

# **Analysing the National Potential for more CHP in Germany**

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# Items

- Background of the Study, Procedure, Results
- Barriers, Expectations, Strategy

# Background of the Study

- Transposition of the European CHP Directive 2004/8/EG in Germany:  
**“Analysis of the National Potentials for High-Efficiency Cogeneration in Germany”** (Final Report December 2005, commissioned by Federal Ministry of Economics)
- Worked out by Bremer Energy Institute (BEI) and German Aerospace Center (DLR), Stuttgart
- Taking into consideration the period from 2005 until 2020
- High-Efficiency: benchmark is the best available technology in operation for separate production of electricity and heat

# Procedure

- Separate investigation of 5 sub-potentials:

**CHP based on district heating systems  
(residential buildings and CTS-sector)**

**Non networkbound micro-CHP  
in residential buildings**

**Non networkbound small-scale CHP  
in non-residential buildings**

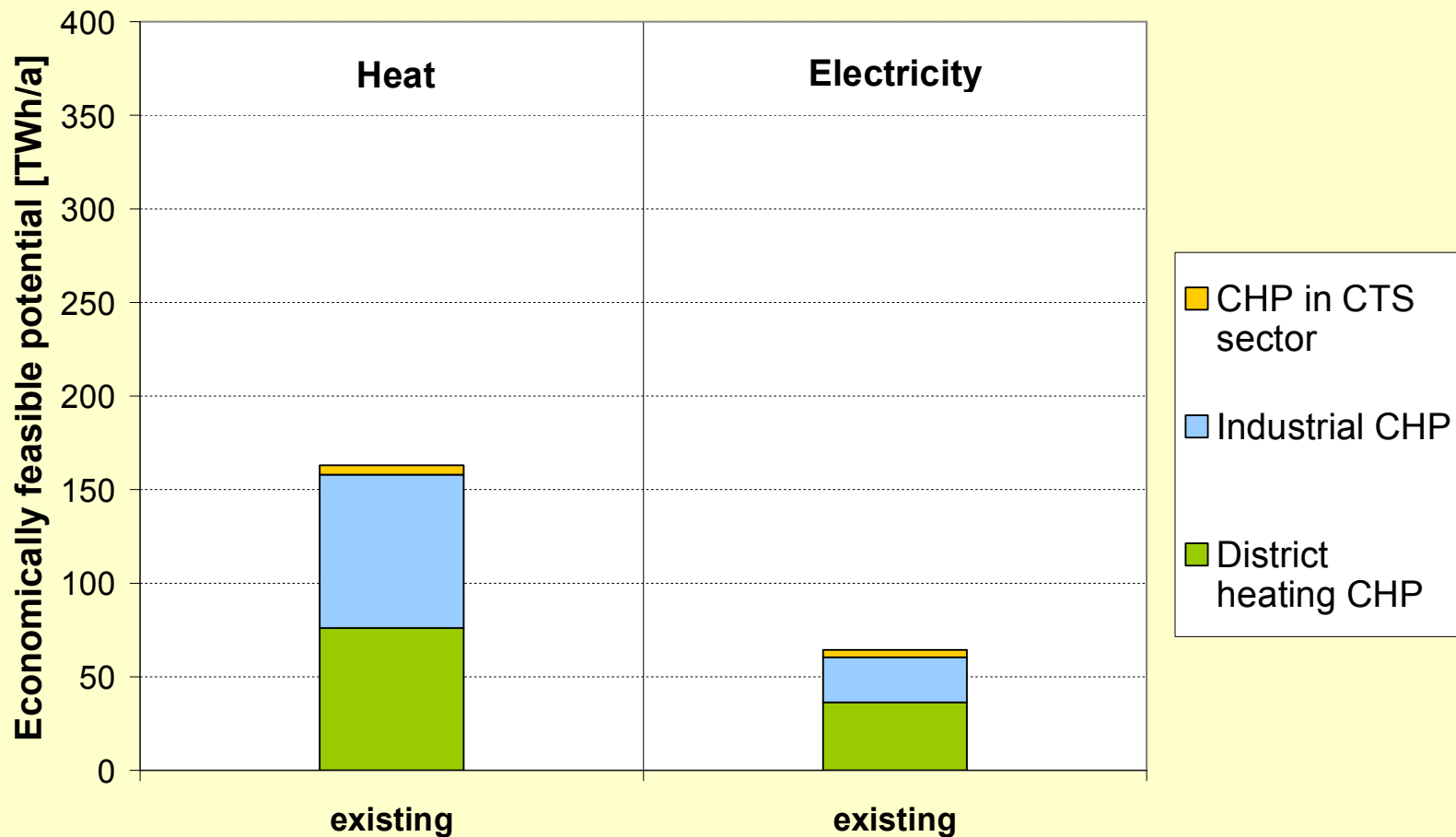
**Industrial CHP**

**Biomass CHP**

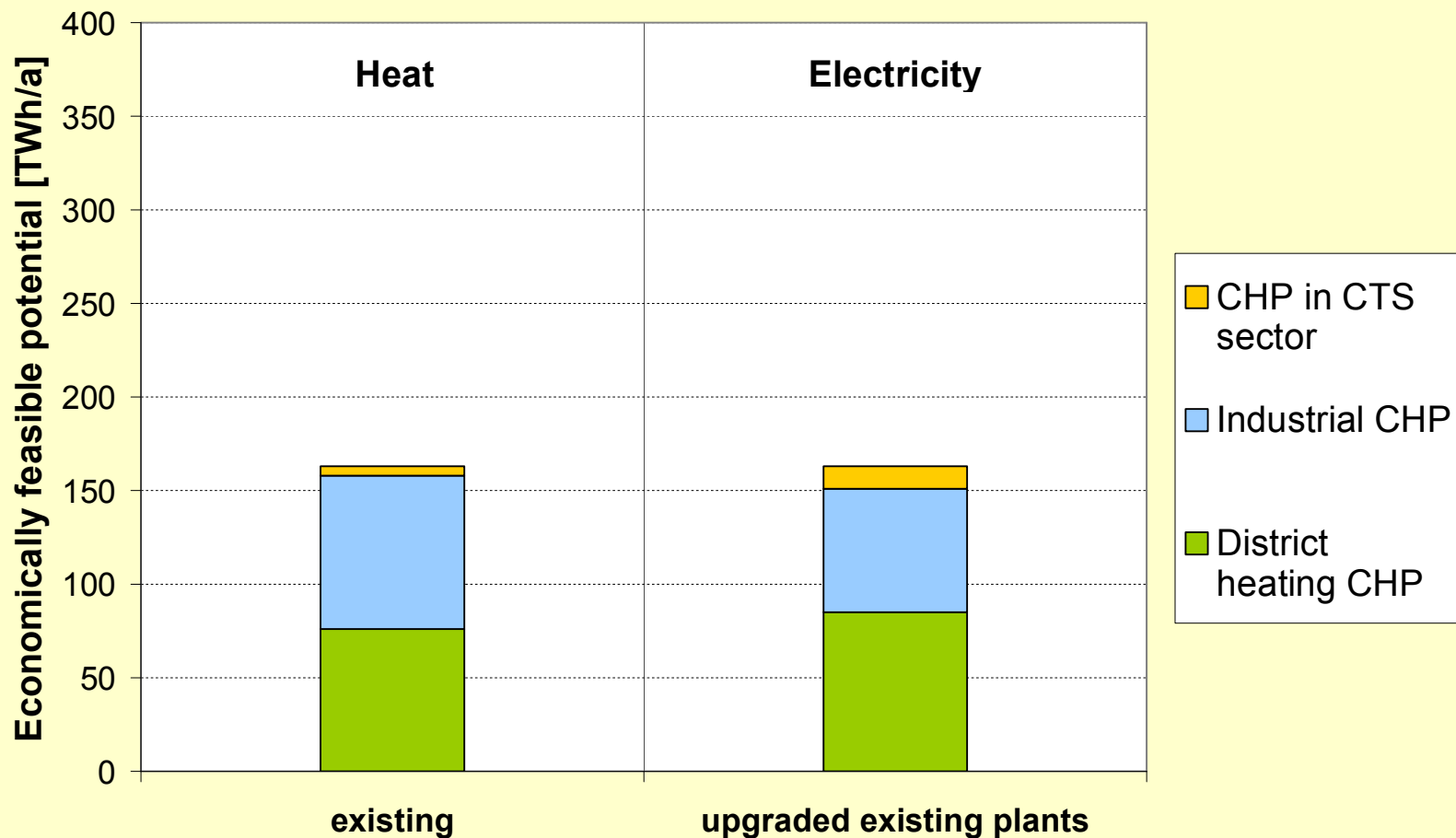
# Procedure

- Analysis of the framework / projection:
