



25th world gas conference
"Gas: Sustaining Future Global Growth"

A Vision for a 100% Renewable Energy Future

Is Natural Gas Still a Transition Fuel?

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Venue: Level 4 - Room 406/7



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Why 100% Renewable Energy?

1. Climate

- at least 80% less Greenhouse Gas globally by 2050

2. Conventional oil/gas scarcity

- BAU: we need “4 times Saudi Arabia and 4 times Russia for 2030”

3. Threats of unconventional fuels

- CTL, GTL, deep water oil, shale gas, tar sands - more impacts than just carbon

4. Nuclear development

- What to do with 100,000 tonnes toxic waste for next 10,000 years?

5. Equity

- 1.4/2.7 billion people lack access to electricity/safe cooking energy

6. Costs

- No-regret technologies, easy to implement, hardly any fuel, and no adaptation costs

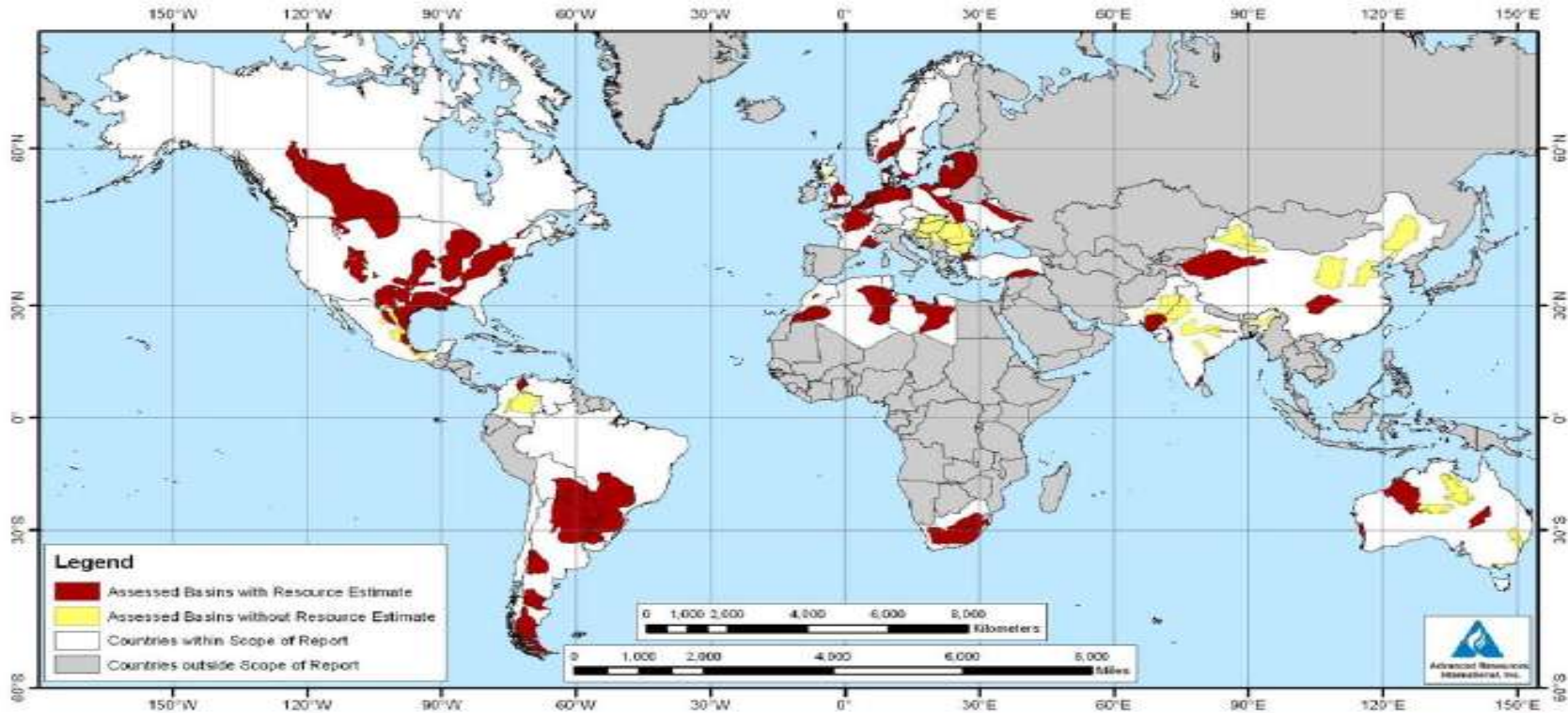
1. Is gas replacing coal as a transition fuel to a renewable energy future?

