Supply Scenarios TYNDP 2015

Data basis

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Brussels, 30 April 2014

Introduction

- Characteristic of an ENTSOG supply scenario

  - Assumption on a possible “gas supply potential” of a given source as input for TYNDP

Supply from outside the EU:	***Supply from inside the EU:***
Libya, Algeria, Norway, Russia, LNG	***National production, Biomethane, Shale gas***

  - Libya, Algeria, Norway and Russia are referred to be pipeline exports. LNG from those countries is included in the LNG scenario
  - To reflect the uncertainty and to have wide rage of possible market situations in the future, every supply scenario consists of a minimum, maximum and intermediate line
  - Best available information: official literature, member information, press releases
  - Each supply scenario is elaborated independently from the others
  - The likelihood of the different supply scenarios is not assessed

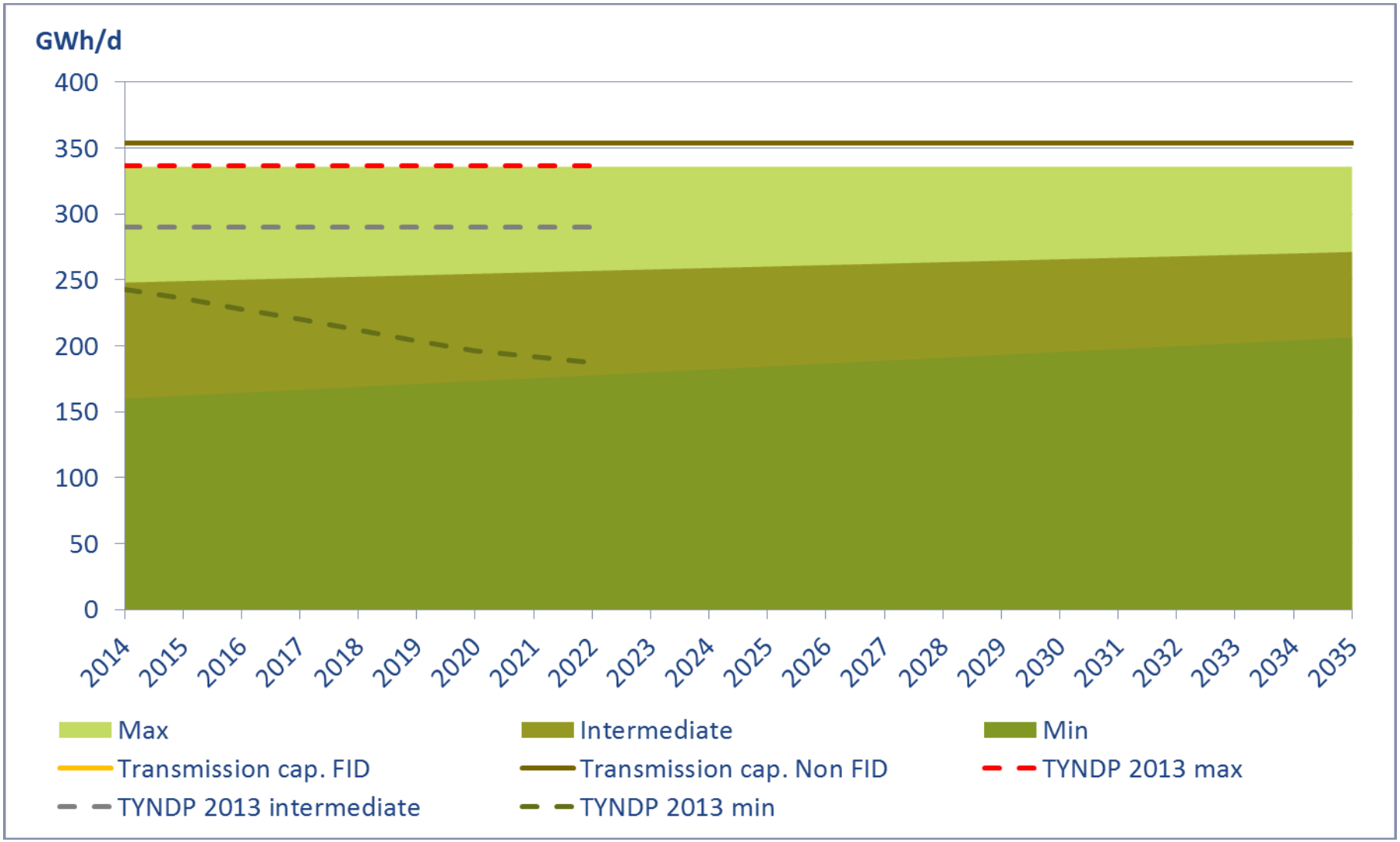
Supplies from outside the EU

Supplies from Libya

- Scenarios:
  - Maximum: 95% load factor of the transmission capacity (Greenstream)
  - Intermediate: average of minimum and maximum
  - Minimum (3-step process):
    1. Extrapolation of low case “Gas Supply” from Mott Mac. Donald’s Report *
    2. Applying minimum ratio of export/production of the last 8 years (34%) **
    3. Assuming a portion of pipeline export of 96% ***

Sources:
** Mott Mac Donald’s: Supplying the EU Natural Gas Market, November 2010*
*** OPEC: Annual Statistic Bulletin 2008 and 2013*
**** BP: Statistical Review 2012*

