

# Innovative Process Technology for Refining Lignite – R&D needs

**IBI**

**Innovative Braunkohlen Integration in  
Mitteldeutschland**

**(Innovative Lignite Integration in Middle Germany)**

**17<sup>th</sup> European Round Table on Coal  
Horizon 2020: best use of fossil fuels  
Brussels, June 6<sup>th</sup> 2012  
Prof. Mathias Seitz**

# Topics

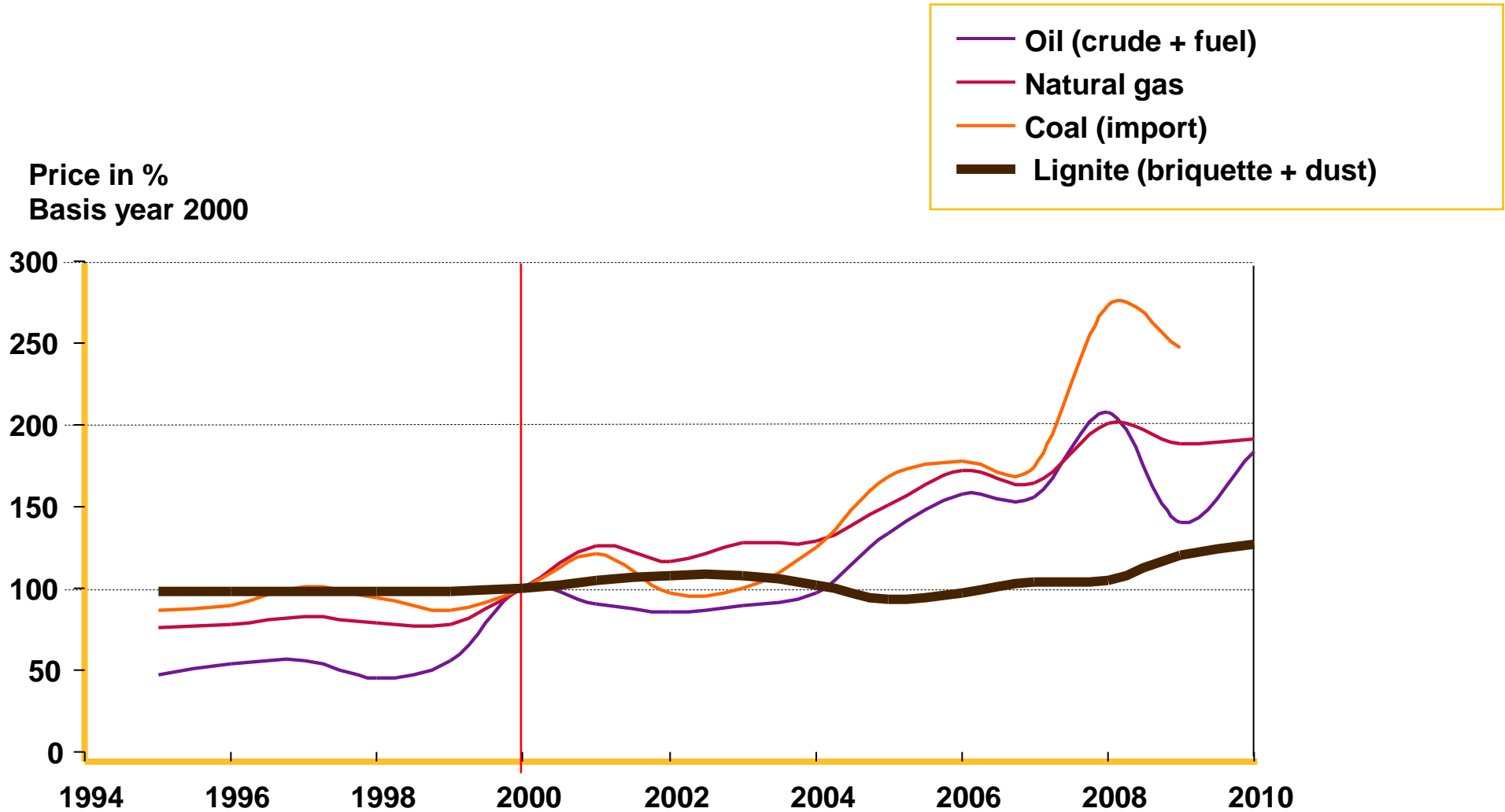
## Opportunities for Refining Lignite

- Stable price for lignite
- Increasing national added value in Europe
- Using carbon footprint method, lignite seems to be better than natural gas with regard to CO<sub>2</sub> – equivalents
- Value chains show higher efficiency than one technique alone
- The conversion of lignite to chemicals enables reasonable integration of renewables