1. How much CO₂ can we emit in a below 2-degree world? How much carbon is already in “pipeline”?

1. Solution?

- “Natural Gas is not a transition fuel [to renewables] – it is a destination fuel” (SHELL CEO, May 2011)
- “There are resources for 250 years” [of present Natural Gas consumption] (SHELL ads during last year in many papers)
- ***Note: 250 years of present natural gas consumption equals about 2750 Gt CO₂ emissions, or almost 3 three times a below-2 degrees CO₂ budget until 2050.***

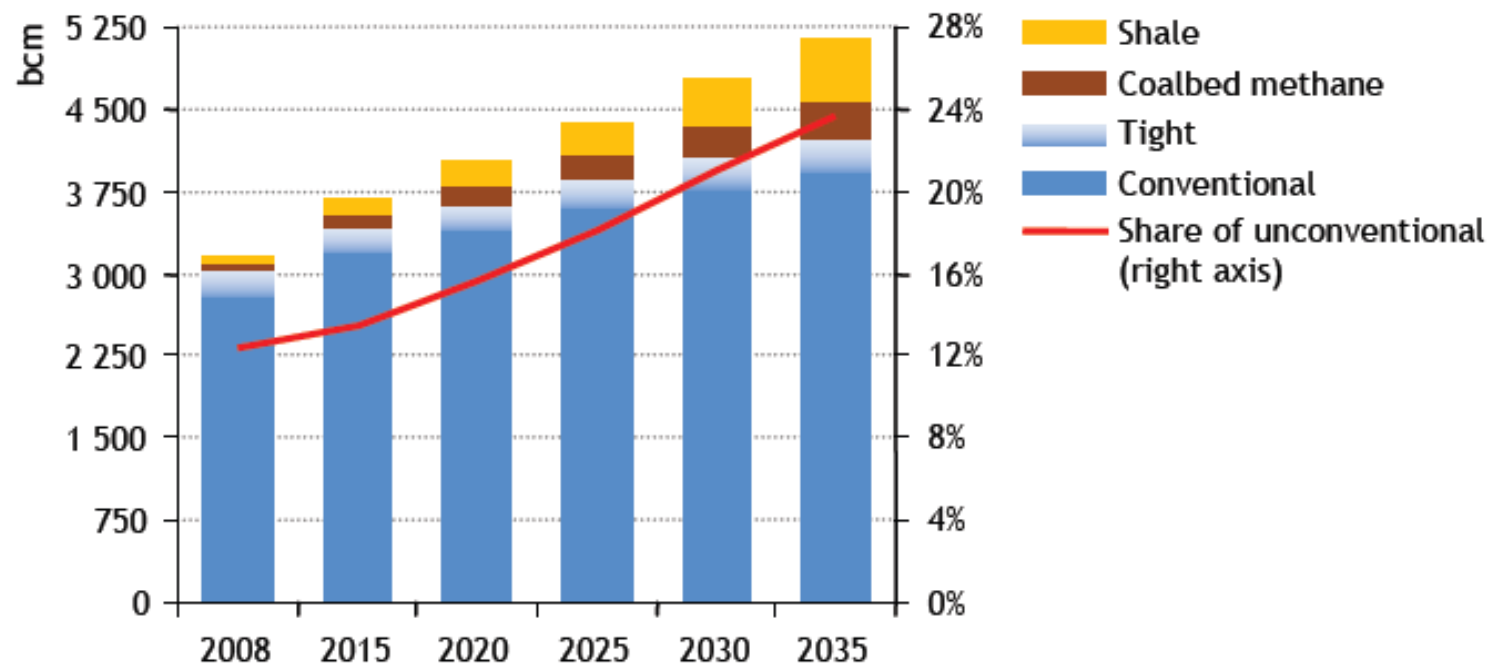
Global shale gas reservoirs – where there is coal there is also shale gas (IEA)



US Energy Information Administration (EIA): world proven shale gas resources are estimated to be 6,622 trillion cubic feet (Tcf), for 32 countries assessed + the United States. The biggest potential of unconventional gas is currently seen in the region of the former Soviet Union (CIS), Central Asia and China.

