EUROPEAN GAS MARKET :

The challenges to face

WEC-Europe regional meeting

Jean-Marie DAUGER

Executive Vice-President

GDF SUEZ

MONACO

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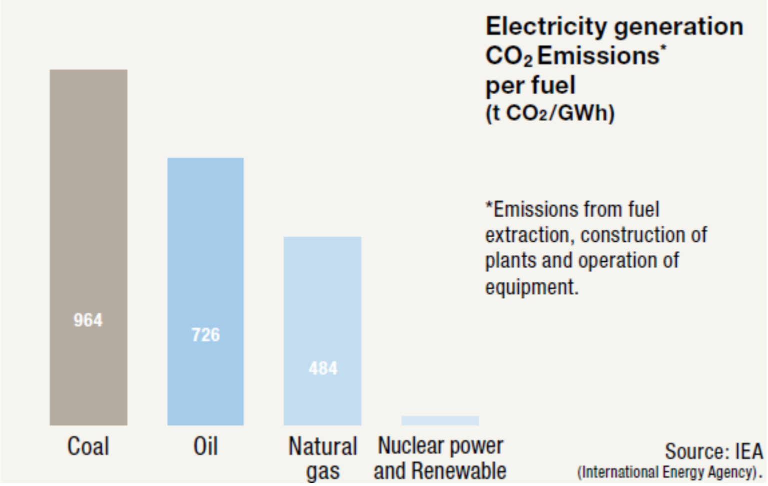
BY PEOPLE FOR PEOPLE

The challenges of natural gas in Europe

- Acceptability of natural gas and long term perspectives on demand
- Competitiveness of natural gas
- Accessibility and security of supply
- Energy policies at national and European levels

Natural gas in Europe
Acceptability

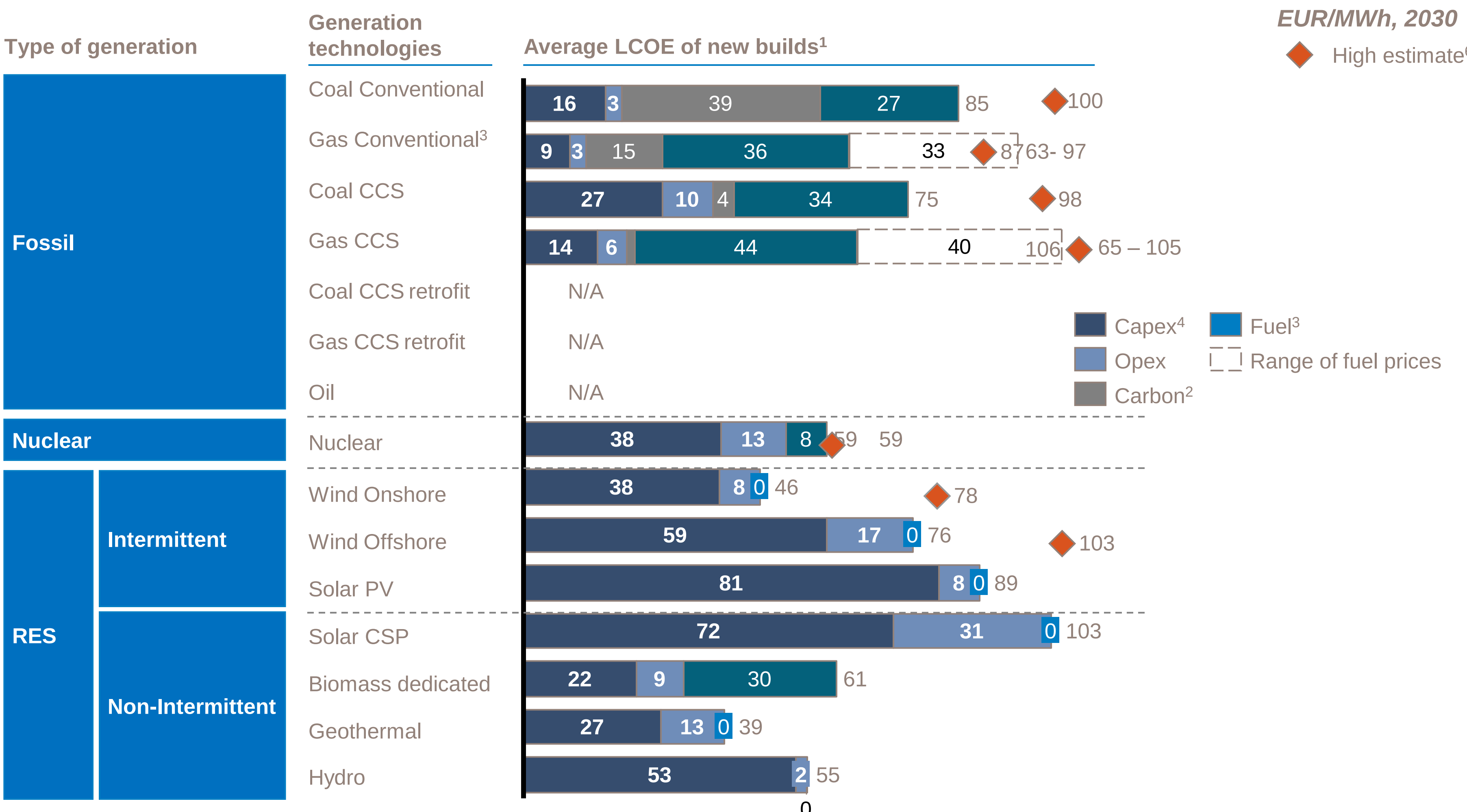
- Low CO_2 emission – High efficiency
- Flexible & complementing reneweables
- Innovative solutions in the residential and transportation sector
- Economic
  - High capital performance
  - CCG are quick to build



