



european network
of transmission system operators
for gas

Supply Scenarios TYNDP 2015

Data basis

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Libya (1 of 2)

Methodology

- Scenarios:
 - Minimum (3-step process):
 1. Extrapolation of low case “Gas Supply ” 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 97% ”
 - Intermediate: average of minimum and maximum scenario
 - Maximum: 95% load factor of the transmission capacity

Sources:

‘ Mott Mac Donald’s: *Supplying the EU Natural Gas Market, November 2010*

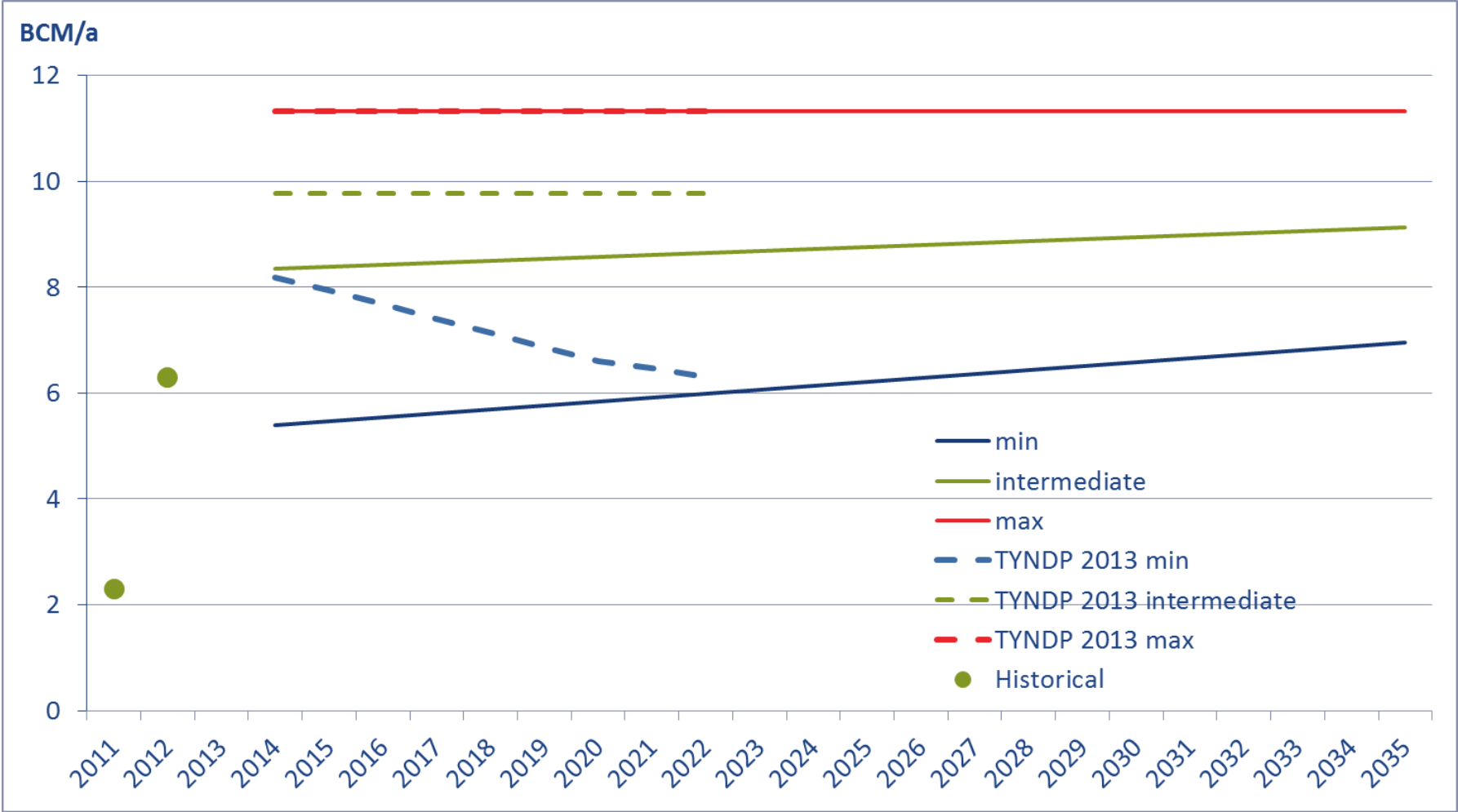
” OPEC: *Annual Statistic Bulletin 2008 and 2013*

”BP *Statistical Review 2012*

Libya (2 of 2)



Libya (2 of 2)

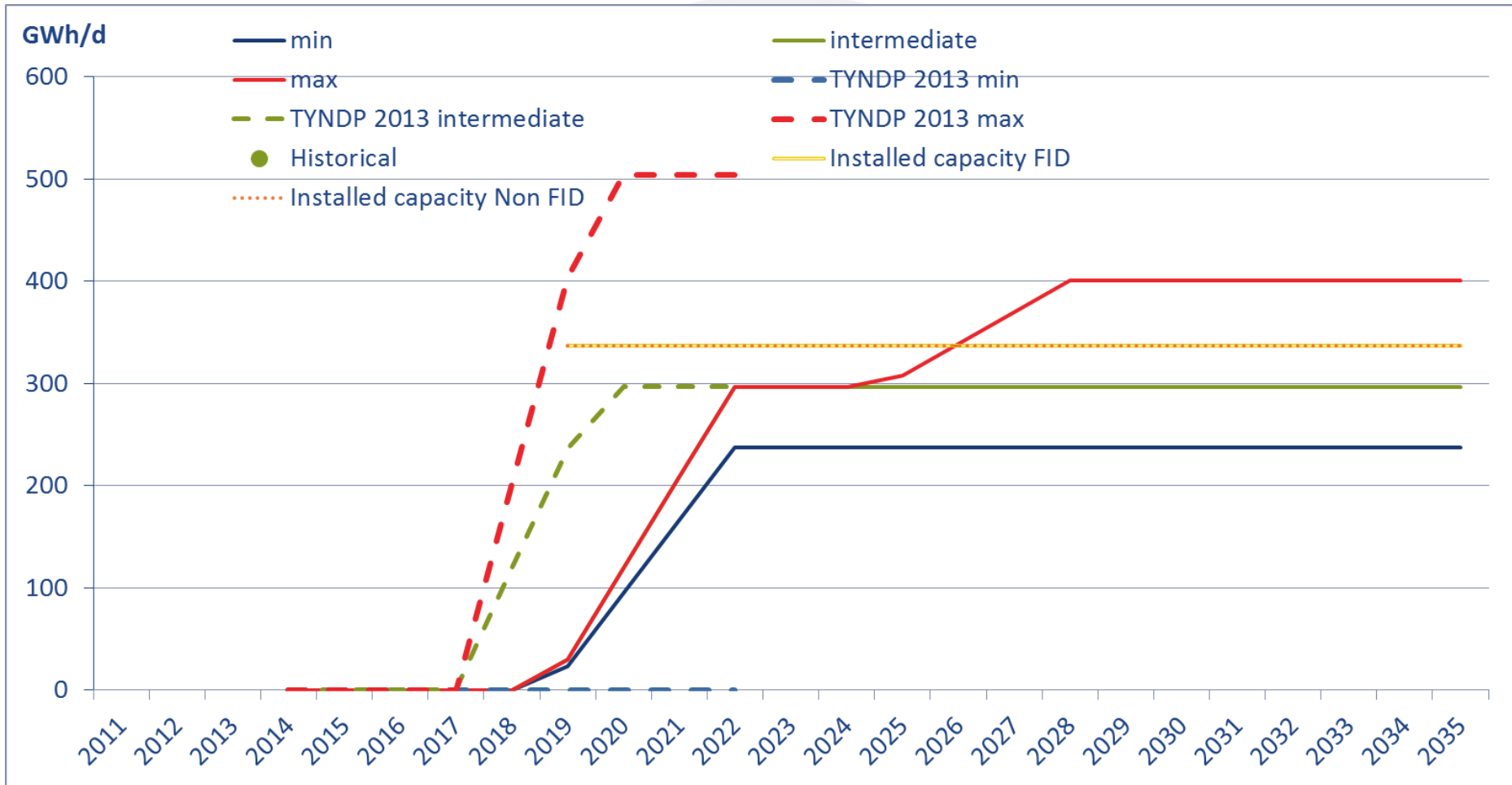


Azerbaijan (1 of 2)