Global gas market – Conventional gas is still likely to play a major role

Figure 1.7 ▶ Natural gas production by type in the GAS Scenario



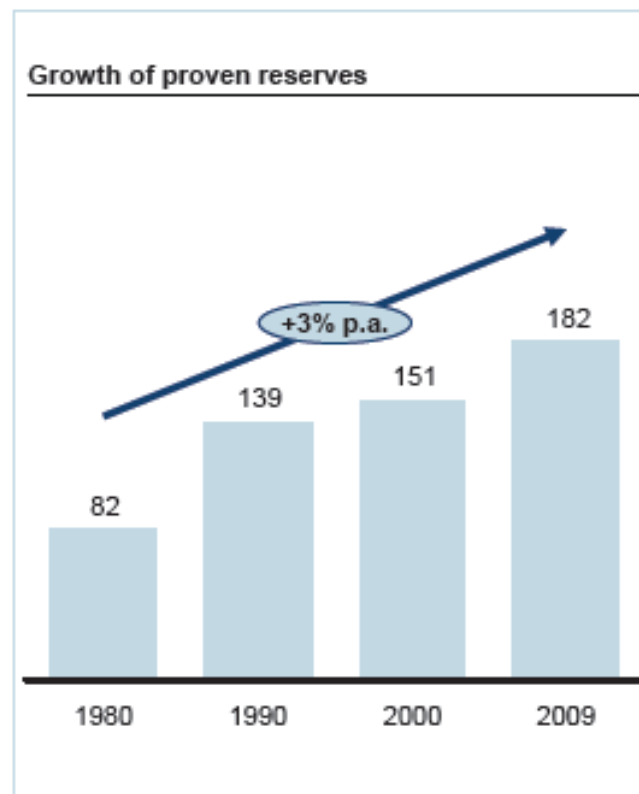
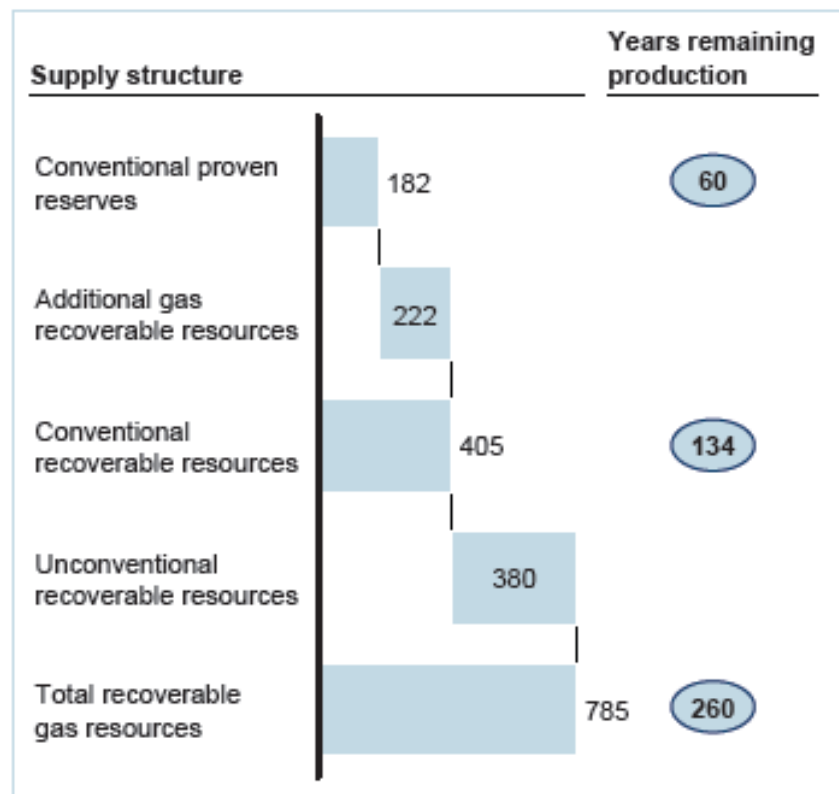
Unconventional gas production meets more than 40% of the increase over the period between 2010 and 2035 and is projected to reach 1.2 tcm in 2035. → The share of unconventional gas in the the global gas production increases from 12% in 2008 to 24% in 2035 (vs. 19% in IEA New Policies Scenario), out of which shale gas production is projected to account for 11% in 2035.

A gas glut coming?

Proven gas reserves currently stand at 60 years of production, and are growing – total resources are estimated at over 250 years

