IEA Energy Storage TCP

Meeting of the UK National Team

29th June 2023; 10:00

Gill Davies, UK Department for Energy Security and Net Zero

Energy Storage Innovation Programme Manager

UK Delegate to the IEA Energy Storage TCP

Dr Jonathan Radcliffe, University of Birmingham

Reader in Energy Systems and Innovation

UK Alternate Delegate to the IEA Energy Storage TCP

Meeting Agenda

National Team meeting 10:00; Task 42 meeting 11:30 – 13:00

1. Welcome and introductions - Jonathan Radcliffe (University of Birmingham) and Gill Davies (DESNZ)
2. Update on energy storage innovation in government – Gill
3. Overview of the TCP – Gill
4. Role of National Team – Jonathan
5. Current/upcoming TCP activities – Jonathan
6. Q&A/Discussion – all
7. Next steps and close – Jonathan

2. UK Energy storage innovation - government update

3. Overview of the TCP

International Energy Agency

- Established in 1974 in wake of 1973-74 oil crisis, hosted by OECD, focus on energy security
- Current mission: “shaping a secure and sustainable energy future for all
- Membership: 30 member countries (plus three ‘accession’ countries – Chile, Israel, Lithuania) and eight association countries (Brazil, China, India, Indonesia, Morocco, Singapore, South Africa, Thailand)

Areas of work of IEA

- Promoting energy efficiency
- Ensuring energy security
- Promoting digital demand-driven electricity networks
- Programmes and partnerships
- International collaborations
- Data and statistics
- Industrial and global engagement
- Technology collaboration

Technology Collaboration Programmes (TCPs)

- Aim: to advance the research, development and commercialisation of energy technologies
- Basis of public/private research partnerships
- 38 TCPs; UK participates in 20 of them, with a government official as primary delegate, and expert 'alternate' delegate selected through competitive process
- 6000+ experts involved from nearly 300 public/private organisations in 55 countries
- Technology coverage: Buildings, Electricity, Industry, Transport, Renewable Energy, Fossil Energy, Fusion Power, Cross-cutting

TCPs are governed by a flexible and effective framework and are organised through an Implementing Agreement. TCP activities and programmes are managed and financed by their participants.

Energy Storage TCP

- Established in 1978 with aim of catalysing collaborative R&D on energy storage (EES and TES)
- Five-year Strategic Plan recently approved for 2021-2026
- Mission: to facilitate integral research, development, implementation, and integration of energy storage technologies to optimise the energy efficiency of all kinds of energy systems and to enable the increasing use of renewable energy instead of fossil fuels.
- Priority areas:
  - ***System Integration:*** enabling flexibility and sector coupling
  - ***Electrical Storage:*** systems aspects, new and innovative concepts
  - ***Thermal Storage:*** thermo-chemical/thermo-physical, PCMs, sensible heat TES
- Membership:
  - ***19 countries:*** Austria, Belgium, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Israel, Italy, Japan, Korea, Netherlands, Norway, Slovenia, Sweden, Switzerland, Turkey, UK, USA
  - ***2 sponsoring organisations:*** BVES (German ES Association), University of Seville
- Activities: 'Annexes'/'Tasks' – 43 since 1978; 9 currently 'live'; 2 just complete; 3 proposals
- Executive Committee meets twice/year, last time in May 2023 (Vienna), next in November 2023 (Berlin)

4. Role of the National Team

The UK ‘National Team’

The ‘Alternate Delegate’ is in charge of running the UK’s TCP activities and producing main outputs. Includes participating in TCP Executive Committee meetings and leading the National Team

Dr Jonathan Radcliffe has been appointed by DESNZ as AD from May 2023 – March 2025.

The National Team is a team of UK experts from industry, third sector and academia convened by the alternate delegate.

- At least annual meetings, with email updates between ExCo meetings.
- Further engagement by AD with stakeholders as required.

Aims of the meetings and engagement are to ensure that

- The activities of the TCP are fully disseminated to their respective UK industries and researchers.
- The UK takes an active role in the participation, management and development of the TCP and ensures their activities are beneficial for the UK.
- Activities across related TCPs are joined up, to avoid duplication and maximise added value through collaboration.

