

IEA End-Use Working Party Webinar on Deep Decarbonization in Industry

Report

Participants: EUWP delegates and TCPs representatives

Time: 9th and 10th December 2020, 14h00 – 17h00 (CET)

Online platform: Link was distributed to registered participants.

This webinar was held as a digital workshop instead of the planned EUWP workshop in Sweden in March 2020 and with the same contents.

The webinar was attended by approximately 60 participants.

Having a common goal - the deep decarbonization in Industry-its main aim was to identify key areas for collaboration between IETS TCP and other IEA TCPs, and by doing so:

- a) Technology and System oriented as well as lifecycle approaches were included
- b) Different key thematic issues were presented, distributed into 5 main areas

1st day (Dec 9th) - The first day was dedicated to presentations of major Swedish programmes and projects dealing with deep decarbonization in Industry. Based on recently performed and ongoing activities, this useful session on Dec 9th described key Swedish contributions and challenges being addressed in the Swedish context that are covering a wide range of topics. The five main topics included were based on major activities in Sweden as well as on findings from the IETS Vienna expert workshop, October 2019.

- **Carbon capture and storage from fossil (CCS) and biogenic (BECCS) feedstocks and fuels**

Considering favourable implementation in general (i. e. close distance to the coast, large fixed emissions sources, access to storage infrastructures), CCS and BECCS could play an important role, and are included in many roadmaps. One main challenge is financing these technologies, which depends largely on EU-ETS and on possible future incentives on negative emissions.

- **Industrial Biorefineries**

From 2003 till 2017 biofuels have been experiencing a significant progression within the energy use in e. g. domestic transports and several large programmes are ongoing. Use of biomass also for other purposes, materials and chemicals, are investigated.

- **Electrification in Industry**

Different industrial P2X projects were put into perspective in the process industries, e.g., in the steel industry with Hybrit (fossil free steel making), LKAB (C-free ore), Oxy-H2 (replacing LPG with renewable H2), and industrial case-studies.

- **Digitalization and Artificial Intelligence**

Although digitalization and AI in industry is a huge and rapidly developing area, the activities specifically for energy efficiency and GHG mitigation in industry are still a small part of this. However, this potential is investigated and measures for utilizing it are ongoing in Sweden.

- **System aspects and Industrial Symbiosis**

Industrial symbiosis is the structured approach being followed to maximise an energy symbiosis along time in industrial facilities, e.g., process integration for advanced heat recovery (case: the Stenungsund chemical cluster), and high-level transformative changes by process design and/or energy supply (case: a regional application of 150 MW excess process heat to a district heating system). Studies include scenario approaches and comparative ex-ante evaluations.

2nd day (Dec 10th) - On the second day, the session consisted of three parts:

- An IEA Secretariat presentation on the IEA ‘Iron and Steel Technology Roadmap’ by Hana Mandova and Tiffany Vass
- A presentation of the ‘Results and suggestions from the Vienna workshop’ by Thore Berntsson (IETS TCP Chair)
- and, the main part, a ‘speed-dating’ networking session followed by a final discussion.

The ‘speed-dating’ networking session, which included predefined short presentations to the group, was performed by adopting a pitch-like format approach and addressed ongoing R&I activity on deep decarbonization in Industry. That session enabled the TCP representatives to profit from networking and to showcase opportunities for further discussion and future collaboration. It was demonstrated that IEA, and therein the Industry-oriented TCPs, are building a significant body of technical knowledge and expertise on this predefined main topic. The success of such interaction process along the five areas, and the detailed discussion that followed about each topic, could be possible with the contribution of the 11 presentations (see Table).

Focus Area	TCP	Obs. (*)
Carbon Capture and Storage (CCS, BECCS)	Monica Garcia, GHG TCP	...
Industrial Biorefineries (Biofuels, Materials, Chemicals)	Paul Stuart & Marzouk Benali, IETS Annex XI	...
	Olle Olsson & Johanna Mossberg, IEA Bioenergy TCP	...
Electrification in Industry	Thore Berntsson, for IETS Annex XIX	...
	Frank Lipnizki, IETS Annex XVII	...
	Marina Holgado, Hydrogen TCP	...
	Monica Axell, HTP TCP	...
Digitalization and AI (EE, GHG mitigation in Industry)	Mouloud Amazouz & Paul Stuart, IETS Annex XVIII	...
System Aspects and Industrial Symbiosis	Elliot Mari, New IETS Annex on Industrial Roadmaps	...
	Simon Moser, Annex proposal on Industrial Circular Economy	...
	Rene Hofmann, IETS Annex XV	...

(*) See each presentation for details

In the discussions on the five topics, several ideas for further collaboration opportunities were identified. The discussions are summarized below:

- **Carbon Capture and Storage from fossil (CCS) and biogenic (BECCS) feedstocks and fuels**

Monica Garcia, GHG TCP

The IETS TCP does not have an ongoing annex in this area. In 2015, there was a joint workshop in Lisbon between IETS and the IEAGHG TCPs about CCS in industry. Furthermore, CCUS and BECCS are/will be included as components in system studies in some ongoing/planned annexes in IETS.