Supplies from Libya in different scenarios



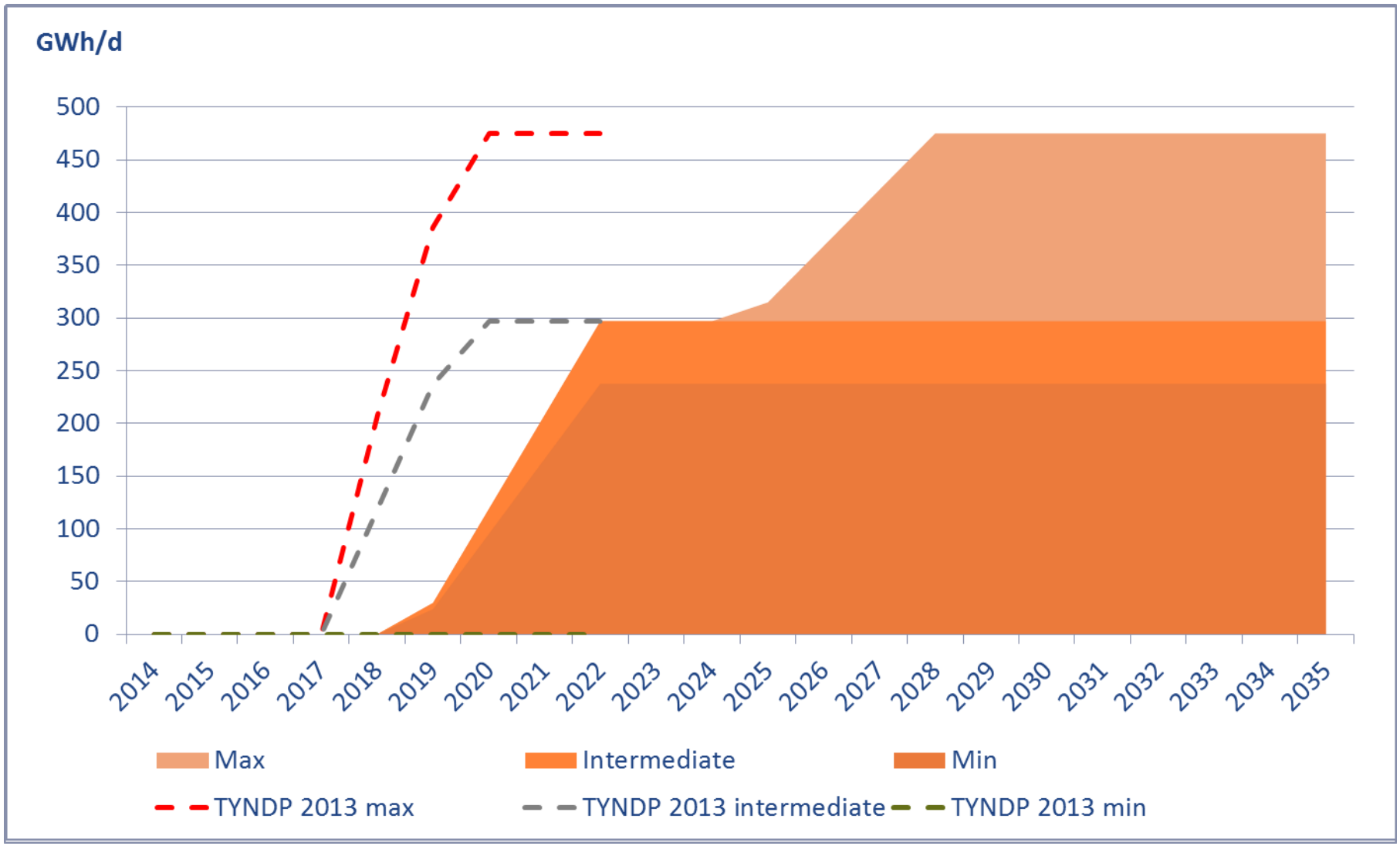
Supplies from Azerbaijan

Methodology

- Shah Deniz II production (incl. possible quantities from stage III)
  - Stage III: Peak level of 25 BCM/a for an extended period as of 2025 *
- First gas in 2019
- Scenarios:
  - Maximum: Stepwise increase to plateau production of 16 BCM to Europe in 2028 *
  - Intermediate: 10 BCM to Europe as of 2022 **
  - Minimum: 80% of intermediate scenario ***
- Ramp-up phase 10% / 40% / 70%

Sources:
** Recent information from BP (March 2014)*
*** Same approach as in previous TYNDP*
**** Own assumption*