5. TCP Activities

Running tasks

Tasks described below, but in summary:

Energy storage in energy systems

- Task 32: Modelling of Energy Storage for Simulation Optimization of Energy Systems
- Task 35: Flexible Sector Coupling
- Task 37: Smart Design and Control of Energy Storage Systems
- Task 39: Large Thermal Energy Storages for District Heating
- Task 41: Economics of Energy Storage
- Task 42: System flexibility from Medium-Duration Energy Storage

Materials and components

- Task 40: Materials & Component Development for TES

Technology improvements

- Task 38: Ground Source De-Icing and Snow Melting Systems for Infrastructure
- Task 43: Standardized use of building mass as storage for renewables and grid flexibility

See https://iea-es.org/tasks/

Other tasks and activities

Tasks just finished

- Task 34: Comfort & Climate Box
- Task 36: Carnot Batteries

Task proposals/ideas

- Offshore and onshore Energy Islands
- Zero-carbon (industrial) heat and power supply
- Follow-up to Task 39: Large Thermal Energy Storage for District Heating

Enerstock conference 2024

"Enerstock is a leading international conference on energy storage, addressing the latest developments in science, policies, and deployment. It is organized every three years by the IEA Energy Storage Technology Collaboration Programme and attended by hundreds of experts."

Enerstock 2024 will be held in Lyon, 5−7 June 2024, see http://enerstock2024.org/

Important dates

- 1 July 2023: Extended abstract submission open
- 1 December 2023: Extended abstract submission deadline

ES-OnSeminar https://iea-es.org/events/

20 July 2023 at 14-15 CEST: Speakers will be Yvonne Bäuerle of the Eastern Switzerland University of Applied Sciences, talking on their latest developments in seasonal energy storage, and Geoffroy Gauthier from PlanEnergi talking about the PTES in Høje Taastrup, Denmark.

Which? *(Annex no., title)*	**Task 32: Open Source Energy Storage Models ('Open Sesame')** https://iea-eces.org/annex-32/
Why? *(Why necessary)*	To understand and foster the role of energy storage (EES and TES) in future energy systems (de-carbonised, cross-sectoral) by modelling and simulation Aim: The development of comprehensive models for relevant energy storage devices and input data sets for simulation. These models must be scientifically proven, open source and implementable.
Who? *(Operating Agent, participating countries)*	OA: Fraunhofer UMSICHT, Germany 18 participants from: Austria, Belgium, Canada, Denmark, France, Germany, Israel, Portugal, South Korea, Switzerland Collaborating with Energy Technology Systems Analysis Programme (ETSAP) TCP
When?	May 2020 – mid-2023 (final report at November 2023 ExCo meeting)
How? *(Subtasks)*	1. Test cases / input data: standardised data sets (demand, PG profiles) for different regions, open source 2. Storage model & data: mathematical description, open source demo 3. Application: app. for design & operation optimisation, assessing storage
What? *(Status, findings, etc.)*	• Collecting energy system data from partners, categorising models across 4 levels • Inventory of technologies and models • Application template

IEA ECES Task 32

In a nutshell

Situation and Aims

- **The situation** is, that the **energy system is changing** due to variable energy production, **decarbonization, decentralization, cross-sectoral** approaches etc., which requires new, more and various operated storage devices to balance demand and production.
- **The challenge** is, that there are hardly any scientifically proven, open source models for energy storage systems, which are an indispensable prerequisite for operation or structural optimization and for assessing the value of storage systems.
- **The task** is to develop a standardized **and** scientifically proven approach and methodology to asses various **storage devices** for various applications
- **The results** are **generic open source models** and **data sets**. These scientifically proven models should be used to find answers to current storage questions.
- **Benefit for society** is, that everybody could use these models and data sets for further research, application etc.

The overall aim of this Task32 is to understand and foster the **role of energy storages in the future energy system (decarbonized, cross-sectoral)** by modelling/simulation of energy storages, implemented in energy system models, and **assessing the benefit** to the energy system.

SCOPE

- **Electrical Storages (Power-to-power)**
  - Pumped Hydro (PH),
  - Compressed Air Storage (CAES)
  - Lead Acid Battery (LA),
  - Lithium-Battery (different types),
  - Vanadium-Redox-Flow-Battery (VRFB)
- **Thermal Storages (Heat-to-heat):**
  - hot water tank (stratified / mixed),
  - PCM
  - Seasonal storage (boreholes, pit, etc.)
    -> broader scope (seasonal!)

