

The impact of fossil fuels

**Greenhouse gas emissions, environmental consequences
and socio-economic effects**

era energy research architecture

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1. Subject of the study

- Analysis of conventional and unconventional fuels:
 - Greenhouse gas emissions
 - Environmental consequences
 - Socio-economic effects
- Potential of biofuels

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2. Greenhouse gas emissions of conventional and unconventional fuels

What are unconventional fossil fuels?

- Complex processing
- Fuels from extra-heavy oil, tar sand (bitumen) oil shale, natural gas and coal

3. Methodology

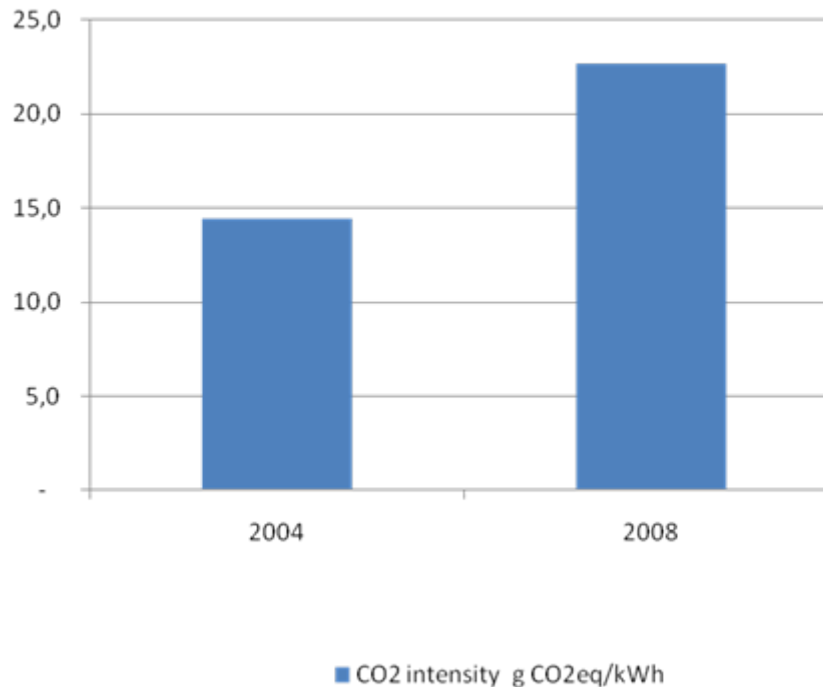
- Evaluation of international studies on greenhouse gas emissions of fossil fuels and own calculations based on data of the following institutions:
 - National Energy Laboratory (USA)
 - California Environment Protection Agency (CARB)
 - European Commission Joint Research Centre
 - University of California Berkeley
 - World Bank
 - Jacobs Consultancy (USA)
 - Oil companies (BP, Talisman, Maersk)
 - Other institutions (UCG –Underground Coal Gasification – Partnership)