Supplies from Azerbaijan in different scenarios



Supplies from Algeria

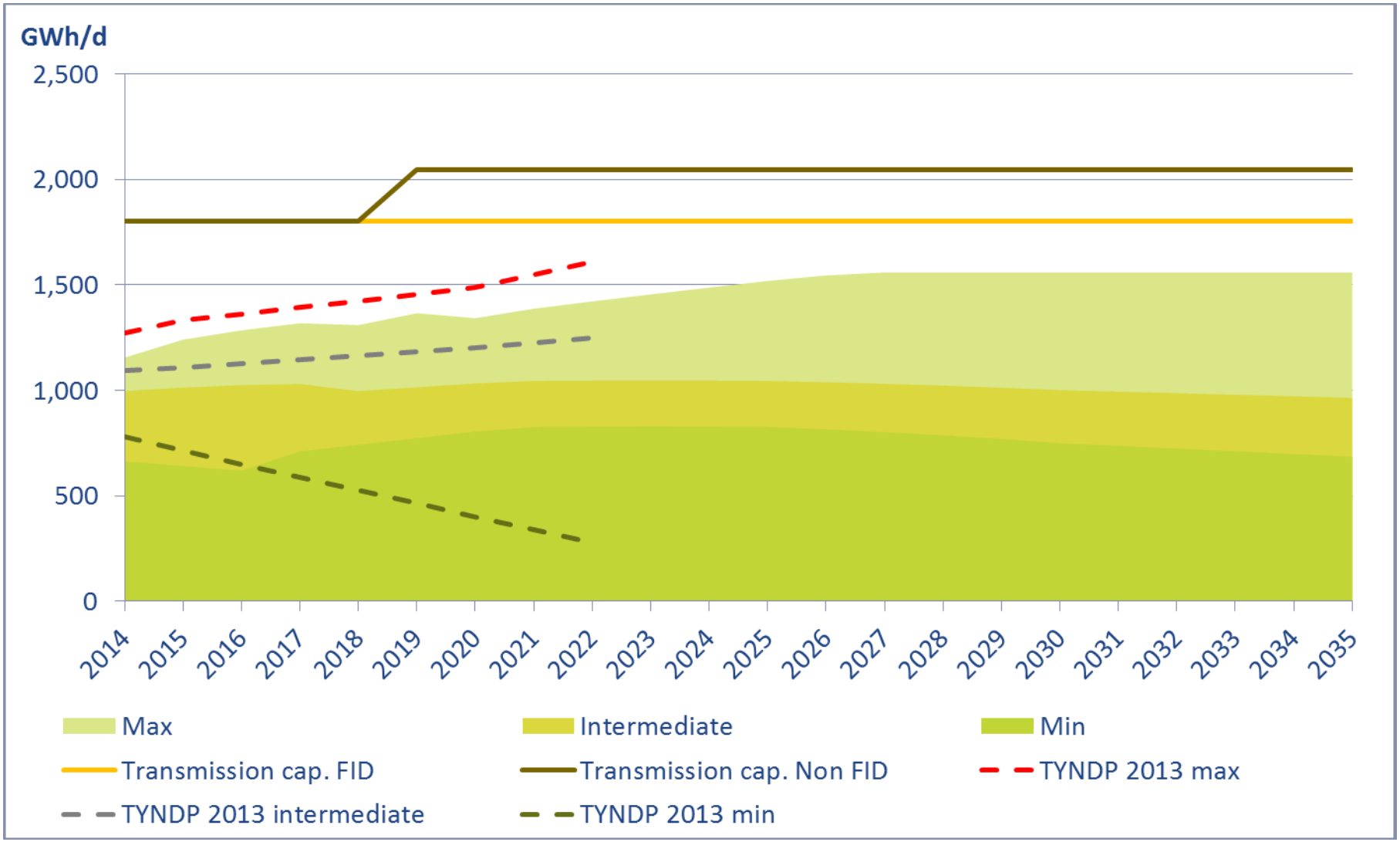
Methodology

- ***Algerian gas production outlook:***
  - Medpro *
  - IEA (WEO 2013) **
- Algerian demand projections (Ministère de l'Enerie et des Mines – Algeria) ***
- Evolution in the split Pipe/LNG (Ministère de l'Enerie et des Mines – Algeria) ***

- Scenarios:
  - Maximum: Combination of Medpro production & Demand projections & Evolution of the Split pipe/LNG
  - Intermediate: Combination of IEA production & Demand projections & Evolution of the split pipe/LNG
  - Minimum: Combination of IEA production & Demand projections & Maximization of the Liquefaction capacity (90% of technical capacity)

Sources:
** MedPro: Outlook for Oil and Gas in Southern and Eastern Mediterranean Countries 2012*
*** IEA (WEO 2013): World Energy Outlook 2013 from the International Energy Agency*
**** Situation du gaz en Algérie, December 2013*

Supplies from Algeria in different scenarios

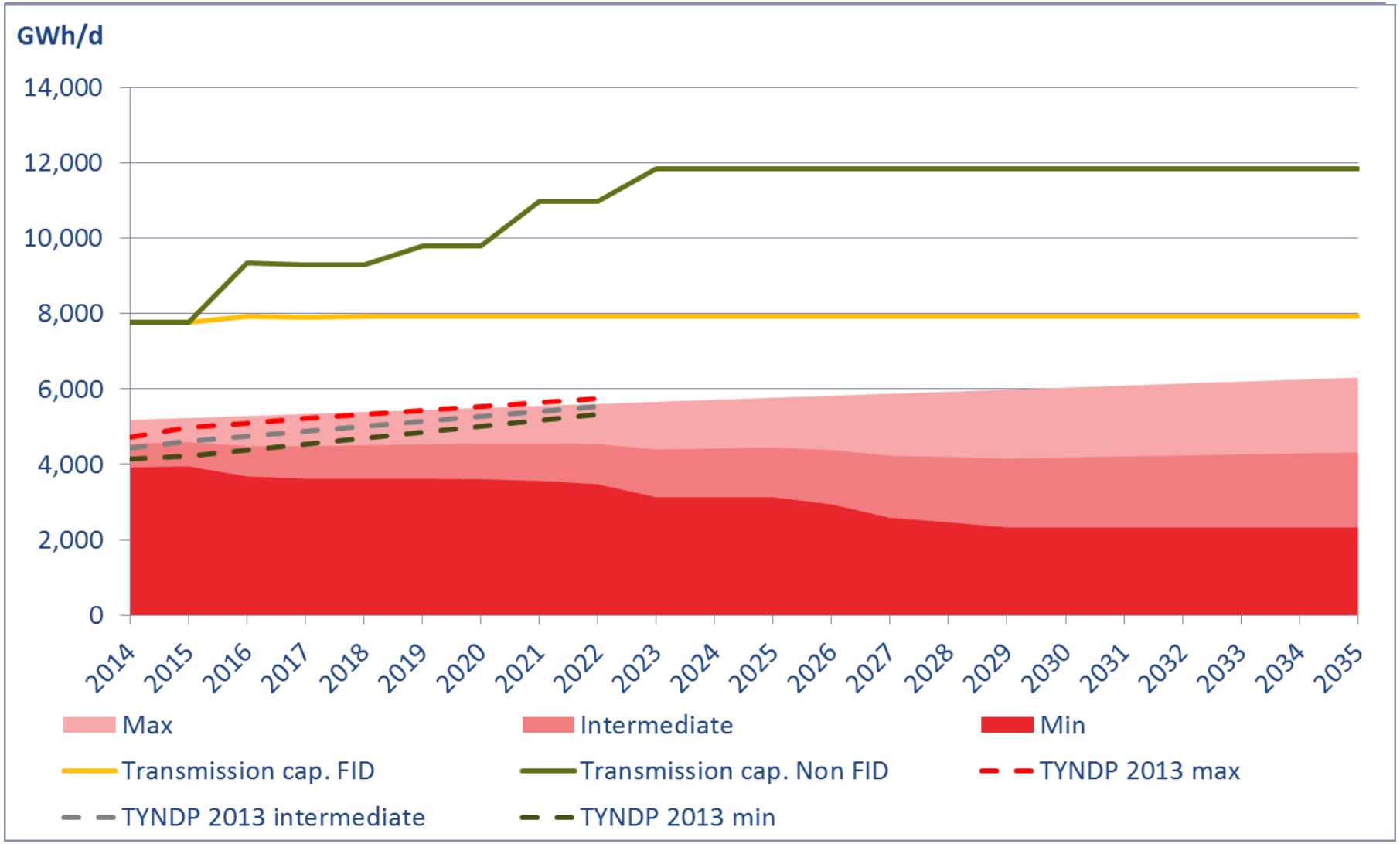


Supplies from Russia

- Scenarios:
  - Maximum: Extrapolation of “Gas Export to Europe” *
  - Intermediate: Average of maximum and minimum scenario
  - Minimum: “Minimal contractual quantities” **

Sources:
** Institute of Energy Strategy (Gromov 2011): Russian gas: between Europe and Asia*
*** Tatiana Mitrova (January 2014): What are the big European suppliers going to do to model their gas supply to the European market?*