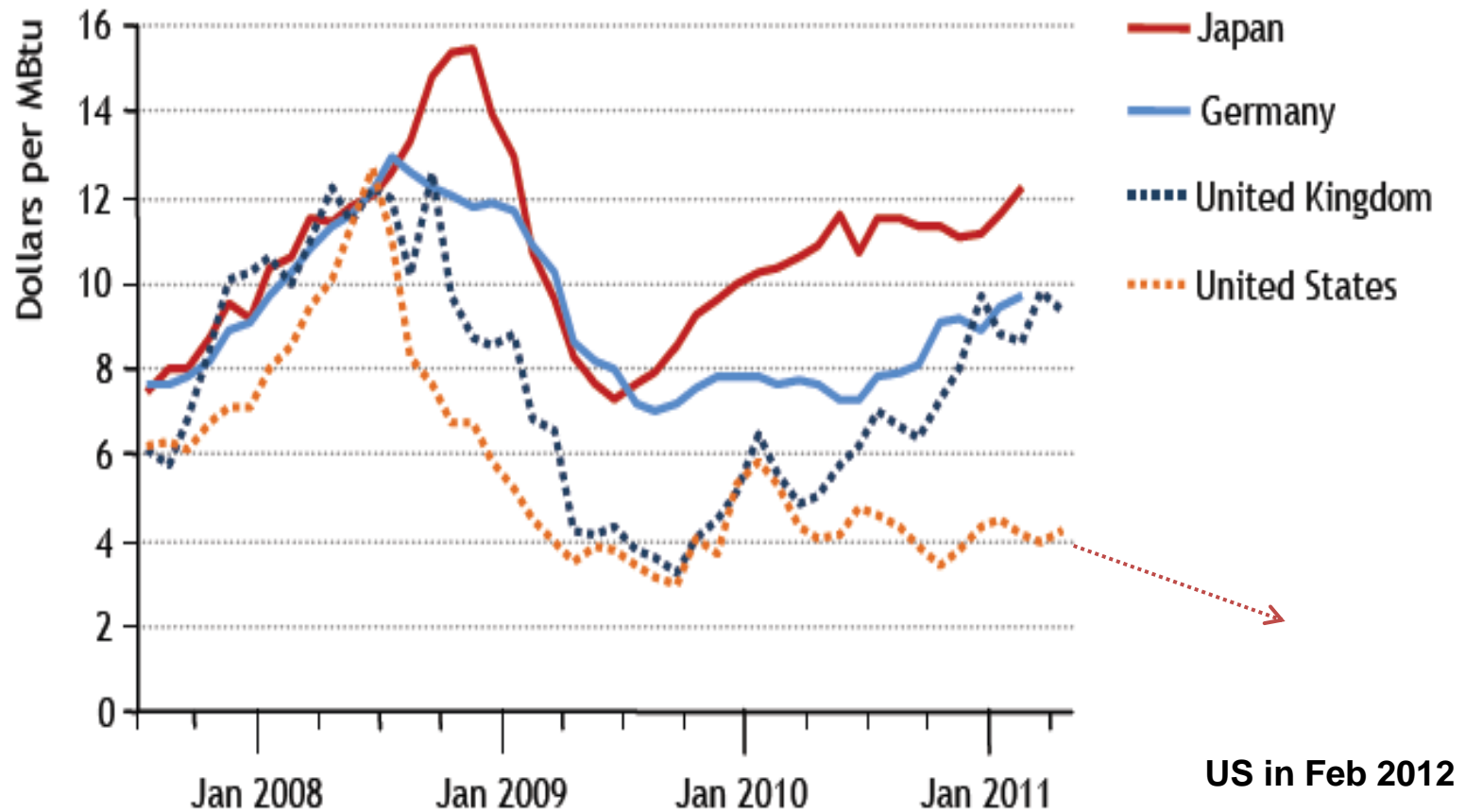
Tcm

○ Years remaining at current production rate, 2009¹



Global gas market – US cracking the oil/gas price linkage in Europe and elsewhere?

