Carbon Footprints of Fossil Fuels for Power Generation

– Comparison of the carbon footprint of pipeline gas from Russia and Norway with those of LNG, shale gas and coal –

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General Economic Policy/Science

Round Table on Coal

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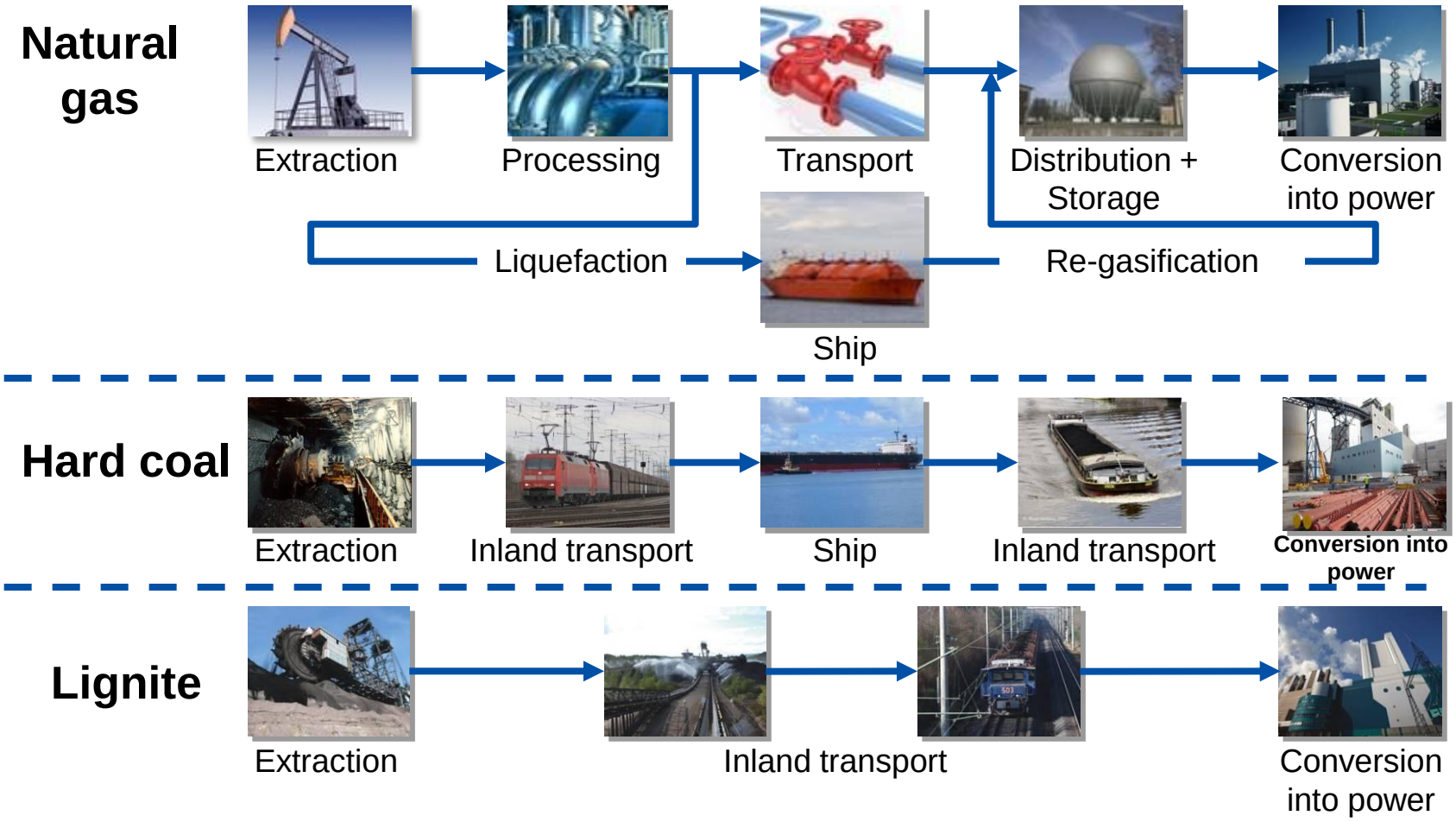
Full chain of natural gas, hard coal and lignite use