  - e. g: 3 energy price scenarios, 2 interest rates have been examined
- Detailed description of the actual heat demand and the development in the future
  - e. g.: digital heat atlas (614 cities via statistical data, including building typology and typology of settlements)
- Structural CHP potential estimation
  - Bottom-up approach: „How much of the effective energy demand can be supplied by a CHP technology?“
- Estimation of the economically feasible CHP potential
- Analysis of the barriers to CHP extension

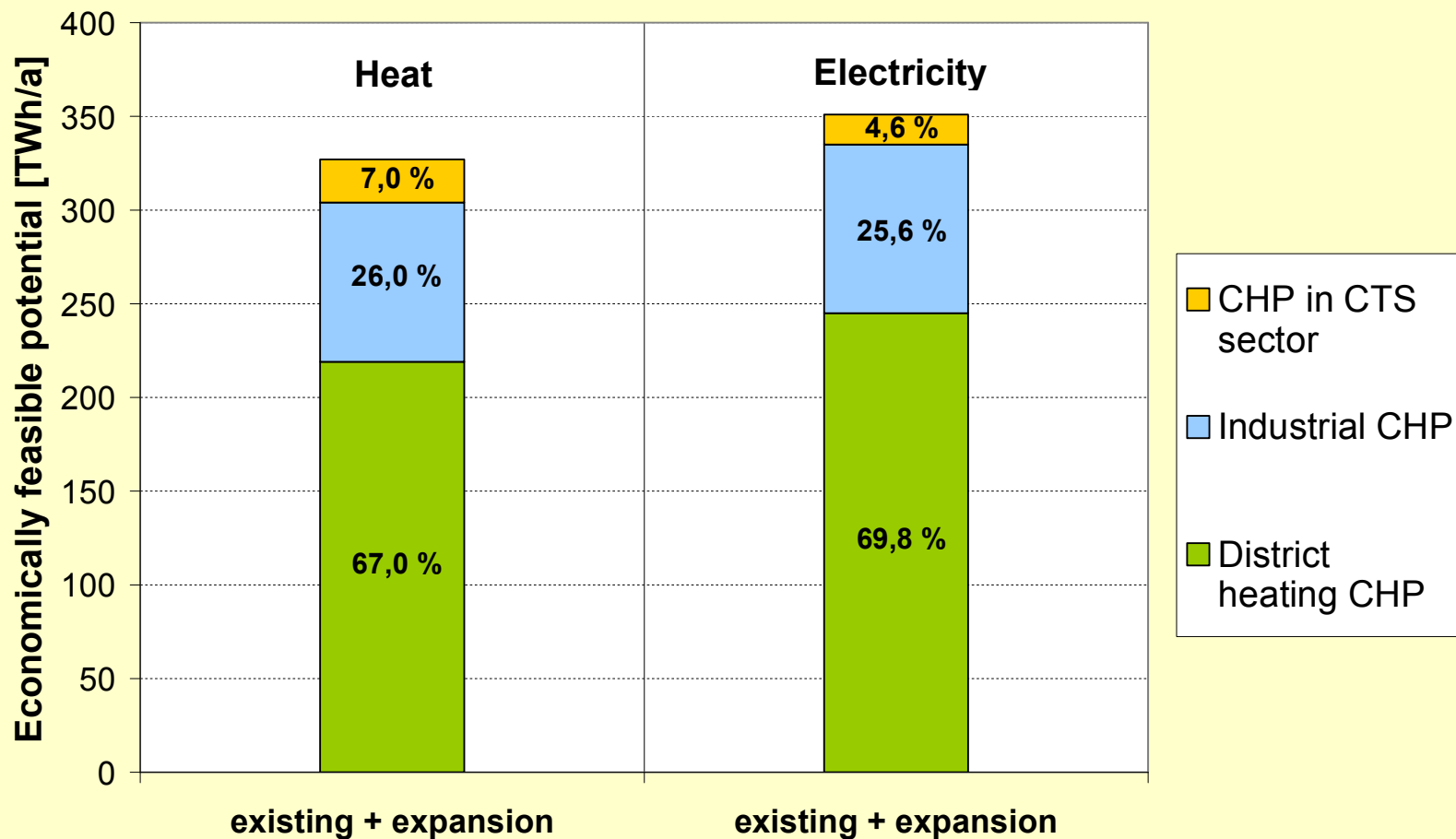
# Overall CHP Potential (Reference Case)