Figure 2.10 ▶ Natural gas prices in major markets, July 2007 to April 2011



Source: IEA 2011

1. Is gas replacing coal?

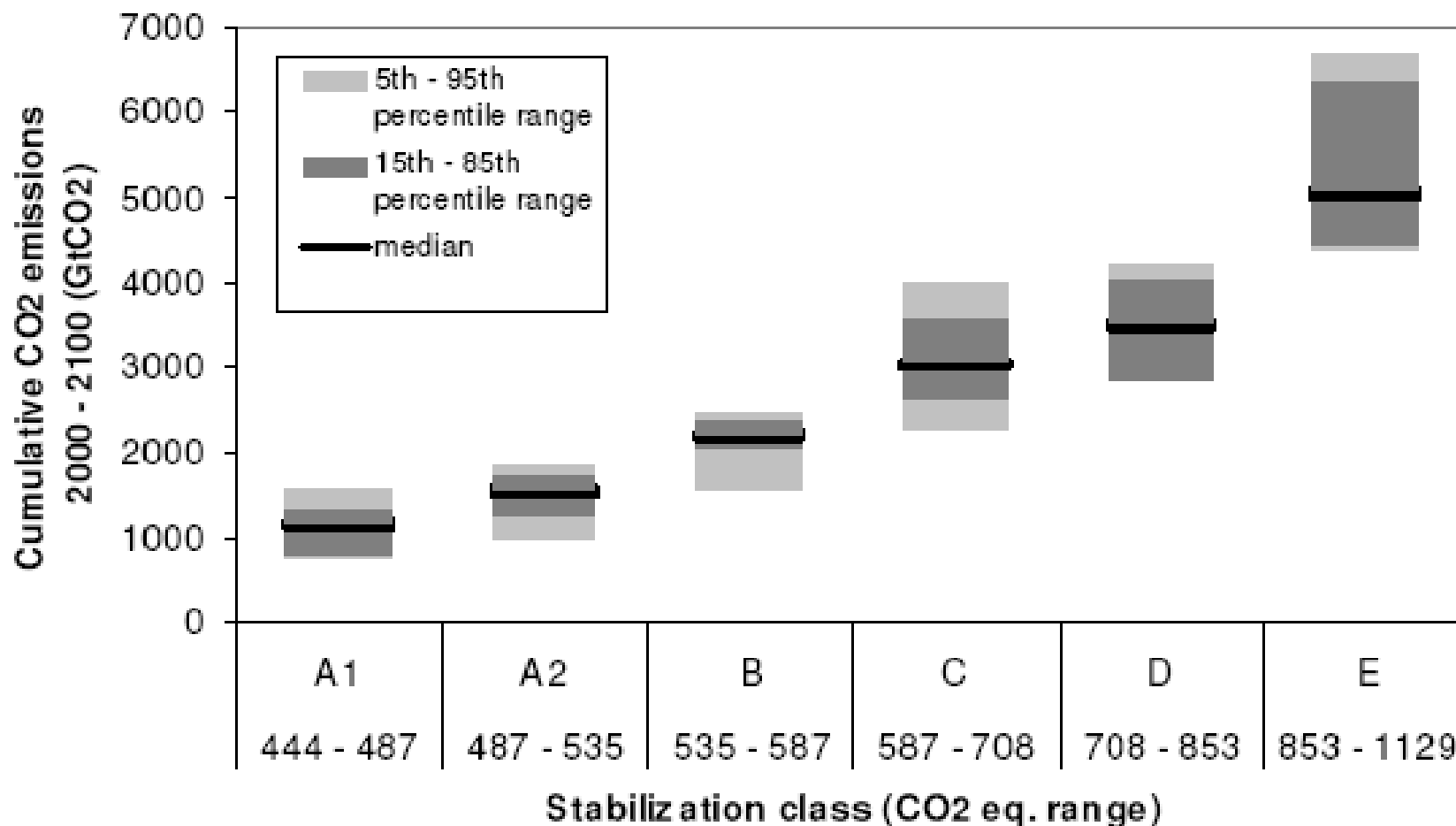
IEA assessment on Shale Gas and Climate

- ***IEA – The Golden Age of Gas Scenario:*** An increased share of natural gas in the global energy mix will put us on a carbon emissions trajectory reaching 35 Gt CO₂ from fossil fuels in 2035, consistent with stabilizing greenhouse gases at around 650 ppm, resulting in a likely global temperature rise of over 3.5°C, well above the widely accepted 2°C target.
- This is because lower prices for natural gas will lead to an increased demand for gas. In this scenario, **gas will only partly displace coal but primarily nuclear power and suppress renewable energies and energy conservation.**

How much CO₂ can we emit in a below 2-degree world? How much carbon is already in “pipeline”?

There is too much carbon already in the “pipeline”. To stay below 2 degrees global warming, most of both reserves and resources – again both – conventional and unconventional need to remain untouched.