GDF SUEZ, CCGT Herdersbrug, Belgium

Natural gas in Europe
Competitiveness

- Gas remains a cost competitive base load generation technology in the long term, but the gas price is a critical driver of overall cost

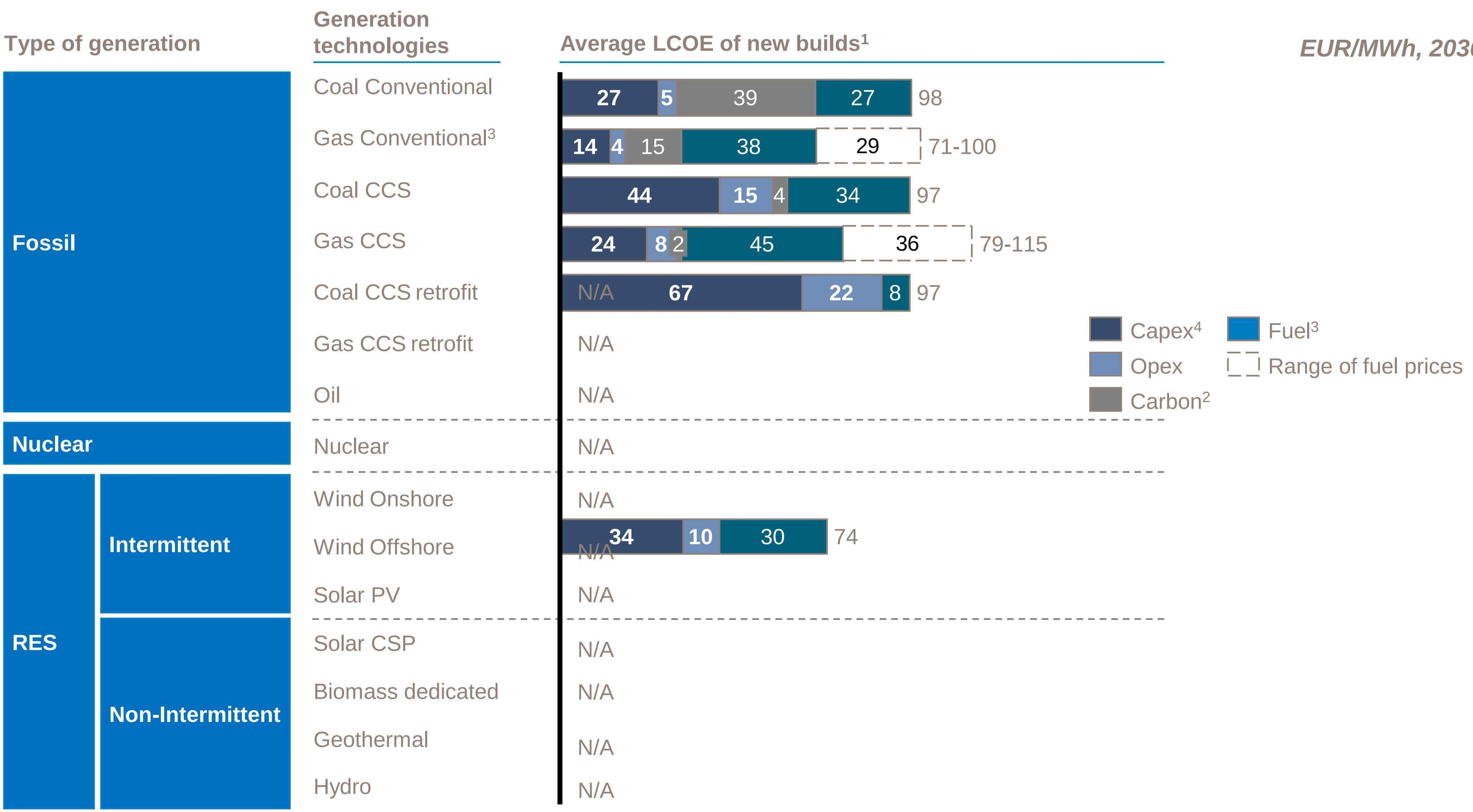


SOURCE: ECF roadmap 2050, Centrica, MoH MaCDonald UK electricity generator costs update

(1) Average of low and high cost estimates. Exchange rate of 1.1 EUR/GBP, (2) Assuming a carbon price of 44 EUR/tonne, (3) Based on IEA price forecasts and a gas price of 7.50 USD/mmbtu (base case shown) and 14.8 USD/mmbtu (high case), assumed load factor of 85%, (4) Assumes 7% discount rate, (5) Including storage cost of 1.11 EUR/MWh and transportation costs of 1.46 EUR/MWh (source: Centrica), (6) High estimate based on Mott MacDonald 'case 8' pg 88 estimates for 2023 Nth of a kind at 7.5% cost of capital (compared to 7% for ECF), carbon prices adjusted to match ECF for the purposes of comparison, and a gas price rising to approx 12 USD/mmbtu by 2030

Natural gas in Europe
Competitiveness

- For mid-merit order load factors (4,500 hours per year) and at low gas price, gas looks most attractive



SOURCE: ECF roadmap 2050

(1) Average of low and high cost estimates, (2) Assuming a carbon price of 44 EUR/tonne, (3) Based on IEA price forecasts and a gas price of 7.50 USD/mmbtu (base case) and 14.8 USD/mmbtu (high case)
(4) Capex is assumed to spread in a NPV neutral way, (5) Including storage cost of 1.56 EUR/MWh and transportation costs of 2.44 EUR/MWh (source: Centrica)

Natural gas in Europe
Competitiveness

- Optimized pathways to achieve CO_2 reduction targets by relying on natural gas

Lower costs to households[1]

€150-250 lower annual cost of power per household

Profits in energy intensive industries[1]

5-10% decrease in profit margins will be avoided driven by energy price increases in alternative renewables-heavy scenarios

Jobs in energy intensive industries

20-25 mln jobs will not be affected by higher energy costs in energy intensive industries

Consolidated investments

Up to € 450-550 bn lower required investments in 2010-30 compared with renewables intensive pathways, with further savings potential in 2030-50