Supplies from Russia in different scenarios

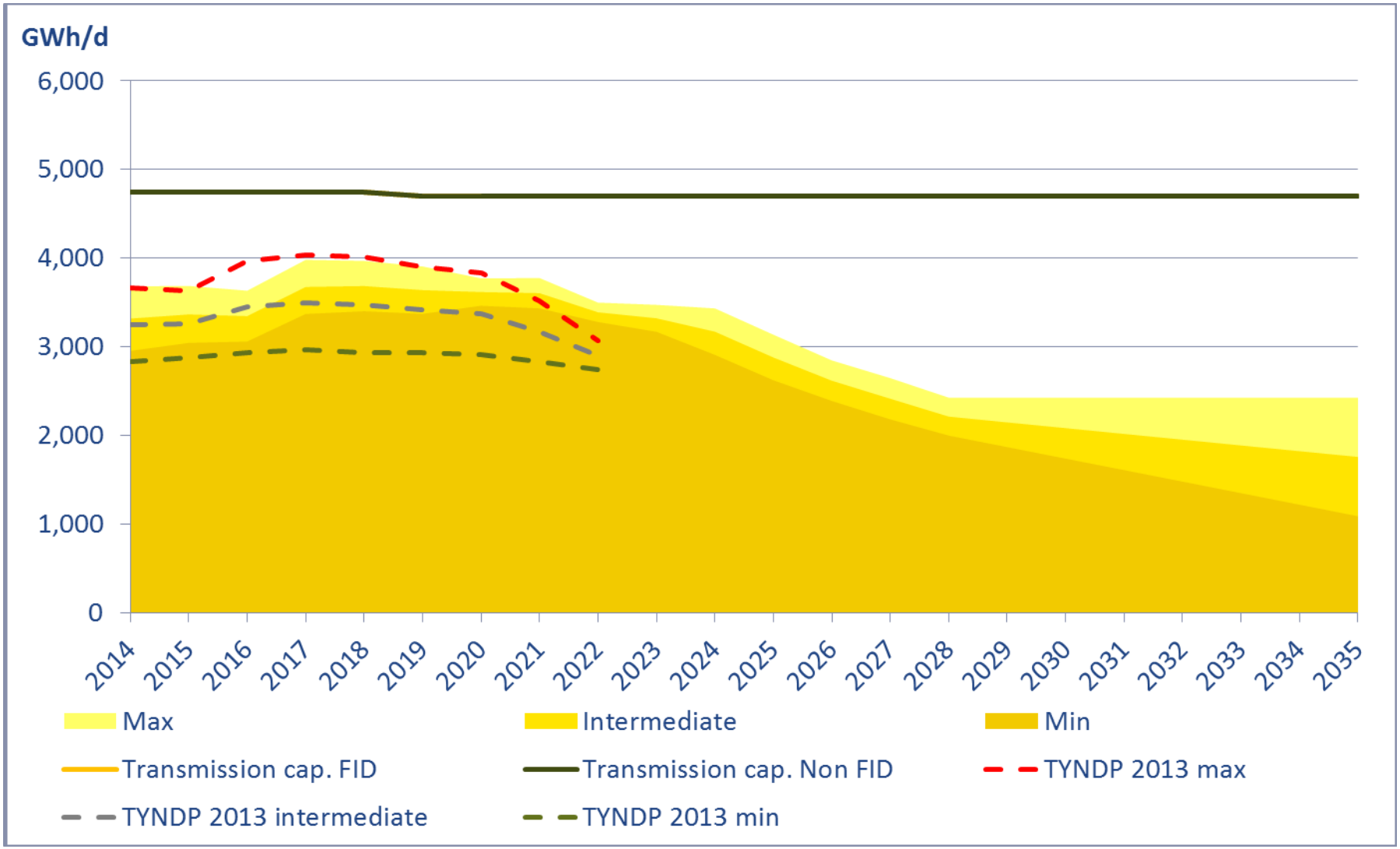


Supplies from Norway

- Scenarios:
  - Maximum: maximum daily production with constant figure as of 2028 *
  - Intermediate: average of maximum and minimum scenario
  - Minimum: minimum daily production with extrapolation of the years 2026-2028 for the assumption on the future trend to 2035 *

