

Final report

1. Project details

Project title	Danish IEA-IETS participation in ExCo 2021-2023
File no.	64020-2058
Name of the funding scheme	EUDP
Project managing company / institution	DTU Construct
CVR number (central business register)	30060946
Project partners	Weel & Sandvig
Submission date	27 February 2024

2. Summary

English Summary

The project has covered continued Danish participation in the International Energy Agency's (IEA) collaboration on industrial energy technology and systems IEA IETS (www.iea-industry.org). Denmark has a historic position as a leader in industrial energy efficiency and has companies that supply world-class energy technologies. This position is achieved through close collaboration between research and industrial development as well as in close contact with the international environment, including through the IEA. With this project, we have continued cooperation with the other countries in the program. The development of the collaboration focused on contributing to the continued development of the program by participating in the Executive Committee. The main activities are related to tasks (formerly called annexes) on excess heat utilization, electrification, digitalization, circular carbon economy, industrial symbiosis and roadmaps for industry energy systems. The work has continued the development of the Danish national support group and communication of the work to Danish stakeholders. Denmark has actively contributed to the first IETS conference Energy Future in Industry. During the period the collaboration with other IEA programs (TCPs) and tasks in IETS have had significant attention. The work in the IETS ExCo is carried out by four annual meetings, out of which two are held online.

Dansk Resumé

I projektet har vi fortsat den danske deltagelse i Det Internationale Energiagenturs (IEA) samarbejde om industriel energiteknologi og -systemer IEA IETS (www.iea-industry.org). Danmark har en historisk position som førende inden for industriel energieffektivitet og har virksomheder, der leverer energiteknologier i verdensklasse. Denne position opnås gennem tæt samarbejde mellem forskning og industriel udvikling samt i tæt kontakt med det internationale miljø, herunder gennem IEA. Med dette projekt har vi fortsat samarbejdet med

de øvrige lande i programmet. Udviklingen af samarbejdet har fokuseret på at bidrage til den fortsatte udvikling af programmet ved at deltage i Executive Committee. Hovedaktiviteterne er relateret til udvikling af tasks (tidligere kaldet annex) om overskudsvarmeudnyttelse, elektrificering, digitalisering, cirkulær kulstoføkonomi, industriel symbiose og roadmaps for industriens energisystemer. Arbejdet har understøttet fortsat udvikling af den danske nationale støttegruppe og formidling af arbejdet til danske interessenter. Danmark har aktivt bidraget til den første IETS konference Energy Future in Industry. I perioden har samarbejdet med andre IEA-programmer (TCP'er) og mellem tasks i IETS haft stor opmærksomhed. Arbejdet i IETS ExCo udføres blandt andet ved fire årlige møder, hvoraf to afholdes online.

3. Project objectives

IEA-IETS is a technology collaboration program under the International Energy Agency - IEA. The acronym IETS stands for Industrial Energy-related Technologies and Systems. Denmark has participated in IETS since its creation in December 2006. Since its inception, Denmark has had a significant role in IEA-IETS, including the position of chairman in the period 2009-14

Danish IEA-IETS participation takes place at different levels:

- Executive Committee
- Task/project management
- Task/project participation
- National support group – Danish support group

The project covered participation in the Executive Committee (ExCo). This work included participation in quarterly ExCo meetings. Brian Elmegaard, DTU Construct and Jan Sandvig Nielsen, Weel & Sandvig act as Danish representatives in ExCo, respectively as delegate and alternate.

The ExCo activities support the Danish participation in relevant tasks under the program and in the development of new tasks. By the start of the project period, Denmark participated in Task XVII Membrane Processes in Biorefineries and Task XV Industrial Excess Heat, Subtask 3.

During the project period IEA-IETS would define new tasks related Electrification in Industry and Digitalization, Artificial Intelligence and Related Technologies for Energy Efficiency and GHG Emissions Reduction in Industry. Furthermore, options for other new tasks were investigated.

The ExCo delegates would host an annual meeting for communicating with the National Support Group and to inform potential new participants about the tasks.

The project participants and Danish participants in task work under the program form a "National support group" which supports the Danish ExCo representatives in connection with the collection and dissemination of knowledge in connection with ExCo and the task activities.

The Danish delegates focus on expanded research collaboration between the participating countries. A number of universities are active in energy research are closely linked to IEA-IETS, and we see a great advantage in being able to promote exchange of e.g. PhD students and postdocs between the participating countries.

