



ANNUAL REPORT

2021



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ABOUT THE IETS ANNUAL REPORT 43

CHAIRMAN'S MESSAGE

By IETS Chair Thore Berntsson

The industry sector is one of the key sectors for GHG mitigation in society, especially process industry. For this part, combinations of measures will be crucial for achieving radical GHG mitigation. Important examples are combinations in different ways between CCUS systems, electrification (including hydrogen), biorefineries, digitalization and AI, efficient energy and process technologies, process integration, circular economy and industrial symbiosis. In addition, considerably changes in policy instruments, business models, new investment opportunities, etc, as well as a system-oriented and strategic approach are needed for the introduction of new technologies/systems in industry.

The role of the IETS TCP

Knowledge development/transfer of technical, economic and environmental aspects of transformation of different processes and industry types with combinations of technologies and systems mentioned above is a key factor for achieving the necessary transformation. In the IETS TCP, any industrial technologies, systems and industry types can be included. The work consists mainly of networking between leading organisations internationally. Our TCP can therefore play an important role in international development and transfer of knowledge for transformation of the industry sector.

Focus on network aspects

Due to the need for radical changes in industry with novel technologies and complex combinations with system consequences, our work in recent years has been successively more oriented (but not exclusively) towards networking on system aspects, based on national technical developments. During last year, we have started several new activities, i. e. Electrification, Digitalization and AI, Biorefineries, Roadmap evaluation, Circular economy, Industrial symbiosis. We have also developed new knowledge regarding industrial excess heat use and membranes in biomass systems.

The path forward

Based on the recent development of new networking activities, I expect that new important areas will be included in our networking activities. We have developed the networking between the National Support Groups for two-way information and dissemination activities and this will most likely be developed further. These activities, not the least involving different types of industry, are crucial for the IETS work. Sharing experiences between countries on real big changes in industrial processes for radical GHG mitigation will probably also be developed further. Given the knowledge development in IETS, new meta-analyses in different areas for international dissemination will probably also be developed.

Message to policy makers

As the industrial sector is a key sector for GHG mitigation in industry, international knowledge development and transfer is crucial for the necessary transformation in industry. Such transformation means in many cases complex combinations of existing and novel technologies. For this reason, the IETS TCP works intensively with international networking and dissemination activities on system consequences and aspects for novel technologies.

VICE CHAIRS'S INSIGHTS

The IETS TCP has two Vice Chairs – Clemente Pedro Nunes from Portugal and Eric Soucy from Canada. Their duties are, among others, are to discuss and initiate collaborations with fellow TCPs. To conclude the past year, they were asked three questions:

By IETS Vice Chair Eric Soucy:

By IETS Vice Chair Clemente Pedro Nunes:

What have been the most important achievements by the IETS TCP this year?

By providing clear description of its work and improving its communication strategy through a revamped website, newsletter, TCP sectorial discussions and other means, IETS has definitely improved its reach within the IEA community and other relevant stakeholders to position advantageously industrial energy technology and system aspect as a key component of any decarbonisation strategy.

IETS has strengthen its internal activities, and its network with other TCPs, in order to develop common technological objectives within IEA, to guarantee energy efficiency in industry and to promote decarbonization in a clever and practical way.

What has been the most rewarding, working for the IETS during 2021?

By helping on leveraging knowledge and experience of individual country members, IETS is fulfilling its mission of fostering international co-operation to accelerate research and technology development for industry. A chair that knows how to lead on one hand, an effective secretariat, and on the other hand, the solid participation of all members represented by key energy experts is to me, the most satisfactory experience you can get!

To promote technological innovation projects among Industry, Universities and Governmental bodies to guarantee energy efficiency and decarbonization within the process industries.

What would be your message to policy makers?

Industrial sector decarbonisation is essential to a net zero emission policy of any industrialized country. To that end, IETS is advancing science & technology in the field of electrification, bioeconomy, digitalisation and deep decarbonisation transformation pathways to support this ambitious objective.

The Energy transition in Industry is a very complex and difficult process, namely in technological terms.

As such, the political decisions towards this goal shall have to be based in the technological and scientific developments that can safeguard the competitiveness of the industries that operate in the countries that are members of IEA.

INTERNATIONAL ENERGY AGENCY, IEA

IEA - AT THE HEART OF GLOBAL DIALOGUE ON ENERGY

MISSION

The IEA works with governments and industry to shape a secure and sustainable energy future for all.

The IEA is at the heart of global dialogue on energy, providing authoritative analysis, data, policy recommendations, and real-world solutions to help countries provide secure and sustainable energy for all.

The IEA was created in 1974 to help co-ordinate a collective response to major disruptions in the supply of oil. While oil security this remains a key aspect of our work, the IEA has evolved and expanded significantly since its foundation.

Taking an all-fuels, all-technology approach, the IEA recommends policies that enhance the reliability, affordability and sustainability of energy. It examines the full spectrum issues including renewables, oil, gas and coal supply and demand, energy efficiency, clean energy technologies, electricity systems and markets, access to energy, demand-side management, and much more.

Since 2015, the IEA has opened its doors to major emerging countries to expand its global impact, and deepen cooperation in energy security, data and statistics, energy policy analysis, energy efficiency, and the growing use of clean energy technologies.

Source: <https://www.iea.org/about/mission>

AREAS OF WORK

IEA analysis is built upon a foundation of activities and focus areas including data and statistics, training, innovation and international cooperation.

Promoting energy efficiency

The IEA helps governments improve standards, advising them on developing, implementing, and measuring the impact of efficiency policies.

Ensuring energy security

IEA work on energy security ensures that markets remained well supplied, providing information to governments, and helping improve system resilience.

Programmes and partnerships

The IEA works with governments, organisations and agencies around the world to deliver programmes focused on countries, regions or topics.

International collaborations

The IEA works with a broad range of international organisations and forums to ensure secure, affordable and sustainable energy systems.

Promoting digital demand-driven electricity networks

IEA work on digital, demand-driven solutions offering significant benefits to cost reduction, emissions abatement and enhanced energy efficiency.

Data and statistics

Data collection has been at the heart of the IEA's work since the creation, with official energy statistics from more than 100 countries collected on a monthly or annual basis.

Training

For more than four decades, the IEA has carried out training activities around the world on energy statistics, modelling, technology, energy efficiency and renewable policies.

Technology collaboration

With about 40 research collaborations – including the IETS TCP - and about 6,000 experts, the technology programme provides the basis for international public and private research partnerships.

Global engagement

Since 2015, the IEA has opened our doors to eight major emerging economies for a new era of international energy co-operation.

Industry engagement

Meeting with various industry groups on a regular basis, the IEA gains precious insights on how policies shape real-world investments and actions.

Source: <https://www.iea.org/areas-of-work>

ABOUT THE IEA TECHNOLOGY COLLABORATION PROGRAMME (TCP)

Advancing the research, development and commercialization of energy technologies.

The Technology Collaboration Programme supports the work of independent, international groups of experts that enable governments and industries from around the world to lead programmes and projects on a wide range of energy technologies and related issues. The experts in these collaborations work to advance the research, development and commercialisation of energy technologies. The scope and strategy of each collaboration is in keeping with the IEA Shared Goals of energy security, environmental protection and economic growth, as well as engagement worldwide.

