

CCS projects at the Czech Technical University in Prague

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Czech-Norwegian seminar „Co-operation in research and development of
CCS technologies“, Oslo, 12. 10. 2016

Projects in realization:

Research of high temperature CO₂ sorption from flue gas using carbonate loop (NF-CZ08-OV-1-004-01-2014)



- partners: University of Chemistry and Technology, Czech Technical University in Prague, UJV Řež
- duration: 1.1.2015 – 30.4.2017
- total budget 26 685 559 CZK (approx. 1 mil. €)

PROJECT ACTIVITIES:

- 1) Analysis of current state of the R&D in Ca-L
- 2) Experimental research of sorbents in laboratory conditions
- 3) Design of pilot facility concept of the Ca-L for real flue gas
- 4) Documentation for construction of this pilot facility
- 5) LCA and determination of the carbon footprint
- 6) Overview of industrial CO₂ sources and suitable for CaL application
- 7) Investigation of structural materials for the high-temperature CaL

Projects in realization:

Research of high temperature CO₂ sorption from flue gas using carbonate loop (NF-CZ08-OV-1-004-01-2014)



DIFFERENT MATERIALS AFTER LONG TIME EXPOSURE IN A 300 kW OXYFUEL BFB BOILER – study of materials for calciner in the CaL system. *Laboratory of applied research Juliska, Czech Technical University in Prague*



Projects in realization:

Research of oxyfuel combustion in a bubbling fluidized bed for CCS technologies (TA03020312)



- TAČR Alfa 3 (nationally funded applied research)
- partners: Czech Technical University in Prague and UJV Řež
- duration: 1.1.2013 – 31.12.2016
- total budget 10 885 000 CZK (approx. 400 000 €)

PROJECT ACTIVITIES:

- 1) Numerical model of the FB oxyfuel combustion
- 2) Design and construction of a laboratory scale 25 kW BFB oxyfuel facility
- 3) Retrofit of current 300 kW BFB boiler to oxyfuel combustion
- 4) Documentation for construction of this pilot facility
- 5) Experimental investigation of the process, model validation
- 6) Experimental research of emission control, in-situ direct SO_x removal by Ca-based sorbents
- 7) Proposal of technological modifications for full scale application

Projects in realization:

Research of oxyfuel combustion in a bubbling fluidized bed for CCS technologies



Photos of both facilities, Laboratory of applied research Juliska



Projects submitted:

Research of NO_x reduction in flue gas within the oxyfuel combustion CCS technology



- TAČR Epsilon 2 (nationally funded applied research)
- partners: Czech Technical University in Prague, UJV Řež, Envir&Power Ostrava
- planned duration 1.1.2017-31.12.2020
- total budget 14 240 000 CZK (approx. 530 000 €)
- current status: after peer-review, probably will be accepted

PLANNED PROJECT ACTIVITIES:

- 1) Model and design of a SCR deNO_x unit for oxyfuel BFB boiler
- 2) Manufacturing of the SCR unit, implementation into the flue gas system of the boiler, operation start-up
- 3) Experimental evaluation of the SCR deNO_x under different operation conditions of the oxyfuel boiler
- 4) Design proposal of a pilot scale SCR unit for a reference oxyfuel coal fired power plant block

Projects submitted:

Bio-CCS/U

(Research centre for low-carbon energy technologies)



- OP VVV (nationally funded through EU Structural funds)
 - partners: Czech Technical University in Prague, Brno University of Technology, VSB-TU Ostrava, Institute of Thermomechanics CAS
 - expected duration 1.11.2017-31.10.2022
 - total budget 324 650 300 CZK (approx. 12 mil. €)
 - current status: peer-review of 1st evaluation stage
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- positions for researchers of about 44 FTE equivalent
 - individual researchers from NTNU Trondheim, Technische Universität Wien, Universität Stuttgart, University of Limerick, Technische Universiteit Eindhoven and Lodz University of Technology will participate in the research teams of the WPs
 - available investment budget for development of experimental facilities and measurement techniques

Projects submitted:

Bio-CCS/U

(Research centre for low-carbon energy technologies)



PLANNED PROJECT WORK PACKAGES:

- 1) Biomass oxyfuel combustion
- 2) Biomass oxy-gasification
- 3) CO₂ utilization – production of liquid fuels; flexible oxygen production
- 4) Biomass treatment and preparation (desintegration/drying/torrefaction/pressing)
- 5) CO₂ purification
- 6) Process numerical modelling (oxy-combustion/gasification)

Thank you for your attention!