Global CO2 budgets for various climate scenarios

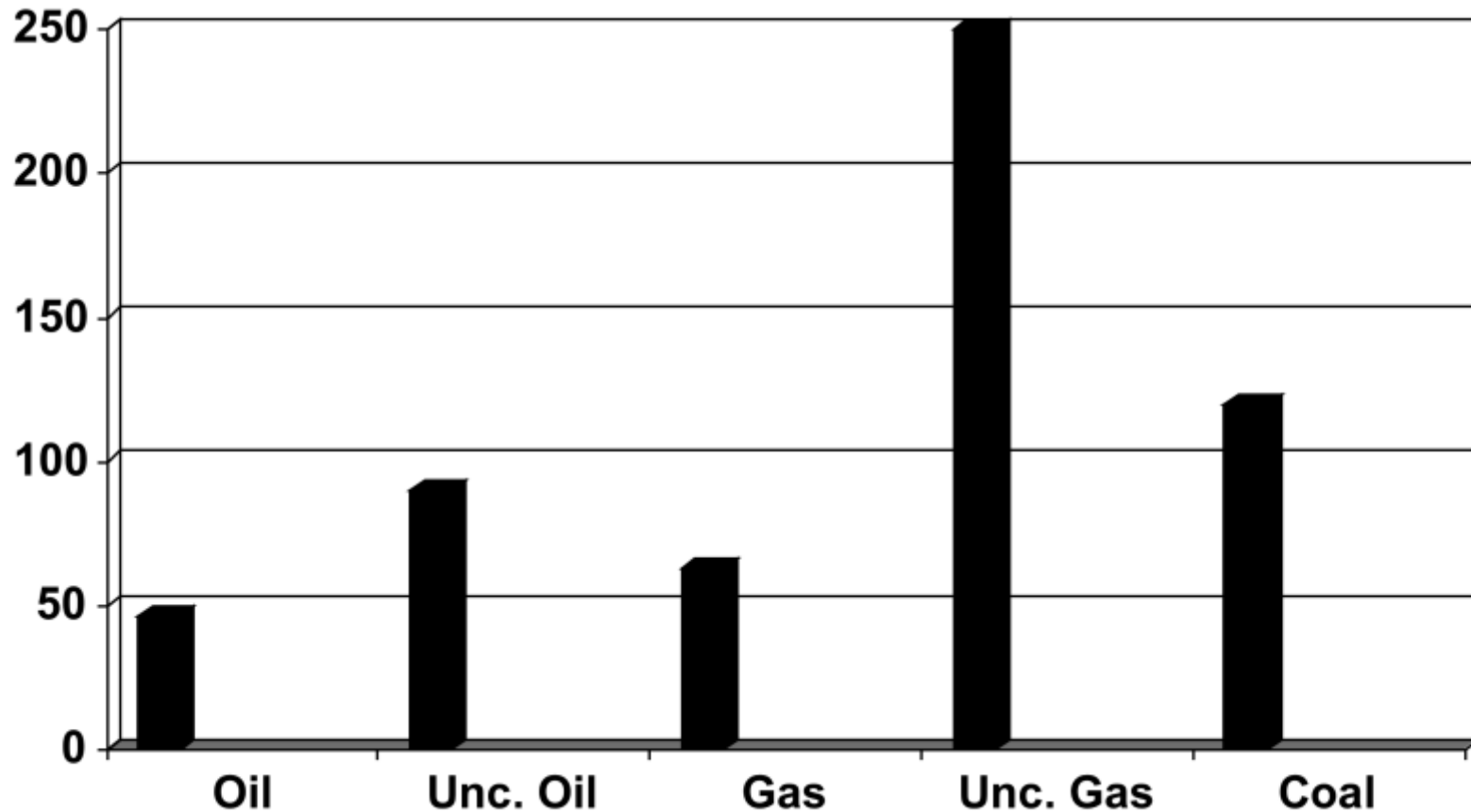


Source: IPCC 2007

Global fossil energy reserves*

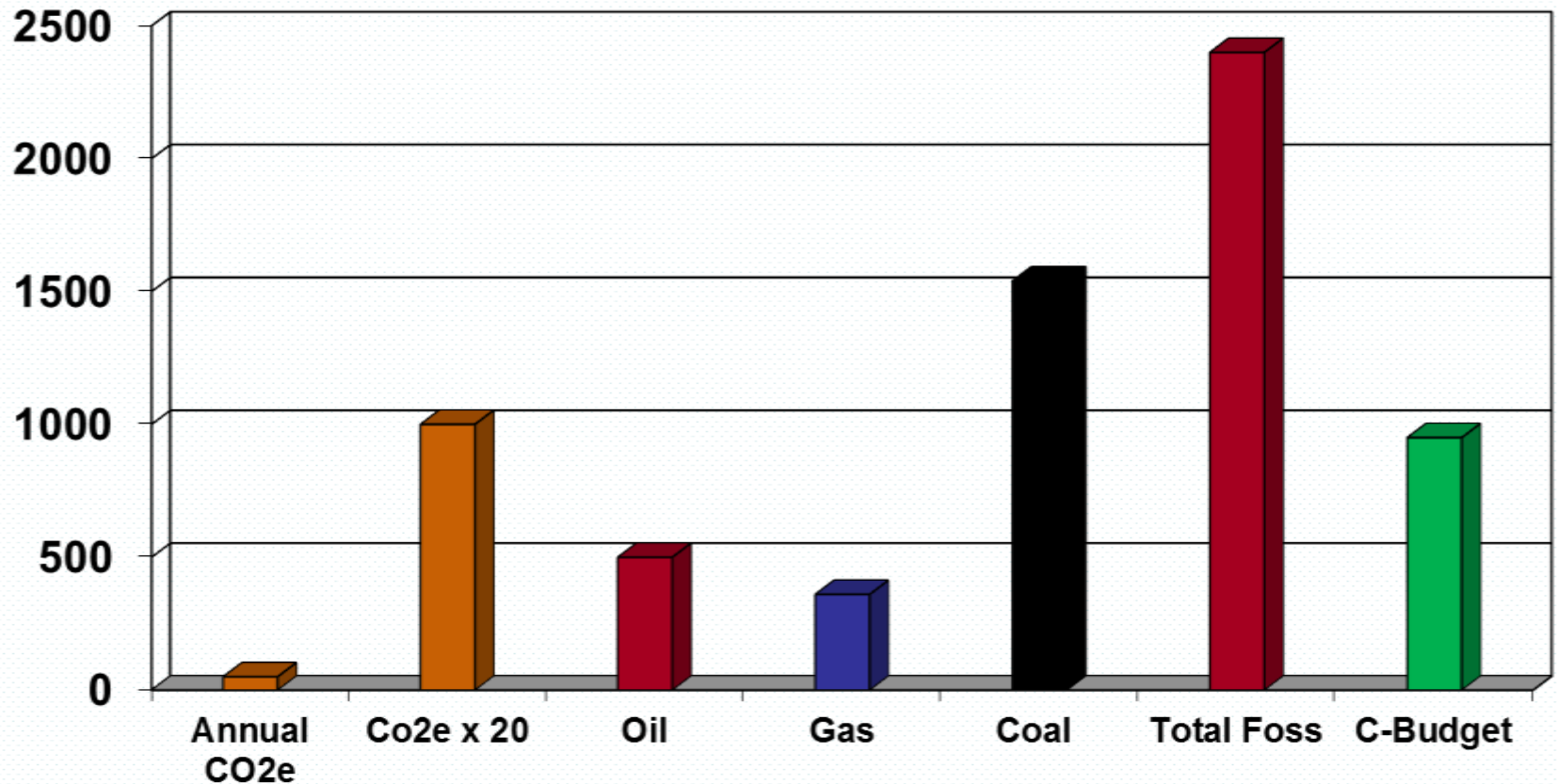
R/P ratio (years)

