sCO2 Working Group

Minutes of the meeting

*22 October 2020, Teleconference*

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| Participants |
| Marco Ruggiero | Baker Hughes | Ugo Simeoni | ETN Global |
| Paolo Del Turco | Baker Hughes | Markus Lesemann | Gas Technology Institute |
| Vittorio Michelassi | Baker Hughes | Nenad Glodig | KTH - Royal Institute of Technology |
| Giuseppe Bianchi | Brunel University London | Rafael Guedez | KTH - Royal Institute of Technology |
| Harry Trump | Centrax | Renaud Le Pierres | Meggitt |
| Kumar Patchigolla | Cranfield University | Thomas Chupick | Shell Global Solutions |
| Yiguang Li | Cranfield University | François Salin | Siemens |
| Carlo De Servi | Delft University of Technology | Olaf Bernstrauch | Siemens |
| Albannie Cagnac | EDF | Hayato Hagi | Total |
| Eugenio Giacomazzi | ENEA | Marianne Cuif-Sjostrand | Total |
| Giuseppe Messina | ENEA | Alberto Traverso | University of Genoa - DIMSET |
| Olaf Brekke | Equinor | David Sanchez | University of Seville |
| Elisa Todesco | ETN Global |  |  |

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# sCO2 state of the art inventory

M. Ruggiero opened the discussion on a proposed sCO2 state of the art inventory to be carried out by the ETN sCO2 Working Group. The following points where addressed:

* The paper would mostly consist of a literature review of published research papers and business case results.
* The main target group of the initiative was still open for discussion:
	+ An application-oriented review would mostly be targeting end-users interested in deploying one of the described solutions.
	+ A technology-centred review, detailing barriers and challenges would be useful for policymakers to identify funding needs.
* It was suggested that the ETN report could provide added value by focusing on what sCO2 technology currently offers and promises. Participants agreed that the purpose of the paper should be to develop a clear understanding of technologies available on the market at the moment, and to present points currently under development and their readiness level. The comprehensive overview should also be supported by a classification of existing technologies.
* In order to incite further support of sCO2 technologies, the report should detail their current status of development while also reviewing points that are missing today for their wide deployment.
* Participants agreed to avoid duplicating existing work, taking into consideration that many papers have addressed the description of sCO2 cycles, often also looking at different applications.

G. Bianchi mentioned an ongoing study that should be published by the end of 2020 and already includes a review of cycle components (e.g. turbomachinery, heat exchangers) and application types.

* The following content chapters were suggested:
	+ Oxy-fuel combustion
	+ Bottoming cycles waste heat recovery
	+ Baseload power generation (with nuclear, fossil, or CSP)
	+ Energy storage
* A. Cagnac underlined that to convince end-users to adopt the technology, two main points would be required: demonstration at the 10-20MW scale and cost clarity. The advantages and limits of technologies under consideration should be addressed.
* Participants debated the limited scope of interest of the European Commission to support the technology, which in practice prevents any further deployment of sCO2 cycles with fossil or nuclear plants.

On the other hand, participants agreed that there is currently stronger incentive in the O&G sector to reduce CO2 emission via waste heat recovery than there was in the previous years. This translates into an increased market readiness for sCO2 cycles implementation thanks to their efficiency, small footprint and absence of cooling water.

Participants agreed to evaluate a first draft of the table of content by next teleconference call, then to divide the redaction work among ETN Members

**Action:** WG Members to comment and review a first draft of the table of content for the ETN sCO2 state of the art inventory.

[Link to the draft document](https://europeanturbinenetwork.sharepoint.com/%3Aw%3A/s/ETNSharedDocumentsEXTERNAL/EXCb75eMuHFOuCjAYi3srdIB8fR19mFx2UyGmrKle-mgiQ)

# Cooperation with OGCI

T. Chupick followed up on the discussion initiated after his previous [presentation](https://etn.global/wp-content/uploads/2020/10/ETN-OGCI-Chupick-Presentation.pdf) on the OGCI initiative that he made at previous ETN sCO2 WG teleconference on 5th October 2020.

* T. Chupick noted that the development and sharing of best practices could be one topic for OGCI-ETN collaboration. Input from ETN on the decarbonisation of gas turbines would be very relevant on upstream and LNG activities under the focus of OGCI. $ 100 million of the OGCI fund will be allocated to projects on energy efficiency, which could help supporting such best practices activities.

In particular, there is interest in:

* + Gas turbine loading optimisation strategies
	+ Gas turbine hybridisation with batteries, also considering practical variations depending on the time of the year
	+ Hydrogen firing has also been mentioned as an option, although not much considered at the moment due to excessive capex & opex that would limit interest of the industry.
* U. Simeoni commented that the definition of best practices within ETN is decided based on interest and needs of ETN Members. He took an action for the ETN Office to initiate the drafting of the scope and have it reviewed by the ETN Board.
* T. Chupick mentioned that half of the $ 1 billion fund will be focused on CCS, and therefore there is interest in sCO2 technologies supporting future CCS solutions implementation.
* The OGCI fund also looks at supporting the start-up of novel technologies.

Researching and understanding the competitive and readiness landscape of sCO2 technologies has been mentioned has an example of potential collaboration topic with ETN.

* + ETN could help with the inventory of existing and emerging solutions (by category of technology rather than by supplier, to be compliant with internal rules of OGCI)
	+ The scope should cover both greenfield and brownfield projects as of 2021
	+ OGCI might support partial funding of a demonstration project located at one of their 13 member companies
* U. Simeoni noted the interest of OGCI for future collaboration activities with ETN, which would need to be reviewed by the ETN Project Board.

# AOB

## SET PLAN Action 6 – Energy efficiency in industry

U. Simeoni announced that the Activity fiche of SET PLAN Action 6 was currently under review. He noted that research activities in sCO2 would be reviewed as part of the drafting process of the Implementation Plan, which would therefore translate in funding plan by the European Commission and Member States for selected activities.

**Action**: U. Simeoni to share the SET PLAN Action 6 (Energy efficiency in industry) Activity Fiche for review

*(completed 4 November 2020)*

**Action**: WG Members to review the SET PLAN Action 6 (Energy efficiency in industry) Activity Fiche

*(completed 13 November 2020)*

## STEP Project presentation

U. Simeoni announced plans to have a presentation of the STEP Project at next sCO2 WG teleconference.

# Actions list

| # | Actions | Resp. | Deadline |
| --- | --- | --- | --- |
| 1 | WG Members to comment and review a first draft of the table of content for the ETN sCO2 state of the art inventory.[Link to the draft document](https://europeanturbinenetwork.sharepoint.com/%3Aw%3A/s/ETNSharedDocumentsEXTERNAL/EXCb75eMuHFOuCjAYi3srdIB8fR19mFx2UyGmrKle-mgiQ) | All. | 25 February 2020 |