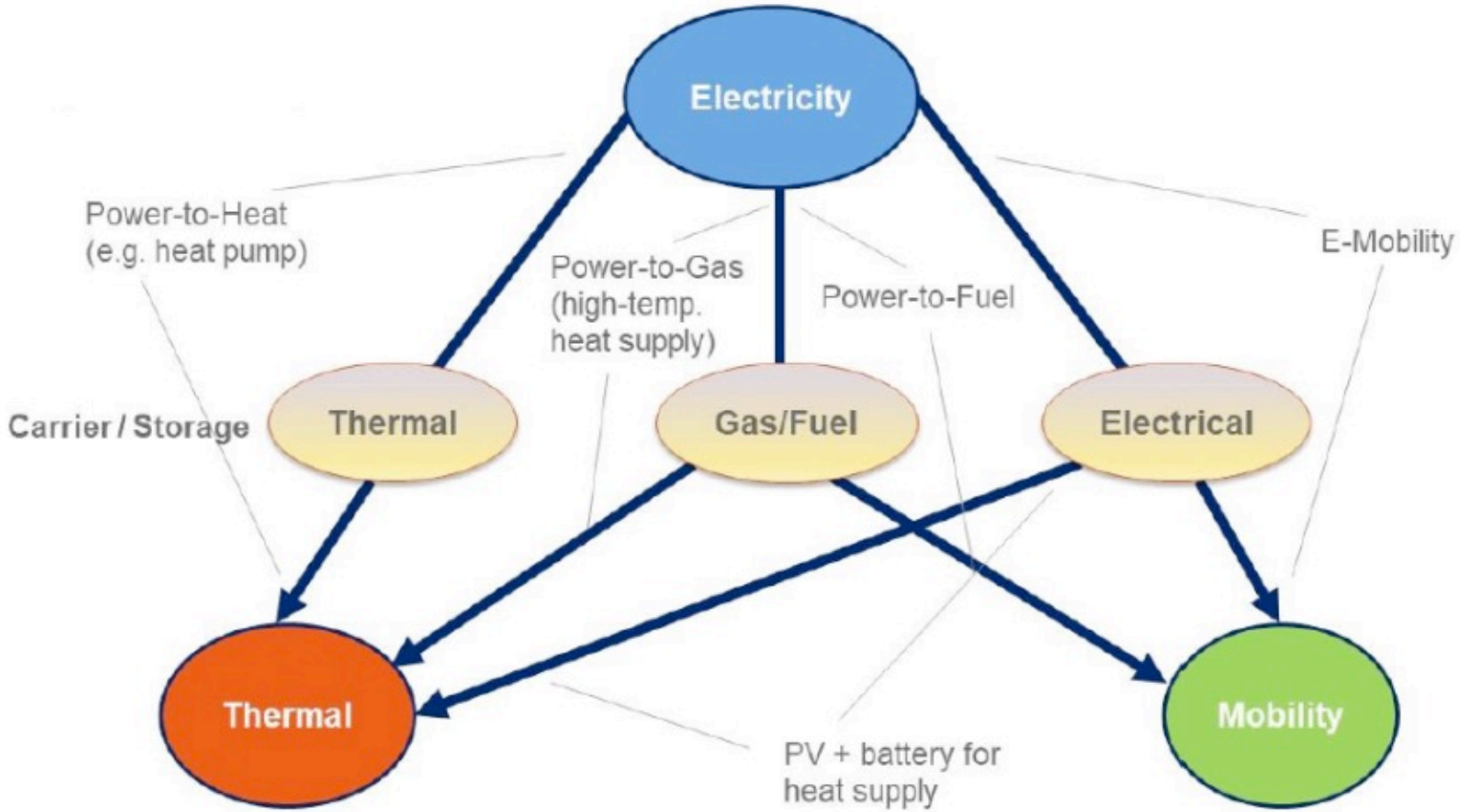
Status:
- ☐ DRAFT / without classification
- ☐ public [anyone]
- ☑ semi-public [interested parties]
- ☐ internal [closed group]
- ☐ confidential

Fraunhofer UMSICHT

Which? *(Annex no., title)*	**Task 35: Flexible Sector Coupling by Energy Storage Implementation** https://iea-eces.org/annex-35/
Why? *(Why necessary)*	Aim: To evaluate the possibilities and impact of implementing energy storage in the context of flexible sector coupling (FSC)
Who? *(Operating Agent, participating countries)*	OA: ZAE Bayern, Germany Countries: Austria, Canada, Denmark, Germany, Italy, Korea, Japan, Morocco, Netherlands, Sweden, Switzerland, Turkey, UK (BEIS) Collaborating with District Heating & Cooling (DHC) TCP, SIR, World Bank, IRENA
When?	Jun 2019 – Jun-2022; final report to ExCo in November 2023
How? *(Subtasks)*	1. FSC concept development 2. Configuration-related storage technology specs 3. Local energy system design & operation 4. National-scale energy systems analyses of FSC potential
What? *(Status, findings, etc.)*	• Scope: all ES technologies, all applications in H&C sector (i.e. all kinds of buildings, DH, process heat/cold for industry), all applications in mobility sector and all propulsion technologies (EVs, FCEVs, H2, etc.) • White Paper “Flexible Conversion of Renewable Electricity to the Thermal and Mobility Sector by Energy Storage Implementation” being drafted. • Will evaluate difference in terms of primary energy consumption and total system cost between reference scenario and one with no storage.