Basic assumptions for comparison

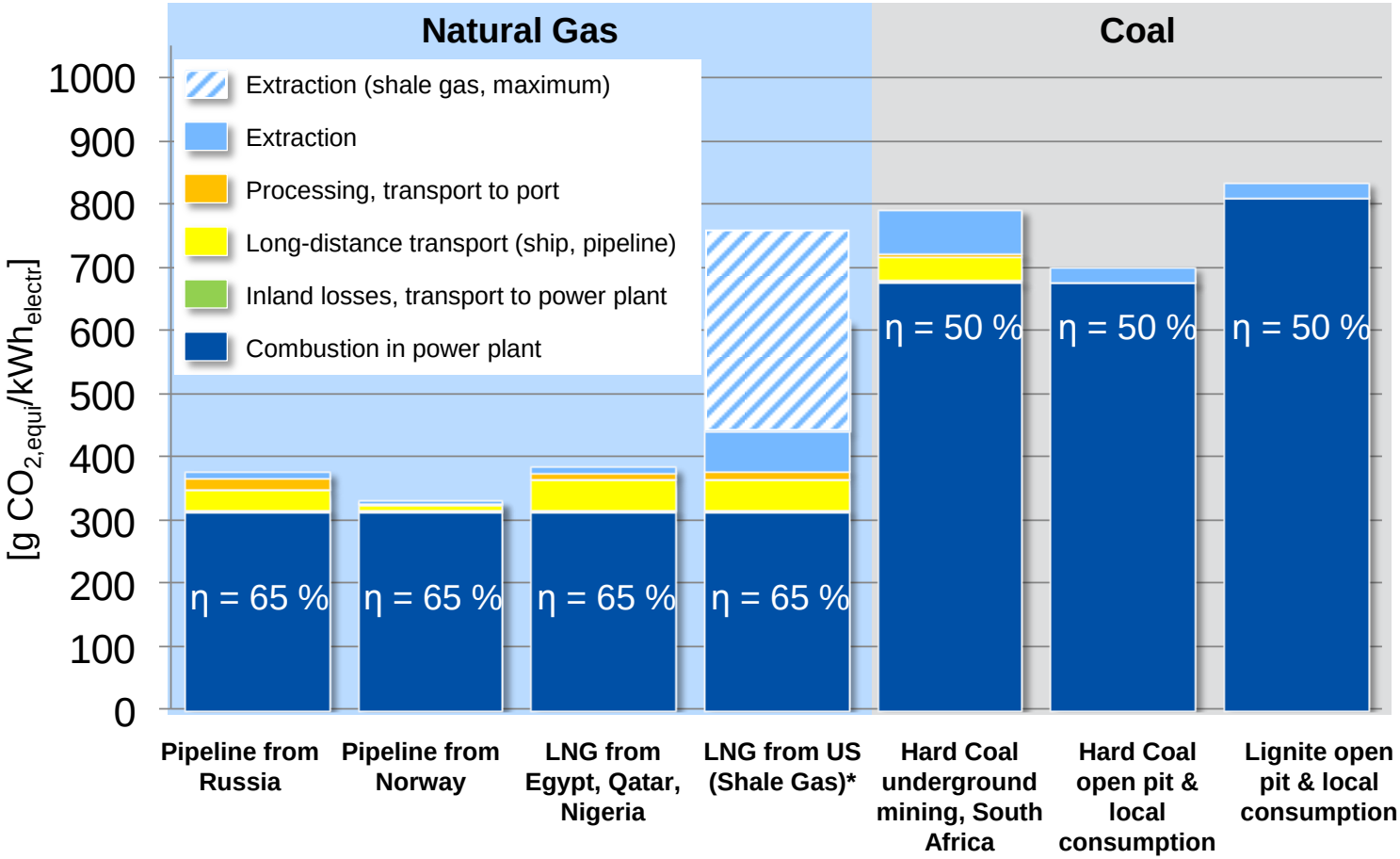
- Account taken of emissions due to consumption and leakage along the supply chain for natural gas, hard coal and lignite
- Inclusion of carbon dioxide and methane
- Period under review: 100 years and, alternatively, 20 years (GWP*)
- Extraction method, origin and type / length of transport route
- Power-plant technology – specifically efficiency in 2030
- Study of plants without CCS and, alternatively, with CCS

Comprehensive approach on the basis of existing literature

* GWP = Global Warming Potential according to IPCC (2007), i.e. for methane: factor 25 for 100 years and factor 72 for 20 years.

