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
Duration: 60 months

Deliverable D3.2:
Oxygen-carrier production for pilot-unit validation

Due submission date: 2021-02-28

Actual delivery date: 2021-01-22

Organisation name of lead beneficiary for this deliverable:
SINTEF AS
(short name: SINTEF MK)

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

Abstract for publication on the website of CHEERS

CHEERS conforms to the European Horizon 2020 Work Programme under the low-carbon energy initiative (LCE-29-2017: CCS in Industry, including BioCCS). The ambition is to improve the efficacy of CO_2 capture in industry, and help ensuring sustainable, secure, and affordable energy. This will be achieved by testing and verifying a 2nd generation chemical-looping technology, first at laboratory scale (up to 150kWth), then developing into a 3MWth system prototype for demonstration in an operational environment. The system will include heat recovery steam generation with CO_2 separation and purification, and it will comply with industrial standards, specifications and safety regulations. Except for CO_2 compression work, the innovative concept can remove 96% of the CO_2 while eliminating capture losses to almost zero. This constitutes a major step towards large-scale decarbonisation of industry, offering a considerable potential for retrofitting industrial combustion processes.

The CHEERS project started in October 2017 and is scheduled to end by September 2022. The budget is €16 million, partially financed by the European Union's Horizon 2020 research and innovation programme under grant agreement No 764697, and co-funded by the Chinese Ministry of Science and Technology (MOST) and Chinese industry.

WP3 of the CHEERS project is about oxygen carrying materials and fuel conversion. A main objective of the WP is to ensure that proper oxygen carriers will be available for demonstration of petcoke conversion by Chemical Looping Combustion in the demo unit to be developed within the project. There is a close correlation between the oxygen carrier properties and the design and sizing of the demo unit. Oxygen carrying materials need to be evaluated for the selected window of operation for the particular chemical looping configuration system to be designed. Furthermore, the selection of oxygen carriers will also affect the nominal power of the pilot plant, since this is related to the circulated amount and the oxygen capacity of the oxygen carrier material. Therefore, delivery of state-of-the-art oxygen carriers between partners is really important to make a comprehensive evaluation of oxygen carriers by combining the competencies of partners in WP3. Deliverable D3.2 is the summary report from Task 3.2 on oxygen carrier production for subsequent pilot-unit validation in Task 3.3. Special emphasis has been put on the three oxygen carriers that were selected as the most relevant candidates, as determined in D3.1. These have been ilmenite chosen as the first candidate, a CMTF perovskite material chosen as a second candidate, and a manganese ore from China as a possible third candidate. Due to problems with sulphur deactivation of the CMTF, its use with petcoke was evaluated to be too risky. An alternative variant of ilmenite was therefore delivered for pilot-testing instead of the CMFT. This deliverable describes the delivery of these state-of-the-art oxygen carriers for evaluation and pilot testing to be done in Task 3.3. This deliverable also covers most of materials exchange and knowledge transfer regarding materials fabrication between partners, which is required to fulfil the objectives and establish close collaboration in the project.