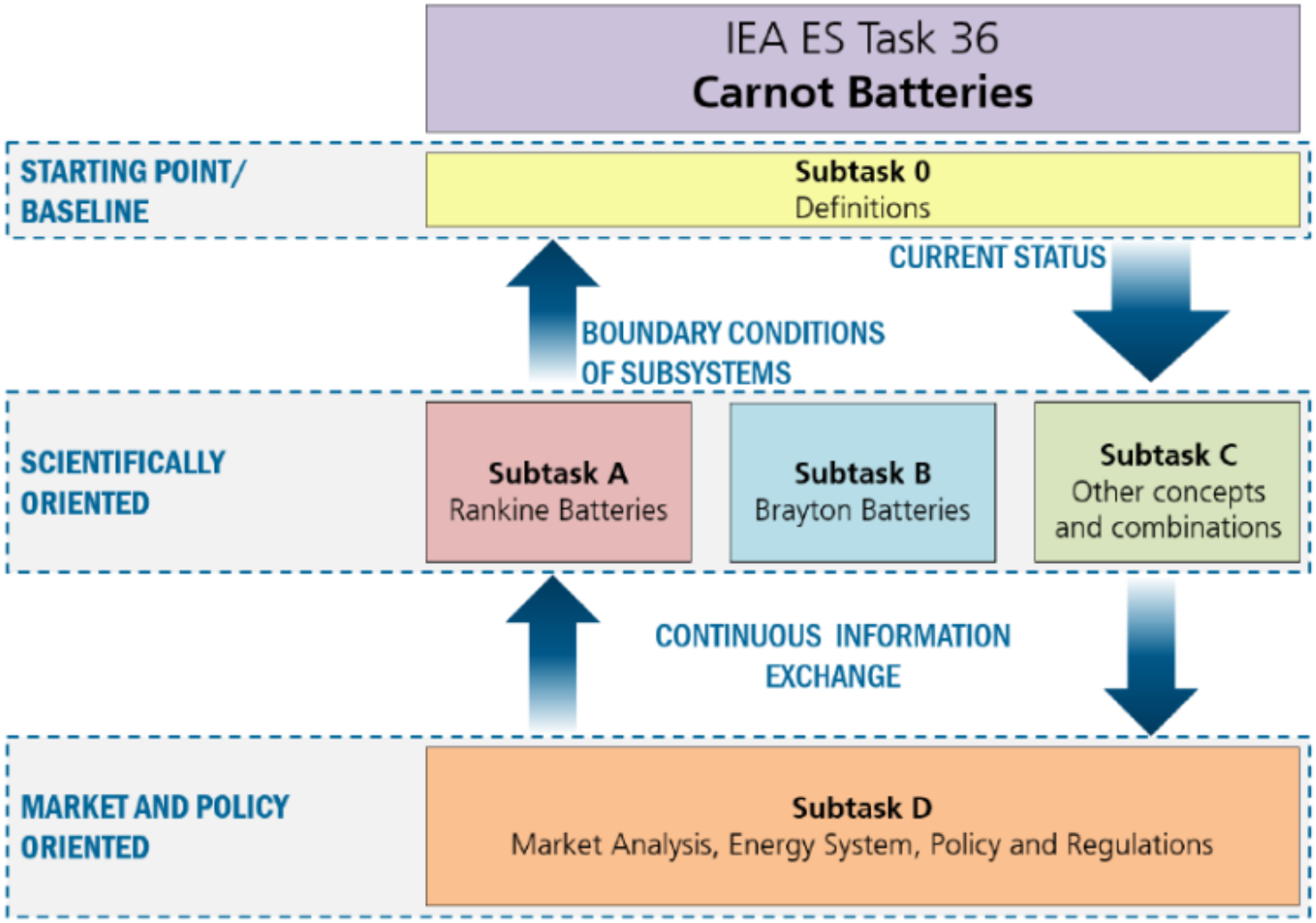
Task 35
Flexible Sector Coupling by the Implementation of Energy Storage

ZAE BAYERN



Which? *(Annex no., title)*	**Task 36: Carnot Batteries** https://iea-eces.org/annex-36/ and https://www.eces-a36.org/
Why? *(Why necessary)*	Aims to establish a platform that brings together experts from the industry and academia, to systematically investigate, assess and strengthen the potential role of Carnot Batteries in the future energy systems gaining international attention
Who? *(Operating Agent, participating countries)*	OA: DLR, Germany 28 institutions; from : Austria, Belgium, Czech Republic, Denmark, France, Germany, Italy, Japan, Korea, Netherlands, Sweden, Switzerland, UK (Durham Uni & Uni of B'ham, Highview Power, BEIS), USA
When?	Jan 2020 – Dec 2022; final report delivered May 2023
How? *(Subtasks)*	O. Definitions A. Rankine batteries B. Brayton batteries C. Other concepts & combinations D. Market analysis, energy systems, policy, regulations
What? *(Status, findings)*	• Carnot battery technologies and applications mapped and published in a White Paper. • KPIs of Carnot batteries systematically defined • Market analysis, assessing the current challenges and climate crisis, the barriers to deploy such technologies and policy recommendations were made • Wikipedia page https://en.wikipedia.org/wiki/Carnot_battery + review papers