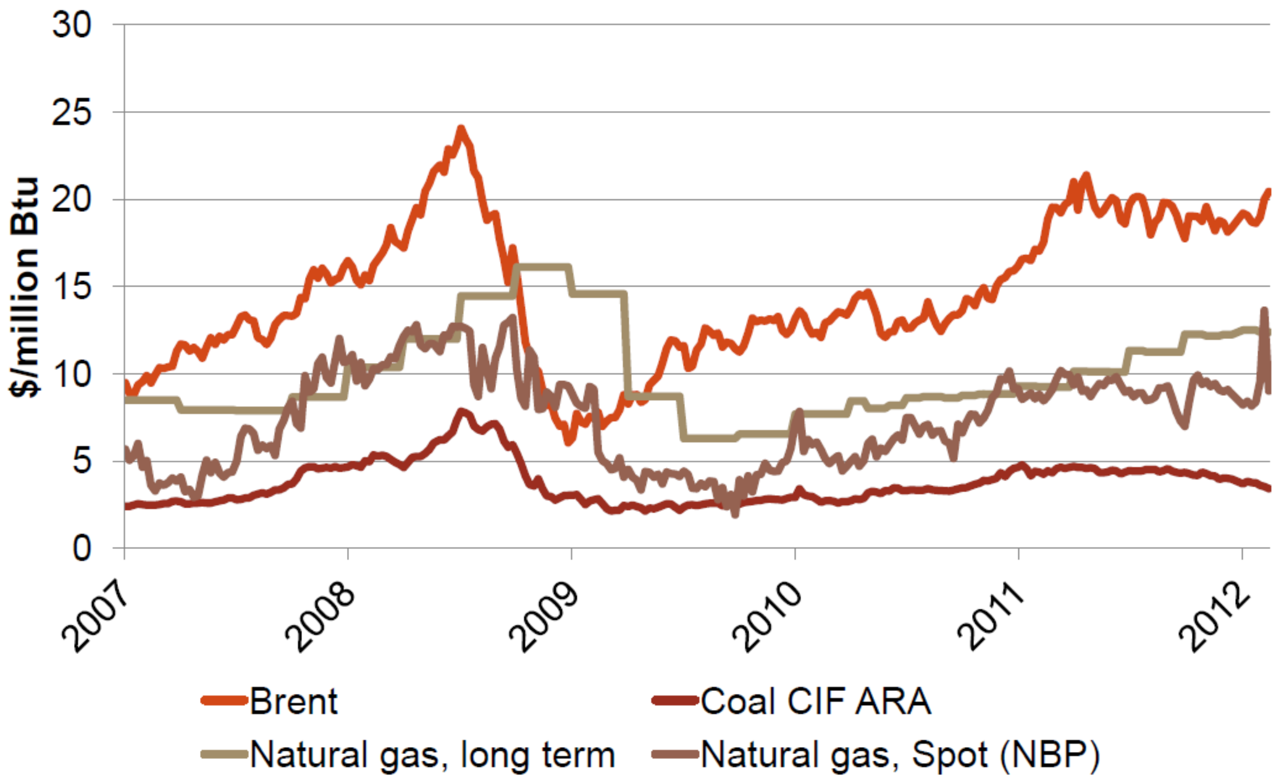
Source: European Gas Advocacy Forum

[1] Includes direct and indirect effects of lower costs in power generation

[2] Compared with ECF Roadmap 2050 60%-RES pathway (Numbers are not additive)

Natural gas in Europe
Competitiveness

- The competitiveness of natural gas is now challenged by coal in the power production sector
- The lasting spread between oil indexed long term contracts and spot prices is not sustainable

