

Research Centre Řež

Hydrogen Days 2014

H₂ production from lignite liquefaction applying nuclear co-generation

K. Stehlík, F. Wertz, L. Karásková-Nenadálová,
J. Vít, K. Vonková

2. – 4. April 2014



-
- **Project SYNKOPE**
 - **Contribution of CVŘ**
 - **Conclusions**



- **Financing: German State of Saxony and EU**
- **Timetable: 08/2012-12/2014**
- **Motivation**
 - Large sources of lignite in the border triangle G, P, CZ
 - Current utilization: Almost exclusively power generation
- **Objectives**
 - Use of domestic coal resources
 - Long-term: Alternative low-carbon utilization of lignite necessary



TU Dresden (**Coordination**)



Helmholtz-Zentrum Dresden-Rossendorf



TU Bergakademie Freiberg

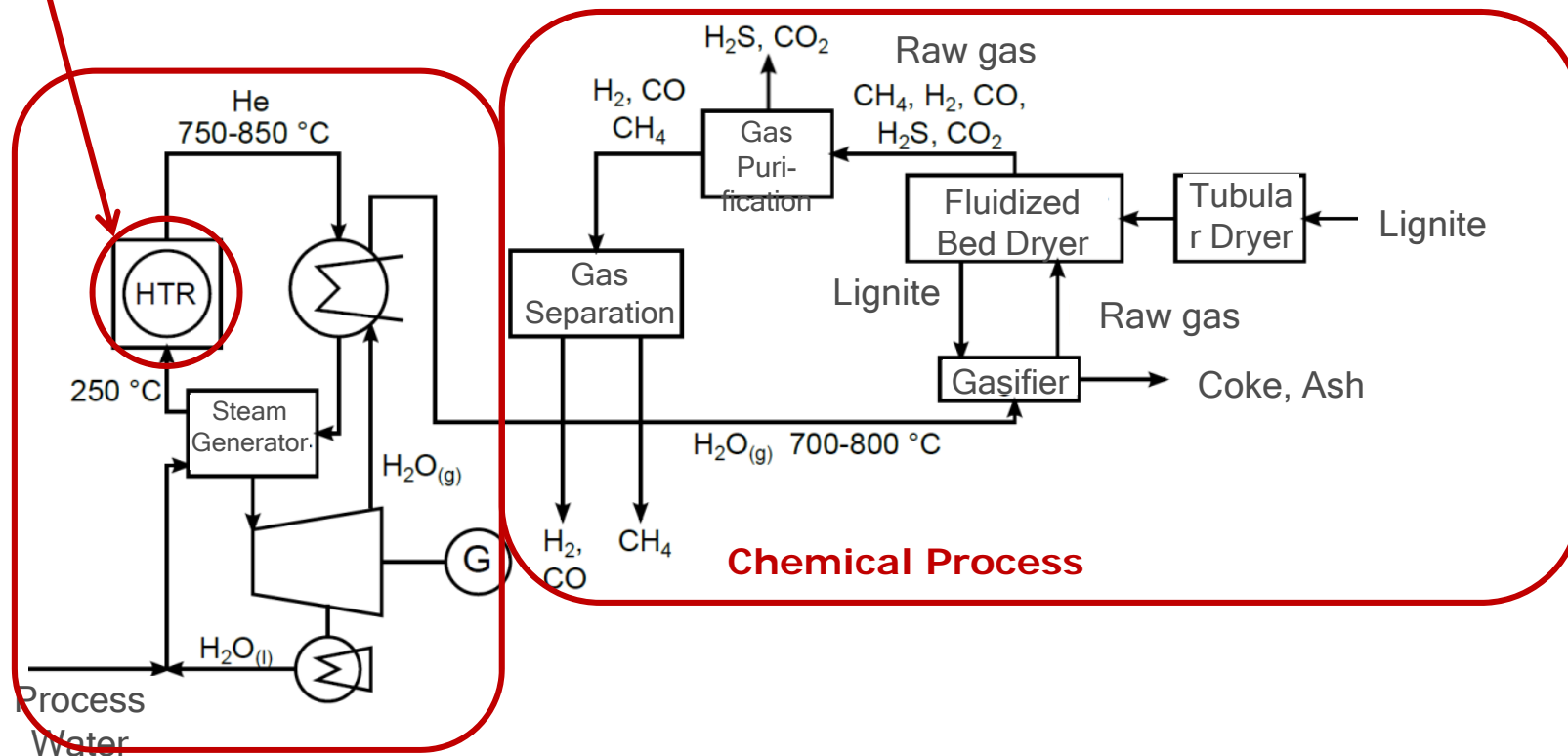


Hochschule
Zittau/Görlitz
UNIVERSITY OF APPLIED SCIENCES

Hochschule Zittau/Görlitz



HTR Core Design and Safety



Coupling HTR / Chemical Process



-
- Potential of nuclear co-generation in CR
 - Czech Energy Mix 2050



Potential end users

- Steel production
- refinery

■ District heating grid

- Very well developed

■ Regulations

- For co-generation exists since 1990

■ Possible sitings



■ A new tool to include electricity production externalities

- Developed by Frédéric Wertz, CVŘ

■ Based on Life Cycle Assessment

- Positive impacts: dispatchable electricity generation, potential co-products
- Negative impacts: social (health), economic (fuel or technology imports), environmental (damaged surface and water), long term (nuclear wastes liability, climate change)

■ Can be used to draw future Electricity Mix scenarios

- 2050 EU objective: -90% CO₂ emissions compared to 1990



Technologies	Lignite	Gas	Nuclear	SYNKOPE
Lifetime (years)				
Load Factor (%)				
CAPEX (€/kW)				
Fuel				
CO ₂ (€/MWh)				

Czech Energy Mix 2050



Technologies	Lignite	Gas	Nuclear	SYNKOPE
Summary	Flexible	Very flexible	Not flexible	?
Lifetime (years)	40	30	60	
Load Factor (%)	42	22	85	
CAPEX (€/kW)	3180	1070	3980	
Fuel	12.0	42.0	4.8	
CO ₂ (€/MWh)	60.0	28.2	0.5	



- **SYNKOPE: process for nuclear co-generation**
- **Good conditions in CR for nuclear co-generation**
- **Validation of SYNKOPE in „Czech Energy Mix“**
- **Proposed continuation in SYNKOPE II**