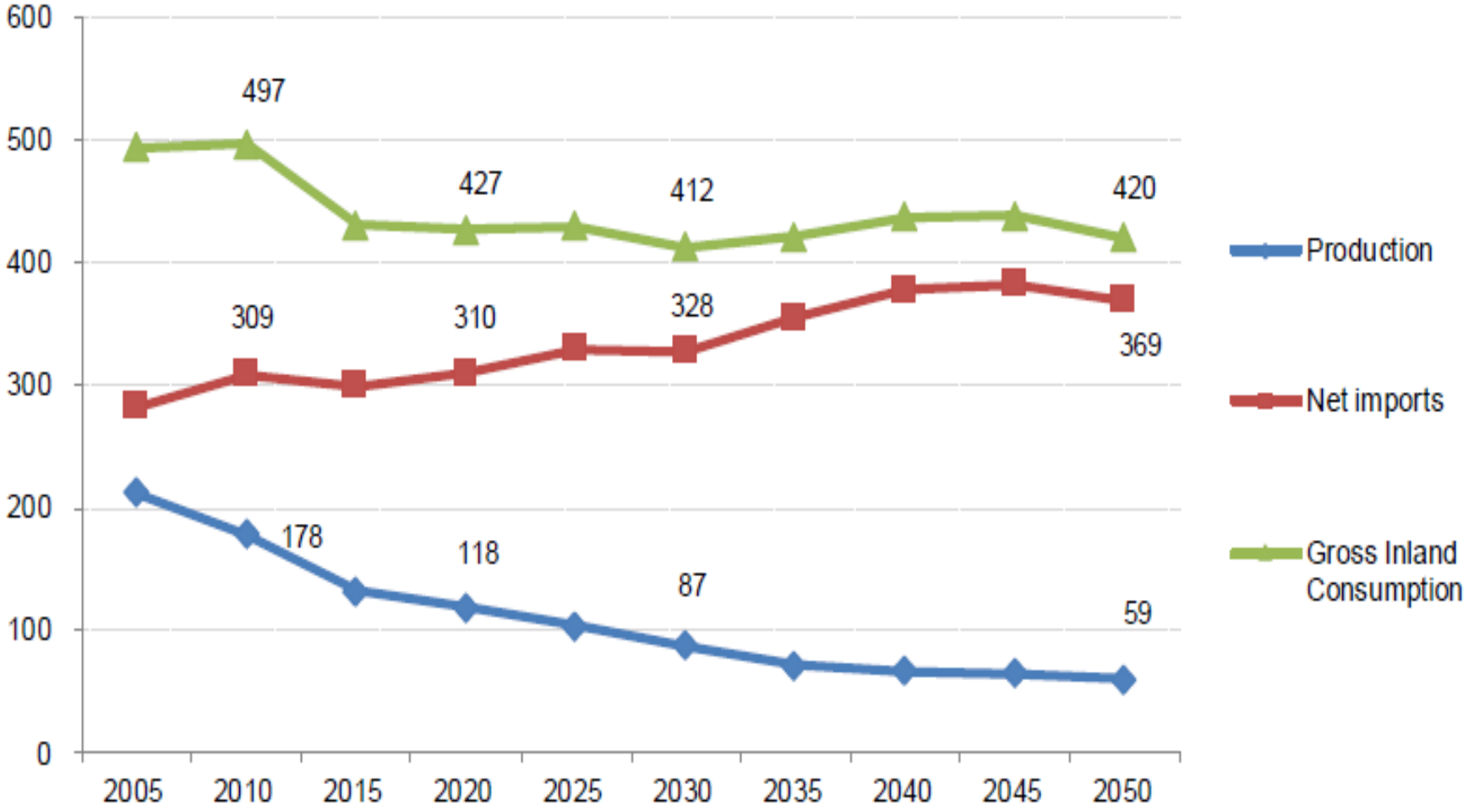
Source: IEA, Energy Statistics Manual, page 57

Some volume and energy indicators

Source	Conversion factor
BP Statistical Review of Word Energy	10.47 kWh / m^3
Eurogas GCV	10.83 kWh GCV/ m^3
Russian standard GCV (at 20°C)	10.5 kWh GCV/ m^3 at 20°C