4. Main findings: Conventional Oil

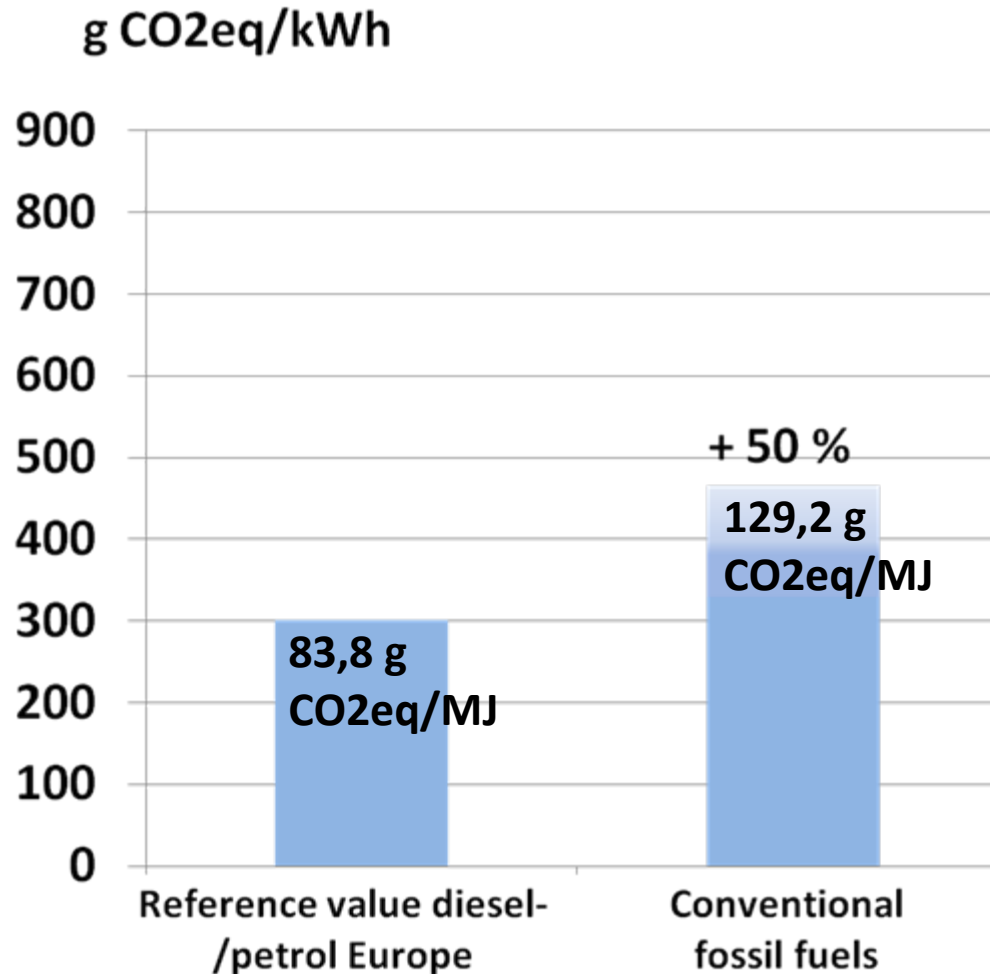
- Greenhouse gas emissions from conventional oil are on the rise - this results from:
 - a more intensive use of existing oil fields
 - deeper oil deposits
 - heavier oil fields
 - more sulfur in the oil deposits
 - huge quantities of flared or vented methane, which is extracted together with the oil

Example: Development of CO₂-intensity of BP-oil production in the North Sea – increase in 2004 – 2008 of 60 %