Total emissions without CCS

Climate period under review: 100 years; forecast for 2030
Combustion in German power plants



Sources: GEMIS database (Ökoinstitut); *: according to Howarth et al. (2011) and Jiang et al. (2011).

IHS CERA (2011; no quantifications made) assumes there are no differences in the emissions resulting from shale gas and natural gas.

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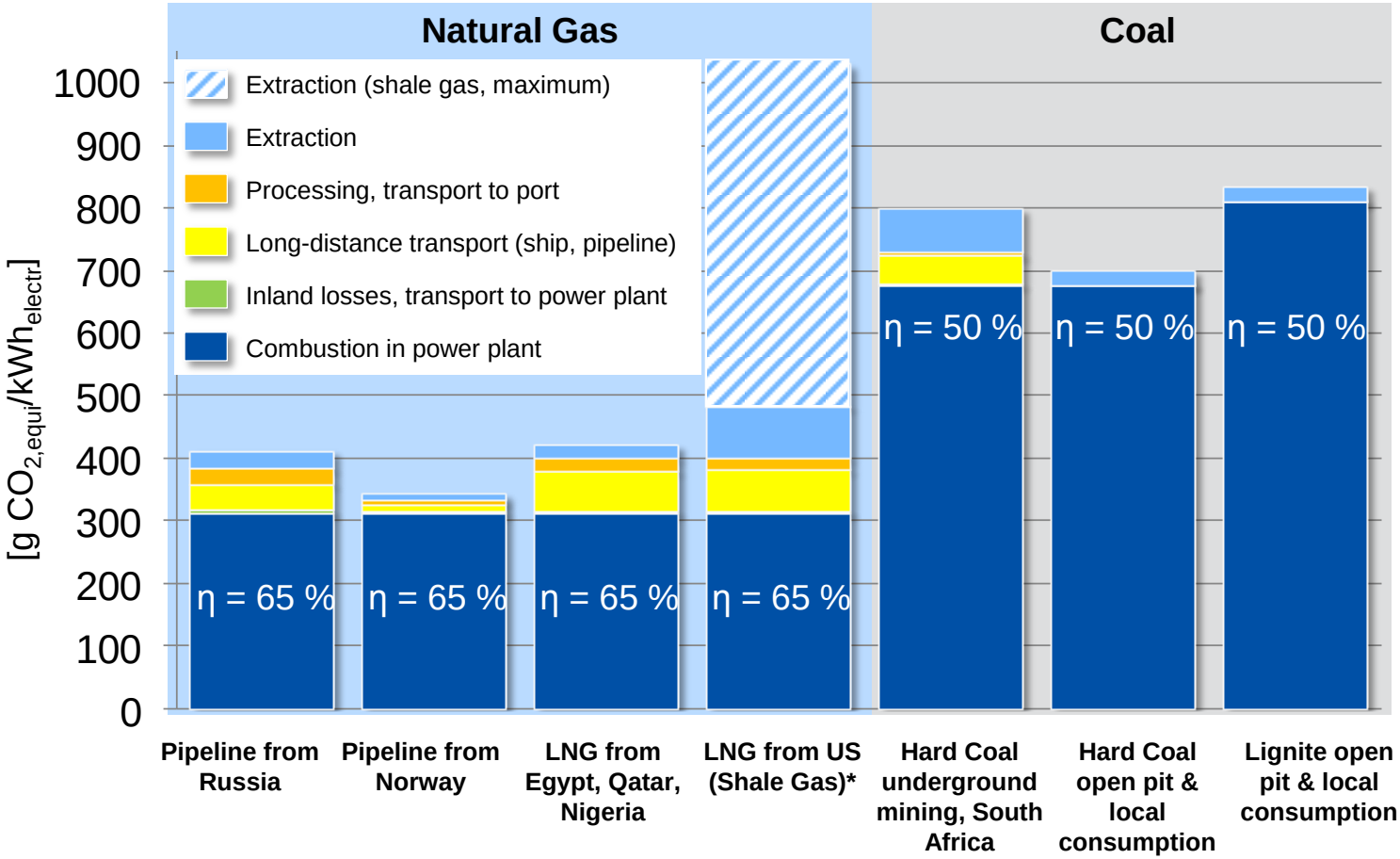