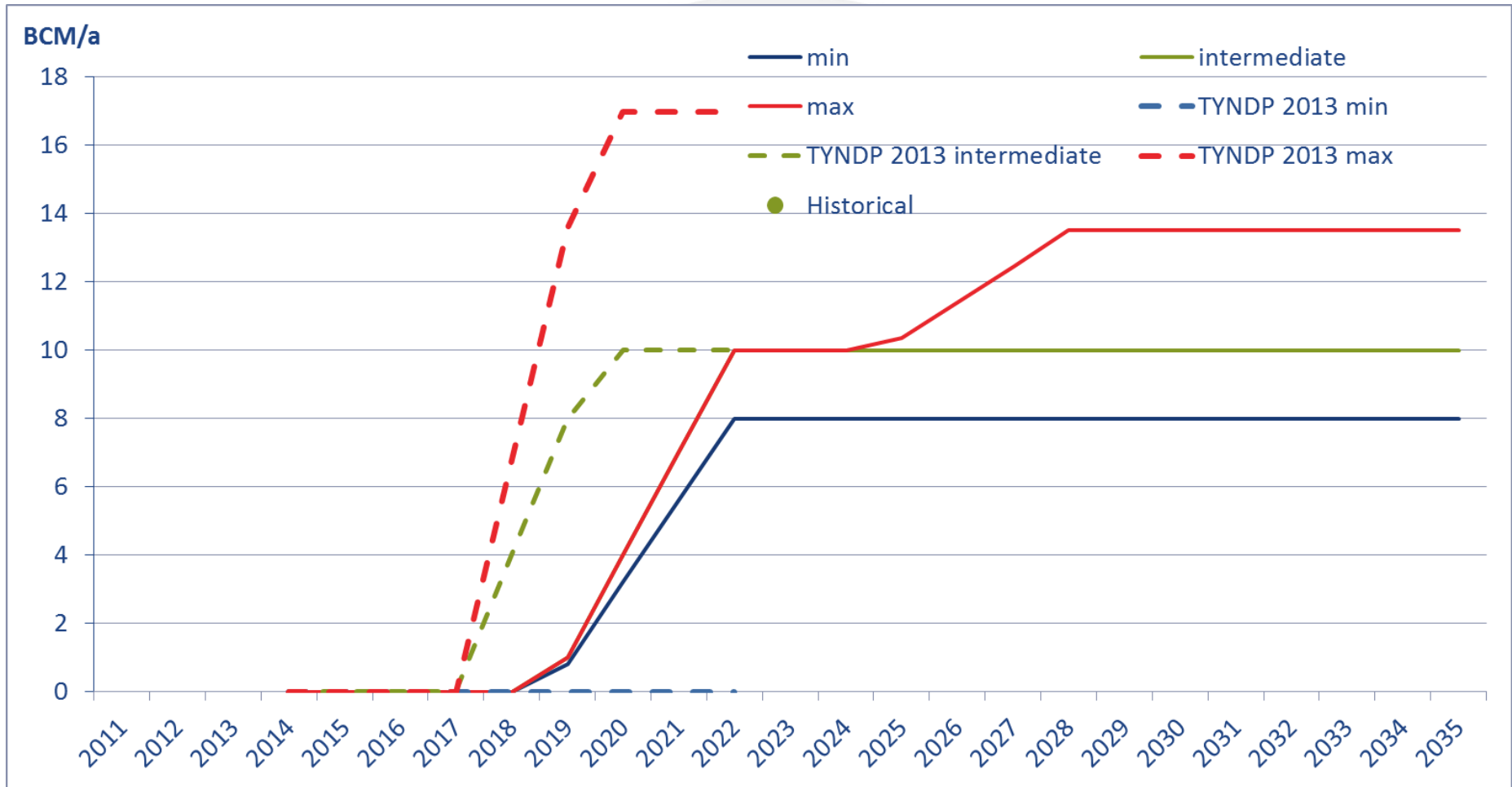
Methodology

- Only Shah Deniz II production
- First gas in 2019
- Scenarios:
 - Minimum: 80% of intermediate scenario
 - Intermediate: 10 BCM to Europe as of 2022
 - Maximum: Higher plateau of 13.5 BCM to Europe as of 2028'
- Ramp-up phase 10% / 40% / 70%

Azerbaijan (2 of 2)



Azerbaijan (2 of 2)



Algeria (1 of 2)

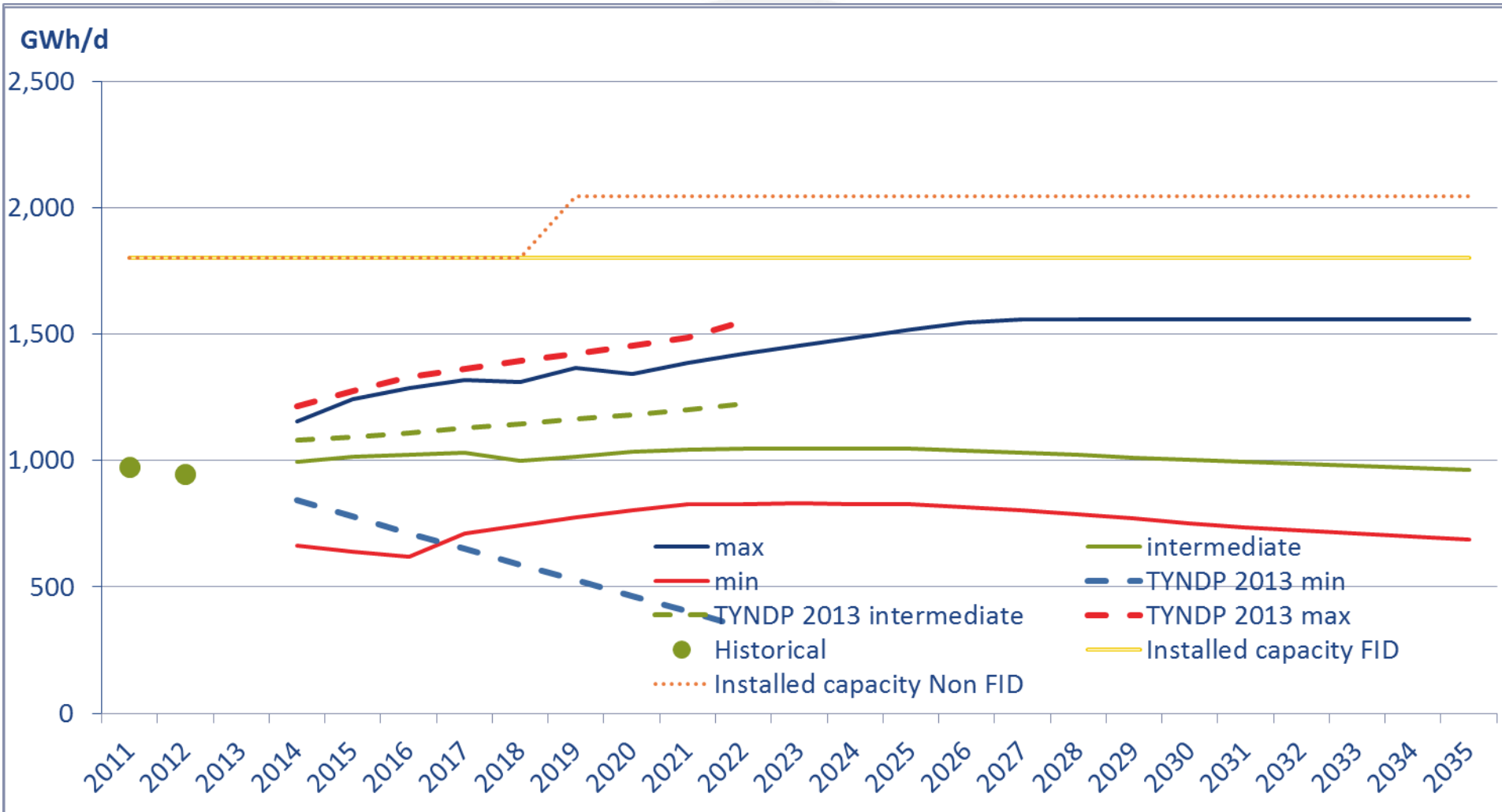
Methodology

- Data considered for the scenarios:
 - Algerian gas Production Outlook:
 - Medpro (')
 - IEA (WEO 2013)
 - Algerian demand projections (Ministère de l'Energie et des Mines – Algeria)
 - Evolution in the split Pipe/LNG by Ministère de l'Energie et des Mines – Algeria
- Scenarios:
 - High: 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)