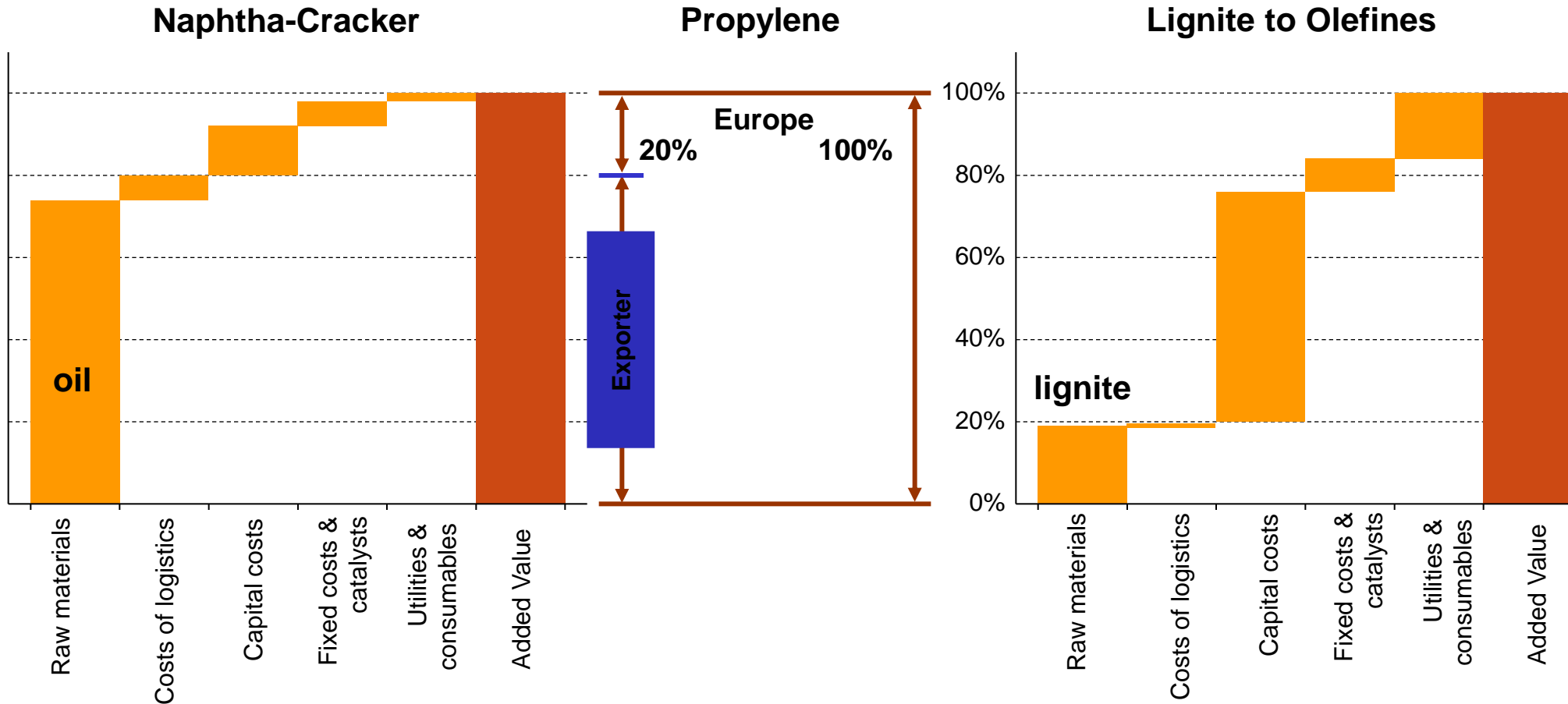
## Needs

- Development of value chains with new technologies
- Chemical parks as technology bases for testing (demonstration plants)
- Guaranty in planning