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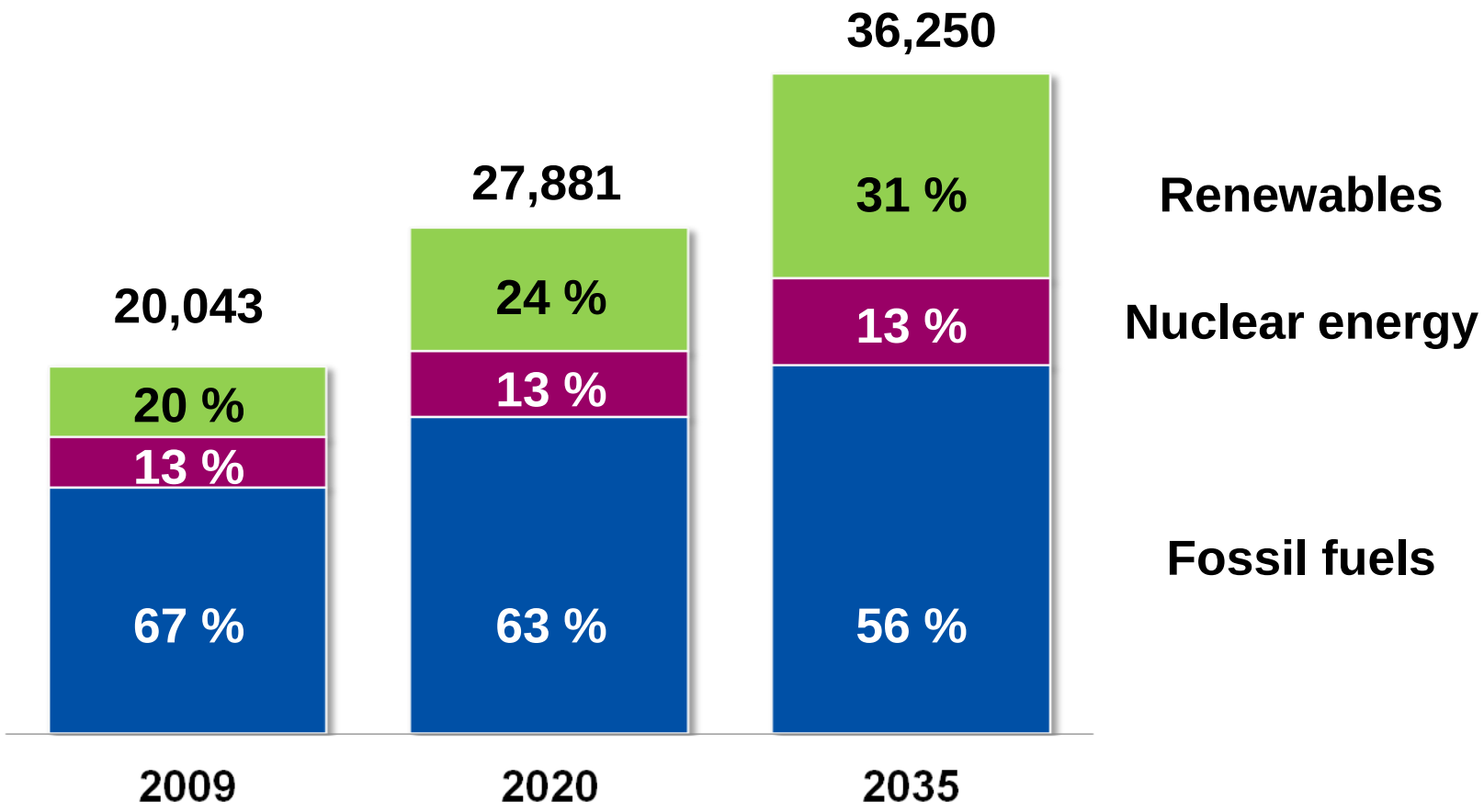
Worldwide power generation, 2009 to 2035, in TWh (New Policies Scenario)