The breadth of the analytical expertise in the Technology Collaboration Programme is a unique asset to the global transition to a cleaner energy future.

These collaborations involve over 6 000 experts worldwide who represent nearly 300 public and private organisations located in 55 countries, including many from IEA Association countries such as China, India and Brazil.

Source: <https://www.iea.org/areas-of-work/technology-collaboration>

INDUSTRIAL ENERGY-RELATED TECHNOLOGIES AND SYSTEMS – THE IETS TCP

The IETS TCP is a Technology Collaboration Programme dealing with new industrial energy-related technologies and systems. IETS was established in 2005 as the result of merging, revamping, and extending activities formerly carried out by a number of separate industrial IEA programmes: Process Integration, Pulp and Paper, Heat Exchangers and Heat Transfer. This was done to facilitate development of both industry-specific as well as cross-cutting technologies, and to ease participation by countries in a broad range of industrial areas.

The mission of the IETS TCP is to foster international cooperation among OECD and non-OECD countries for accelerated research and technology development of industrial energy-related technologies and systems. In doing so, IETS seeks to enhance knowledge and facilitate deployment of cost-effective new industrial technologies and system layouts that enable increased productivity and better product quality while improving energy efficiency and sustainability.

The IETS TCP will be evolving continuously with the aim to include a range of energy-intensive sectors, such as iron and steel, cement, non-metallic materials, aluminum, petrochemicals, chemicals and food, as well as manufacturing industries, and small and medium-sized enterprises (SMEs).

Through its activities, the IETS TCP will increase awareness of technology and energy efficiency opportunities in industry, contribute to synergy between different systems and technologies, and enhance international cooperation related to sustainable development.

Additional information about the IETS TCP and its different activities can be found on the IETS website:

www.iea-industry.org

IETS WORK

The principal work of the IETS TCP is about identifying, observing, following and sharing work among countries and their organizations and industry clusters. This is done through defined projects, so called Tasks, in which experts from countries who choose to take part form a working group with a Task Manager in charge of coordinating.

As of December 2021, the IETS TCP had the following ongoing Tasks (read more about them and their specific activities later in this report):

- Task XI: Industry-based Biorefineries towards Sustainability
- Task XIV: Energy-efficiency in the Iron and Steel Industry (restarting)
- Annex XV: Industrial Excess Heat Recovery – Technologies and Applications
- Task XVII: Membrane Processes in Biorefineries
- Task XVIII: Digitalization, Artificial Intelligence and Related Technologies for Energy Efficiency and GHG Emissions Reduction in Industry
- Task XIX: Electrification in Industry
- Task XX: Knowledge sharing on Industry Transition Roadmaps
- Task XXI: Decarbonizing industrial systems in a circular economy framework

The work of IETS is continuously proceeding and new Tasks are developing in order to meet the arising needs of the IETS members. The IETS ExCo has recently taken the strategic decision to start more long-standing annexes and continuously add new tasks to existing ones.

IETS MEMBER COUNTRIES AND SPONSORS

As of December 2021, the IETS TCP Member Countries and Contracting Parties were the following:

- Austria: Climate and Energy Fund of the Austrian Federal Government
- Canada: Natural Resources Canada (NRCan)
- Denmark: Danish Energy Agency
- France: ADEME - Agence de l'Environnement et de la Maîtrise de l'Énergie
- Germany: Forschungszentrum Jülich GmbH
- Italy: ENEA – Italian National Agency for New Technologies, Energy and Sustainable Economic Development
- Netherlands: RVO Netherlands Enterprise Agency
- Norway: ENOVA SF
- Portugal: Instituto Superior Técnico, Technical University of Lisbon
- Sweden: Swedish Energy Agency

The following organizations are Sponsors to the IETS TCP, i.e., they can participate in Task Work and ExCo meetings but without the right to vote:

- Central Research Institute of Electric Power Industry, Japan
- Limerick Institute of Technology, Ireland
- Lucerne University of Applied Sciences and Arts, Switzerland
- VTT, Finland

WEBSITE: WWW.IEA-INDUSTRY.ORG

The IETS TCP website focuses on IETS projects, findings and collaboration activities. The website consists of an official layer containing background information about IETS, descriptions of Tasks, procedures for participation, lists of events, and publications for downloading.

The IETS website is also the forum for material being internally shared between participants within the TCP. There is a specific password protected section for the ExCo delegates through which meeting agendas, documents and minutes are shared. The IETS Secretariat acts as the webmaster, being responsible for general updates.

HIGHLIGHTS 2021

IETS is the only TCP exclusively for the industrial sector, and there is a big scope for further development. The industrial sector is one of the main sectors with enormous opportunities for energy efficiency, GHG abatement, sustainable power production, and more sustainable raw materials/products. It is well known that industrial energy savings are among the most cost-efficient ways to reduce GHG emissions.

ATTRACTING NEW MEMBERS

During 2021, National Renewable Energy Laboratory (NREL), i.e., the U.S. Department of Energy's primary national laboratory for renewable energy and energy efficiency research and development was invited to be an IETS TCP as sponsors. The application was approved by the CERT (Committee on Energy Research and Technology) early 2022.

Discussions about sponsorships are ongoing with a number of other organizations.

THE IMPORTANCE OF NETWORKS

The visibility of the IETS TCP is also important in the member countries to enhance the cooperative aspect internally. As a TCP covering all kinds of industrial activities, implementing National Support Groups (NSGs) on the ExCo level provides delegates with a broader platform for discussions and dissemination nationally. In general, the idea with an NSG is its evaluating and advising function when it comes to assisting the country's ExCo representative in responding to inquiries of different character from the IETS Chair, Secretariat and the ExCo. The NSG network is also important for the future work of the IETS TCP as it can enhance and spread the knowledge about the TCP in relevant contexts in the IETS member countries and thus contribute to the concrete as well as overall strategic development of the IETS TCP.

In October 2021, the first meeting gathering representatives from all IETS National Support Groups was held.

THE MATRIX

Since 2013 the IETS TCP has been mapping areas of interest and industry initiatives in the IETS member countries respectively, resulting in a general picture of the sectors with most activities and the technology and system areas of highest interest. This compilation of these fields of interest, shared by several IETS member countries, is now referred to as the Matrix.

The Matrix is continuously updated and is used as a tool to identify areas of specific interest to the IETS TCP in order to start new activities.

EXTENSION GRANTED

During 2020, the IETS TCP applied for and was granted an extension by the Committee on Energy Research and Technology (CERT). The extension is for five years from 1 March 2021 to 28 February 2026, provided that the TCP incorporates the Framework for the Technology Collaboration Programme into its Implementing Agreement by 28 February 2022.

NEW LEGAL TEXT

The IEA Governing Board approved a new Framework, i.e., a high-level document that provides the legal basis for the TCPs, in April 2020. For all TCPs, this caused the need to amend the Implementing Agreement (or Legal Text) to incorporate new Framework. For the IETS TCP, a draft Legal Text was developed by the IEA Legal Office, together with the IETS Chair and Secretariat, and approved by the IETS ExCo in December 2020. During 2021, it was implemented in terminology, procedures, documents etc.