# In the Long Term only Lignite will be a price stable and available Feedstock

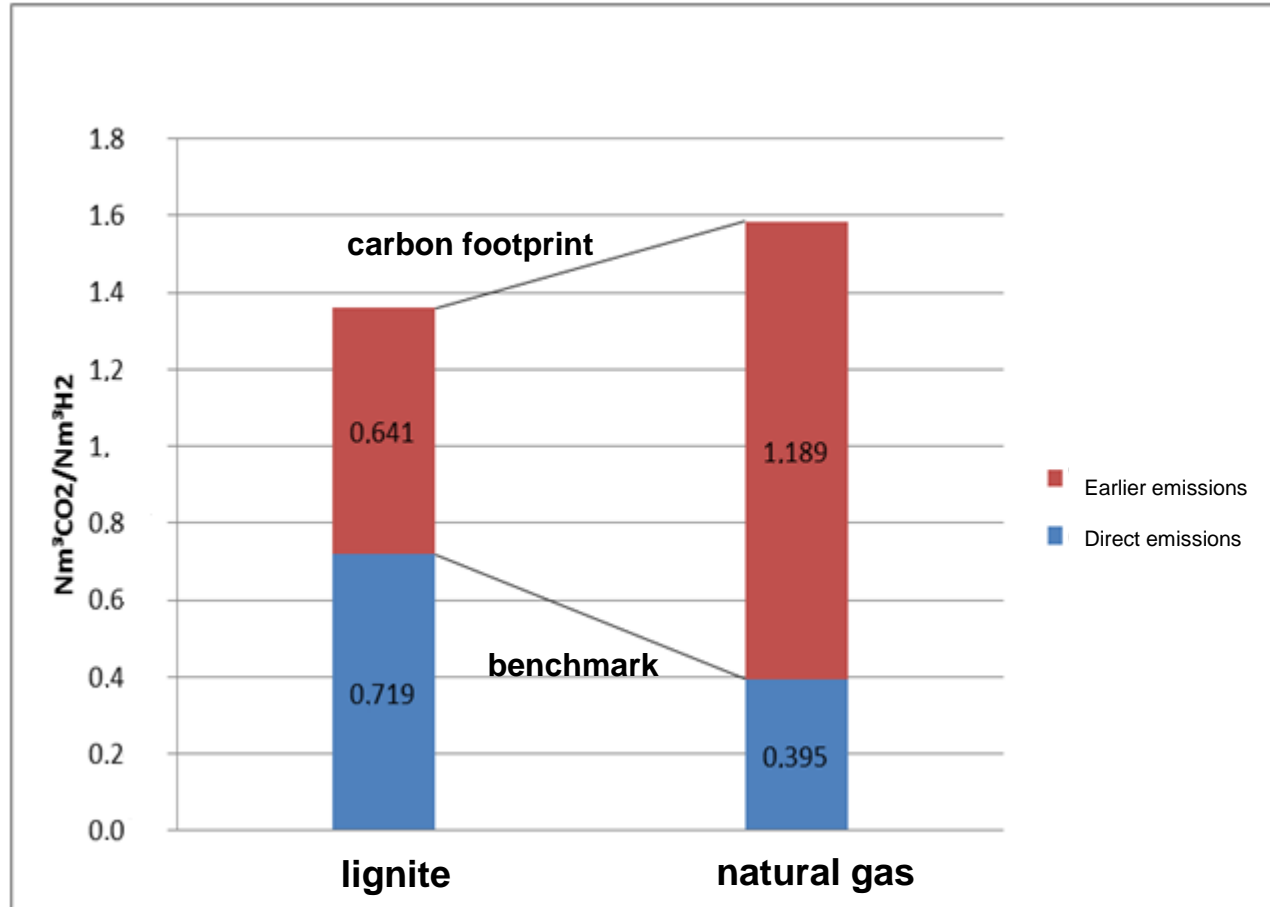


# Increasing National Added Value in Europe has an Effect on Growth and Employment