* Under present economic and technological conditions



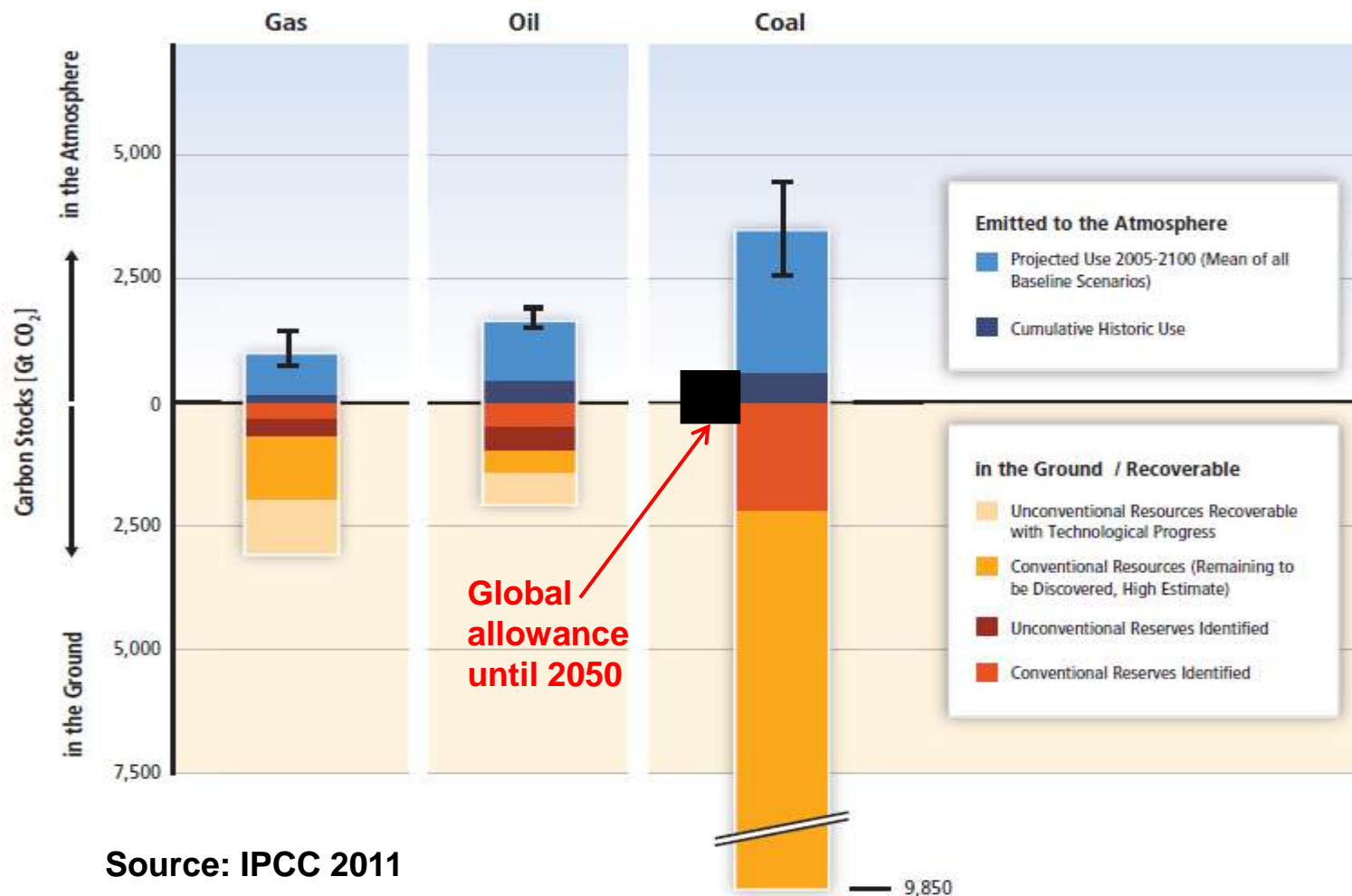
Source: BP Stat. Review 2010; IEA WEO 2009, 2010