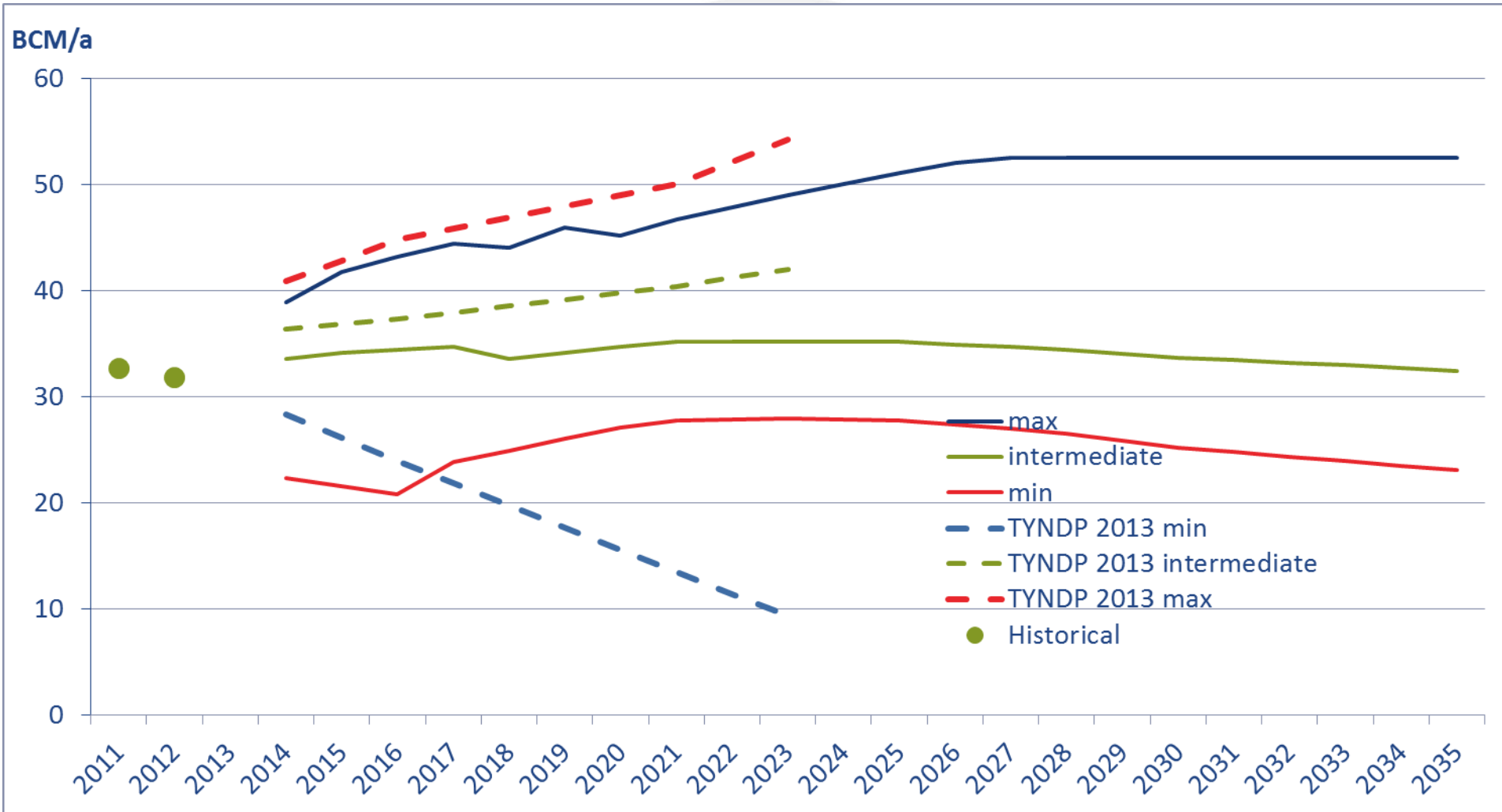
Sources:

' MedPro: Outlook for Oil and Gas in Southern and Eastern Mediterranean Countries 2012

Algeria (2 of 2)



Algeria (2 of 2)



Russia (1 of 2)

Methodology

- Scenarios:
 - Maximum: regression of “Gas Export to Europe” from Institute of Energy Strategy’
 - Intermediate: average of maximum and minimum scenario
 - Minimum: 50% greenhouse gas scenario”

50% GHG Reduction, which imposes an economy-wide price on CO2 and other greenhouse gases (GHG) that gradually reduces GHG emissions to 50 percent below 2005 by 2050 in Europe, USA, Canada, Japan, Australia and New Zealand. China, India, Russia, Mexico, and Brazil beginning in 2020 on a linear path to 50 percent below their 2020 levels by 2070. The rest of the developing countries delay their action to beyond 2050.

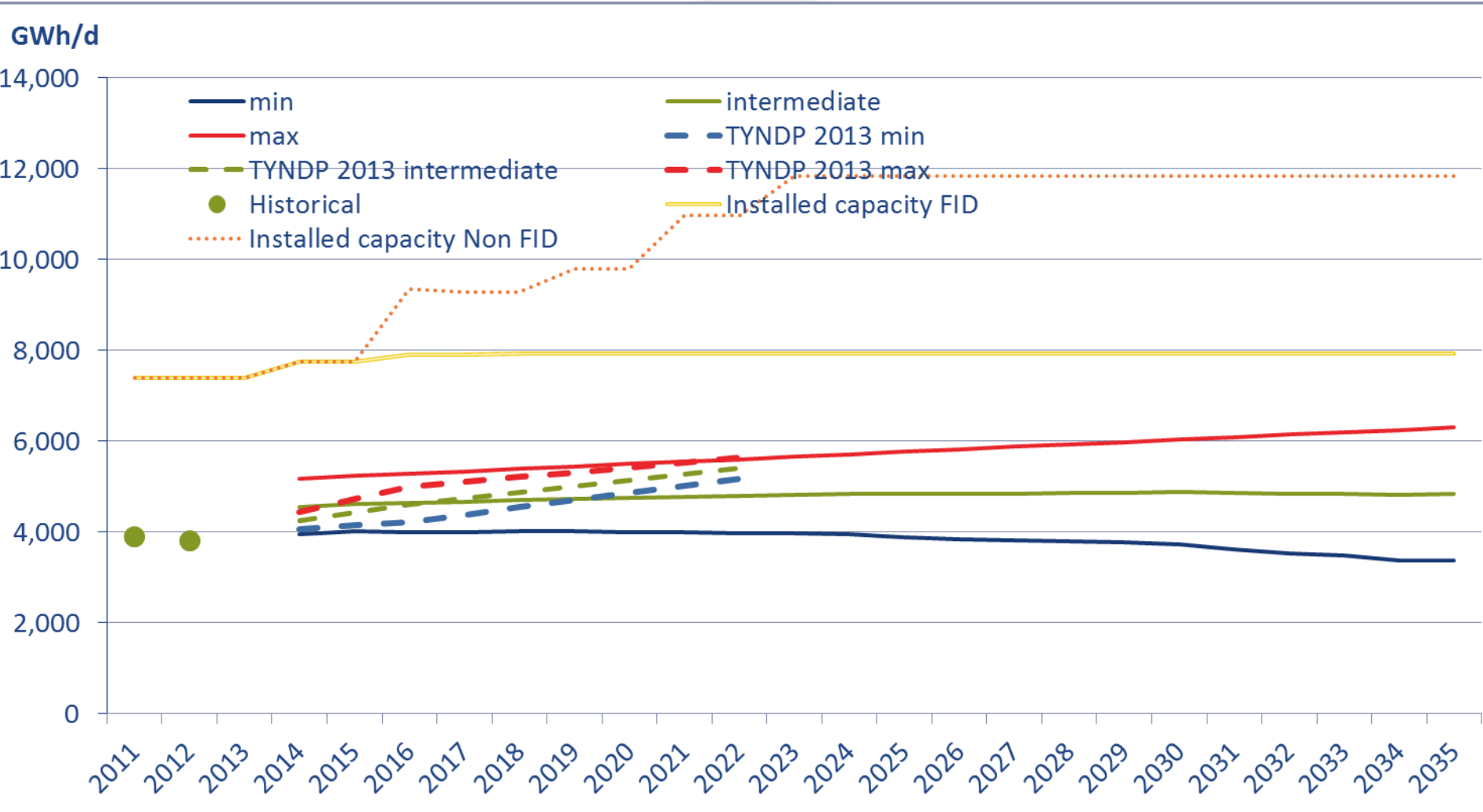
Sources:

‘Institute of Energy Strategy (Gromov 2011)

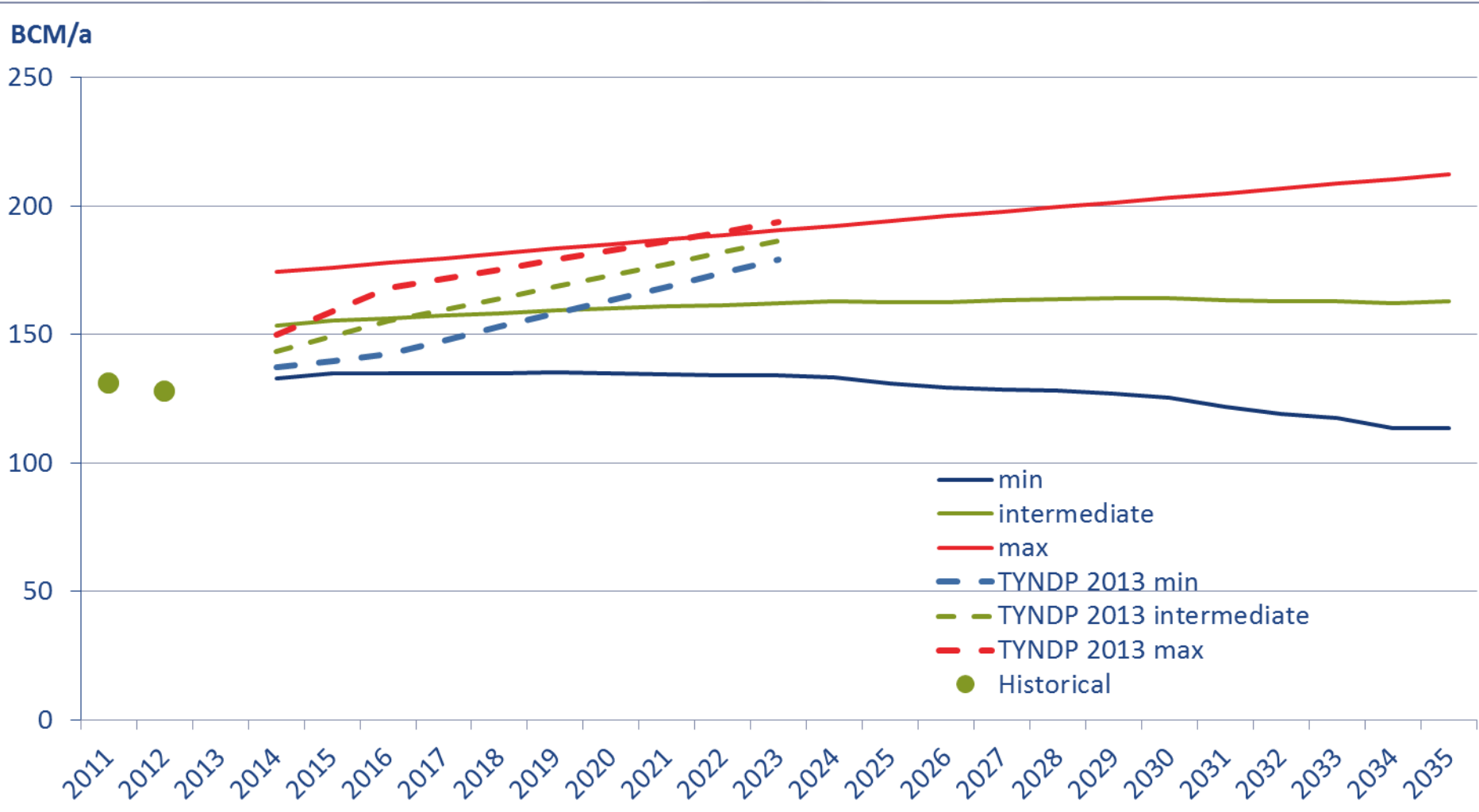
“Russia’s Natural Gas Export Potential up to 2050 Sergey Paltsev 2011



Russia (2 of 2)



Russia (2 of 2)

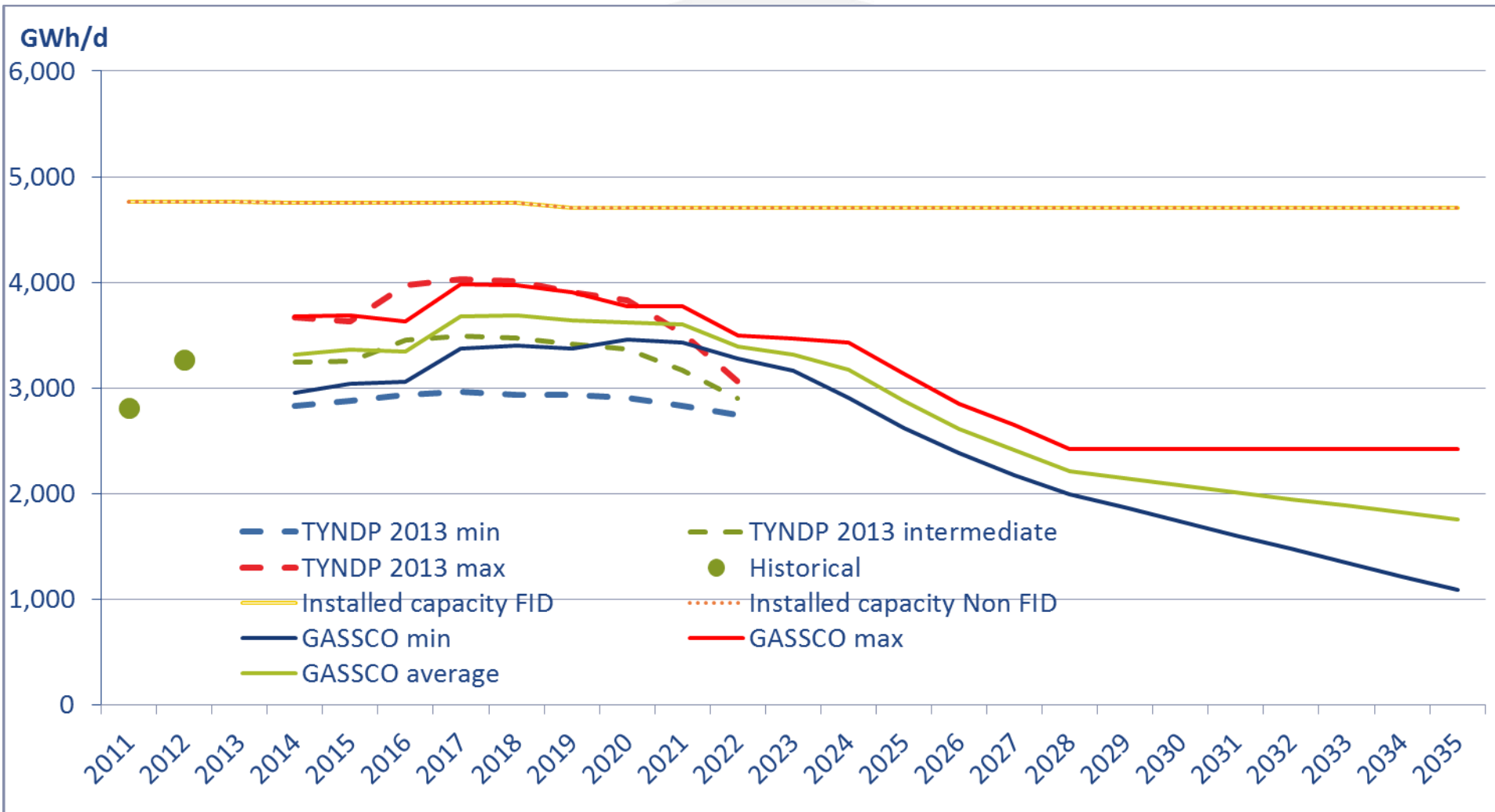


Norway (1 of 2)