The Implementation Agreement/Legal Text is a detailed agreement on the specific terms and conditions of participation:

- Details of Executive Committee.
Responsibilities, membership, voting rules, procedures.
- Details of Tasks (formerly called Annexes)
Process for establishing and joining, contents.
- Rights and responsibilities of Participants
Financial obligations, dispute settlement.
- Secretary and Task Operating Agents (formerly called Annex Managers)
Designation process, legal rights and responsibilities.
- Process for new Participants to join the TCP.
Approval requirements, necessary paperwork, administrative steps.

[The Implementation Agreement/Legal Text is available at the IETS website.](#)

CHANGES IN MEMBERS AND DELEGATES

Cyrielle Borde, Ademe, is the new French delegate.

Rene Gail, Forschungszentrum Jülich, is the new German alternate delegate.

At the ExCo meeting in November, Chair Thore Berntsson, Sweden, was re-elected, as were Vice Chairs Clemente Pedro Nunes, Portugal, and Eric Soucy, Canada.

For a complete list of delegates and alternates, please refer to page 39.

COMMUNICATION

The IETS website is the main communication channel – in addition to personal meetings – and attracted about 6 000 visitors from all over the world during 2021. The website is continuously updated with current information, e.g., regarding activities in and status updates from Task work, seminars and conferences, news and new publications. Short summaries of the ExCo meeting minutes are also posted at the website.

In 2018, the EITS Secretariat started producing fact sheets on important and relevant topics, based on Task reports, workshop summaries etc. The following Topic Sheets were produced and published during 2021:

- Topic sheet no 12, June 2021: Industrial Electrification. This Topic Sheet is based on the first Task Report – Mapping of Activities – from the IETS Task XIX Electrification in Industry
- Topic sheet no 13, November 2021: Digitalization, Artificial Intelligence and Related Technologies – Definitions. In a broad range of literature, digitalization, artificial intelligence (AI), and related technologies (Big Data, Data Analytics, Internet of Things (IoT), Automation, Control, etc.) are conceptual terms that are closely associated and often used interchangeably. In this fact sheet, the most common definitions of the terms in the field of digitalization are listed.
- Topic sheet no 14, November 2021: IEA EUWP Webinar on Deep Decarbonization in Industry. This fact sheet is based on the report from the IEA End-Use Working Party Webinar on Deep Decarbonization in Industry, 9th and 10th December 2020.

Two issues of the IETS Newsletter were distributed online to about 150 subscribers and posted at the IETS website. The Secretariat also supplied an Annual Brief for the EUWP (Working Party on Energy End-Use Technologies – one of CERT's – the IEA Committee on Energy Research and Technology – four working parties).

To increase visibility and dissemination, news, reports etc. are also posted on Twitter and LinkedIn. A LinkedIn group for knowledge sharing was created in order for members to share information and experiences.

EVENTS 2021

EXECUTIVE COMMITTEE MEETINGS

- 32nd IETS ExCo Meeting online, 18-19 May
- 33rd IETS ExCo Meeting online, 24-25 November

In 2021, the need for additional ExCo meetings in between regular meetings was addressed and it was decided to have intermediate (online) meetings in March and September each year. The first one was held on 21 September.

WORKSHOPS & WEBINARS

Also in 2021, most events were digital, gathering quite a larger number of participants and giving more stakeholders the opportunity to engage in discussions. The following Task related but open webinars and workshops were held:

Information Webinar on Task XVIII - Digitalization, Artificial Intelligence and Related Technologies for Energy Efficiency and GHG Emissions Reduction in Industry (29 March and 1 April)

Task XVIII organized two information webinars to present an overview of new Subtasks developed with potential participants. The target group consisted of interested parties in the field of digitalization and/or in the application of digitalization and artificial intelligence in large industrial GHG emitter sectors (e.g., oil refining, iron & steel, forestry, minerals & mining)

Workshop in Task XI on Future Scenarios and Strategic Decision-Making for Industry Transformation (15 April and 6 May)

The main aims of this two-day workshop were to highlight international strategies for deep decarbonization and scaling-up the sustainable bioeconomy, as well as novel developments in methods and tools for strategic decision-making, and to discuss interests for enhanced international collaboration in this area.

Workshop in Task XX – Knowledge sharing on Industry Transition Roadmaps (6 May)

The aim of this workshop was to present the planned activities in more details, the expected contribution from the participants and also discuss the terms of commitment when participating in the recently started Task. This will be the opportunity to discuss roadmapping initiatives and future working methodologies.

ONGOING TASKS 2021

TASK XI: INDUSTRY-BASED BIOREFINERIES

Responsible authors: Marzouk Benali, Natural Resources Canada/CanmetENERGY and Paul Stuart, Polytechnique Montréal and EnVertis Consulting (Canada)

Task Members: Austria, Canada, Portugal and Sweden

Projected ending date of Task XI: January 31st, 2025

SCOPE OF TASK XI

The main objective of Task XI is to promote systems analysis and decision support systems related to identifying sustainable industry-based biorefineries.

The reorientation of Task XI reaffirmed its initial mission considering the “biomass agnostic” bioeconomy perspective, with an increased emphasis on deep decarbonization of various industry sectors through the integration of different biorefinery pathways, to ultimately achieve net zero or negative GHG emissions. In addition, we will seek to collaborate with other Tasks in IETS and other TCPs, for all Task XI Subtasks that may be established.

As the bioeconomy continues to evolve, innovative solutions need to be found considering, for example:

1. Specific challenges of implicated sectors, and cross-sectoral value chains being created in the bioeconomy, considering near-term and longer-term policy landscapes;
2. Advanced energy analytical methods for sites transforming to the bioeconomy, especially in support of identifying long-term strategic approaches to achieving net zero GHG emissions;
3. Potential synergies between upstream and downstream stakeholders across bioeconomy value chains, and new forms of industrial symbiosis including through digitalization; and
4. Identification of opportunities for new circular bioeconomy value chains.

ON-GOING SUBTASKS

Subtask 5: Decision support tools and ex-ante research for evaluating bioeconomy transformation strategies.

Subtask 6: Technology pathways towards net-zero/negative emission biorefineries.

PROJECTED TASK XI DELIVERABLES

- Decision support tools and ex-ante methodologies to support the deployment of the bioeconomy, to be disseminated across IETS and IEA Bioenergy TCPs.
- Roadmaps for decision-making processes to support the transition of industry towards the bioeconomy, considering sustainability.
- Emerging biorefinery technologies emphasizing the potential to achieve net-zero or negative GHG emissions.

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- Guidelines and recommendations for future biorefinery scenarios analysis and key success factors to achieve the bioeconomy net-zero GHG emissions goals, to be disseminated across the IETS and IEA Bioenergy TCPs as well as industrial bioeconomy stakeholders.
 - Biorefinery case studies provided as technical factsheets.