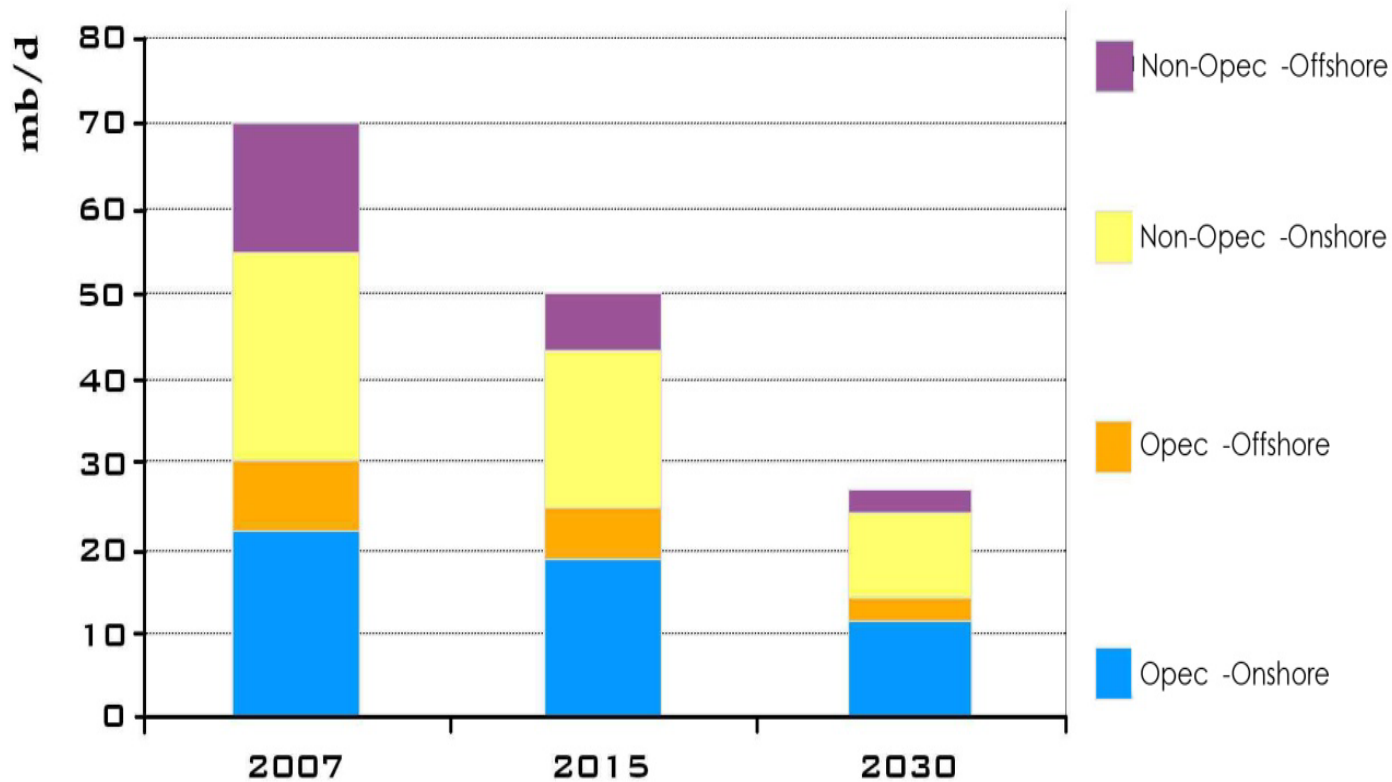
CO₂ intensity g CO₂eq/kWh



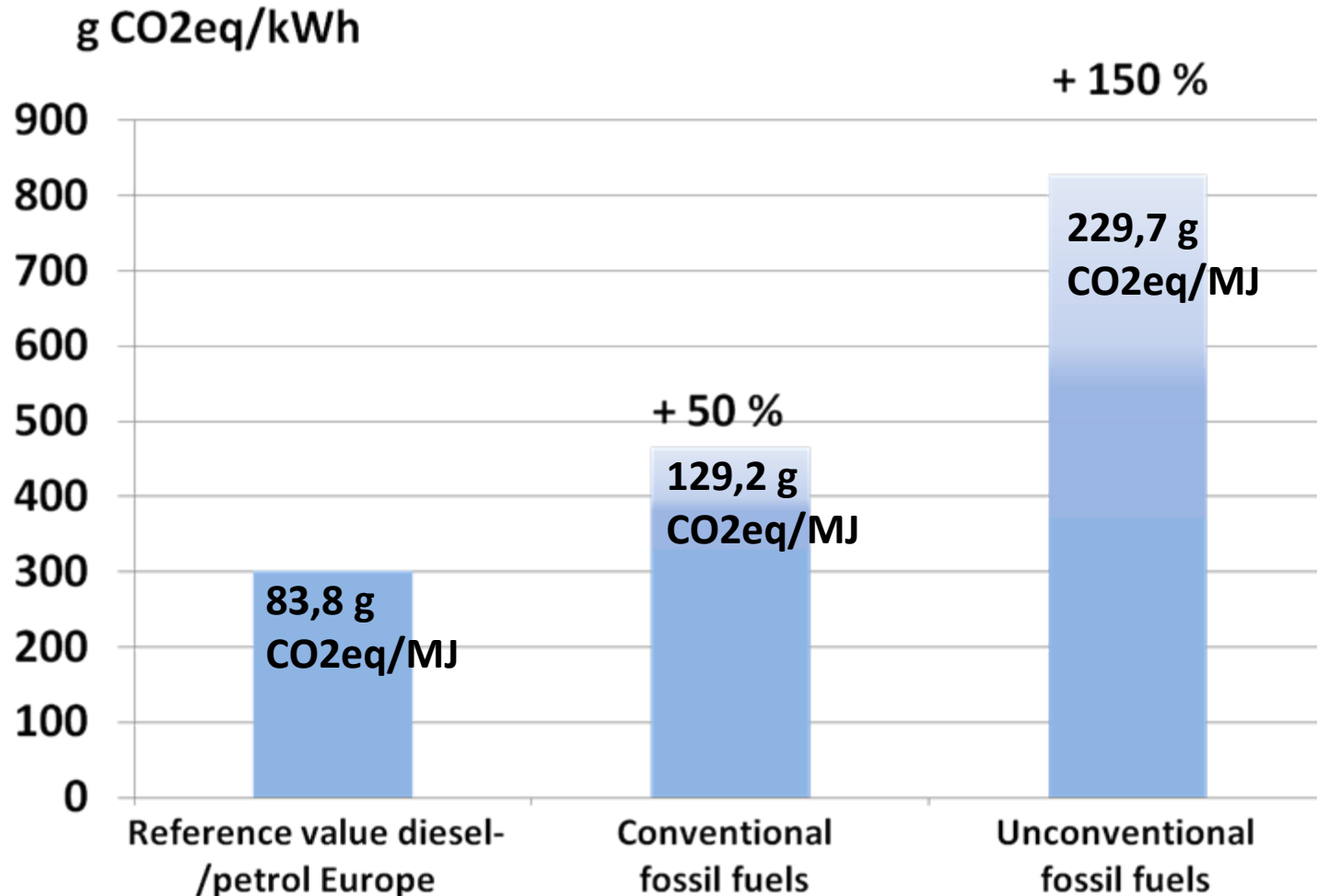
Greenhouse gas balance of fossil conventional fuels