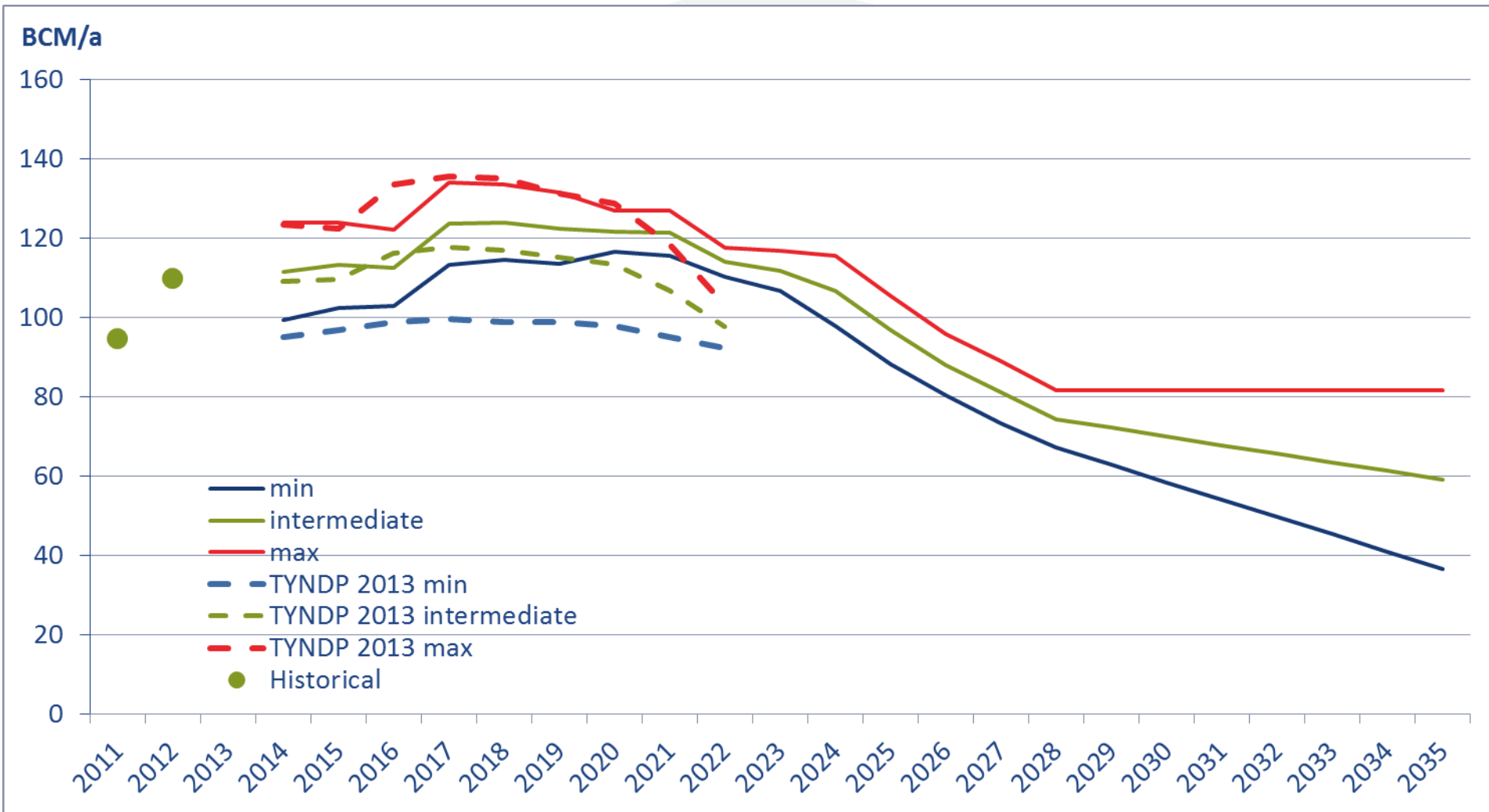
Methodology

- 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'

Norway (2 of 2)



Norway (2 of 2)



Shale Gas (1 of 2)

Methodology

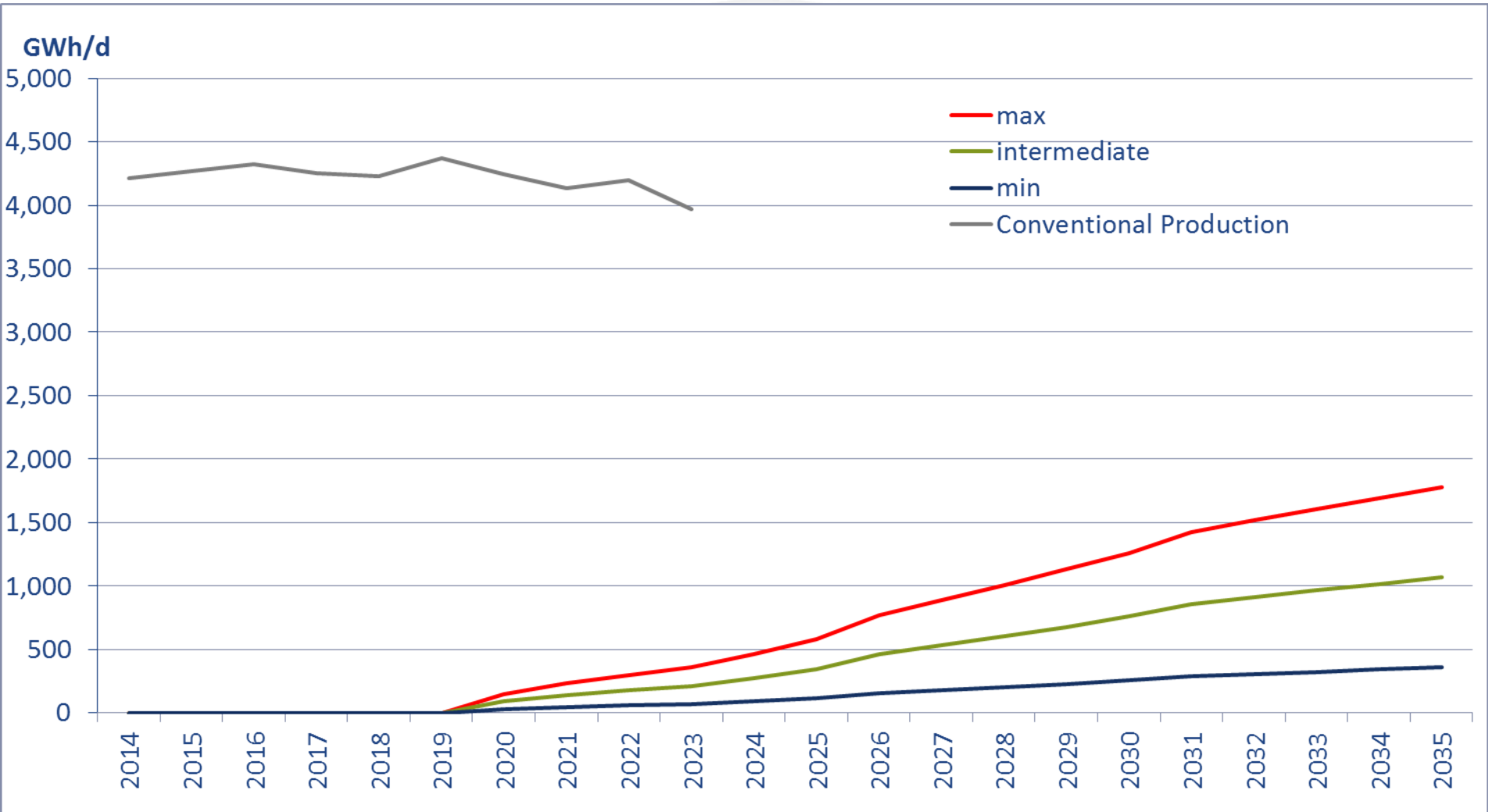
- Scenarios:
 - Maximum: “Some Shale Gas Scenario” from PÖYRY’
 - Intermediate: average of maximum and minimum scenario
 - Minimum: Aggregation of possible shale gas supplies from UK and Poland’
- *These countries currently are the most active players and might have the highest potential to deliver some volumes in the future*