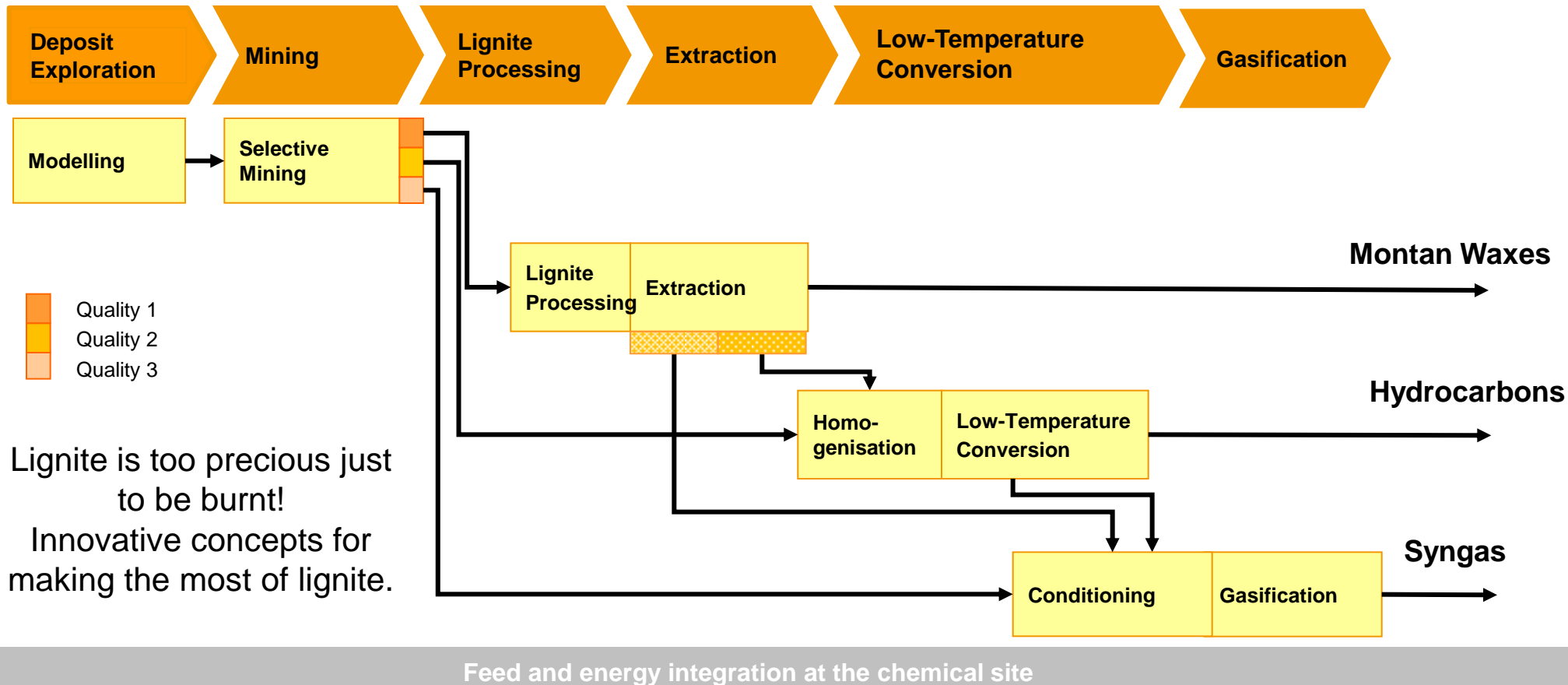
## CO<sub>2</sub> Emissions for the Production of Hydrogen from Lignite and Natural Gas

The comparison is based on a 100 % conversion from lignite or natural gas to hydrogen.