5. The production of conventional oil is decreasing and will be balanced by an increase in the production of unconventional oil



6. Greenhouse gas balance of fossil conventional and unconventional fuels



7. Greenhouse gas development in the transport sector

Two scenarios:

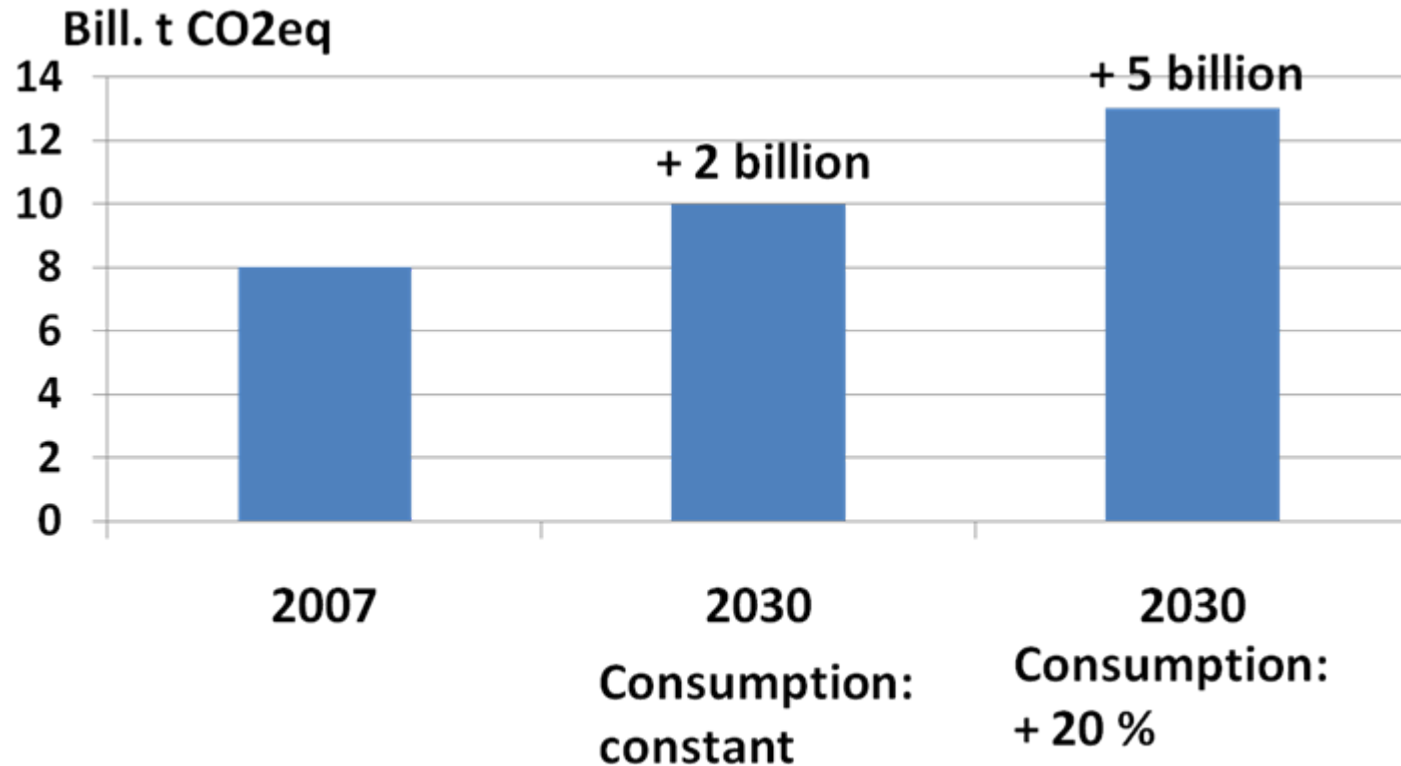
- 1.Constant consumption until 2030
- 2.Consumption increases by 20 % until 2030

Assumptions:

- Share of different types of conventional oil based on IEA and University of Uppsala
- Share of different types of unconventional oil based on own estimates, which consider the amount of resources and technological development
- Average values of our evaluation of GHG-emissions of fossil fuels

7. Greenhouse gas emissions both from conventional and unconventional oil will reach record levels in the future

GHG-emissions in transport sector



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Thank you for your attention!

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