SUMMARY OF MAIN ACTIVITIES DURING 2021

- A Steering Committee was established to identify and catalyze new Task XI Subtasks and other activities, in collaboration with other Tasks and Subtasks. The Steering Committee currently consists of Paul Stuart (CA), Marzouk Benali (CA), Bettina Muster (AT), Isabel Cabrita (PT), Jorge Costa (PT) and Thore Berntsson (SE). The Steering Committee membership is expected to evolve over time, attracting members that are particularly active in Task XI.
 - A series of virtual meetings was held by the Task XI Steering Committee during 2020 to further develop a three-year action plan, as well as develop proposals for new subtasks.
 - The revised proposal of the Subtask “Decision Support Systems and Ex-Ante Research” was completed and submitted for formal approval by the IETS ExCo. Paul Stuart and Marzouk Benali from Canada lead this subtask.
 - The proposal of the new Subtask “Technology pathways towards negative/net zero emission biorefineries” was completed and submitted for formal approval by the IETS ExCo. Bettina Muster-Slawitsch from Austria will lead this subtask.
- On April 15th, 2021 and May 6th, 2021, a two-day workshop entitled “**Future Scenarios and Strategic Decision-Making for Industry Transformation: Powered by Systems Engineering**” was organized in support of Subtask 5.
- On June 29th, 2021, a pre-kick off meeting on Decision Support Systems and Ex-Ante Research was organized. Thirteen (13) project ideas from Austria, Canada, Italy, Portugal, Spain, The Netherlands and USA.
- On November 25th, 2021, a presentation was given to the IET ExCo, in which advances in Task XI and the path forward were highlighted.
- On December 6th, 2021, Marzouk Benali and Paul Stuart gave a presentation entitled “**Planning the Canadian Bioeconomy in the Context of Industrial Symbiosis, the Circular Bioeconomy, and Net-Zero GHG Emissions**” at the technical session “Industrial Symbiosis and Biorefineries in a Circular Economy” within the IEA Bioenergy Triannual Online Conference 2021.

WORK PLANNED FOR 2022

- In 2022, the emphasis of Task XI will be on:
 - Working closely with the IETS Secretariat for approval of the updated “DSS and Ex-Ante Research” subtask proposal, and the new subtask on Negative/Net-zero Biorefineries proposal.

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- Continuing discussions to reach a decision on whether to move forward with the proposed new subtask on Circular Bioeconomy and Biomass-oriented Industrial Symbiosis.
 - Organizing a series of webinars and topical workshops intra-IETS and with IEA Bioenergy TCP.
 - Working closely with IETS Task XVIII manager to develop a joint activity and/or a joint subtask.
 - Inviting on occasion other country representatives to determine their interest to Task XI in general and specific subtasks in particular, with the goal of attracting more country eventually.
 - Disseminating the ongoing Task XI activities and key outputs internally and externally to each country member.
- On January 17th, 2022, the DSS Ex-Ante Subtask kick-off meeting was held and attracted about 40 participants from different countries.
 - On February 16th, 2022, a workshop on “Circular Bioeconomy and Biomass-oriented Industrial Symbiosis” was organized. It attracted 55 participants from different countries.
 - On April 5th, a first meeting will be organized in the context of positioning the new Subtask on Negative/Net-zero Biorefineries to assemble experts active in decarbonizing biorefinery strategies.
 - Organizing a joint workshop between Task XI and Task XVIII on “Industrial decarbonization powered by digitalization”. Both Tasks have identified the needs for a clear framework where digitalization and the bioeconomy can effectively synergize to create competitive advantage. In addition, drivers and barriers of establishing the digital-bioeconomy space need to be developed to unlock the opportunities of such new business model – the subject area is embryonic in nature. The goal of this workshop will be to better understand digitalization and the bioeconomy, as well as identify potential synergies and bridges to connect these transformation levers to leverage digitalization for effective and sustainable industrial decarbonization.
 - Analyze the biorefinery projects being developed and extract key findings, and review linkage between DSS and ex-ante scenarios to accelerate bioeconomy deployment.
 - Organize a joint workshop with IEA Bioenergy Task 42.

CONTACT DETAILS

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TASK XIV: ENERGY-EFFICIENCY IN THE IRON AND STEEL INDUSTRY

Responsible author: IETS Secretariat

Task Members: TBD

Time schedule, Tasks 1-3: 1 January 2011 – 31 May 2014

Time schedule, new Subtasks: TBD

DESCRIPTION OF CURRENT SUBTASKS

This Task was put on hold at the IETS ExCo meeting in May 2019.

ACTIVITIES DURING 2021

Discussions aiming at a restart, based on the IETS Survey of technologies and the IEA Iron and steel technology roadmap. A workshop together with IEA Secretariat, Task Manager and country experts, with the following objectives, was planned:

- To present research and development work in participating countries
- To identify areas of common interest
- To identify possible collaboration activities

WORK PLANNED FOR 2022

Workshop according to the planning will be held on 18 May.

CONTACT DETAILS

Task manager:

Vacant, please contact the IETS Secretariat for more information.

ANNEX XV: INDUSTRIAL EXCESS HEAT RECOVERY – TECHNOLOGIES AND APPLICATIONS

Responsible authors: René Hofmann, AIT, Center for Energy and TU Wien, Austria and Thore Berntsson, CIT Industriell Energi, Sweden

Annex*) Members: Austria, Canada, Denmark, France, Norway, Portugal and Sweden and sponsor organization from Switzerland.

Time schedule: 1 November 2019 – 31 October 2021 (Task 3)

*) Since this Annex was planned to end in 2021, the title was not changed to Task. If the participants seeks a continuation, the next phase will be called Subtask 4 of Task XV.

INTRODUCTION, BACKGROUND AND AIMS

This annex was originally suggested in 2008. Annex XV Task 1 was finalized in the spring 2015. From September 2016 to August 2018 Task 2 was successfully completed. Nevertheless, a number of further questions were identified which are to be tackled within the framework of this Annex - Task 3 (01.11.2019 to 31.10.2021). The Annex takes on a multi-disciplinary approach to the concept of excess heat recovery integrated in industrial complexes, aiming at the optimization of energy efficiency in global terms. The approach is based on industry needs and application, combining the knowledge of industrial technologies with energy efficiency and cost-effectiveness. The findings from Task 2 lead to a number of areas which resulted in this Task 3. Thus, the present Annex XV, Task 3 enabled to broaden the scope and included some new aspects, which may not be considered separately for changed framework conditions within an industrial environment.

The included Subtasks were:

Subtask 1: Combination of methods for excess heat identification and quantification

Subtask 2: Consequences for excess heat levels of future changes in industrial energy systems

Subtask 3: Operational aspects in industrial energy systems

Subtask 4: Opportunity and risk assessment for excess heat projects

Subtask 5: Compilation of innovative excess heat projects

The achievements and results are:

- Synthesis report on findings in the projects included in the Task as well as reported in literature, divided into the five subtasks,
- Report on discussion points and findings in the workshops included in the Task (included in the synthesis report),
- Recommendation for further work internationally (to be included in the synthesis report),
- Report from each participant project (one or more per country).
- Dissemination activities of each participating country.