Source: International Energy Agency, World Energy Outlook 2011, Paris 2011

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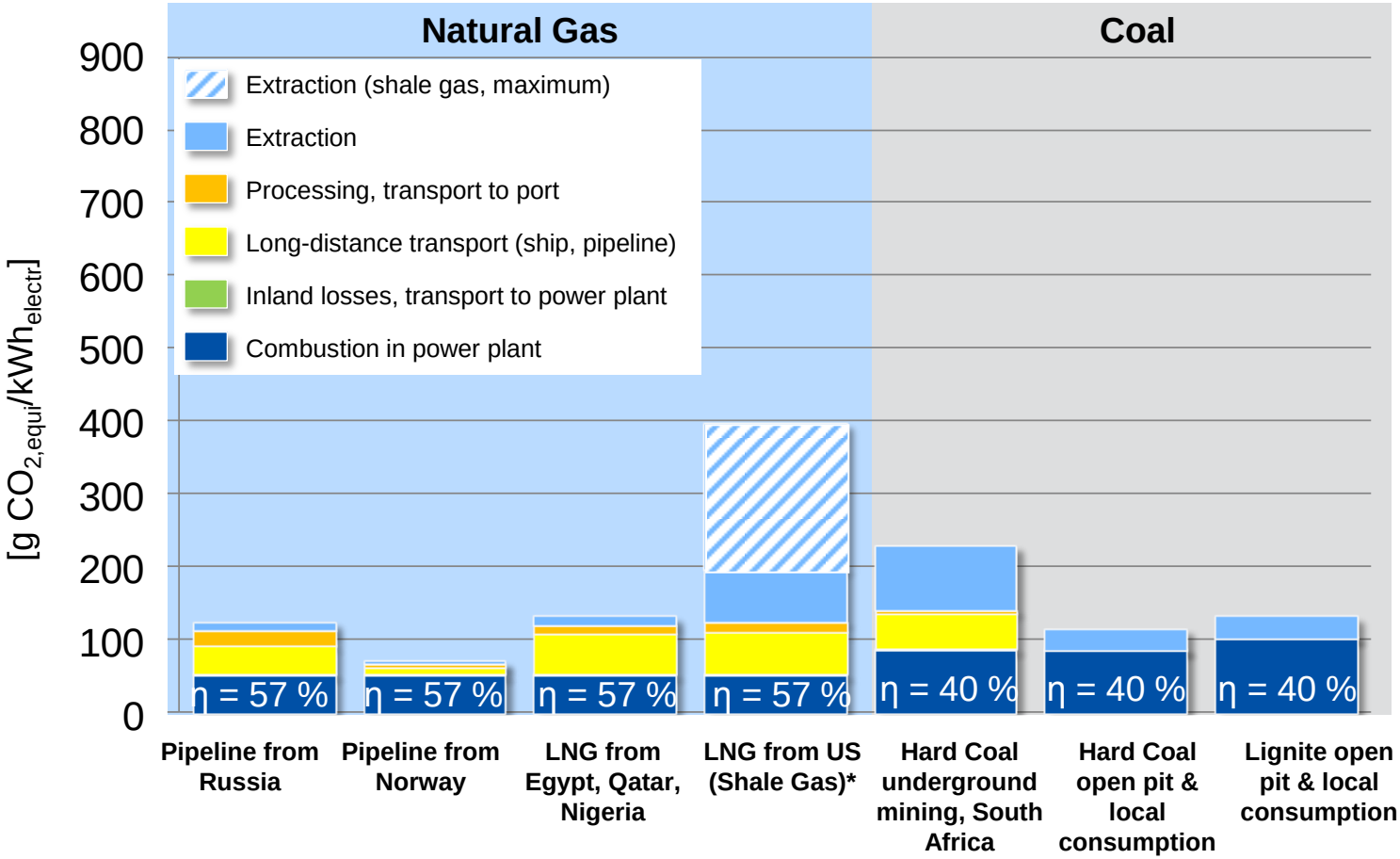