A glance on summary chart from EU Ref 2016

Gas demand and supply balance of EU 28 in bcm/a



- EU Ref 2016 has used BP´s Conversion Factor but applies it to NCV data

Source: EU Ref 2016, Summary of results page 4

Increase in EU / Swiss gas needs:
+ 20 bcm until 2020 and + 41 bcm until 2025

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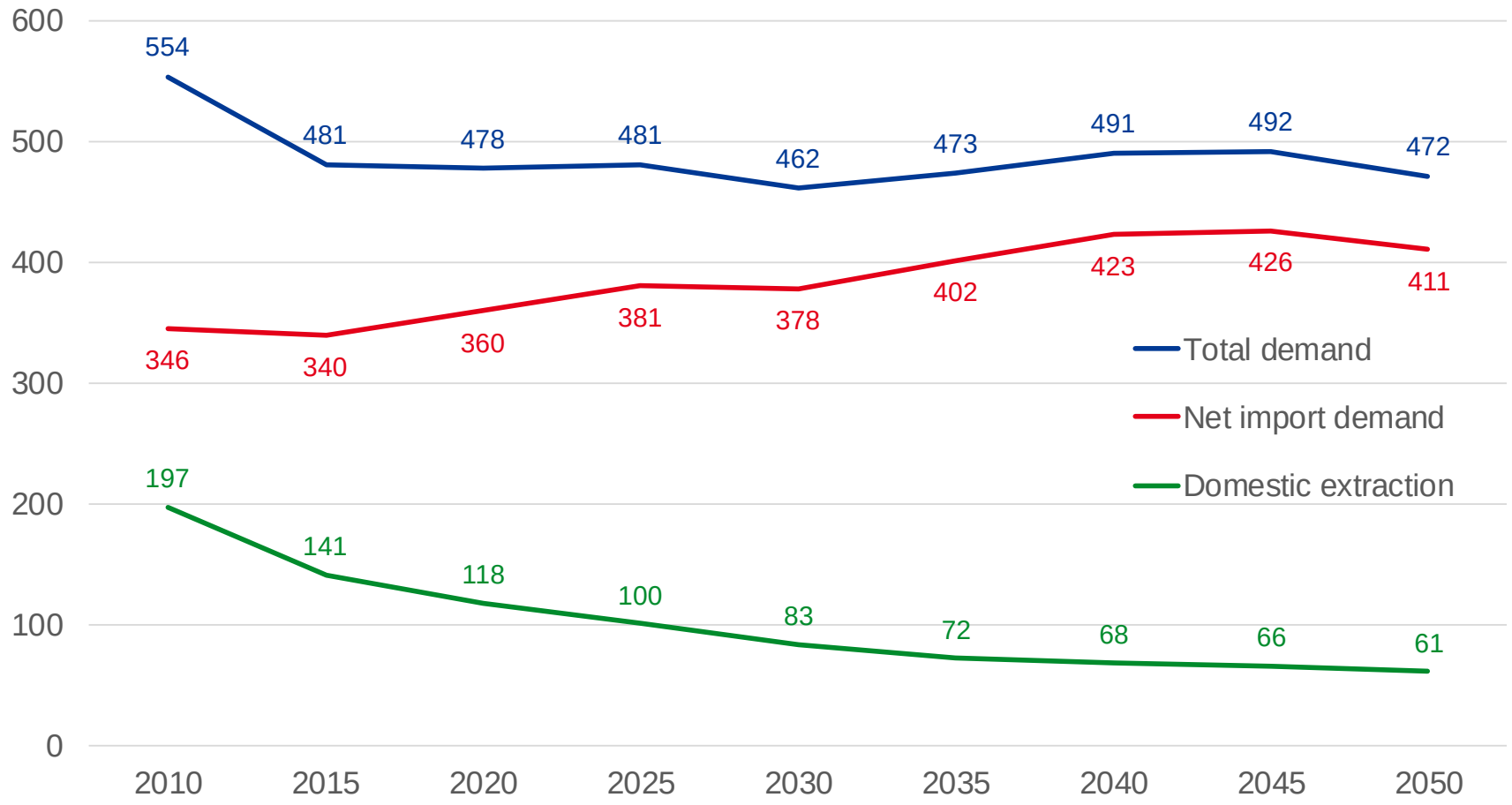
Gas balance of EU 28 and Switzerland 2010-2050 with recent production forecasts given in billion Sm³



Source: Prognos based on (GTS 2015), (Rijksoverheid 2016), (FNB Gas 2016), (DECC 2016), (EC 2016b)

Conclusion

- Most scenarios don´t want to be forecasts. They describe likely or less likely outcomes of future developments under certain conditions.
- The definition of an adequate scenario depends on the purpose that it is designed for.
- Reference scenarios seem to be a good choice if security of supply has the highest priority.
- When comparing results of scenarios (especially volumes), be aware of different definitions and gas qualities.

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