



International
Energy Agency

Natural Gas and Climate Change Mitigation: Friend or foe or ...?

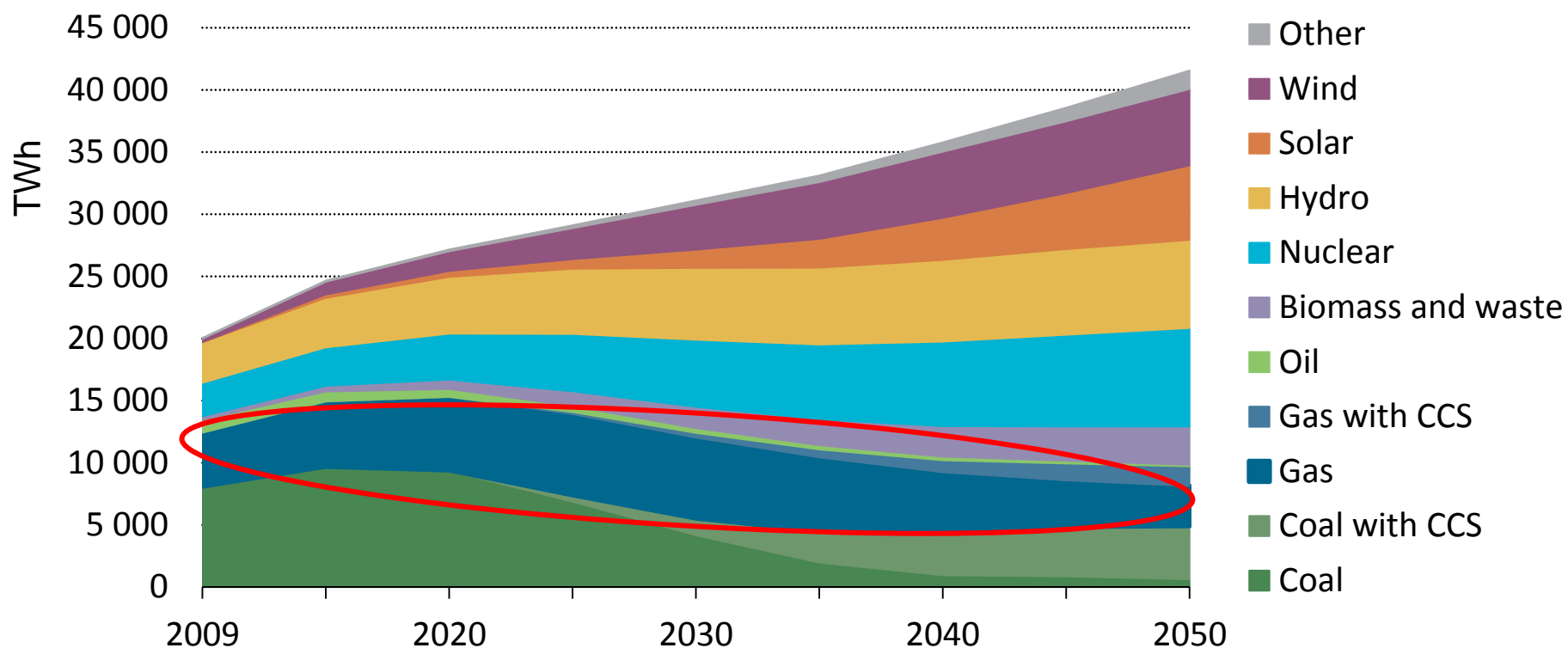
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International Energy Agency