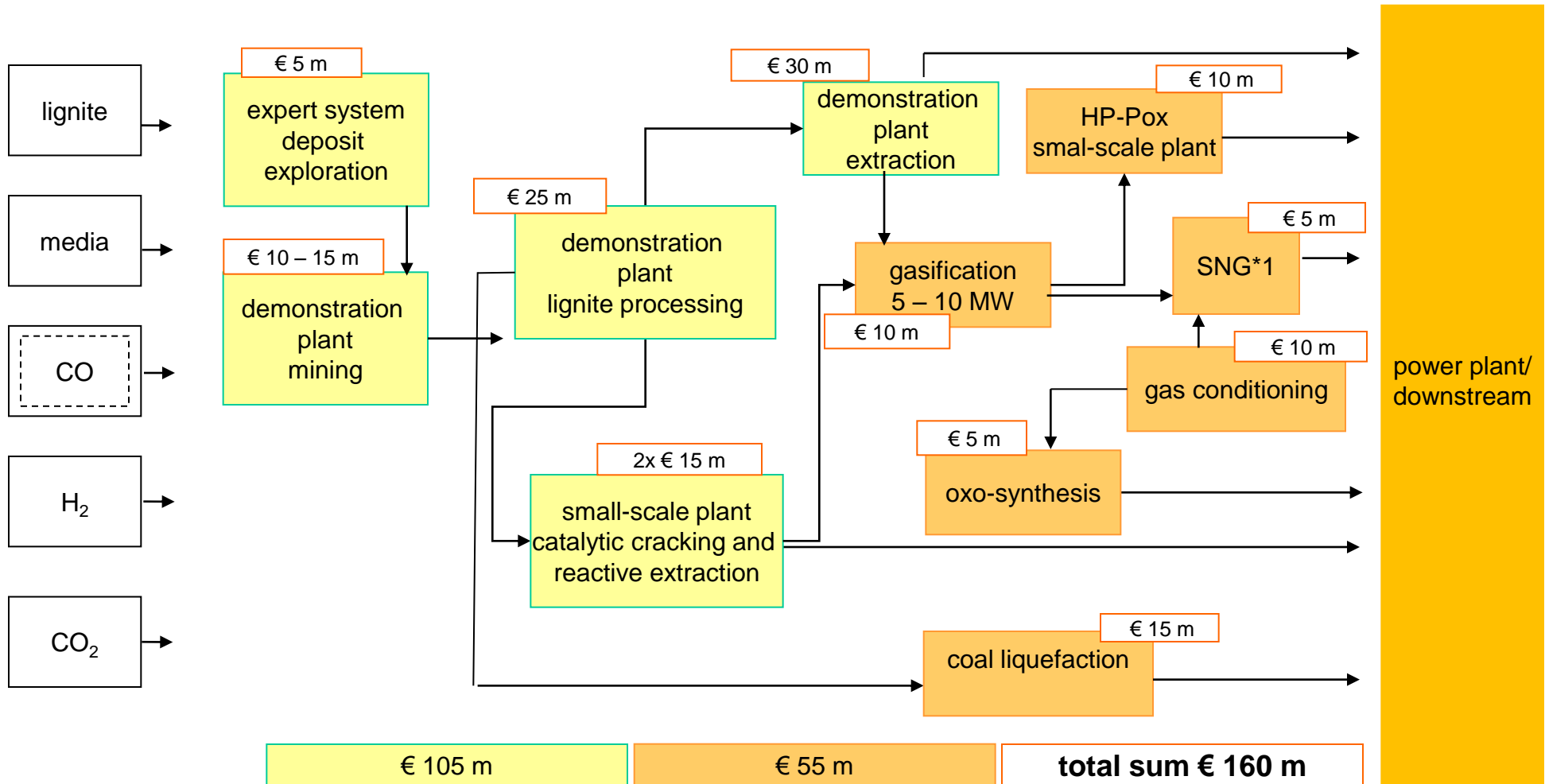


## ibi-Value Chain and Projects

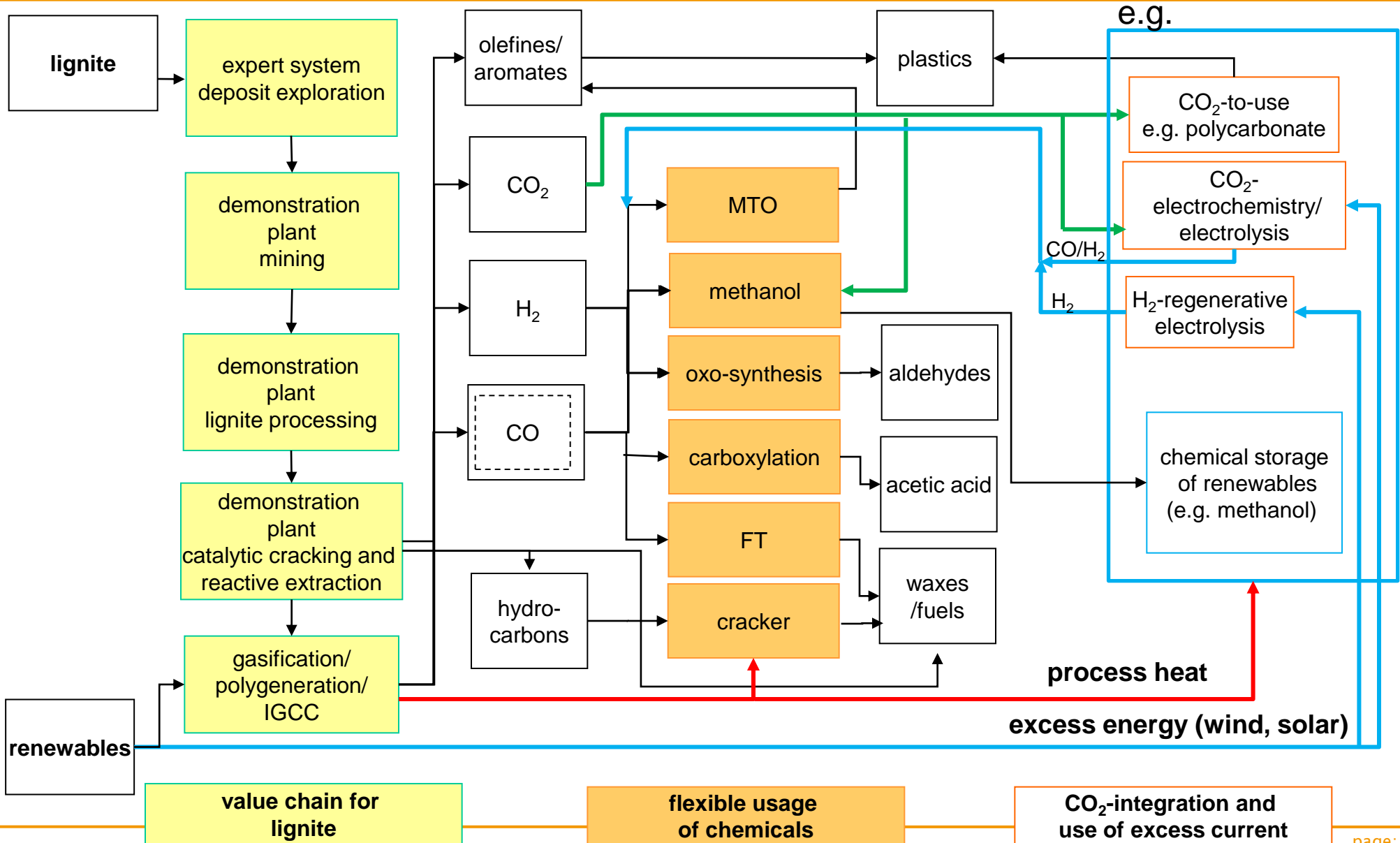
Possible reduction from about **4.4 to < 2.1 kg CO<sub>2</sub>/kg hydrocarbon**  
 (using the whole value chain instead of only gasification)



## Need to develop new integrated Technology Parks at Chemical Sites for testing Value Chains



\*1 Synthetic Natural Gas





## Future Needs for Research

- Development of value chains in lignite conversion to enhance process efficiency (small-scale and demonstration plants)
- Integration of renewable energies
- Development of flexible power plants, gasifiers and downstream processes considering fluctuating renewable energies
- Use of chemical parks as technology bases for investigating the synergies of value chains with integration of renewables (system of building blocks of small-scale and demonstration plants)
- Development of value chains for coal to chemicals as a part of Horizon 2020
- Bundling of lignite research and development in the EU

## Lignite is too precious just to be burnt! Innovative concepts for making the most of lignite.



**Thank you very much  
for your attention!**



# The use of lignite for chemicals enables the integration of renewable energies!

**The use of lignite produces CO<sub>2</sub>.**

**Renewable energies show different capacities (wind, solar).**

**How can excess energy be used? How can a lack of energy be balanced out?**

## **Examples:**

1.) Inverse SOFC: Production of H<sub>2</sub>/CO from CO<sub>2</sub> and H<sub>2</sub>O

→ Integration in methanol production

→ Syngas chain and chemical usage is necessary

2.) Electrolysis of H<sub>2</sub>O: H<sub>2</sub> use for hydrogenation reactions

→ e.g. aromatics to cycloalkanes

3.) Combined cycle produces electrical power if renewables are weak  
or it produces syngas in the case of a low electrical power demand

→ Syngas chain and chemical usage is necessary