Structure of Task 36



Which? *(Annex no., title)*	**Task 37: Smart Design & Control of Energy Storage Systems** (follow-up to 31) https://iea-eces.org/annex-37/
Why? *(Why necessary)*	To address the design/integration, control, and optimization of energy storage systems within buildings, districts, power grids, and/or local utilities. The research results will be organized as design materials and operational guidelines. AI is expected to feature prominently.
Who? *(Operating Agent, countries)*	OA: University of Tokyo, Japan 50 people have participated from 13 countries: Canada, China, Denmark, France, Germany, Italy, Japan, Norway, Slovenia, Sweden, Turkey, UK (Alan Turing Inst, Uni of Cambridge, Uni of Nottingham), USA
When?	Jun 2020 – Jun 2023
How? *(Subtasks)*	O. Smart technologies & SotA A. Prediction modelling B. Development/component C. Building & district design D. Optimal building/district control/operation E. Optimal grid control/operation/cooperation
What? *(Status, findings)*	• Three summer school workshops, May – July 2021 • Review paper on control methods and systems being drafted, find that AI-based control better solves both prediction of key influencing factors of the ES system (performance, weather, demand) and best solutions of control variables with multiple objectives. Savings 10 – 20%, but large variation.

ACTIVITY: RELATIONSHIP AMONG SUBTASKS

Subtask 0 Smart Technologies and State of the Art

Fundamental of Smart Tools/Technologies

Subtask A Demand & Supply Prediction

Conditions/Constraints for Energy Storage System

Subtask B Device/Component

Modeling for Device/Component of Energy Storage System

Subtask C Smart design/integration method in Buildings and Districts

Subtask D Optimal Building and District Control /Operation

Subtask E Optimal Grid Control/Operation/Cooperation

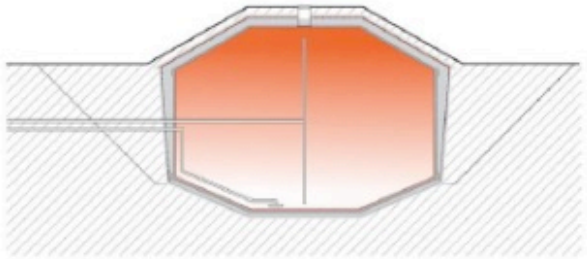
Which? *(Annex no., title)*	**Task 38: Ground-source De-icing & Snow Melting Systems for Infrastructure** https://iea-eces.org/annex-38/
Why? *(Why necessary)*	To contribute to the replacement of electrical resistance heater systems & expand utilisation of direct geothermal heating systems or GSHP technology in snow melting and de-icing of infrastructure. Scope includes TES.
Who? *(Operating Agent, participating countries)*	OA: Aysegul Cetin, Turkish Society of HVAC and Sanitary Engineers and Bijan Adl Zarrabi Chalmers University of Technology, Sweden Countries: Belgium, Finland, Germany, Italy, Sweden, Turkey
When? *(Start/end dates)*	Jul 2021 – Dec 2024
How? *(Subtasks)*	1. Market potential & SotA 2. Modelling of geothermal ES & de-icing systems 3. Development of system components for selected applications 4. Planning, construction & monitoring
What? *(Status, findings, etc.)*	• Review of state-of-the-art • Defined models and integration • Next meeting March 2024

The overall goal of the TASK38 is to contribute to expanding utilization of direct geothermal heating systems or ground source heat pumps in de-icing and snow melting of infrastructure.

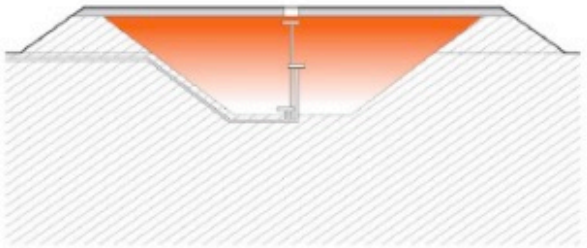
Which? *(Annex no., title)*	**Task 39: Large TES for District Heating** https://iea-eces.org/annex-39/
Why? *(Why necessary)*	To determine aspects that are important in planning, designing, decision-making & realising very large TES for integration into DH & for industrial processes. Scope: PTES, TTES, ATES & BTES (>50,000m3), water/soil as ES medium, seasonal/daily/multifunctional.
Who? *(Operating Agent, participating countries)*	OA: AEE INTEC, Austria 22 experts from: Austria, Canada, Denmark, France, Germany, Italy, Netherlands, Sweden, Turkey, UK (Nottingham Trent Uni, Uni of Birmingham), US Collaborating with Solar Heating & Cooling TCP, & District Heating & Cooling (DHC) TCP
When? *(Start/end dates)*	Oct 2020 – Nov 2023
How? *(Subtasks)*	1. Application scenarios, assessment of concept, integration aspects 2. Components & materials database 3. 'Round robin' simulation 4. Knowledge base for decision-makers
What? *(Status, findings, etc.)*	• List of KPIs almost complete • Database being developed • Five test cases for different LTES technologies/applications were calculated by 30 partners/models.