COP 19, 17 November 2013, Warsaw



- **Gas: a transition or destination fuel?**
- **Gas and CCS**

Low-carbon electricity: gas plays an important role

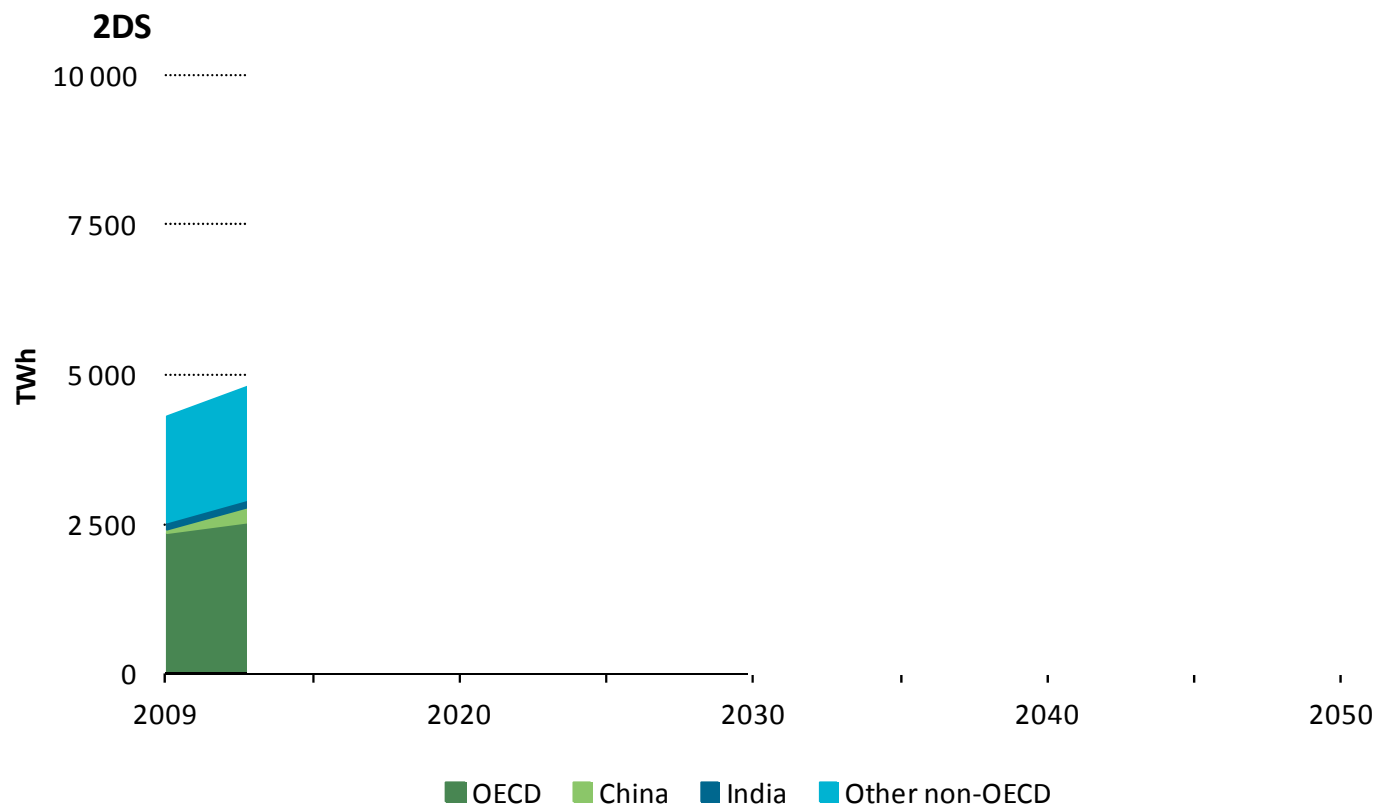


Source: ETP 2012



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Profile of natural gas for power evolves in the 2DS



Natural gas-fired power generation must decrease after 2030 to meet the CO₂ emissions projected in the 2DS scenario.

