



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

D2.3: Pre-FEED for the demonstrator

Due submission date: 2019-04-01

Actual delivery date: 2019-11-25

Organisation name of lead beneficiary for this deliverable:
IFP Energies nouvelles

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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.

The action involves a 2nd generation chemical-looping technology tested and verified at laboratory scale (150 kWth). Within the framework of CHEERS, the core technology will be developed into a 3 MWth system prototype for demonstration in an operational environment. This constitutes a major step towards large-scale decarbonisation of industry, offering a considerable potential for retrofitting industrial combustion processes.

The system prototype is based on a fundamentally new fuel-conversion process synthesised from prior research and development actions over more than a decade. The system will include heat recovery steam generation with CO₂ separation and purification, and it will comply with industrial standards, specifications and safety regulations. Except for CO₂ compression work, the innovative concept is capable of removing 96% of the CO₂ while eliminating capture losses to almost zero.

The CHEERS project is 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).

CHEERS started 1 October 2017 and is scheduled to end by September 2022. The estimated budget is 16 mill. EUR.

WP2 of the CHEERS project deals with the design of the Process Demonstration Unit (PDU). From the design philosophy to the Pre-FEED study, this work package considers all stages required to provide the basic design of the PDU to the FEED phase (WP4 Process Integration and Engineering).

The present deliverable D2.3 represents the final step in the design procedure. It corresponds to the Process Design Package (PDP) of the PDU. This dossier mainly provides the basis of design, the process description, the process flow diagrams, the mass and heat balance for different design cases, the characteristics of the inlets and outlets (supply specifications, effluents and wastes) and the equipment specifications.

The PDP includes two configurations: configuration 1 (IFPEN-TOTAL design) and configuration 2 (Tsinghua University design) using common air and fuel reactors. The difference between two configurations is limited to the carbon stripper technology resulting in modification of solid circulation between the two reactors.