Source:
** GASSCO: Figures 2014*

Supplies from Norway in different scenarios



LNG supplies

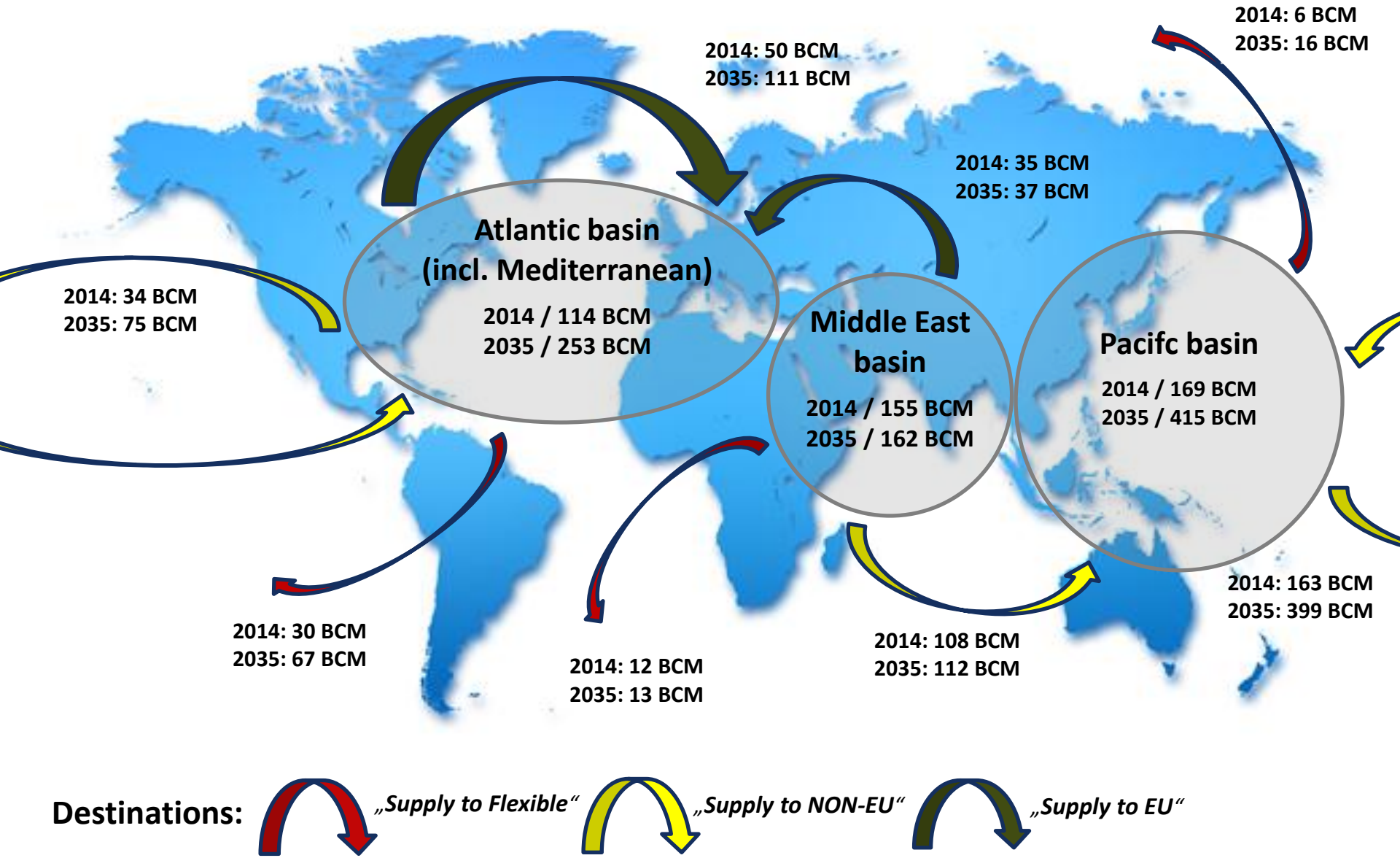
Methodology

- Projection of future world LNG supplies in 2035: 830 BCM/y *
- Breakdown to specific LNG supplies per basin in 2035 (Atlantic, Pacific, Middle East) **
  - Atlantic basin: 30% / Pacific basin: 50% / Middle East basin: 20%
  - Extrapolation to derive yearly figures for the period 2014 – 2035. Starting point in 2014 based on current concluded LNG contracts per basin ***
- Different destinations for LNG supplies: "EU", "NON-EU" and "Flexible"
- Fix delivery share by basin to the designated destination based on the current proportion of the delivery share by basin which can be retrieved from LNG contracts for 2014 ***

	to "EU"	to "NON-EU"	to "Flexible"
Atlantic basin	44%	30%	26%
Middle East basin	23%	69%	8%
Pacific basin	0%	96%	4%

Sources:
** BP (2013): Energy Outlook 2030*
*** ExxonMobil (2014): Energy Outlook 2040*
**** International Group of Liquefied natural Gas Importers (GIIGNL): The LNG Industry in 2013*

LNG – production and destination per basin –



LNG supplies

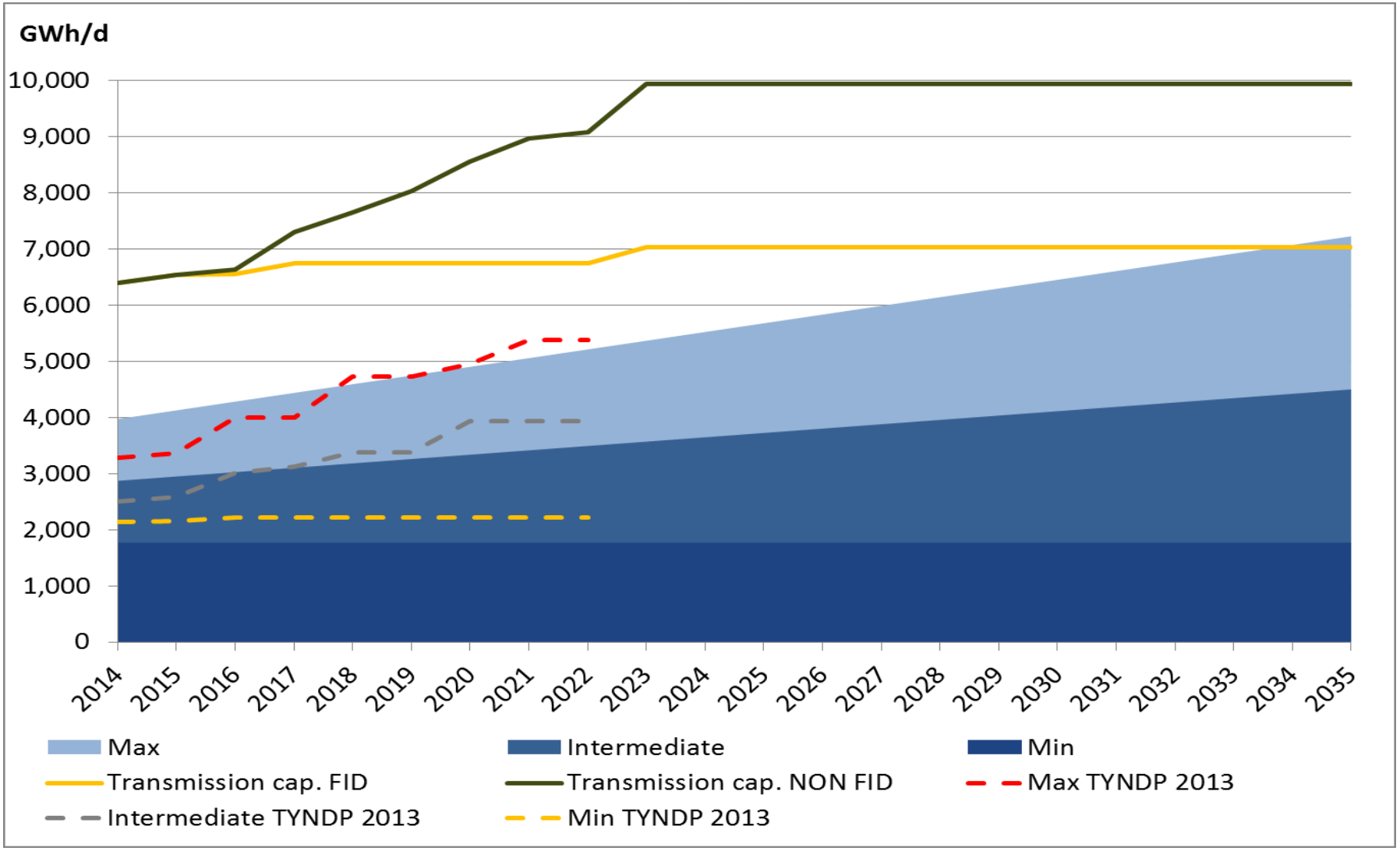
Additional to GIIGNL Source

- Only consideration of contracts which are already in force and concluded
- All considered contracts are medium or long-term contracts (> 5 years)
- Contracts with no given destination are considered as destination with “Flexible”