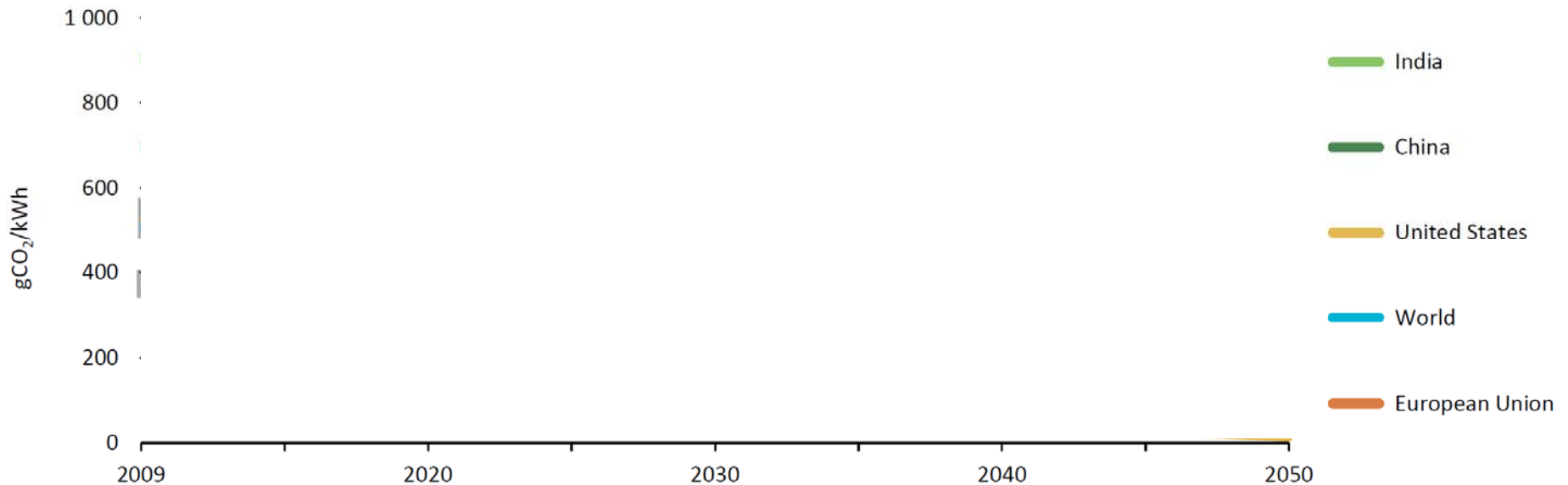
Notes: Natural gas-fired power generation includes generation in power plants equipped with CCS units. Biogas is not included here.

Source: ETP 2012

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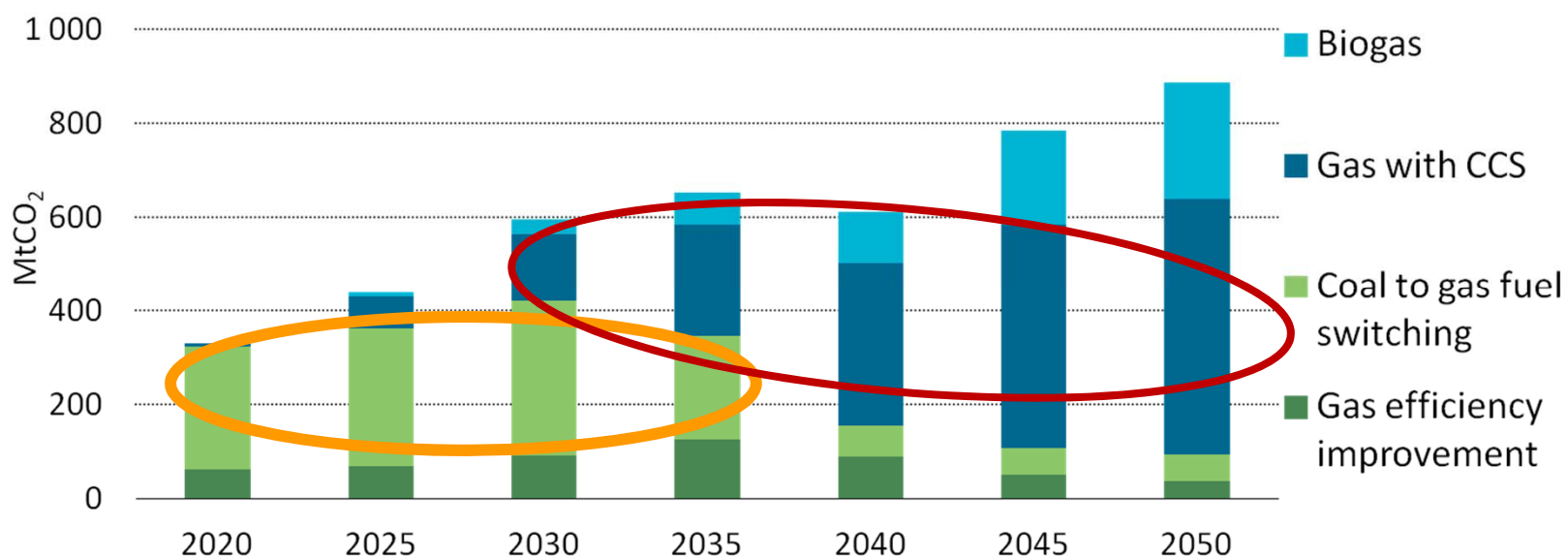
Natural gas: a 'low or high-carbon fuel' ?



The global average CO₂ intensity from natural gas-fired power generation falls below the carbon intensity of CCGTs in 2025.