# Overall CHP Potential (REF)



# Overall CHP Potential (REF)





# Overall CHP Potential (REF)

- CHP Heat Potential: **328 TWh/a**
- CHP Electricity Potential: **351 TWh/a**

→ **The existing CHP Potential in Germany is not an effective limit for more CHP!**

→ **The detected CHP Potentials will not be exploited automatically!**  
**There are several barriers...**

# Barriers

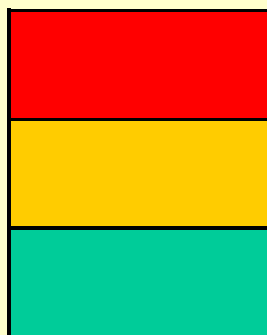
- End of the subsidy based on the CHP law (for CHP electricity), prosecution uncertainty
- Higher investment demand for CHP plants
- High expectations concerning payback period of investment
- Alternatives for investment with higher profit ratio
- Obstacles resulting from market structure:
  - Monopoly-like structure in the electricity and natural gas sector
  - A new plant always has to compete with electricity prices of older plants with low capital costs
  - Avoidance of CHP projects by offering dumping prices for electricity
- Competition to the high diffusion of natural gas networks in Germany
- Lack of knowledge, lack of objective assessment

# Economic situation of CHP

- Research project for Federal Environment Agency:  
**“Modernisation of CHP promotion”**
- Software Development:  
Excel tool for calculation of the economy of 11 CHP plants  
(+ peak load boiler) in the range from 5.5 kW<sub>el</sub> to 600 MW<sub>el</sub>,  
→ Results for investment period + single years 2006 - 2030
- The user can “play” with approx. 20 input parameters:  
interest rate, payback period of investment,  
different subsidies, district heat network costs,  
full load hours of CHP and reference power plants...  
→ “What are the effects of different conditions for CHP?”

# Economic situation of CHP

| Scenario                                   | 5.5 kW <sub>el</sub> -<br>310 kW <sub>el</sub> | 1 MW <sub>el</sub> -<br>20 MW <sub>el</sub> | 100 MW <sub>el</sub> -<br>220 MW <sub>el</sub> | 600 MW <sub>el</sub> |
|--|--|---|--|----------------------|
| 1) packback period<br>= product life-time  | Red  | Yellow                                      | Green  | Green                |
| 2) packback period<br>< product life-time  | Red  | Red   | Green  | Green                |
| 2) + higher district<br>heat network costs | Red  | Red   | Yellow   | Green                |



uneconomic

un-/economic ?!

economic


Different energy prices and other input data used in the two studies.

# Strategy

- More CHP in Germany?  
Not without an effective CHP promotion policy!
- Different CHP plant scales, different markets, different actors:  
→ CHP law subsidy is not enough to promote CHP,  
but prosecution of CHP law is essential
- Micro-CHP is uneconomic without a subsidy
- Remember: One 220 MW<sub>el</sub> CHP plant produces as much electricity as approx. 11.000 CHP plants with 18 kW<sub>el</sub>!  
→ Subsidy efficiency ?!

# Strategy

- For 2/3 of the CHP Potential district heating systems are essential!
- Investment in district heating systems needs conditions that allow companies long-term planning
- To motivate companies to invest in district heating systems subsidy of CHP heat side is recommended
- In supply companies a long-term strategy instead of „as the case arises“ decisions is required



# Thank you for your Attention!

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