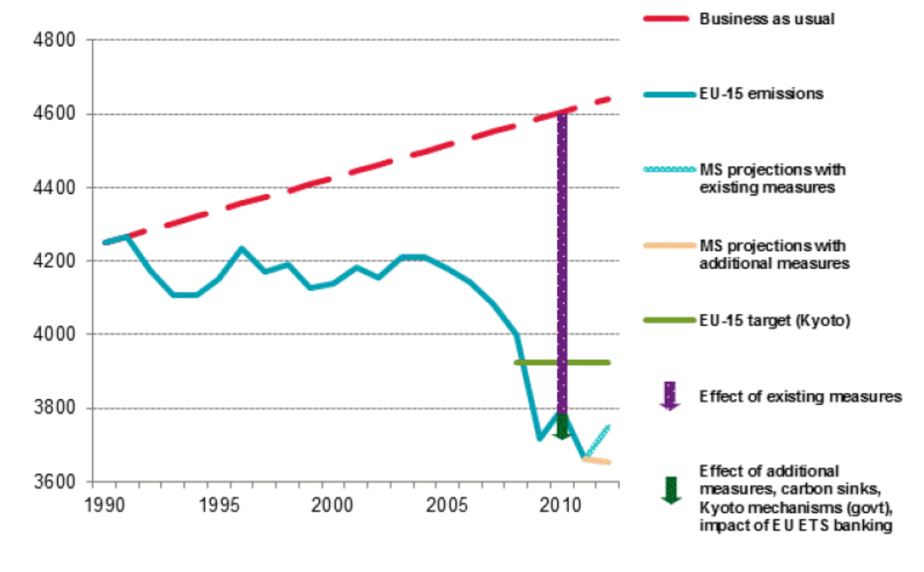


All data converted in Million British Thermal Units
Source: IFRI, based on USDOE, International Coal Report, World Gas Intelligence

Natural gas in Europe
Competitiveness

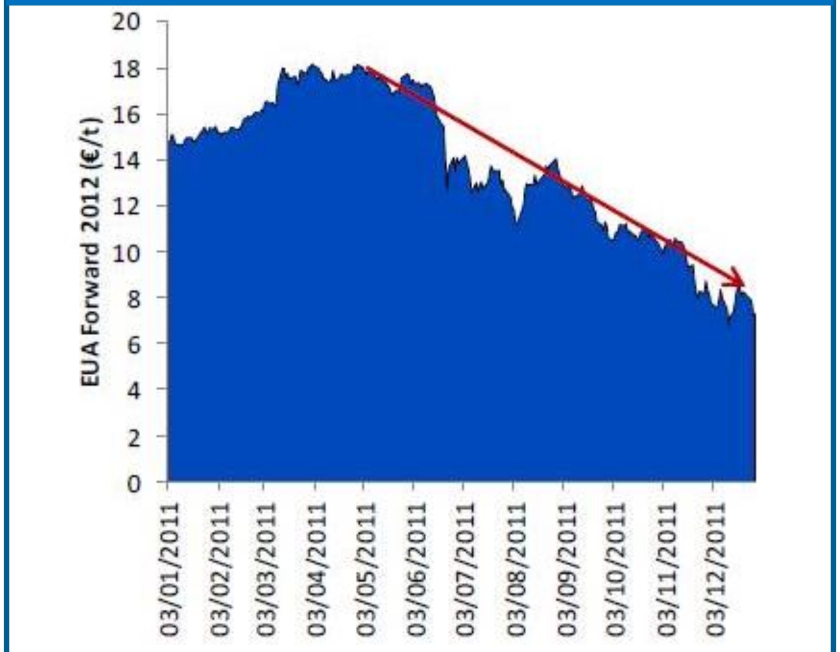
- In 1997 Kyoto: 8% reduction target for 2012 compared to 1990 for EU-15 (EU-15 on track to reach its Kyoto target)
- In 2012: Energy Roadmap to reach a 80-95% reduction target in 2050 but incentive mechanisms to be strengthened