Scope

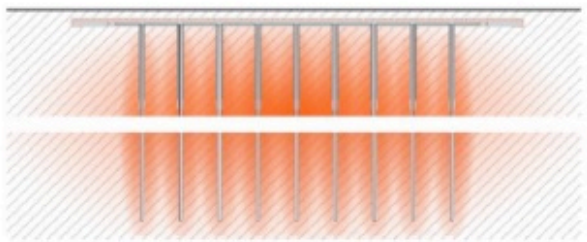
Tank thermal energy storage (TTES)



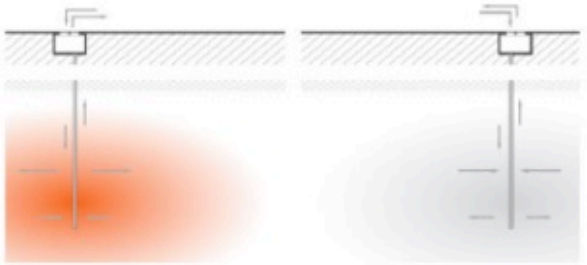
Pit thermal energy storage (PTES)



Borehole thermal energy storage (BTES)



Aquifer thermal energy storage (ATES)



- Water or soil
- Volumes > 50,000 m^3
- LTES in DH or in industries
- Seasonal storage, daily storage and multifunctional storage will be included
- Dissemination is targeted to decision makers in policy, municipalities, utilities and DH heating companies

Which? *(Task no., title)*	**Task 40: Materials & Component Development for TES ('TCM-PCM')** https://iea-es.org/task-40/
Why? *(Why necessary)*	To pick-up on some of the priorities emerging from Annex 33 including: synergies between PCM and TCM in terms of materials characterisation, materials database maintenance & extension, research into PCM and TCM degradation, determining state-of-charge (links materials research with TES systems integration issues), etc.
Who? *(Operating Agent, participating countries)*	OA: ZAE Bayern, Germany Countries: Australia, Austria, Canada, Denmark, France, Italy, Netherlands, Portugal, Slovenia, Spain, Sweden, Switzerland, UK (Uni Birmingham) Collaboration with Solar Heating and Cooling TCP (IEA SHC Task 67)
When?	July 2021 – June 2024
How? *(Subtasks)*	1. Materials characterisation & database 2. SoC determination 3. TES materials development 4. Stability of PCMs and TCMs 5. Effective component performance with innovative materials
What? *(Status, findings, etc.)*	Thermal materials database at https://www.thermalmaterials.org/ Survey of current state of knowledge on SoC determination. Survey on component performance.

Scope

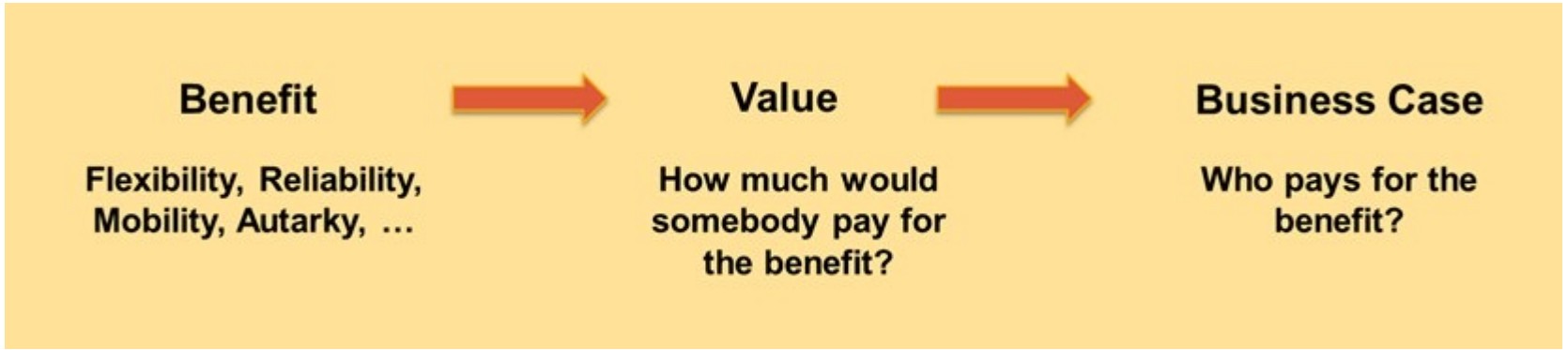
- CTES (Compact Thermal Energy Storage) materials
  - Phase Change Materials (PCM)
  - Thermochemical Materials (TCM)

