Project No:
764697

Project acronym:
CHEERS

Project full title:
Chinese-European Emission-Reducing Solutions

Type of Action: **RIA**

Call/Topic:
European Horizon 2020 Work Programme 2016 – 2017, 10. 'Secure, Clean and Efficient Energy', under the low-carbon energy initiative LCE-29-2017: *CCS in Industry, including BioCCS*

Start-up: 2017-10-01
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Deliverable D4.4:
Assessment report on the flue gas treatment system

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Organisation name of lead beneficiary for this deliverable:
TOTAL

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Dissemination Level		
PU	Public	
CO	Confidential, only for members of the consortium (including the Commission Services and MOST)	X
INT	Confidential, only for members of the consortium	

Abstract for publication on the website of CHEERS

CHEERS conforms to the European Horizon 2020 Work Programme 2016 – 2017, 10. 'Secure, Clean and Efficient Energy', under the low-carbon energy initiative (LCE-29-2017: CCS in Industry, including BioCCS). The ambition is to improve the efficacy of CO2 capture in industry, and help ensuring sustainable, secure, and affordable energy.

This report summarized the activities carried in the framework of task 4 of Work Package WP4 of CHEERS project.

Chemical looping combustion (CLC) is an innovative combustion technology with inherent CO2 separation. A metal oxide is used to transfer oxygen from the air reactor to the fuel reactor, where fuel is burned without direct contact with air. The resulting CO_2 from the combustion part of the process is not diluted with nitrogen from the air, hence, no additional CO_2 separation step is required. This is the main feature of the CLC process, which permits inherent CO_2 separation with a high degree of energy efficiency improvement and competitive capture cost.

Captured CO_2 needs to respect specifications depending on the final usage which may be storage or utilisation and transportation method such as pipeline or ship transportation. Accordingly, treatment and conditioning are critical step in CO_2 capture process regarding downstream sections.

Various contaminants may be present in the captured stream such as NOx and SOx depending on the type and quality of the fuel. Fuels such as natural gas and some biomass need little post treatment while heavy fuels such as petcoke need DeNOx and DeSOx units. These technologies are currently deployed in large scale in industrial applications. However, captured CO_2 has some differences compared to conventional flue gasses such as absence of free N_2, lack or low O_2 content and high steam concentration (in case of CLC). This makes the flue gas smaller in size but higher in concentration with specific challenges to be overcame.

This work is focused on the treatment of CO_2 captured by CLC with petcoke combustion. Regarding the typical content of this fuel, a complete flue gas treatment scheme is needed including dedust, DeNOx, DeSOx. This will be further completed by drying and compression steps to deliver a CO2 on specification for CO2-EOR usage.

This study permits evaluation of next CLC development phase which is first industrial unit at a capacity of 30 – 60 MWth. The success of this stage will the result in wide industrial deployment of the CLC technology to produce steam for industrial applications or electrical power with zero or negative CO2 emission and improved energy efficiency.