Actual and projected emissions (MtCO2-eq.) for EU-15



Source: EU Commission, September 2012

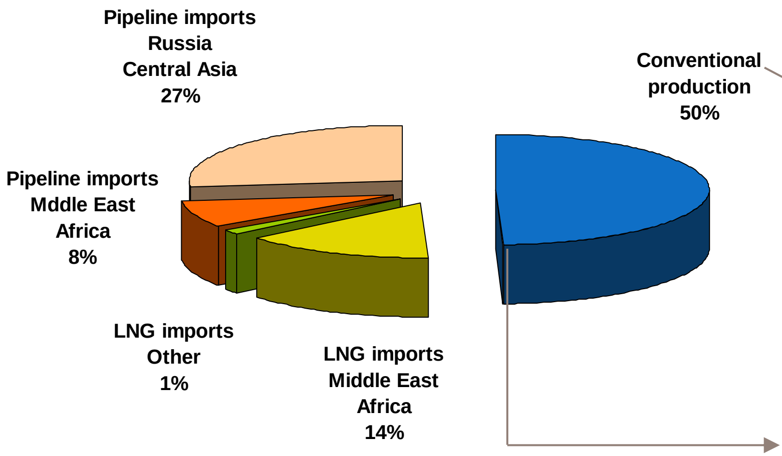
CO_2 price in 2011



Natural gas in Europe
Security of supply

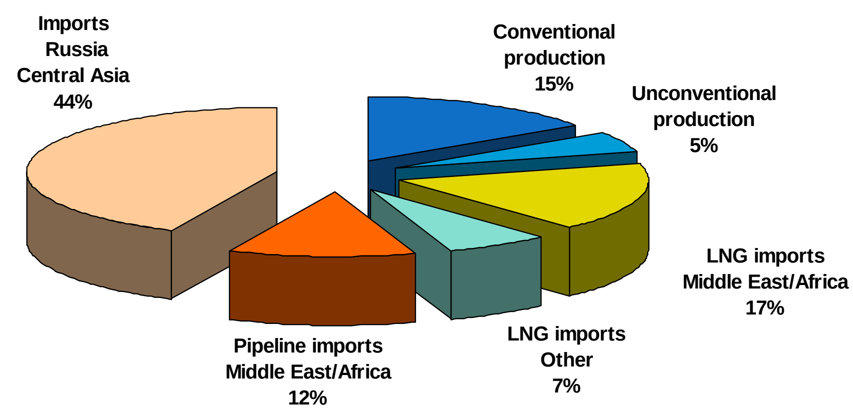
- A declining conventional indigenous production
- Uncertainties on the development of unconventional gas
- Increased import needs

2011: 550 bcm
Dependence: 50%



+ 1.3%/year

2030: 740 bcm
Dependence: 80%



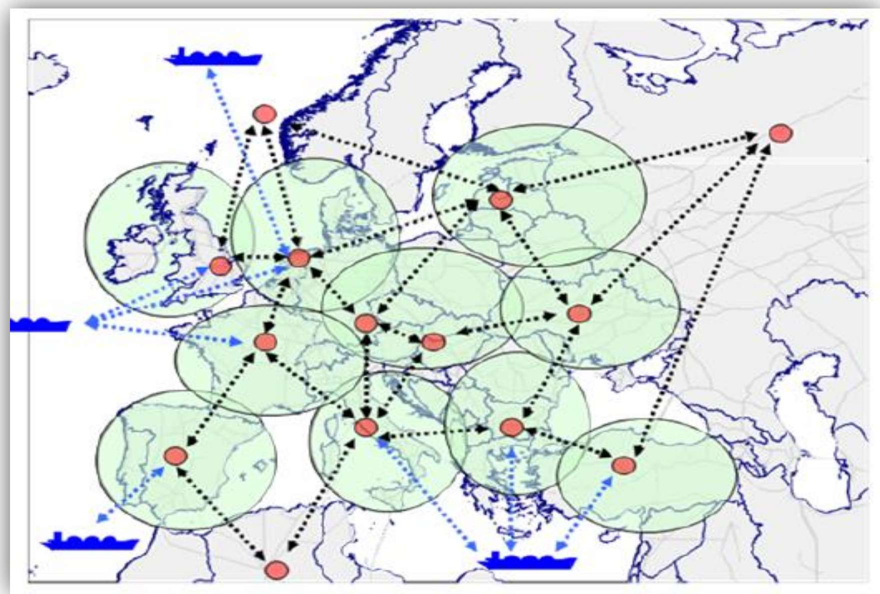
Doubling of net imports by 2030

(2030: 500 – 580 bcm)