- CTES material…
  …characterization
  …development
  …improvement
  …testing in components (heat exchangers, reactors)

PCM
(e.g. ice, paraffins, salt hydrates)

TCM
(e.g. zeolite+water, NaOH+water)

Which? *(Task no., title)*	**Task 41: Economics of Energy Storage - EcoEneSto** https://iea-es.org/task-41/
Why? *(Why necessary)*	Overall objectives: • What is the value of energy storage in promising applications and how can it be quantified? • How can benefits and value of energy storage be translated into promising business cases?
Who? *(Operating Agent, participating countries)*	OA: Dr. Andreas Hauer, Beatrice Schulz, BVES, Germany 27 participants, including 5 companies, from Austria, Germany, Denmark, Italy, Japan, Netherlands, Spain, Sweden, United Arab Emirates, United Kingdom (Univ Bham, Swansea), USA
When?	July 2022 – June 2025
How? *(Subtasks)*	1. Methods to evaluate energy storage economics 2. Acceptable energy storage costs from application perspective 3. Success stories and difficult cases of energy storage systems 4. Energy storage valuation framework
What? *(Status, findings, etc.)*	• Discussion on how to include the internalization of external costs, life-cycle perspective and social impacts from cross-disciplinary studies. • Questionnaire being developed to source case studies and approaches on ES costs.



SUBTASKS

	What is to be done?	Subtask Lead
Subtask 1 Methods to evaluate energy storage economics	Collect and classify methods to evaluate storage economics	KTH, Sweden Felipe Gallardo
Subtask 2 Acceptable energy storage costs from application perspective	Extend top-down approach to all types of energy storage (both capacity and power)	ZAE, Germany Christoph Rathgeber
Subtask 3 Success stories and difficult cases of energy storage systems	Collect and analyse economically viable and non-viable examples	DTU, Denmark Jianhua Fan
Subtask 4 Energy storage valuation framework	Elaborate a method to develop business cases for energy storage systems	TNO, The Netherlands Joris Koornneef

Which? *(Task no., title)*	**Task 42: System flexibility from medium-duration energy storage** https://iea-es.org/task-42/
Why? *(Why necessary)*	Main goal is to support the introduction of medium-duration energy storage systems into energy systems worldwide, as a significant contribution towards achieving global Net-Zero both affordably and quickly.
Who? *(Operating Agent, participating countries)*	OA: Seamus Garvey, University of Nottingham Participants tbc from India, Japan, Denmark, USA
When?	Nov 2022 – Oct 2025
How? *(Subtasks)*	1. Definitions and Taxonomy 2. What does exist or could exist in the category of (LS-)MDES 3. Regional dimensions of MDES 4. What policy / financial frameworks could support MDES
What? *(Status, findings, etc.)*	• Kick-off meeting in June 2023

Task #42 LS-MDES Kickoff Meeting

Temporary Shared Drive Area:- **www.TinyURL.com/LS-MDES-task**

For other communication:- Seamus.Garvey@Nottingham.ac.uk

… BUT Please include “LS-MDES” as the first 7 characters in the Email title!

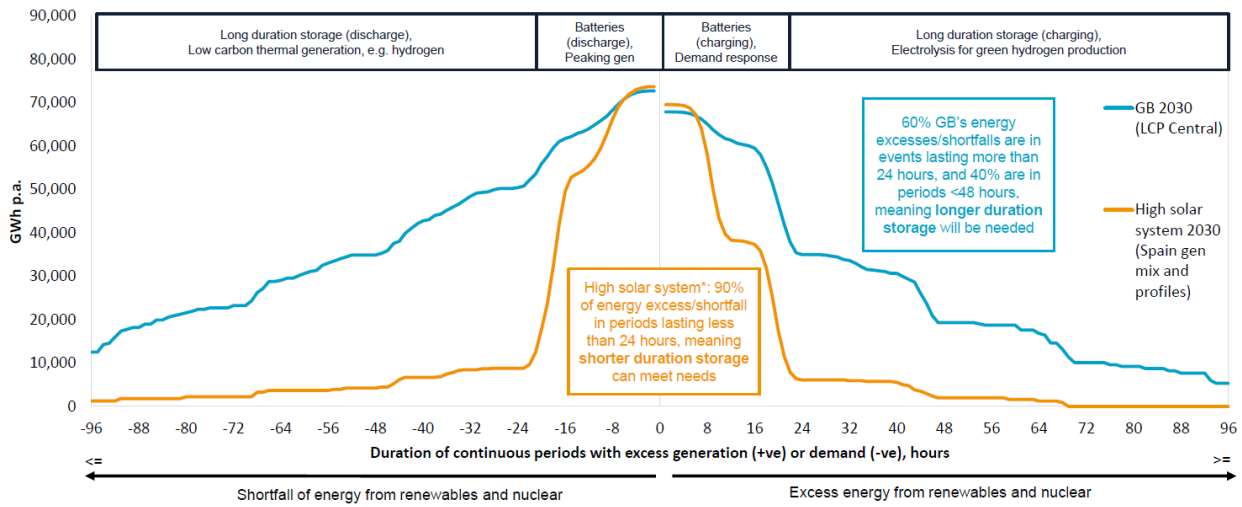
www.penguin.co.uk/articles/2021/03/hitchhikers-guide-galaxy-douglas-adams-42-facts