PARTICIPANTS

The participants in Task 3 are 15 institutions from 9 countries:

-
1. **Austria:** TU Wien (TUW), AEE - Institut für Nachhaltige Technologien (AEE INTEC), Austrian Institute of Technology (AIT), and Energieinstitut an der JKU Linz (EI-JKU)
 2. **Canada:** Natural Resources Canada – CanmetENERGY
 3. **Denmark:** Technical University of Denmark (DTU), Weel & Sandvig, and Viegand Maagøe
 4. **France:** Greenflex
 5. **Italy:** ENEA, Politecnico di Torino
 6. **Norway:** SINTEF Enerig AS, Department Theraml Energy
 7. **Portugal:** Instituto Superior de Engenharia de Lisboa (ISEL), Instituto Superior Técnico (IST), and the National Group for Process Integration (GNIP)
 8. **Sweden:** Chalmers University of Technology, Alfa Laval since 2021
 9. **Switzerland:** Lucerne University of Applied Sciences and Arts

MEETINGS

There have been in total 6 meetings in the task, including 5-day deep dive sessions for the individual Subtasks.

Time schedule: 1 November 2019 – 31 October 2021

In project year 2019, the contributions of the individual participants were collected and analyzed. In total, the participants provided information on rd. 30 projects. The result of this analysis is available in the form of a Contribution Matrix, which sorts and clusters the available projects. The Contribution Matrix now allows the identification of synergies as well as gaps that should be addressed in the further course of the projects. The Contribution Matrix, the description of the competences of the participants as well as detailed project descriptions were made available to the participants.

In the project year 2020, the proposed work was to start, continue and deepen according to the legal text of Task 3. The aim was to deepen the established matrix of project contributions of the individual subtasks. Therefrom, the project work and all detailed research questions in the individual subtasks with each group associated will be elaborated and answered regarding:

- Methods combination,
- Consequences for future changes,
- Operational aspects and
- Risk assessment.

Meetings in 2020:

- Annex Q1 Meeting, online, 28 January 2020:
- Annex Q2 Meeting, online, 2 April 2020
- Annex Q3 Meeting, online, 25 and 26 June 2020
- Annex physical workshop was planned in spring 2020 in Vienna and will be postponed due to COVID-19.

In the project year 2021, the ongoing activities in Subtasks 1 to 5 were extensively deepened. On the basis of the comprehensive project list, detailed questions relating to the individual subtasks within the legal text were discussed in deep-dive sessions during a one week Web-meeting. This provided an excellent basis for the Annex XV group to draw conclusions from different viewpoints and enabled to learn from all projects of the participating countries. Beginning in summer, the work started on the Synthesis Report, which reflects the findings from the Annex XV Task3 Industrial Excess Heat.

Meetings in 2021:

- Annex Q1 Meeting, online, 18-19 January 2021:
- Annex Q2 Meeting, online, Deep Dive Sessions
 - 22 April 2021, 26 April 2021, 27 April 2021, 28 April 2021, 29 April 2021
- Annex Q4 Meeting, online, 4.10.2021

On January 31st, 2022 a Final Meeting focused on further works activities. It was noticed, that there are still a lot of open questions that could not be answered within the framework of the present Subtasks, but new questions have arisen. This has led to new topics, which could be tackled within a Task XV - Subtask 4 in the next years.

DISSEMINATION

- General information about the Task were uploaded on the website of IETS by the IETS secretariat.
- Results from the Annex XV were made available on the IETS website as well as disseminated by the Annex Managers.

COLLABORATION WITH OTHER IEA ACTIVITIES

Industrial excess heat is a part of an industrial energy system and interacts directly with parts. Hence, more close cooperation within IETS and other IEA TCPs is important in future work. Examples of activities of importance for industrial excess heat are:

IETS Tasks

- Task XI, Industry-based biorefineries towards sustainability
- Task XVIII, Digitalization, Artificial Intelligence and Related Technologies for Energy Efficiency and GHG Emissions Reduction in Industry
- Task XIX, Electrification in Industry
- Task XXI, Decarbonizing industrial systems in a circular economy framework

Other TCPs

- Heat pumping, IEAGHG (CCUS technologies and systems), ISGAN (International Smart Grid Action Network), Energy in buildings and communities

SUGGESTION FOR FURTHER WORK IN TASK XV - SUBTASK 4

Based on all inputs and discussions during the meetings, a suggestion for possible Subtask 4 in a continuation of the Task XV has been suggested:

Activity 1: The role of excess heat in industry and industrial symbiosis

Activity 2: (How to use) Process integration/intensification (strategy/benefits)

Activity 3: Ongoing Big projects and Experiences

Each participating group shall make a contribution in one or more of the activities.

CONTACT DETAILS

Task Manager:

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TASK XVII: MEMBRANE PROCESSES IN BIOREFINERIES

Responsible author: Frank Lipnizki, Lund University, Sweden

Task Members: Austria, Denmark, Germany, France, Italy, Netherlands, Portugal and Sweden.

Time Schedule initial Tasks: 1 January 2014 – 30 June 2017

Time Schedule Current Subtasks: 1 April 2019 – 30 March 2022

DESCRIPTION OF TASK

Scope

The transition of our society from a society largely dependent on fossil-based materials to a climate-smart society based on biomass does not only mean a change in the raw material base, but it will also require that new production concepts in the form of biorefineries are developed. Within the concept of biorefineries membrane processes have been identified as a key separation technology due to their high selectivity and low energy consumption. While the design and operation of membrane processes in other industrial sectors, e.g., the dairy industry, is well established, the design, integration and operation of membrane processes in biorefineries is largely empirical. The fact that process streams in biorefineries contain a large variety of components increases further the complexity. The first part of Task XVII focused exclusively on biorefineries based on lignocellulosic biomass, while the second part of Task XVII will transfer, exchange and extend the existing knowledge of the industrial and academic partners with regard to the energy-efficient use of membrane technology to the overall concept of biorefineries based on different renewable resources ranging from algae to agricultural residuals. The accessible knowledge will be mapped and structured and potential knowledge gaps will be identified together with the necessary actions to close those.

Subtasks

The Task XVII is divided in 5 Subtasks:

Subtask A – Separation in Biorefineries - maps separation challenges in biorefineries, benchmarks separation technologies for separation duties and provides selection criteria for separation processes in biorefineries.

Subtask B – Integration and Optimization - optimizes of membrane processes to reduce investment and operating costs, adjusts operating parameters to minimise energy consumption and provides techno-economical evaluation of hybrid processes in biorefineries.

Subtask C – Fouling and Cleaning – is based on a completed mapping of fouling and cleaning and focuses on in-situ analysis of fouling and cleaning, modelling and fouling prediction and techno-economical optimisation of fouling and cleaning.

Subtask D – Pre-treatment – maps methods for selecting optimal pre-treatments and analyses the integration and optimization of pre-treatment methods and membrane processes.

Subtask E – Emerging membrane processes – maps systematically the potential for emerging membrane technologies in biorefineries.

Subtask F – Water and Wastewater treatment – focus on the water loop in biorefineries and consolidates membrane opportunities.

Main deliverables

The dissemination of the results takes place during Task meetings, seminars with industrial participation, presentations at conferences and publications for the general public and scientific community. Furthermore, the results will be publicly available on the webpage of the Task.

