

ETN CCS Taskforce

Monthly Meeting (Wednesday, 3 July 2024)

Agenda of the meeting

Topics to be discussed

1. Summary of recent activities
2. Next activities
 - Second Master Thesis
 - Second webinar episode
3. October Workshop
4. AoB

Summary of recent activities

Results achieved

1. **Master thesis** (Master student from Politecnico di Milano) recently finalised:
 - *“Evaluation of the minimum size of a GT-CCS system for economically viable CO2 reduction measures”* (finalised in April 2024)
2. **Webinar series**
 - First episode on Thursday, 20 June with BASF OASE
 - 111 participants
3. **Second Master thesis**
 - Pager on scope of the master thesis shared with ETN Hydrogen & Alternative Fuels WG
4. **Governance**
 - Jens Walter (BASF) is the new Chair; James Bain (RWE) the new Vice-Chair.

Following the successful result of the previous Master thesis, we aim at starting a new Master thesis.

Next activities

Second Master Thesis on:

“Evaluation of the maximum size of a H₂-fired GT with given constraints on the H₂ supply infrastructure”

3. Second area for further research (“Evaluation of the maximum size of a H₂-fired GT with given constraints on the H₂ supply infrastructure”)

Following the successful work on the first area for further research, ETN CCS Taskforce now intends to address the second area of research identified at ETN AGM in March 2023:

- b) Evaluation of the maximum size of a H₂-fired GT with given constraints on the H₂ supply infrastructure.

In a GT-CCS case, like many other technologies, the economies of scale affect the economic viability of plants. That is why it is interesting to find the minimum size of such a plant (or minimum yearly operational hours with certain load) that still results in reasonable economic figures (e.g., CoE in €/MWh_{el}). As per this area, it is interesting to look at a generic load profile of a CCGT plant during the recent years or a prospect of its load profile in the coming years (see the figures below, just as a generic example). This will help to assume the frequency of load changes, start-up, and shutdown events. Eventually considering these dynamic events (that affects the cumulative CO₂ capture rate), the study can provide the minimum load (or the minimum size of the plant) that ensures a viable operation, considering certain assumptions such as the CO₂ price. The sensitivity of results to the variations in CO₂ price, fuel price, capacity factor (number of yearly operational hours), and other assumptions can also be included in the study.

The same practice can be pursued for a H₂-fuelled case. However, in this case, the maximum size of the plant is of interest because of different limitations including the availability of H₂, and more specifically in the case of green H₂ because of capacity of electrolysis units and the need for H₂ storage. The optimum interaction between electrolysis/H₂ storage/GT power plant is of interest, especially also for dynamic load following operation schemes.

A specific challenge will be given for optimizing the heat integration (internal system use of heat generated/consumed) for these dynamic operating schemes. Technical limitations of heat integration should be identified, and economic consequences be highlighted.

Second Master Thesis

Next actions

The following ETN Members expressed interest:

- Ansaldo Energia, EPRI, Ethos Energy, KTH, RWTH Aachen

Discussion to touch upon:

- Degree of involvement of ETN Members (cooperation among industry and academic stakeholders)
- Timeline

Second webinar episode

Next actions

The second episode would take place in September/October

ETN Office recently contacted the former student from Politecnico di Milano (who completed the first Master Thesis), with the aim of presenting her research

No responses were received so far.

- Should we find an alternative for the 2nd webinar episode, and invite the Master student to present at the October Workshop?

October Workshop

Next actions

ETN is organising its October Workshop, which will take place on **8-10 October 2024 in Stuttgart, Germany**

A CCS Taskforce meeting will take place on Thursday, 10 October. Open topics for the organisation of the meeting

- The meeting will be chaired by James Bain. We should look for a **Vice-Chair** at the October Workshop: any volunteer / suggestions?
- We foresee a **thematic presentation** (15 minutes). If we do not invite the Master student, which ETN Member would be interested to give a presentation related to CCS-GT (with good level of granularity)?

AoB

Final remarks

Proposal for the next monthly meeting

- Wednesday, 4 September at 15:00 (CET)

Any other topics to be discussed?



Thank you for your attention