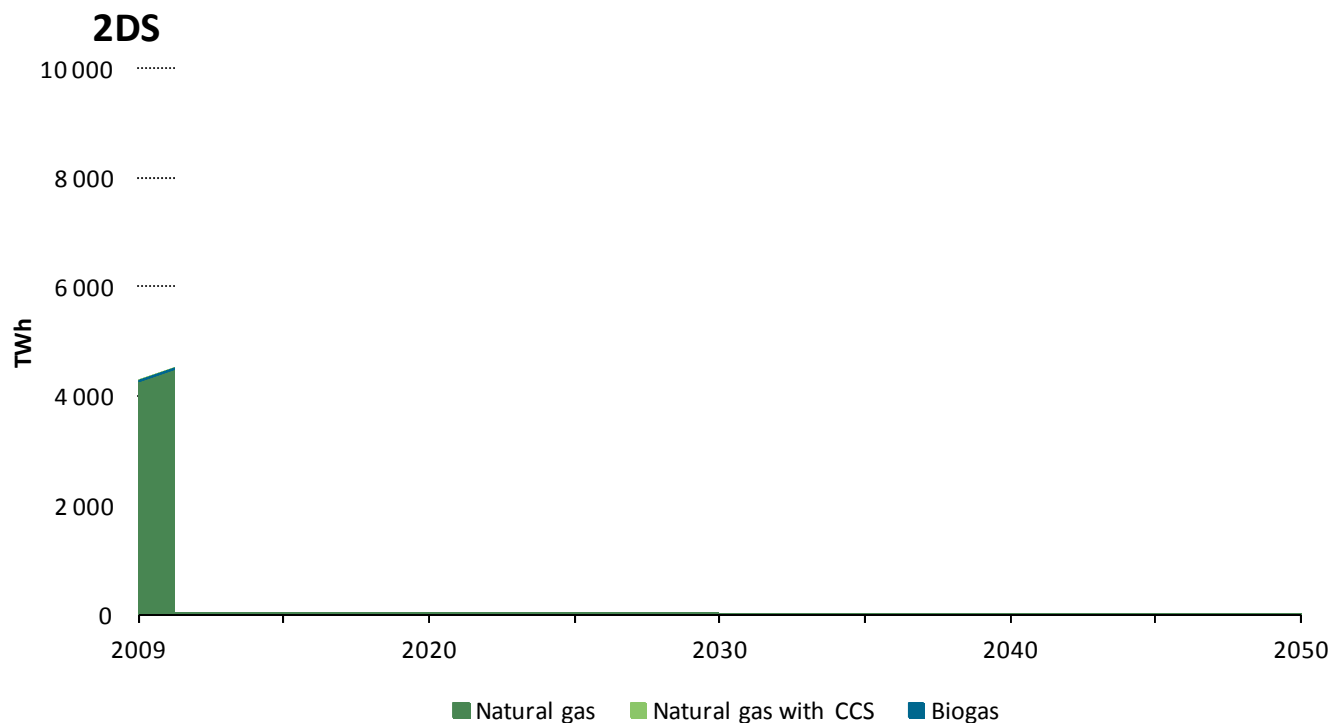
Source: ETP 2012

Gas technologies in the power sector are essential to achieve the 2DS



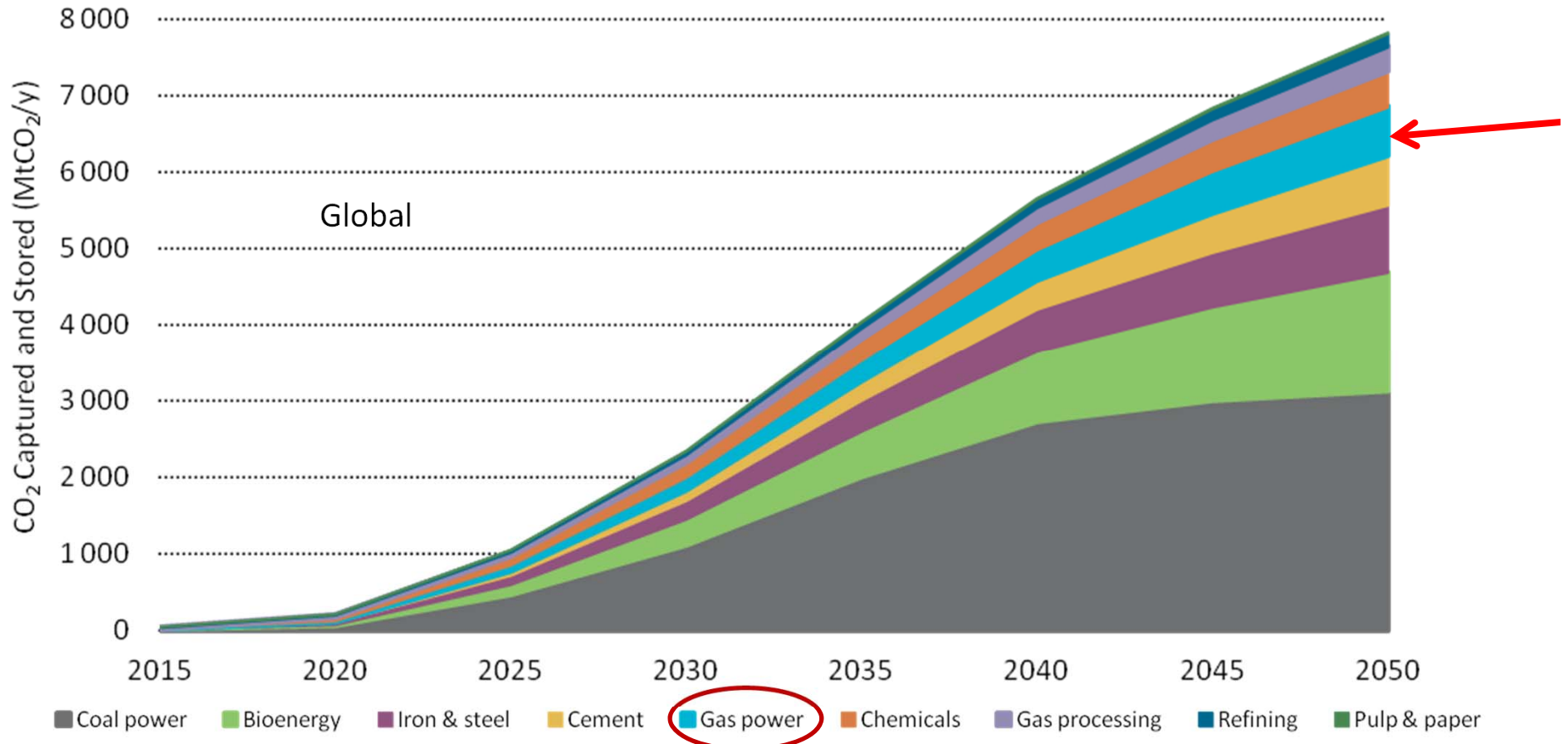
Short-term: coal to gas fuel switching

Long-term: gas with CCS, biogas



In the 2DS, 40% of the electricity generated from gas by 2050 comes from natural gas with CCS and biogas.

CCS on gas and other industries



CCS is not just about coal-fired power at the global level:

In 2050, 63% of coal-fired electricity generation (630 GW) is CCS equipped, 18% of gas (280 GW) and 9% of biomass (50 GW)

Gas with CCS: How does it work?

- Avoiding 85% of the emissions from a gas plant is technically possible and proven
- Best available technology today is uses chemical solvents to scrub flue gases
- CCGT flue gas contains 3-4% CO₂ [13-14% for coal]
- More energy, solvent and equipment is needed to capture 1tCO₂ from gas *cf.* coal
- But, a CCGT generates less CO₂ per kWh; CCS on gas has less impact on power costs
- CCGT efficiency of 57% would be reduced to 48%, i.e. 19% more fuel [34% for coal]
- 60% of this 'energy penalty' is related to the stripping of CO₂ from the solvent

Gas with CCS test facilities



tcmda.com

Technology Centre Mongstad

- Norway
- 25 MW slipstream from a CCGT CHP plant
- Opened in 2012
- Testing amine and chilled ammonia solvents
- Captured CO₂ is vented



Total

Lacq project

- France
- 30 MW_{th} boiler
- Operated between 2010 and 2012
- Oxy-combustion
- 120 ktCO₂ stored in a depleted gas field
- Operated by Total