ACTIVITIES DURING 2021

- Activities, meetings and workshops: Submit short descriptions of events, including e.g. main conclusions, participants, etc.
 - Task Workshop (26.01.2021) – online
Subtask presentations and discussions
25+ participants
 - Task Meeting (07.05.2021) – online
 - Two partner presentations (Alfa Laval and TNO), subtask presentations and discussions
20+ participants
 - Task Meeting (25.10.2021) – online
 - Three partner presentations (IST, Liqtech and Lund University, subtask presentations and discussions
20+ participants
 - Task Meeting (29.11.2021) at Euromembrane, Copenhagen, Denmark
Status presentation and discussions on the future of the task.
40+ participants
- Reports (and their availability)
 - Investigations on membrane fouling and cleaning in ultrafiltration processes in lignocellulosic biorefineries (Gregor Rudolph, Lund University, Sweden. Available under: <https://portal.research.lu.se/en/publications/investigations-on-membrane-fouling-and-cleaning-in-ultrafiltratio>)
 - Guideline for the integration of emerging membrane separation processes in biorefineries for research, industry and decision-maker (AEE and TU Graz, Austria)

WORK PLANNED FOR 2022

- Work planned
 - Complete mapping of Integration and optimization opportunities
 - Update of Task webpage
 - Promotion of Task during Filtech conference and Exhibition (3rd to 5th of March, Cologne, Germany) and ISCE (5th to 7th of April, Graz, Austria).
- Further work needed
 - Focus work on separations in biorefineries (subtask A) and pre-treatment (subtask B)
 - Linking with Task XI: Industry-based biorefineries.
 - Preparing continuation of task.
- Meetings
 - Two Task meetings (8th of April, online) and (17th or 18th of August, Gothenburg, Sweden)
 - One Task workshop

CONTACT DETAILS

Task Manager:

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TASK XVIII - DIGITALIZATION, ARTIFICIAL INTELLIGENCE AND RELATED TECHNOLOGIES FOR ENERGY EFFICIENCY AND GHG EMISSIONS REDUCTION IN INDUSTRY

Responsible author: Mouloud Amazouz, CanmetENERGY, Natural Resources Canada

Task Members: Austria, Canada, Denmark, France, Germany, Portugal, Netherlands, Italy and Sweden and sponsor organization in Finland (VTT).

Time Schedule Subtask 1: December 2018 – September 2021. (Final report approved and published)
Time Schedule current Subtasks: January 2021 – December 2024

SCOPE

Energy-intensive process industries - such as forestry, mining and smelting, oil and gas, energy production, chemical and fertilizers - increasingly have implemented sophisticated data management systems to capture process data across the supply chain for logistical decisions, as well as at the process level for quality, control and automation purposes. This dataset has potential to be at the foundation of the opportunity to identify new strategies for achieving radical GHG emissions reduction – related to significantly increased efficiency and improved competitiveness. Harnessing and analyzing a wide variety of data from different sources through Process Digitalization Technologies will allow energy-intensive process sectors to, amongst other things, improve product quality, increase manufacturing throughput, grow insight into the root causes of manufacturing issues, reduce machine failure and downtime, and render supply chains more efficient.

DESCRIPTION OF TASK

The main objective of task XVIII is to advance knowledge and development of digitalization, artificial intelligence and related technologies to improve the economic and environmental performance of targeted energy and GHG-intensive industries. The initiative would seek to assemble a network of academic, research labs, IT providers and process industry stakeholders to cooperate on the availability, quality and use of data (quality, quantity, location, operational, energy, etc.); to align capacity; and inform decision-making relevant to the targeted sectors.

To achieve this objective, the Task goals are:

- To create an international network and information infrastructure for stakeholders to exchange knowledge in the area of digitalization technologies.
- To facilitate joint development of new knowledge and expertise on Digitalization.
- To support and accelerate the deployment of digitalization practices in the energy-intensive process industries.

MAIN DELEVERABLES

- Proposals for subtasks submitted to the IETS Executive Committee
- Status reports presented to the IETS Executive Committee.
- Contributions to IETS Newsletter
- Reports and news from each Subtask to be published on webpages.

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- Articles in scientific reviewed journals.
 - Proceedings/summaries of workshops.

SUBTASKS

Subtask 1 – Needs and interests assessments

Subtask 1 started in 2019 and completed in 2021.

Subtask Manager: Paul Stuart, Polytechnique Montréal (Canada)

Subtask 2 – Methods and Applications of Digital Twins

Subtask managers: René Hofmann (TU Wien, Austria) and Lauri Kujanpää (VTT, Finland)

Time frame: 09 - 2021 to 12 - 2024.

Subtask 2 focuses on Methods and Applications of Digital Twins to promote the application of DTs in industry, in order to improve energy efficiency and reduce GHG emissions. Subtask 2 has the following sub objectives:

Overview of methods and applications of DTs and their requirements for different industry sectors

Analysis of the potential benefits of these methods, focusing on the impact on energy efficiency and GHG emissions reduction

Creation of an international, interdisciplinary network of research and industry

Subtask 3 – Lessons Learned and Created Values by Digitalization

Subtask Managers: Zheng (Grace) Ma (SDU, Denmark) and Michelle Levesque (NRCan, Canada)

Time frame: 09 - 2021 to 12 - 2024.

Subtask 3 will review and explore the barriers and incentives and existing business models. It will include:

Literature study to review the barriers and incentives and existing business models.

Qualitative and quantitative data collection from case studies.

Simulations (agent based modeling and discrete event simulation) to investigate the stakeholders' adoption of digitalization strategies

Subtask 4 – Roadmapping the implementation of digitalization in the energy-intensive process industries

Subtask Managers: Tom van der Velde (Tata Steel – NL) and Paul Stuart (Polytechnique Montréal – CA)

Time frame: Subtask 4 proposal is under development

Subtask 4 seeks to support the Task XVIII main objective's achievement by applying hands on measures to realize decarbonization by digitalization through road mapping its implementation in the large emitter industries based on practical objectives and constraints that must be faced by operating plants and corporations.

ACTIVITIES DURING 2021

At the task level, the following activities have been carried out.

- Organized and delivered two identical webinars to inform and attract potential participants to the subtasks
- Followed up with interested participants to the subtasks
- Attracted more than 30 participants to the subtasks
- Preparation of the 2020 IETS annual report
- Presentation of the task overview at the ExCo meetings in May and November 2021
- Evaluation and approval of the application of Aalto university to join task XVIII and IETS as a sponsor and from AG Software, Germany and Rise, Sweden.
- Topic sheet on Digitalization, Artificial Intelligence and Related Technologies – Definitions <https://iea-industry.org/publications/topic-sheet-digitalization-artificial-intelligence-and-related-technologies-definitions/>
- The proposals for subtask 2 and subtask 3 have been submitted and were approved by the IETS ExCo at the 33rd ExCo meeting in November 2021.
- Presentation of Task XVIII overview at the IETS TCP’s sectoral group on October 12, 2021
- Informed participants to the Canadian German Conference on Energy Efficiency in Industry (organized by the Canadian German Chamber of Commerce and Industry - November 21, 2021) about the activities of the Task XVIII.