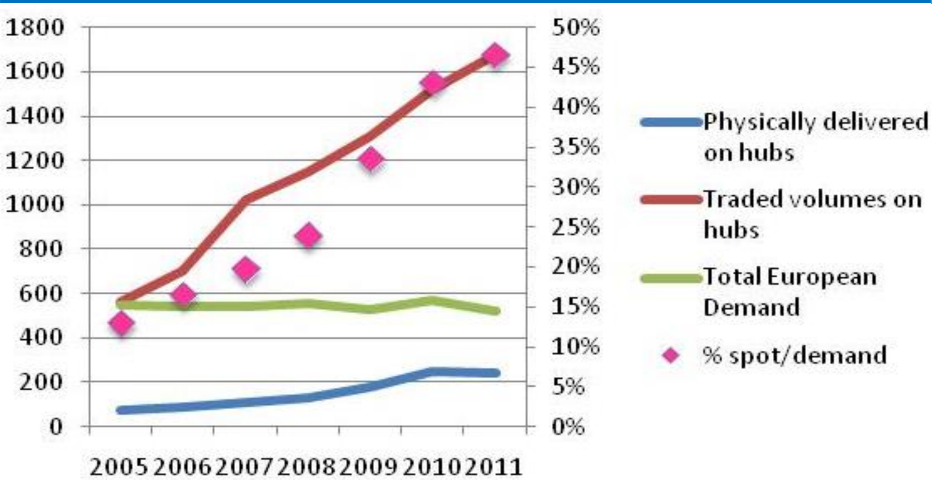
Source: CEDIGAZ, Reference Scenario

Natural gas in Europe
Security of supply

- Increasing liquidity on European market places
    - Spot-linked gas volumes: 42% in 2011, 45% in 2012 (SG)
    - Physical volume on hub and virtual market place in 2011: 47% (IEA)*
- Sharp acceleration of the process towards a unified market
- On-going discussions on the Gas Target Model



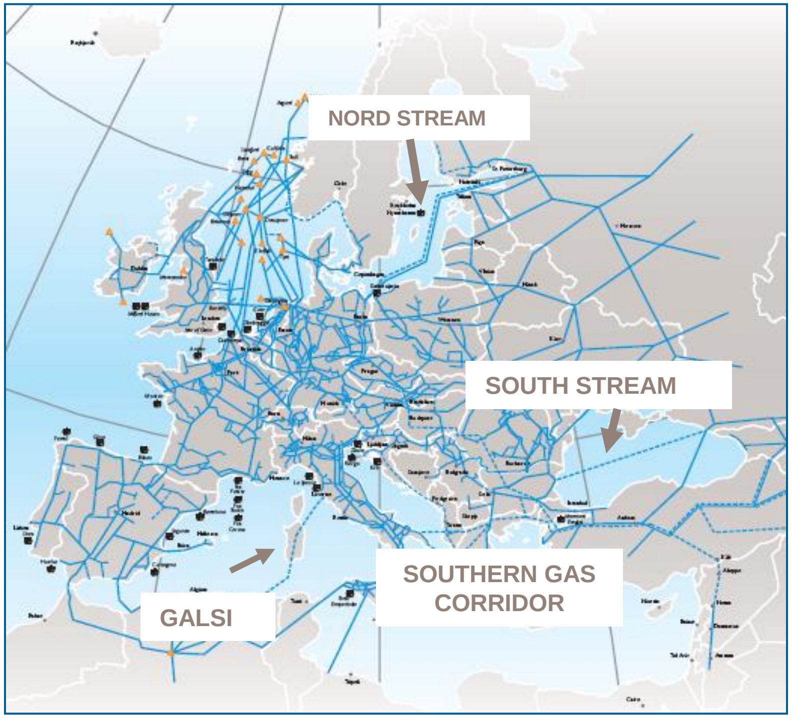
Total traded volumes in Continental Europe market places (in TWh)