The global GHG budget requires to retire about 60% of all known conventional fossil fuel recoverable reserves until 2050 (if CCS is excluded)



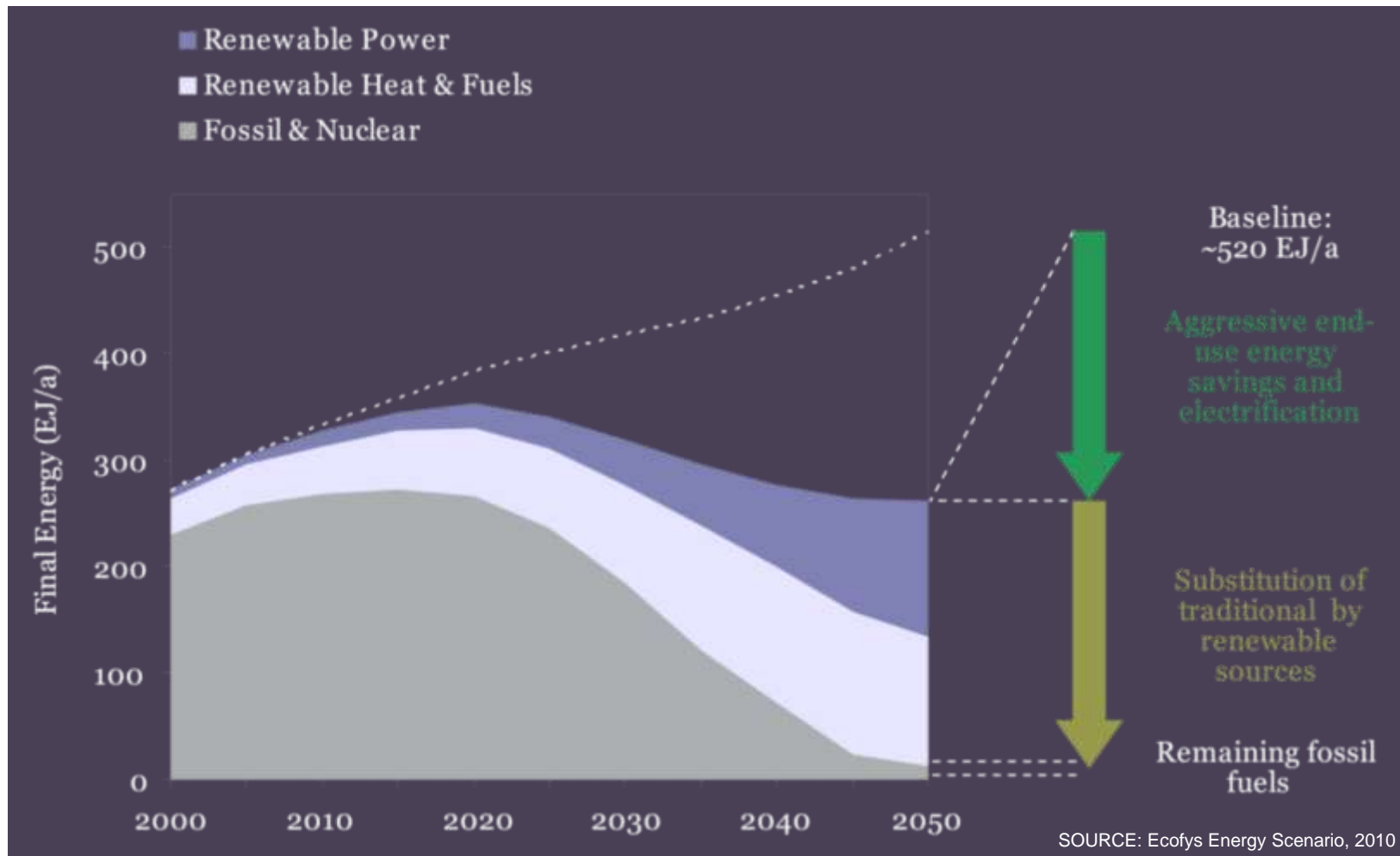
Source: OPEC Secretariat 2011, BP 2011, IEA 2011, IPCC 2007

About 95% all fossil fuel conventional and unconventional resources need to stay untouched, mainly coal



Source: IPCC 2011

The Scenario – Key Elements



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