Subtask 1

- Final report approved and issued It can be found on the IETS website. <https://iea-industry.org/app/uploads/Task-XVIII-Subtask-1-Final-Report-20210915.pdf>

Subtask 2

- Kick-off meeting held on July 7th 2021. 22 organizations from 8 different countries in Europe and North America were participating. Presentation of task objectives and the time table. Two key notes: Tom van der Welde (TataSteel), Brian Elmgaard (DTU). Main take-away points were, that DT technology is very relevant for industry and that a lot of innovative research is being done in academia. All participants were quite enthusiastic about the collaboration in Subtask 2.
- Workshop, prepared by Austria, on key terms and definitions such as “the digital twin” to establish a common understanding of these terms.
- Design of a website for subtask 2 information sharing, <https://owncloud.tuwien.ac.at>
- Development of 11 digital twin project fact sheets, https://owncloud.tuwien.ac.at/index.php/apps/files/?dir=/Shared/IEA_IETS_AnnexXVIII_Task2/project_factsheets&fileid=640664768
- Organization of three sessions, where 15 projects have been presented by participants to Subtask 2. After each presentation the projects were discussed by the group. The project presentation sessions gave some very interesting insights into new developments in the area of digital twins in academia and innovative applications in industry. These sessions also initiated

the knowledge sharing between participants. The list of projects and presentations can be found at this address:

https://owncloud.tuwien.ac.at/index.php/apps/files/?dir=/Shared/IEA_IETS_AnnexXVIII_Task2&fileid=594489482

Subtask 3

- A subtask kick-off meeting was held on October 14, 2021. The event was attended by 25 participants and included a presentation by Piia, as well as from three industry representatives and three technology providers to provide an overview of their case studies. The 7 presentations are recorded and can be found via the link: https://www.youtube.com/watch?v=OZAemHU1Nzw&list=PLeFn4XFYdKduUOZdHBVPN-xhLeAtK9E_-
- Meetings with several partners to further discuss their participation: Fellowmind, KMD (DK), PiiA (SE), Maya HTT, Natural Resources Canada, ArcelorMittal Dofasco (CA)
- Subtask co-leads developed templates to collect information from both industry and technology providers on case studies relating to energy and carbon reduction from digitalization across various sectors and industries.
- A website was designed to promote Subtask 3 and showcase the collection of case studies that have been collected. (<https://www.energyinformatics.academy/projects-iea-iets-xviii-Subtask3>)
- An overview of the Subtask 3 website was also provided to participants and feedback via a survey was sought to ensure that the information on the site was presented in a clear manner. The survey can be found: <https://forms.office.com/r/6hiyL9iiwH>
- 196 Danish funded projects and 280 EU funded projects relevant to the scope of IEA IETS Task 18 were identified. The detailed analysis of these projects has been conducted.
- Development of two case templates for industry and for digital solution provider.
 - Case template for industry: <https://forms.office.com/r/Kq0Rq3q8w4>
 - Case template for digital solution provider: <https://forms.office.com/r/p8Qr5nDN1v>
- Seven case study reports have been received from participants. They can be found via the following links: <https://www.energyinformatics.academy/>

Subtask 4

- Following the difficulty of attracting companies with projects in the development of digitalization roadmaps, a proposal to reorganize the subtask approach and work plan to proceed with working groups rather than by projects, was made and accepted by IETS ExCo members
- Virtual meeting on March 1 2021 with subtask co-leads and the Task Manager, to discuss the status of the three new task proposals development, updating of the list of potential participants and path forward plan development.
- Virtual meeting June 23, 2021 to present and discuss the status of the development of Subtask 4, the list of potential participants, and develop a plan to solicit more members.

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- A series of virtual meetings for the preparation of an information webinar for Subtask 4 to change the orientation from classical Subtask to working committee.

PLANNED WORK FOR 2022

Task XVIII

- Prepare and submit the annual report for 2022
- Prepare and present the task overview to the IETS ExCo meetings.
- Organize a joint workshop between Task XI and Task XVIII on “Industrial decarbonization powered by digitalization”. Both Tasks identified the needs for a clear framework where digitalization and the circular bioeconomy can effectively cohabit and interact to create competitive market advantages. In addition, drivers and barriers of establishing digital-circular bioeconomy space need to be developed to unlock the opportunities of such new business model. The goal of this workshop is to better understand digitalization and the circular bioeconomy and identify potential synergies and bridges to connect these crucial transformation levers to leverage digitalization for effective and sustainable industrial decarbonization. Members from other tasks and TCPs will be invited to participate to the workshop
- Organize a meeting to share experience and explore synergies between the subtask members
- Continue to explore collaborations with other tasks of IETS and other TCPs

Subtask 2:

- Meetings to discuss and evaluate Digital Twin methods and applications along the life cycle.
- Set up a catalog of relevant DT methods along the life cycle, that includes advantages, shortcomings and requirements for industry of each method. A strong focus is laid on the analysis of previous and current projects of the participants.
- Compile the replies to the questionnaire on digital twins in the projects in a report.
- Meetings to present work progress of the subtask projects

Subtask 3:

Webinars will be held to disseminate information on additional case studies as well as promote sub-task 3 for recruiting additional participants.

A summary of findings from the survey will be conducted

Further case studies will be collected with the Subtask 3 partners. Several of them have promised to provide case studies with the designed template.

A publication based on the analysis result of the 196 Danish funded projects and 280 EU funded projects will be conducted

A scoping review to identify case studies from the mining sector will be undertaken.

Subtask 3 will continue to reach out more industry and technology providers to gather more case studies for the collection as featured on the website.

Subtask 4

- Organize virtual information webinar to recruit participants to the new working Subtask 4 Working Group.
- Build list of webinar invitees – those that may know IETS activities, and targeting industry participants who are not likely familiar with IETS.
- Deliver the Subtask 4 information webinar.
- Follow-up with interested participants regarding their potential involvement with the new Working Group.
- Finalize Subtask 4 proposal and submit it for review and approval by IETS ExCo.
- Organize initial virtual Working Group meeting for the selection of discussion themes.
- Organize meetings for the official launch of selected themes, and methodology to define the strategic digitalization roadmap.
- Present the Subtask overview at IETS ExCo meetings.

CONTACT DETAILS

Task Manager:

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Subtask 2 - Methods and Applications of Digital Twins

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Subtask 3 - Lessons Learned and Created Values by Digitalization

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Subtask 4 - Roadmapping the implementation of digitalization in the energy-intensive process industries

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TASK XIX - ELECTRIFICATION IN INDUSTRY

Responsible author: Jonathan Moncada Botero, TNO, Netherlands

Task Members: Sweden, Austria, Denmark, Netherlands, Germany, France, Canada and sponsor organization from the US.

Time Schedule: September 2019 – March 2022

DESCRIPTION OF TASK

The Task aims to be a platform for enhancing collaboration between countries in the area of industrial electrification. The focus of the Task is on the system aspects of industrial electrification rather than on the technologies within each specific pathway or process. As such, the Task aims to foster the creation of “critical mass” in the area of industrial electrification. Early 2021, Subtask 2 started with drafting a more detailed workplan and identification of the final group of participants. The objective of the current Subtask, Enabling a shared view on system aspects of industrial electrification, is to build and strengthen the international ecosystem of industrial electrification with a focus on system impact. Subtask 2 aims at facilitating exchange of knowledge and lessons learned, increase awareness and international collaboration. It entails taking stock of technologies for electrification of industry, sharing and aligning insight and methodologies, identify best practices, broaden awareness by facilitating sharing.