- Scenarios:

  - Maximum: sum of projected world LNG supplies by basin with destination “***EU***” and “***Flexible***”
  - Intermediate: average of maximum and minimum scenario
  - Minimum: average of LNG supplies to EU in 2011 / 2012 / 2013

LNG supplies in different scenarios



Supplies from inside the EU

Shale gas supplies

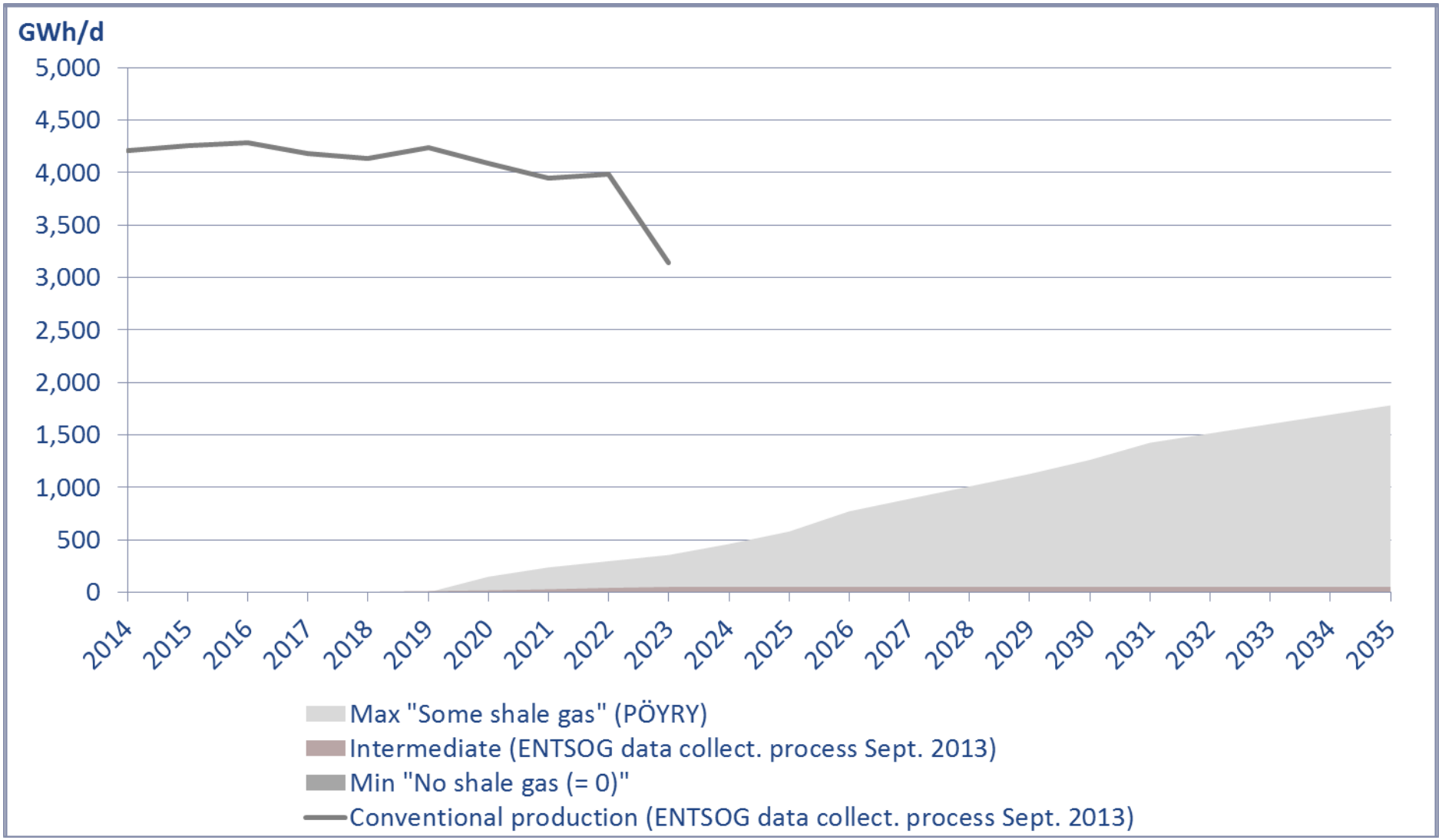
Methodology (PÖYRY)

- "Risk resources" for EU 28: **54 tcm**
- 15% of the estimated risk resources are technical recoverable
- Economical recoverable amount of shale gas for EU 28 after applying of environmental, planning, practical and commercial constraints = around **1.5 tcm**

- Scenarios:
  - Maximum: "Some shale gas scenario" *
  - Intermediate: ENTSOG data collection process September 2013
  - Minimum: "No shale gas" (= 0)

Source:
** PÖYRY: Macroeconomic Effects of European Shale Gas Production November 2013*