Source:

‘ PÖYRY: Macroeconomic Effects of European Shale Gas Production November 2013

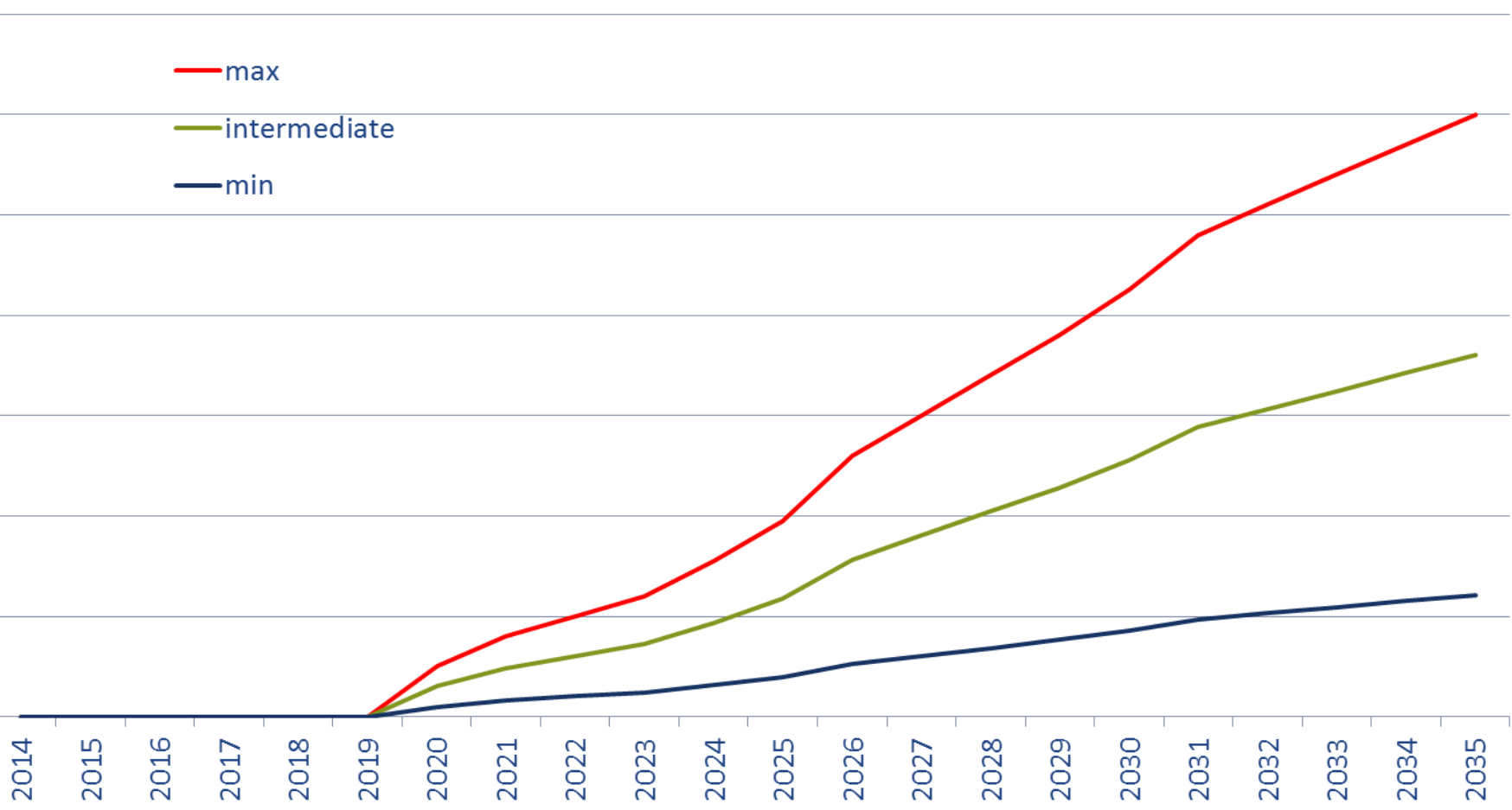
Shale Gas (2 of 2)



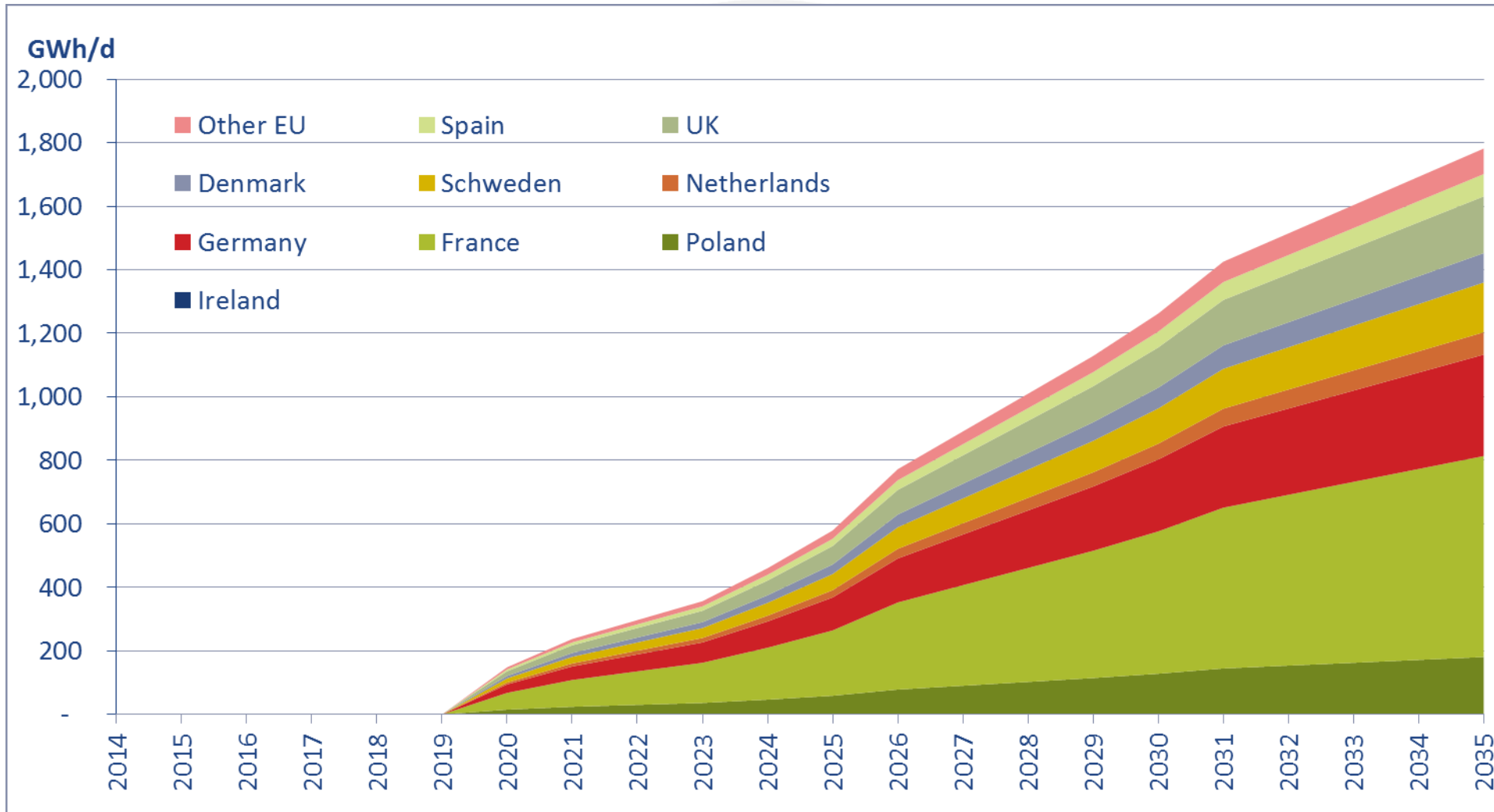
Shale Gas (2 of 2)

bcm/a

max
intermediate
min



Shale Gas (2 of 2)



Biomethane (1 of 2)