ACTIVITIES COMPLETED DURING 2021

- Engagement of participants and preparation of Subtask 2 proposal.
- Kick off meeting with presentations from participants in September.
- Preparation of factsheet format for repository of projects shared within the Task.
- Factsheet templated shared with participants.
- Establish a consolidated group of participants for Task XIX
- Write and refine proposal of Subtask 2 of Task XIX
- Establish a working plan for 2022
- Enable collaboration opportunities for participants by sharing their broad experiences in industrial electrification

WORK PLANNED FOR 2022

- Fill in templates of project factsheets and repository of project factsheets
- Workshop and memo on technology development for industrial electrification
- Workshop and memo on systems analysis for industrial electrification
- Workshop and memo on flexibility of industrial electrification
- Workshop and memo on sector coupling and flexibility
- Workshop on lessons learned and next steps
- Working plan for subtask 3.

CONTACT DETAILS

Task Manager:

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TASK XX KNOWLEDGE SHARING ON INDUSTRY TRANSITION ROADMAPS

Responsible author: Elliot Mari, ADEME

Task members: Germany, Netherlands, Austria, Norway, Sweden, Denmark, Canada, Italy and France

Time Schedule: Officially started on 19/05/2021 (32nd ExCo meeting) and will end on 25/05/2022 (34th ExCo meeting).

BACKGROUND

The development of roadmaps can be undertaken from various perspectives and scales but in the end, the expected outcome of a roadmap is to provide sufficient insights that will translate into informed policy and business decisions. The proposed aim of this Task is to share best roadmap practices that contribute to provide an in-depth understanding of the optimal emission reduction pathways as well as key challenges and opportunities.

DESCRIPTION

- **Scope:** for the bilateral interviews conducted with national industry experts, this Task spans all participating countries listed above. This Task also includes a review of relevant industry roadmaps and the academic literature regarding industry transition and roadmapping methodologies that might go beyond participating members.
- **Main deliverables:** a report analysis of bilateral interviews and roadmapping practices.
- **Duration:** started on 19/05/2021 (32nd ExCo meeting) and will end on 25/05/2022 (34th ExCo meeting).

ACTIVITIES DURING 2021

- **Activities, meetings and workshops:** more than a dozen of bilateral interviews have been conducted with industry experts to collect experiences and practices regarding industry transition and the role of roadmaps. A final restitution workshop is scheduled for late April 2022.
- **Reports (and their availability):** a final report analysis should be delivered by the 34th ExCo meeting to be held on 24-25 May 2022.

PLANNED WORK FOR 2022

No new activities planned beyond 24-25 May 2022.

CONTACT DETAILS

Task Manager:

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TASK XXI - DECARBONIZING INDUSTRIAL SYSTEMS IN A CIRCULAR ECONOMY FRAMEWORK

Responsible author: Simon Moser, Energy Institute at the Johannes Kepler University Linz

Task members: Contributions from Austria, Canada, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Sweden

Time Schedule: Subtask 1 February 2021 – December 2021

BACKGROUND

This Task aims to investigate the topic of circular carbon from an industry perspective, i.e. to describe industrial energy systems in the context of a sustainable, fossil-free economy, striving to meet the targets of both concepts, the circular economy and a sustainable energy system. For industrial production, carbon in its various forms plays an essential role as a raw material that can hardly be replaced. While the use of energy cannot enter a closed loop, fossil carbon must not be released at the balance sheet. Consequently, carbon shall be circulated both in the energy and in the product sector.

DESCRIPTION

Scope: Phase 1 Clarify task content and enable networking

Subtasks - A: Definitions, B: Modelling, C: Circular Carbon Systems, D: Industrial Symbiosis, E: Networking

Main deliverables - Report to be published in May 2022.

Duration: February 2021 – December 2021,

Preparations of new Subtask proposals for the period of July 2022 – June 2024 are ongoing.

ACTIVITIES DURING 2021

The kickoff meeting for Task XXI took place on April 28, 2021; around 25 people took part. Those organizations that turned out to be potential participants in the definition phase were able to find out about the planned work program. The participants were also able to present their main areas of work and projects to the other participants. Task leader Simon Moser outlined the planned activities in the course of the first task phase, which is to be completed in 2021. The core of the cooperation is formed by three interactive workshops with the participating groups. In these workshops, the focal points defined in the five subtasks are to be discussed and deepened.

The first of these interactive workshops took place on June 23, 2021, with around 30 people. The focus was on subtask A (definitions). The tool Slido was used for voting among the participants and interesting insights were gained. In previous months, Energieinstitut made a survey (with more than 70 respondents from Task XXI participants and other experts) that asked for Sustainable Energy System and Circular Economy keywords to see if/how they overlap. It turned out that there is hardly any overlap between the two concepts in terms of basic perception. (Note: The actual overlaps should be discussed again later and were also summarized by FFE) For the other subtasks, the method envisaged for the subsequent work and surveys was discussed. For Subtask B (modelling), the basis for further cooperation and collection of the models was laid using an interactive Miro Board.

The second interactive workshop with 25 participants took place on September 27, 2021. New participants were given the opportunity to introduce themselves. The participants were also asked to present their current projects and publications. In the course of this, FFE presented a summary of a study on the interactions between a sustainable energy system and the circular economy. As in the first workshop, further inputs and opinions were asked using the Slido tool. For WIVA P&G-led Subtask E, speakers were sought for a potential cross-task and cross-TCP workshop. Another focus of the workshop was Subtask D on Industrial Symbiosis. Findings on definitions from the EU project CORALIS were shared by Energieinstitut and potential future focal points for development in the upcoming phases of Task XXI were determined. A potential focus is on working together on the topic of business models for industrial symbiosis.

The final third interactive workshop took place on December 13, 2021 with 15 participants. Prior to this, it was discussed which priorities could be set in the second phase of Task 21. For Subtask B, possibilities for summarizing the spectrum of models in a publishable paper were identified. A central question of the workshop was therefore whether “circular carbon” is completely limited to CCU or whether it also includes biomass or, ultimately, CCS. Some participants see circularity in a narrow circle, some see the cycle from fossil feedstock to long-term underground storage. CO₂ cycles were then also presented by Subtask C, led by ENEA and supported by BOKU, as they are existing/expected in the cement industry. This is intended to determine the extent of decarbonization that is practically possible. In the next phase of Task XXI, the work is to be continued in the two subtasks "Circular Carbon" and "Industrial Symbiosis".

A final report from Subtask 1 has been compiled and is scheduled to be published in May 2022.

WORK PLANNED FOR 2022

- Work planned – Subtask 2 stipulated 2022/07-2024/06
- Further work needed – Subtask 2 stipulated 2022/07-2024/06
- Meetings - Contributions to various IETS meetings and IETS task meetings

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ABOUT THE IETS ANNUAL REPORT

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