Industrial Energy-Related Technologies and Systems iets

An IEA Technology Collaboration Programme

Industrial excess heat utilisation

Conclusions from international networking within the IETS TCP Annex XV – Task 3

René Hofmann

Outline

[***Introduction***]	IEA, TCP – IETS, Collaboration
[***Annex 15***]	Background, Aims, Structure and Working Programme
[***Results***]	Summary of the contents and findings
[***Cooperation***]	International Industries and Universities

The IETS Collaboration

General aims:

- To strengthen international cooperation on energy saving and GHG mitigation in industry
- To include all industrial sectors and technologies/systems in the IETS area

Tasks:

- Technologies and Systems
- Industry type oriented or cross-cutting

Workshops/conferences

Mainly through networking and sharing of experiences, results and methods

No calls, no means for funding projects

Ideally, all participants bring their own already financed project(s)

The IETS Tasks (formerly Annexes)

Task XI	Industry-based biorefineries towards sustainability
Task XIV	Energy efficiency in the iron and steel industry
Annex XV	Industrial Excess Heat Recovery
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 onIndustry Transition Roadmaps
Task XXI	Decarbonizing industrial systems in a circular economy framework

[Annex XV] - Description

- ✓ 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…

Annex XV Structure

Time frame: 01.11.2019 to 31.12.2021

Task Managers: René Hofmann, Austria, AIT & Thore Berntsson, Sweden, CIT

Sub-task no	Sub-task title/Basic contents	Sub-task Manager [Name, Org., Country]
Subtask 1	Combination of methods for excess heat identification and quantification	René Hofmann, Austria
Subtask 2	Consequences for excess heat levels of future changes in industrial energy systems	Thore Berntsson, Sweden
Subtask 3	Operational aspects in industrial energy systems	René Hofmann, Austria
Subtask 4	Opportunity and risk assessment for excess heat projects	René Hofmann, Austria
Subtask 5	Compilation of innovative excess heat projects	Thore Berntsson, Sweden

Work Topics Annex XV Task 3

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

The aim of this subtask is to create a network between groups working on and/or being interested in **developing combinations of excess heat identification methods**.

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

In this subtask, **future changes** in industrial energy systems that could possibly **influence** the amount of **available excess heat** and its temperature levels will be investigated.

Work Topics Annex XV Task 3

Subtask 3: *Operational aspects in industrial energy systems*

New concepts (online, predictive and holistic) for industrial energy supply systems and **combining** existing optimization **approaches** for **unit commitment** and **heat exchanger network synthesis** to increase the efficiency of the overall systems

Subtask 4: *Opportunity and risk assessment for excess heat projects*

In this subtask, approaches and experiences to overcome **reasons** why **excess heat projects** are **not implemented** as well as **scientific projects identifying opportunities** will be shared and discussed

Work Topics Annex XV Task 3

Subtask 5: *Compilation of innovative excess heat projects*

In this subtask innovative excess heat project will be collected and shared amongst the participants. **Each group will** make a **contribution** in **one or more of the 4 subtasks** above and shall contribute with a description of **at least two innovative excess heat projects**.

Project contributions for Subtask 1

Country/Institution/Project	Question naires	Studies focusing on individual industrial branches	Process integration methods	Hybrid-Methods
AUSTRIA				
CORES (AEE INTEC, AIT, TUW)				
DigitalEnergyTwin (AEE INTEC)				
EUREMnext (AEE INTEC)				
SolarAutomotive (AEE INTEC)				
SolarReaktor (AEE INTEC)				
TrustEE (AEE INTEC)				
FRANCE (Greenflex)				
Waste heat recovery potential study in “Ile-de-France”				
DENMARK (DTU)				
Development of Process Integration Methodologies for Systematic Implementation in non-Energy Intensive Industries				
Energy efficiency in the industry: A study of the methods, potentials and interactions with the energy system				
SWITZERLAND (HLSU)				
Guidelines for the use of Industrial Waste Heat				

Project contributions for Subtask 2

Country/Institution/Project	General Systems	Heat Pump Systems	Storage	Power Cycles	Solar
AUSTRIA					
SolarReaktor (AEE INTEC)					
Bamboo (AIT)					
DryFiciency (AIT)					
HTESDürn – Hight temperature energy storage device for the thermal centre Dürnrohr (TUW)					
CANADA (CanmetENERGY)					
Eco-Efficient Processes for Deep Decarbonization of the Industrial Sector					
DENMARK (DTU)					
Development of ultra-high temperature hybrid heat pump for process application					
Norway (SINTEF)					
CETES					
COPRO Competitive power production from industrial surplus heat					
HighEFF: Centre for an Energy Efficient and Competitive Industry for the Future					
SWEDEN (Chalmers)					
A case study-based approach for targeting of potential future industrial excess heat availability accounting for possible deep decarbonisation measures					
ITALY (ENEA)					
Systems for Flexible Energy via Reuse of carbOn (SFERO)					

Project contributions for Subtask 3

Country/Institution/Project	Impact of seasonal changes on excess heat	Addressing complexity of industrial energy systems considering control, monitoring, self-learining assessment regarding excess-heat	Operational restrictions to be considered regarding internal/external use of excess heat
AUSTRIA			
CORES (AEE INTEC/AIT, TUW)			
DigitalEnergyTwin (AEE INTEC)			
SolarAutomotive (AEE INTEC)			
EDCSproof (AIT, TUW)			
Sinfonies (AIT, TUW)			
Norway (SINTEF)			
CETES			
COPRO			
SusOrgPlus			

Project contributions for Subtask 4

SUBTASK 4			
Country/Institution/Project	**Business cases**	**Projects addressing risks regarding excess heat projects**	**Excess heat projects not realized due to risks**
AUSTRIA			
TrustEE (AEE INTEC)			
Gmunden High Temperature Link (EI-JKU/TUW)			
Industrial MicroGrids (EI-JKU)			
S-PARCS (EI-JKU)			
FRANCE (Greenflex)			
Risk Matrix for excess heat recovery projects			
Norway (SINTEF)			
COPRO			

Subtask 5: Compilation of innovative excess heat projects

[Cooperation] – New Task 15, Subtas 4

Activity 1: The role of excess heat in industry and industrial symbiosis [Energy supply system, operational aspects in industrial energy systems, AI methods, connection to the power grid, electrification etc.]

Activity 2: (How to use) Process integration/intensification (strategy/benefits) [The role of different technologies in industry for optimal use of excess heat]

Activity 3: Ongoing Big projects and Experiences [Higher TRL level-research/industry innovative projects]

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References:

[1] Hofmann, R., Berntsson, T., Beck, A., Burrell, L.; Annex XV - Industrial Excess Heat Recovery, Combination of Methods and Operational Aspects for Industrial Excess Heat-Available Resources, Risk Minimization and Consequences of Future Changes in the Energy System, final report, 2022.

[2] https://iea-industry.org/tasks/annex-xv-industrial-excess-heat-recovery/

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