Shale gas supplies

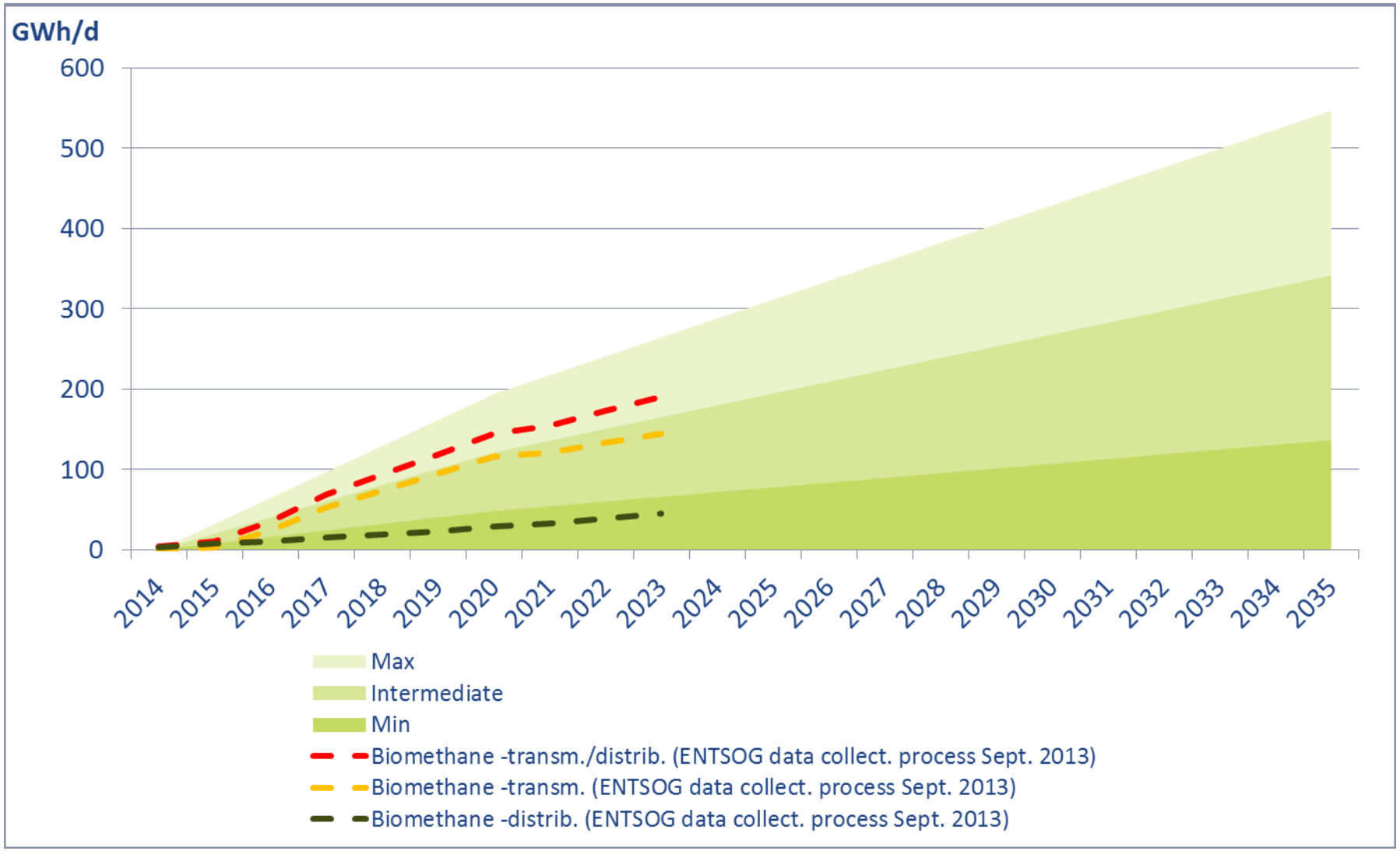


Biomethane supplies

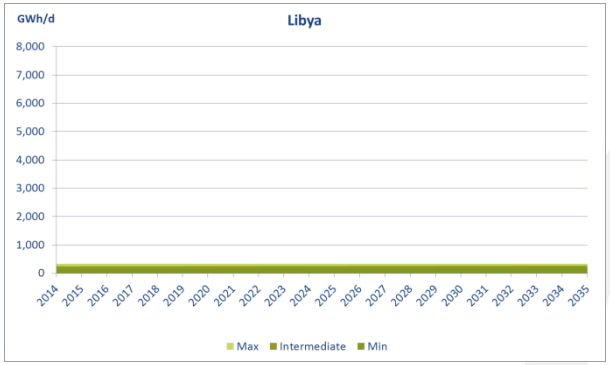
- Scenarios:
  - Maximum: 80% of the Green Gas Grids scenario for Europe *
  - Intermediate: Average of maximum and minimum scenario
  - Minimum: 20% of the Green Gas Grids scenario for Europe *

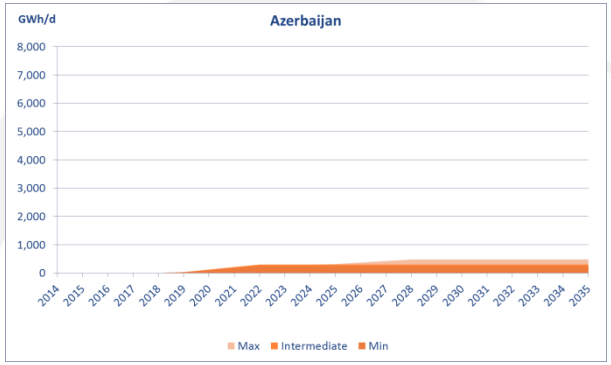
Source:
** Green Gas Grids – Proposal for a European Biomethane Roadmap, Dec 2013, European Biogas Association*