There are several important joint interests between TCPs in this area. Examples mentioned were:

- System and GHG mitigation aspects of CCU and BECCS concepts (interest expressed from IEAGHG, IETS and the Bioenergy TCPs, also highlighted by Olle Olsson in the following session)
- Opportunities for achieving negative emissions in industrial applications
- Integration in industry and system consequences
- Issues related to cost and social acceptance as well as deployment of knowledge and developments.

- **Industrial Biorefineries for Production of Biofuels, Materials and Chemicals**

Paul Stuart & Marzouk Benali, IETS Annex XI

Olle Olsson & Johanna Mossberg, IEA Bioenergy TCP

Biorefineries are of high interest in the IETS, Bioenergy and IEAGHG TCPs. Discussions about possible cooperation is ongoing between IETS Annex XI and Bioenergy Task 42. More discussions would most probably identify joint interests for collaboration. Having joint workshops as a start was mentioned as one possible activity. Some areas of possible common interests mentioned were:

- Strategic evaluation of biorefineries at possible future conditions (included in IETS Annex XI)
- Biorefineries in a circular economy perspective
- Biorefineries for achieving negative emissions
- Hydrogen and biorefineries, e. g. production of green hydrogen

- **Electrification in Industry**

Thore Berntsson, for IETS Annex XIX

Frank Lipnizki, IETS Annex XVII

Marina Holgado, Hydrogen TCP

Monica Axell, HTP TCP

Electrification is a broad area. It is of high importance in several TCPs, e. g. the IETS, Hydrogen, IEAGHG and Heat pumping ones. Other TCPs, not presenting at the webinar, would be e. g. ISGAN, gas and oil and ETSAP.

In the newly started IETS cooperation on electrification in industry (Annex XIX), the possible role of IETS and most important areas to be included (mainly industrial system perspectives) as well as possible connections with other TCPs have been studied in Task 1. These aspects should now be discussed with other TCPs, starting with the Hydrogen and Heat Pumping ones. In earlier discussions and based on the presentations, common interests and opportunities for more direct collaboration have been identified. All three TCPs have expressed high interest for further collaboration in this field.

- **Digitalization and AI for Energy Efficiency and GHG Mitigation in Industry**

Mouloud Amazouz & Paul Stuart, IETS Annex XVIII

Although digitalization and AI in industry is a huge and rapidly developing area, the activities specifically for energy efficiency and GHG mitigation in industry is still a small part of this. The IETS TCP concentrates its efforts towards this part. The interest from organisations to work together in this area is very high. Possible direct collaboration with other TCPs is now being explored.

- **System Aspects and Industrial Symbiosis**

Elliot Mari, New IETS Annex on Industrial Roadmaps

Simon Moser, Annex proposal on Industrial Circular Economy

Rene Hofmann, IETS Annex XV

In the Vienna IETS expert workshop, system aspects were discussed in detail, and in this broad area five aspects were highlighted as being of very high importance:

- Process integration, especially the need for novel methods for the radical transformation of industry
- Strategic evaluation of novel technologies and systems at possible future situations (“ex-ante”)
- Systems for negative emissions
- Industrial symbiosis
- Industrial systems in a circular economy perspective

In the IETS work, all these aspects are included or planned. Also possible collaboration with other TCPs is being discussed. Such possible collaboration in the area of systems for negative emissions has been discussed above. Also “ex-ante” aspects have been mentioned, especially for biorefineries. Industrial symbiosis is dealt with, at least partly, in Annex XV, on industrial excess heat usage. The Austrian proposal for a new annex will deal with circular economy aspects and the French proposal for an annex on industrial roadmaps will put technologies into a system and strategic perspective. In addition, in a webinar on 30 November, process integration developments and applications were discussed and a possible new annex in this area is under discussion.

In the industrial excess heat area, more collaboration and contact with at least the Heat Pumping, storage (ECES) and district heating TCPs would be of high interest. For the new proposals, possible interest for collaboration with other TCPs will be explored.

To conclude, with such portfolio of technologies, conditions were created for a next round of interaction on a B2B basis, as well as to expect more topical focused workshops narrowing down each scope, that will expectedly lead to clear opportunities for future collaborative work.

The Key Takeaways from this Webinar

- At different levels (technology, process, product, company, regional context, ...) system oriented and lifecycle approaches, as well as strategic design, planning and evaluation among

different methods and tools, are keys to address the complexity of the challenge on deep decarbonizing industrial processes.

- By addressing the deep decarbonization in Industry, the IEA and therein the IETS TCP and the other industry-related TCPs, are facing a complex challenge thinking global and acting local that is a unique opportunity for TCP joint collaborations requiring strong interaction and iteration.
- Speed networking was very useful to involve the participants by sharing and discussing C&T information according to their backgrounds, business goals, and to the recent and ongoing activity related to the main topic: deep decarbonization in Industry. That interaction however, in order to be effective, requires follow-up initiatives from the participants, such as B2B meetings and more focused workshops.