

Project title:

**Research of high temperature CO₂ sorption
from flue gas using carbonate loop**

Acronym:

Hitecarlo

High Temperature Carbonate Looping

Project Nr.:

NF-CZ08-OV-1-005-2015

Project partners

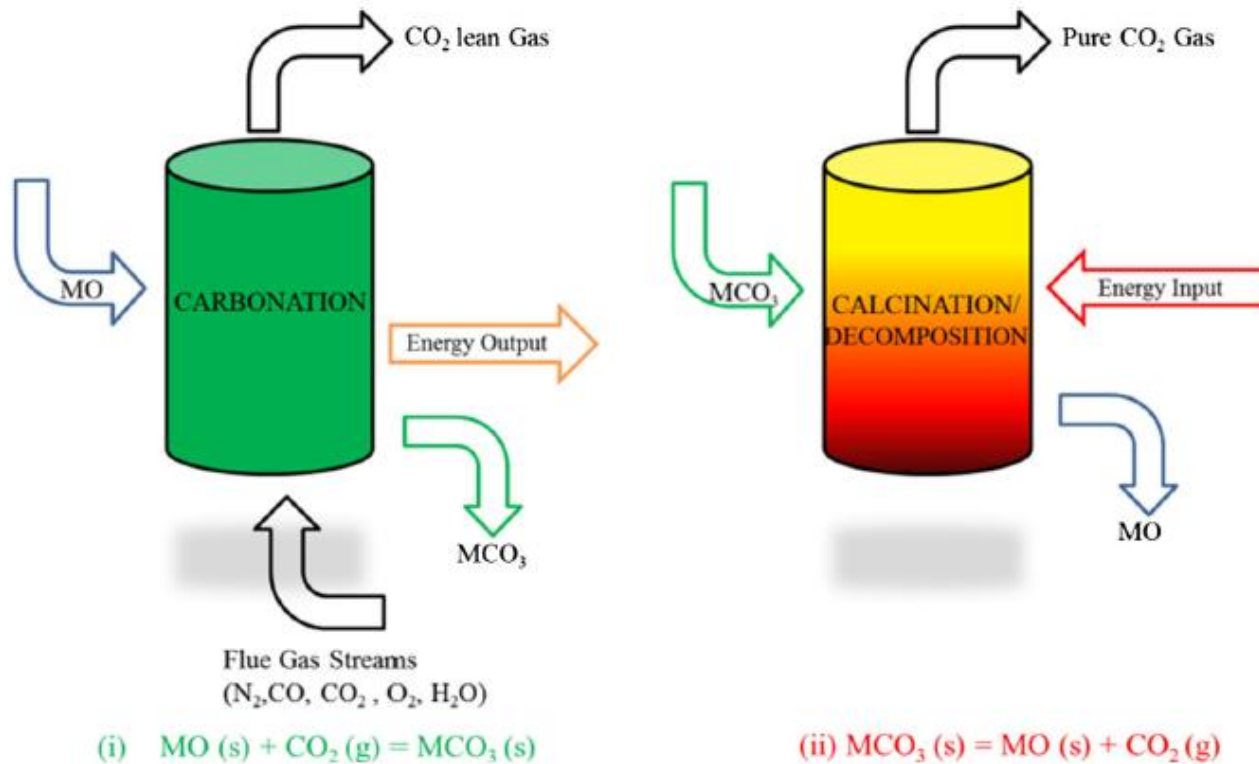
- Leader: University of Chemistry and Technology Prague (UCT)
 - Faculty of Environmental Technology
- Partners: Czech Technical University (CTI)
 - Faculty of Mechanical Engineering



ÚJV Řež (NRI)

Target of the project

Development of the high temperature decarbonation technology for removal of CO₂ from flue gas in laboratory scale and design of the technology in pilot scale.



Main research activities

- 1. Analysis of current state of the research and development on the field of high temperature carbonate looping:**
 - specification of the main problems of CO₂ removal from the flue gas using the process of high-temperature sorption
 - selection and definition of problems for the solution in the framework of the proposed project.

Responsible partner NRI Řež

2. Experimental research of carbonate looping and appropriate sorbents using model gas mixtures in laboratory conditions:

- testing different types of limestone's from the perspective of their potential use in high-temperature carbonate loop
- design and construction of high-temperature fluid laboratory apparatus for carbonate loop working with model gas $N_2 + CO_2$.
- selection of optimal limestone's and their testing in the laboratory facilities ,the determination of the optimal working conditions of high-temperature carbonate loop

Responsible partner UCT Prague

3. Design of pilot facility concept for research of flue gas decarbonation using high-temperature looping:

- Development of the concept of a pilot system for the implementation of the process of carbonate loops for high-temperature CO₂ sorption from flue gas.
- The detailed calculations of the system, calculations of mass and energy flows of the working media.
- Mathematical model of the high temperature sorption system.
- Design of the pilot system on the basis of detailed calculations, specification of the parameters of sorption processes.
- The proposal of measured parameters.

Responsible partners CTI Prague

Main research activities

4. Documentation for the construction of a pilot plant for research of flue gas decarbonation by using of the high temperature carbonate loop process:

- elaboration of project and design documentation for the construction of a pilot facility
- design of measuring positions and the requirements on the characteristics of sensors
- processing of documentation for the control unit of the pilot equipment and documentation for the connection with the user interface at the PC
- development of control software and software for evaluation and visualization

Responsible partner: NRI Řež

5. LCA – carbon footprint for CO₂ in the process of high-temperature carbonate loop:

- Life Cycle Assessment – LCA of the proposed technological solution, focused on carbon footprint of CO₂
- calculation of the balance of CO₂ in the case that the high temperature carbonate looping technology will be applied onto the concrete facility producing flue gas with high concentration of CO₂.

Responsible partner UCT Prague

Main research activities

6. **An overview of industrial sources producing CO₂ in Czech Republic, that are suitable for the application of the technology of high-temperature carbonate loop:**
- formation of database of industrial CO₂ sources suitable for implementation of the carbonate looping
 - analysis of the selected sources on the basis of in situ examination of the technology
 - creation of the resulting overview of sources, which are the best suited for incorporation of the high temperature carbonate loop

Responsible partner UCT Prague

7. Research of construction materials used for the high-temperature carbonate loop technology:

- proposal and realisation of the experimental device for testing high temperature corrosion of construction materials in gas atmosphere with corresponding composition.
- Selection of suitable construction materials for manufacture and building up the pilot facility

Responsible partner UCT Prague

Project budget

- Total costs: 26 685 559 CZK
- Financial support: 20 219 265 CZK
- Own funds: 6 466 294 CZK

Financial support:

- UCT: 12 655 082 CZK
- CTI: 2 770 067 CZK
- NRI: 4 893 116 CZK

Project results

The results obtained by the project solving are available at:

HITECARLO

Research of high temperature CO₂ sorption from flue gas using carbonate loop

www: <http://hitecarlo.vscht.cz>

See also 3 posters in the foyer

Thank you for your attention