Denmark has a tradition of developing energy-efficient technologies and equipment, and Danish industry has long been among the most energy-efficient in the world. However, many other countries have also purposefully

started developing their industries in the direction of higher energy efficiency and considerable research is being done into new technologies. At the same time, there is a rapid development towards increased use of renewable energy, which e.g. involves a restructuring of the energy supply towards increased electrification and the use of biomass. A special area that is expected to be of great importance in the coming years is the increasing digitization and use of intelligent systems to optimize the industry's processes.

This gives rise to both challenges and opportunities for Danish companies. For the industrial end-users, energy efficiency will have a greater influence in the future and there will be an increased need for the use of new technology. For equipment and technology suppliers, there will be greater international competition but also significant growth in the market for new technology. It is therefore important to be internationally oriented for end users as well as for users of energy-efficient technology.

At the same time, it must be recognized that Denmark is a small country with limited resources for research into energy-efficient industrial technologies, which is why it is also of great importance for researchers and developers to enter into international cooperation. Danish participation in IEA-IETS gives Danish and research institutions a platform partly to present Danish developed technologies and partly to obtain state-of-the-art knowledge about new and future technologies. Both parts are essential in relation to maintaining Denmark's industrial competitiveness and promoting the export of energy technologies.

The work under the program is closely related to Danish interests and objectives in the climate area. Industry's emissions of CO₂ make up over 20% of Denmark's emissions, which is why it is of great importance to ensure industrial decarbonization for the green transition.

4. Project implementation

During the project period the delegate has supported the participation in Task XVII Membrane Processes in Biorefineries and Task XV Industrial Excess Heat Recovery. These are well working tasks which have completed several subtasks and plan future work. The delegates support the communication of the results via the NSG and the expansion of Danish participation.

During the period new tasks have been initiated:

- *Task XVIII Digitalization, Artificial Intelligence and Related Technologies for Energy Efficiency and GHG Emissions Reduction in Industry. Denmark participates lead by SDU together with PROACTIVE A/S, 3Tech Automation A/S, KMD A/S, Weel & Sandvig, DTU. Currently working on subtask 2 and 3.*
- *Task XIX Electrification in Industry. Denmark participates lead by DTU collaborating with Danish Technological Institute, Viegand Maagøe, Weel & Sandvig, SAN Electro Heat and Johnson Controls. Subtask 1 and 2 have been completed.*
- *Task XX Knowledge sharing on Industry Transition Roadmaps. Denmark followed the work but did not participate.*
- *Task XIX Decarbonizing industrial systems in a circular economy framework. Denmark has supported the development and is participating by SDU (lead), DTU and Greenlab Skive.*

The participants in the tasks are considered to be members of the National support group. This group has met annually in an open meeting during the project period.

The following meetings have been held in the ExCo during the project period:

2021

32nd IETS ExCo Meeting, May 18-19 online via Teams

1st Extra IETS ExCo Meeting online, September 21

33rd IETS ExCo Meeting, November 24-25 via Teams

2022

2nd Intermediate ExCo Meeting online, March 10

34th IETS ExCo Meeting, May 24-25 via Teams

3rd Intermediate ExCo meeting online, September 29 via Teams

35th ExCo meeting, November 30-December 1 in Copenhagen, Denmark

2023

4th Intermediate ExCo meeting online, March 21 via Teams

36th ExCo meeting 12 May in Gothenburg and 23 May online

5th Intermediate ExCo meeting 21 September, via Teams

37th ExCo meeting 21-22 November in Lisbon

Denmark also participated in the IETS Conference Energy Future in Industry <https://www.energyfuture2023.org/> in Gothenburg 9-11 May 2023.

5. Project conclusion and perspective

The participation in the IETS ExCo is valuable for the Danish participants and industrial decarbonization in Denmark. IETS is developing and expanding its work and the areas covered by tasks during the current years. This is documented by the list of currently active tasks. Several of these have been started during the project period, while even more are under development for the coming period. This includes expected initiatives from Danish participants. It is the experience that the collaboration under IETS leads to novel development, demonstration and research projects in Denmark with considerable connection and inspiration from the international work.

Furthermore, the development of a National Support Group is valuable for dissemination of the IEA work as well as for development of more initiatives.

6. Appendices

- Material related to the IETS ExCo work is available on <https://iea-industry.org/>