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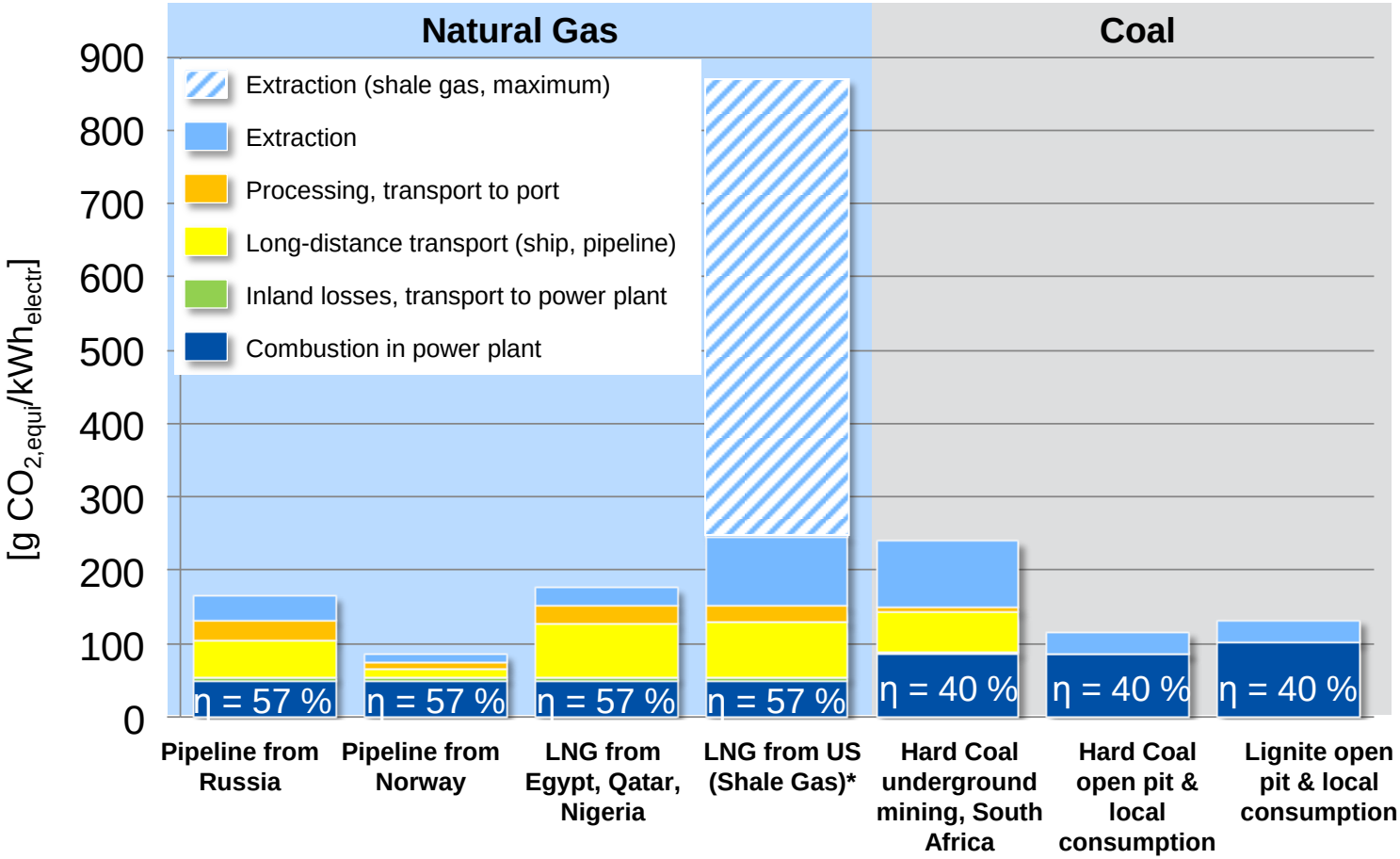

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Upshot for climate relevance of natural gas and coal

- If the entire chain is included, the climate relevance approximates – although gas has an advantage (where no CCS is used).
- To achieve climate targets, CCS is indispensable in the future.
- If power is generated with CCS, coal has no disadvantage over gas.
- In power plants with CCS, coal does better than shale gas (according to Howarth et al. 2011).

It is not substitution of energy sources that is key to climate protection but new technologies, increase in efficiency, and CCS

THANK YOU FOR YOUR ATTENTION