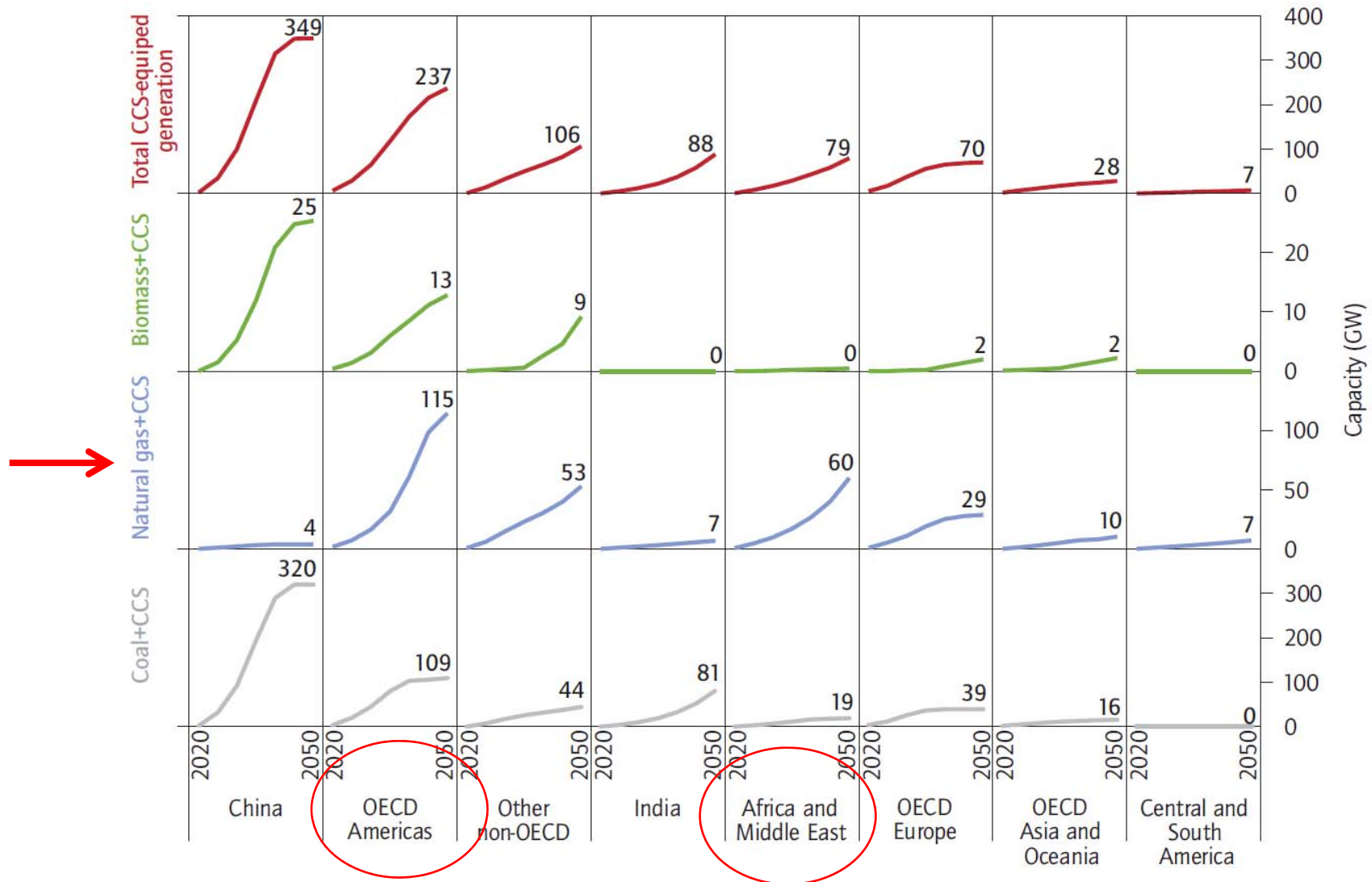


Siemens AG

Peterhead CCS project

- UK
- 340 MW (from 1180 MW CCGT power plant)
- Operation by 2019 if selected by UK government
- Amine solvent capture
- Captured 1 MtCO₂ to be stored in North Sea
- SSE and Shell

CCS in power varies by region





Summary: Natural Gas in the 2DS

Natural gas can retain an important role to 2050.

- Natural gas acts as a transitional fuel
- Natural gas is a destination fuel under the right conditions, notably with some CCS

But it will only play this role if:

- First-generation, large-scale gas plants with CCS are demonstrated and deployed
- Financial support mechanisms for CCS put in place
- Development of unconventional gas is well regulated, responsible, and maintains public support



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Thank you

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- ▶ Environmental Protection
- ▶ Economic Growth
- ▶ Engagement Worldwide