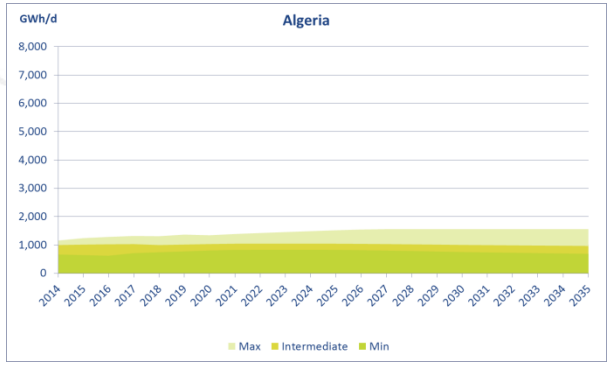
Biomethane supplies

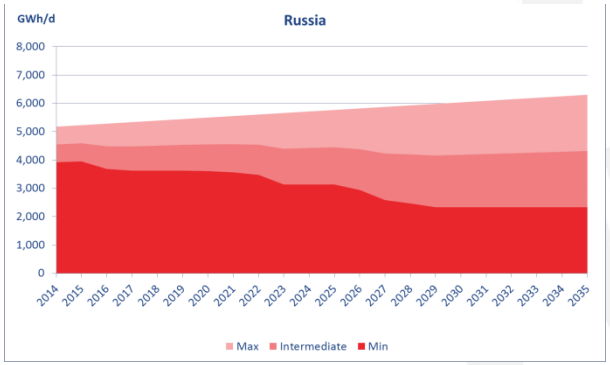


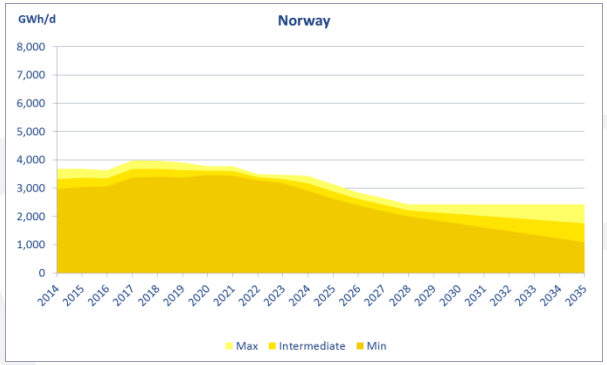
Overview of supply sources

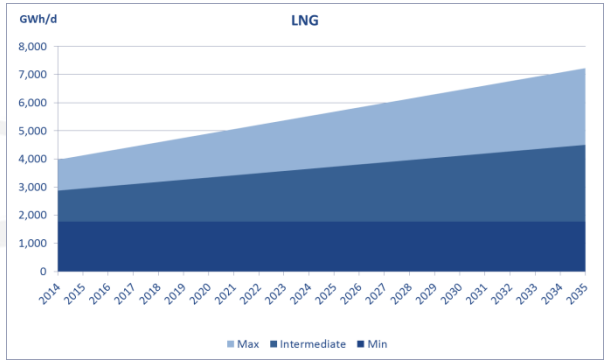


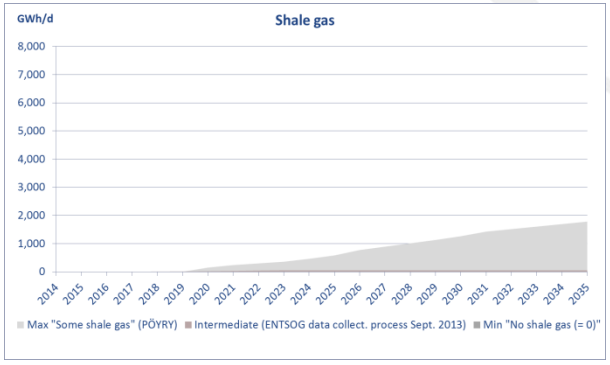


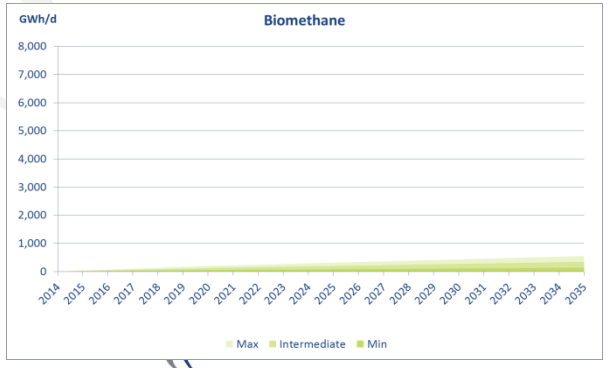












Thank You for Your Attention

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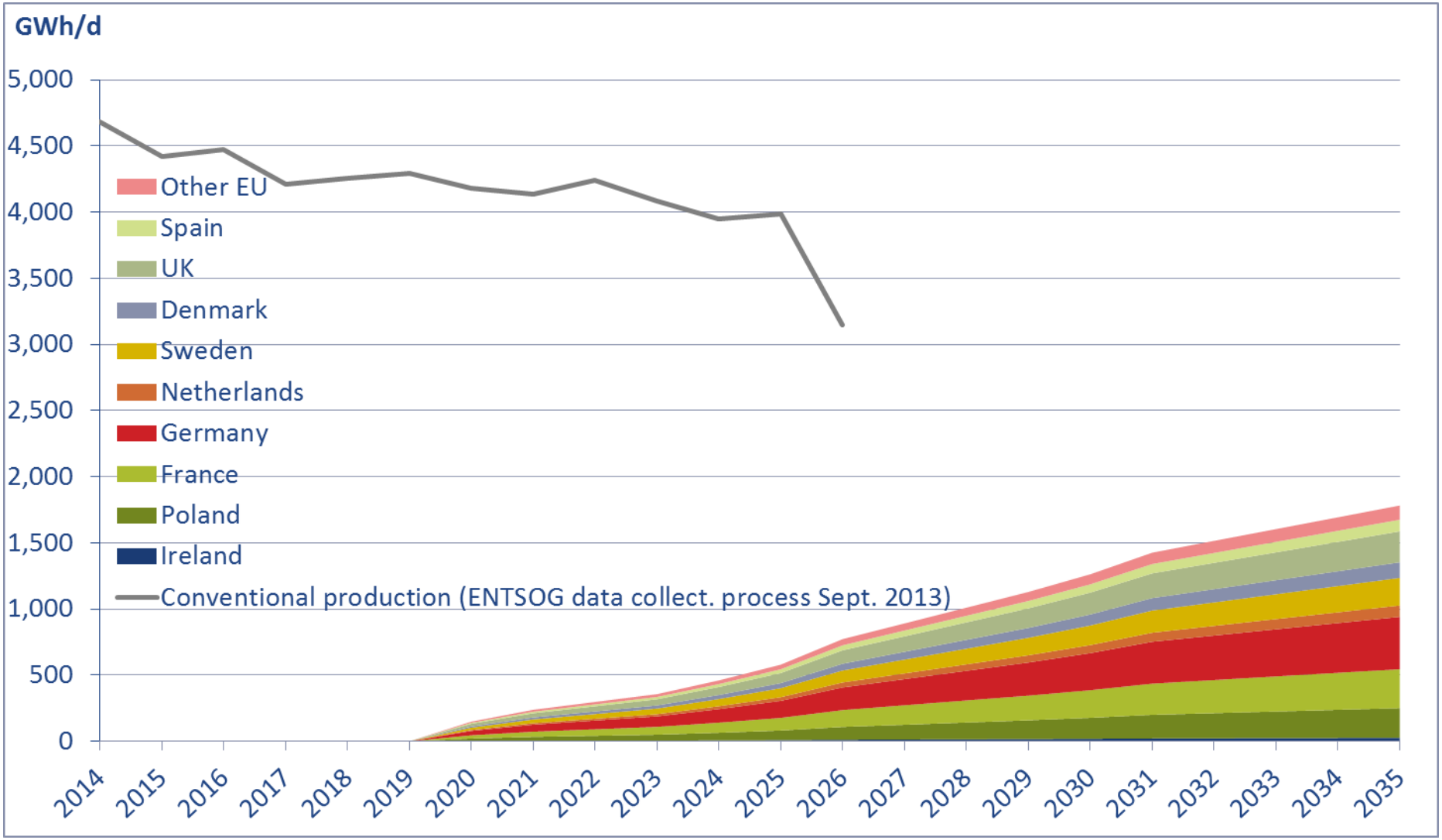
Back up

Shale gas supplies (back up)



Biomethane supplies (back up)