Source: IEA

Natural gas in Europe
Security of supply

- Sustained investments from the natural gas industry in infrastructures
- Supplies and transmission routes diversification to improve security of supply



Source: Eurogas

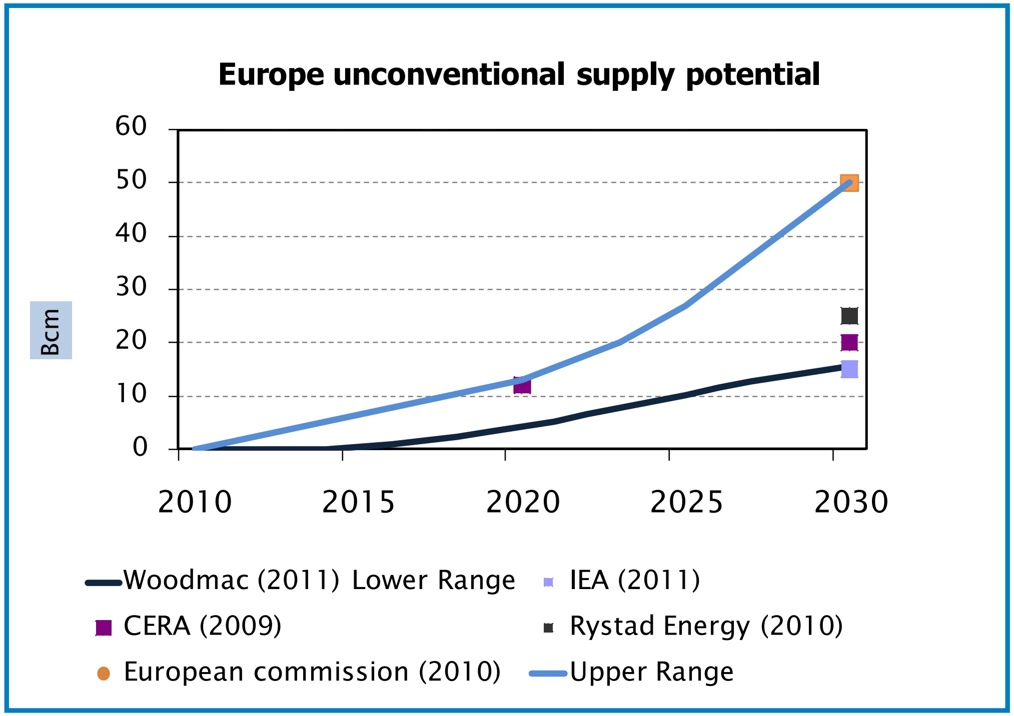
The Southern Gas Corridor

Nabucco and Nabucco West pipeline

Trans Adriatic Pipeline project

Natural gas in Europe
Security of supply

- **Unconventional gas: A potential to be further assessed**
- **Role of the industry**
  - Promote industry best practices
  - HSE
  - Resource management
- **Role of public authorities**
  - Promote exploration to better assess the potential
  - Harmonization of regulation
  - Public awareness
  - Public acknowledgment of importance of UCG in future energy market



The European energy context

- An evolving European regulation:
  - A **roadmap 2050** consistent with the objective of energy independence and reduction of greenhouse gas emissions;
  - With a need for a reliable **carbon market;**
  - A **Gas Target Model** aiming at creating a global European gas market;
- With emerging new national energy policies:
  - Following Fukushima, Germany and Switzerland are to phase out nuclear, and Italy decided not to develop its nuclear program, paving the way for an energy transition and a potential increased role of natural gas;
  - The UK favors a low-carbon economy through its Electricity Market Reform and Capacity Mechanism but refocuses on gas;
  - Gas-to-power demand is increasingly affected by competition from renewables and, in the short run, from cheap imported coal
- On the supply side, Europe should ensure renewed import capacities from historical partners such as Russia and Algeria, and also find new volumes from other sources:
  - Unconventional gas resources: what level of production?
  - New pipe and LNG import needs to Europe

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