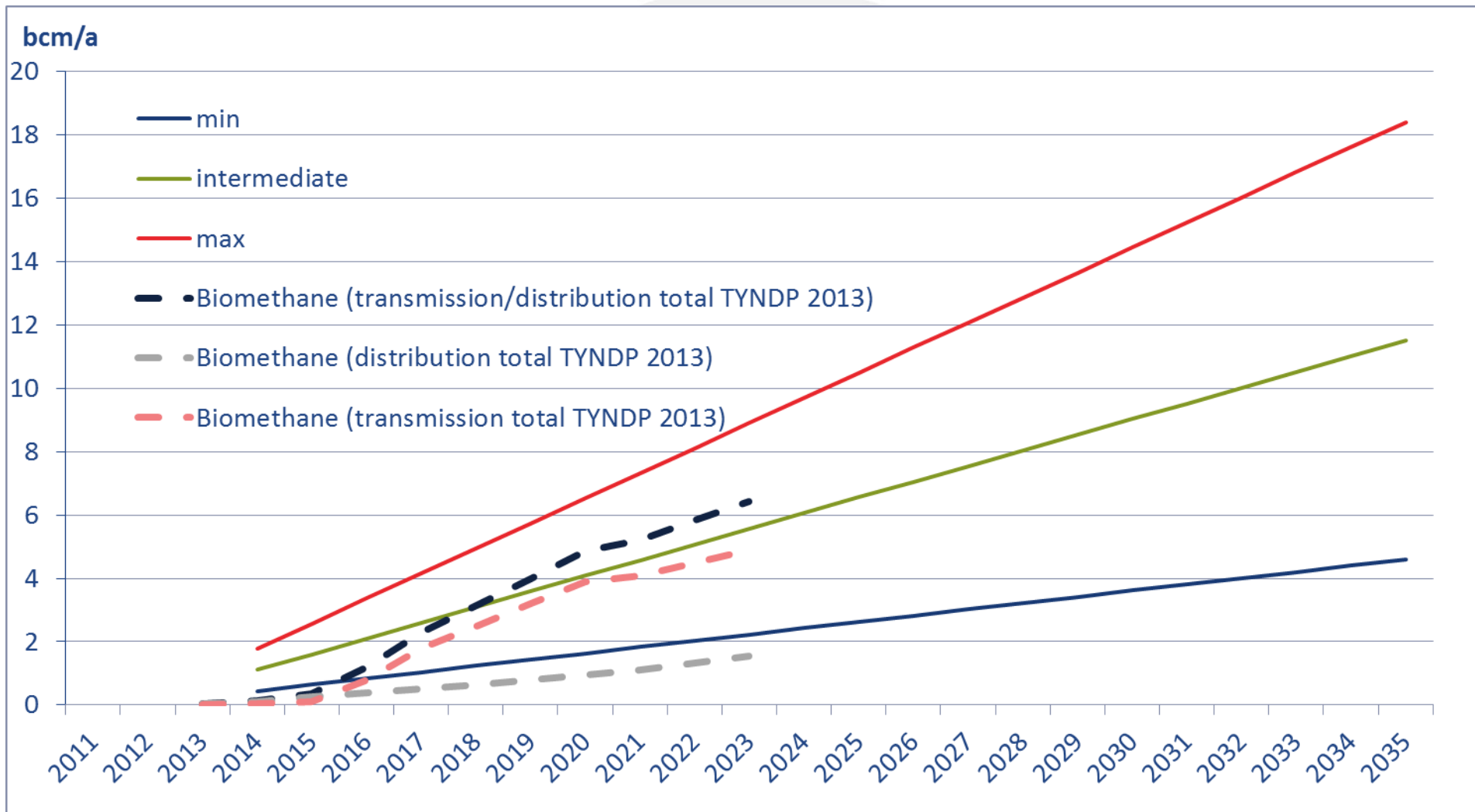
Methodology

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

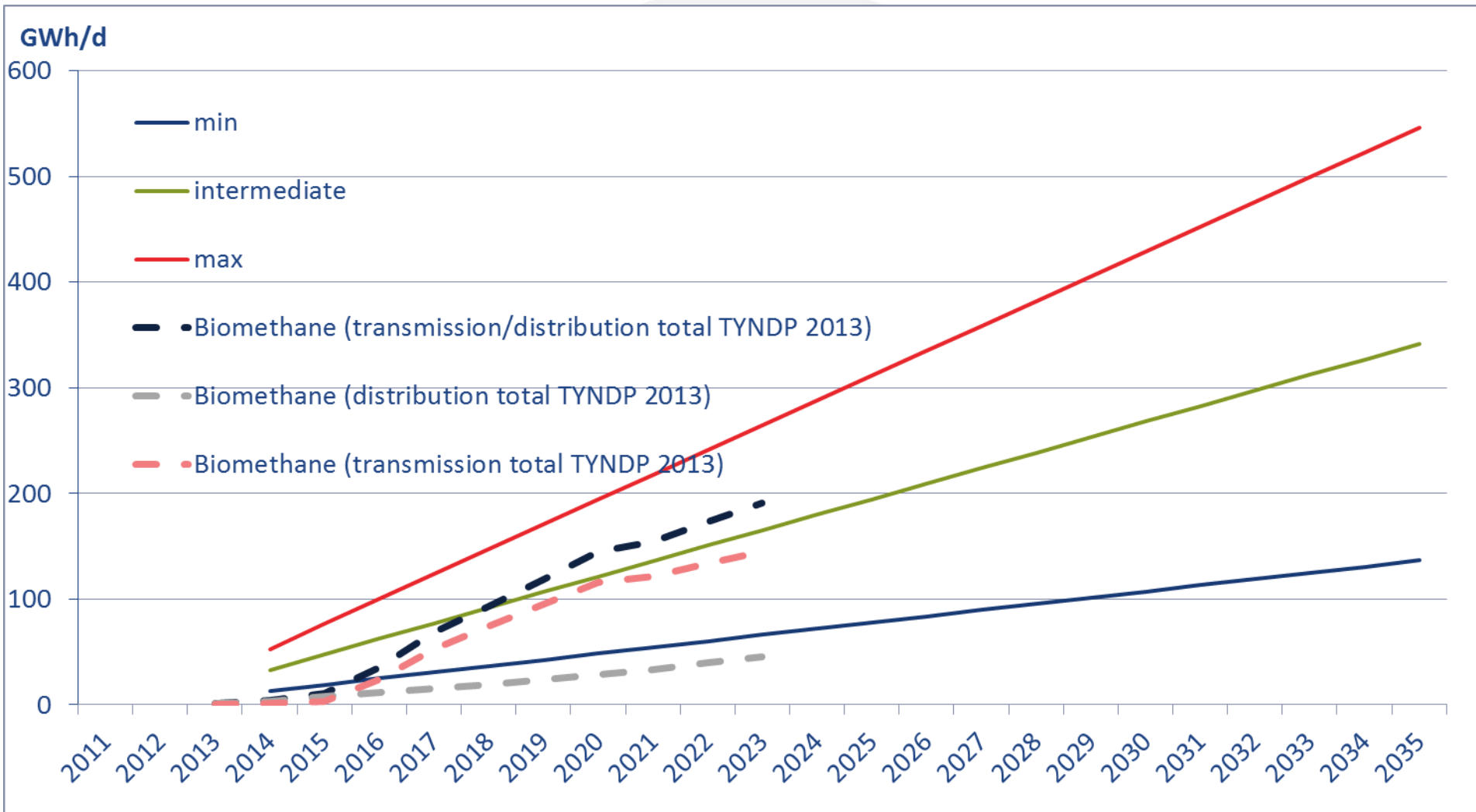
Source:

'Green Gas Grids – Proposal for a European Biomethane Roadmap, Dec 2013

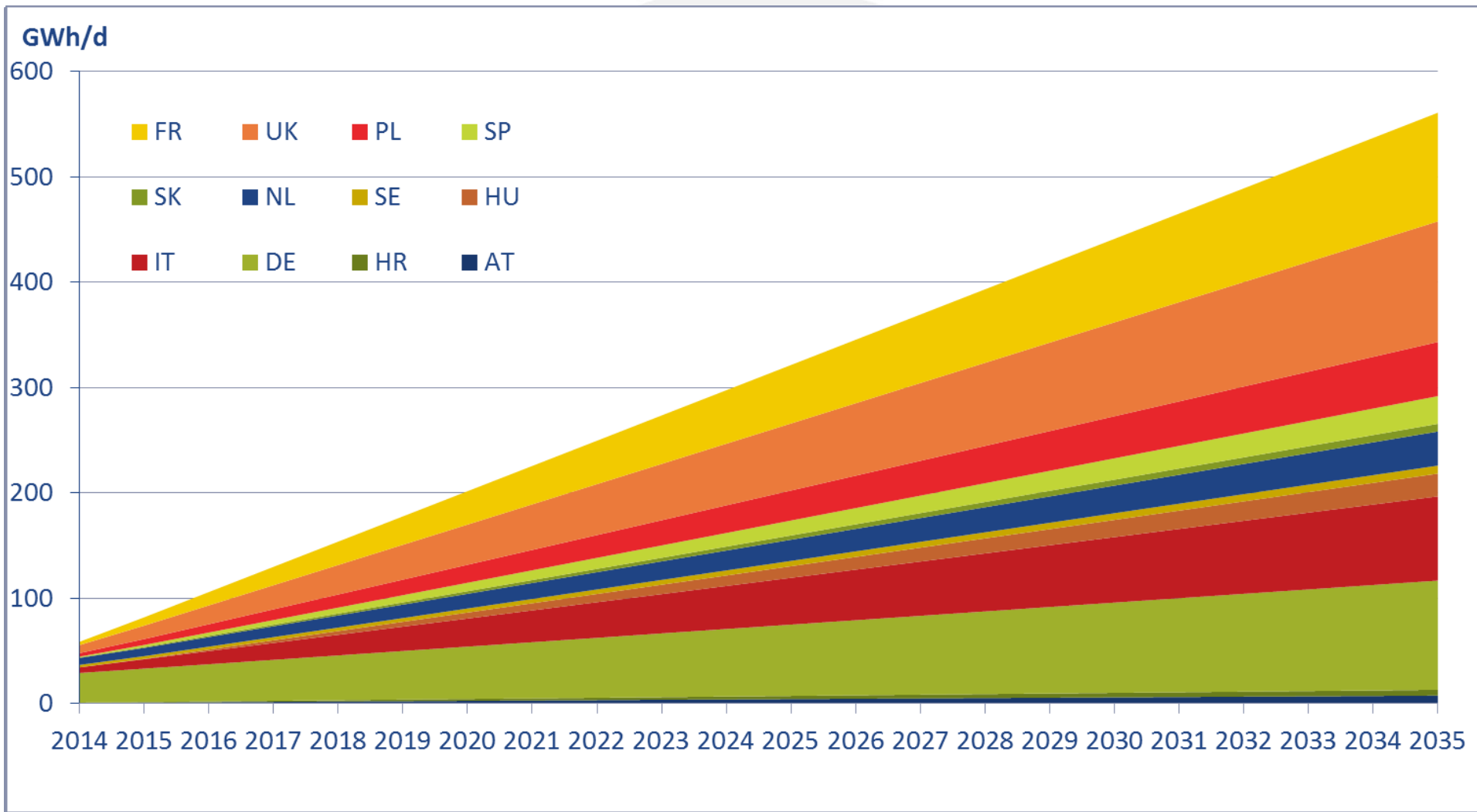
Biomethane (2 of 2)



Biomethane (2 of 2)



Biomethane (2 of 2)

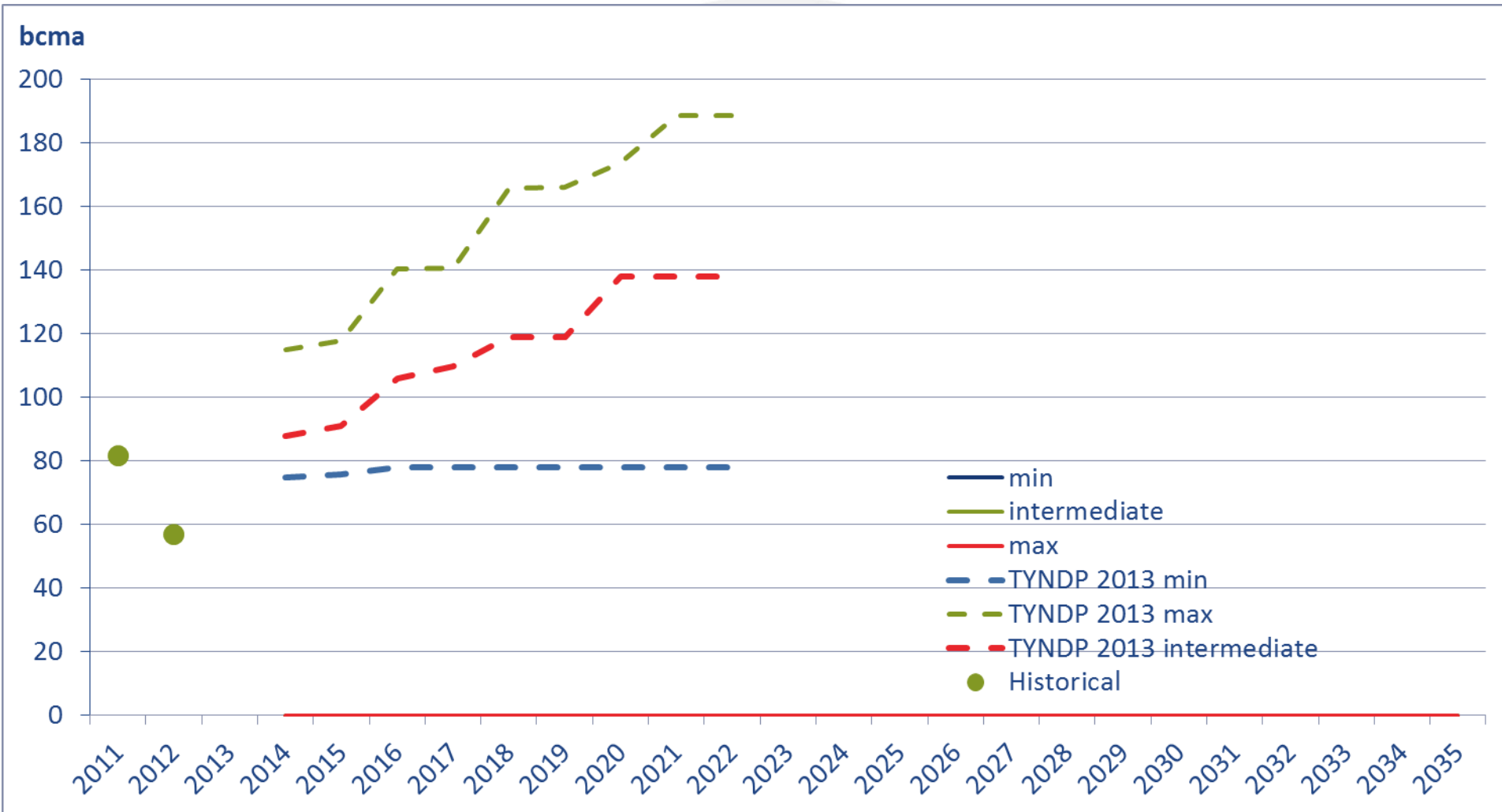


LNG (1 of 2)

Methodology from TYNDP 2013

- Assumptions from last TYNDP regarding uncertainty in the level of LNG supplies to the European market are still valid!
 - High global LNG demand in far East
 - Development of the natural gas market in the US
 - Possible new LNG from Africa
 - Potential for increasing global liquefaction capacities
- Scenarios TYNDP 2013:
 - Maximum: analysis on the liquefaction capacity and analysis of the LNG market (based on capacity by basin, its utilization and the amount of LNG which is destined for Europe)
 - Minimum, Intermediate: aggregation of the load factors (LF) of all European LNG send-out capacities in the period 2009 to 2011 on historical data:
 - 20th percentile LF applied to the future send-out capacity for LNG projects with FID (minimum)
 - 50th percentile LF applied to the future send-out capacity for LNG projects with FID and Non-FID (interm.)
- TYNDP 2015: what could be reasonable assumptions?

LNG (2 of 2) – TYNDP 2013 –



LNG (2 of 2) – TYNDP 2013 –