Need for longer-duration storage is particularly acute in GB

In 2030, GB will require vast quantities of energy to be stored over long periods to balance the system

LCPDelta

Energy in continuous periods of excess or shortfall of renewable generation: GB system in 2030 vs High solar system



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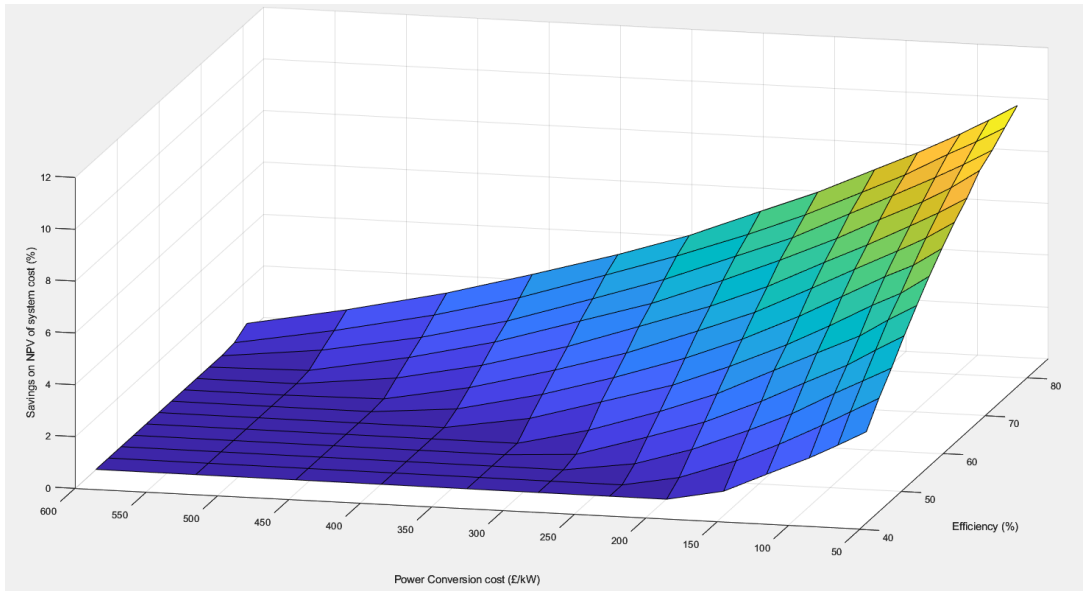

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https://us06web.zoom.us/rec/play/mew6KZlMnE4rusKfR4YVauRAVjYuHbHK7n_yn7SIA_nl3R7khl0ych90457dS_HzHE_RiMEUwIPwaVRD.Hzc7fS01UffwHw9D?autoplay=true&startTime=1681977859000

Which? *(Task no., title)*	**Task 43: Standardized use of building mass as storage for renewables and grid flexibility** https://iea-es.org/task-42/
Why? *(Why necessary)*	Main goal is to prepare the storage technology for widespread integration on an international level, harnessing the benefits of this storage on local, quarter and city level respectively.
Who? *(Operating Agent, participating countries)*	OA: Christoph Rohringer, AEE INTEC, Austria 35 participants from 10 countries: Austria, Belgium, Denmark, Spain, Germany, India, Italy, Norway, Sweden, UK (University of Derby, Northumbria University Newcastle).
When?	Jan 2023 – Dec 2025
How? *(Subtasks)*	1. Construction and Materials 2. System Integration and Control 3. Non technical challenges 4. Standardisation and KPIs
What? *(Status, findings, etc.)*	• Kick-off meeting in March 2023, sub-task meetings scheduled from July 2023.

Subtask A

Construction & Materials

Subtask B

System Integration & Control

Subtask C

Non-technical Challenges

Scientifically oriented

KPIs and boundary conditions

Research findings

Subtask D

Standardisation and KPIs

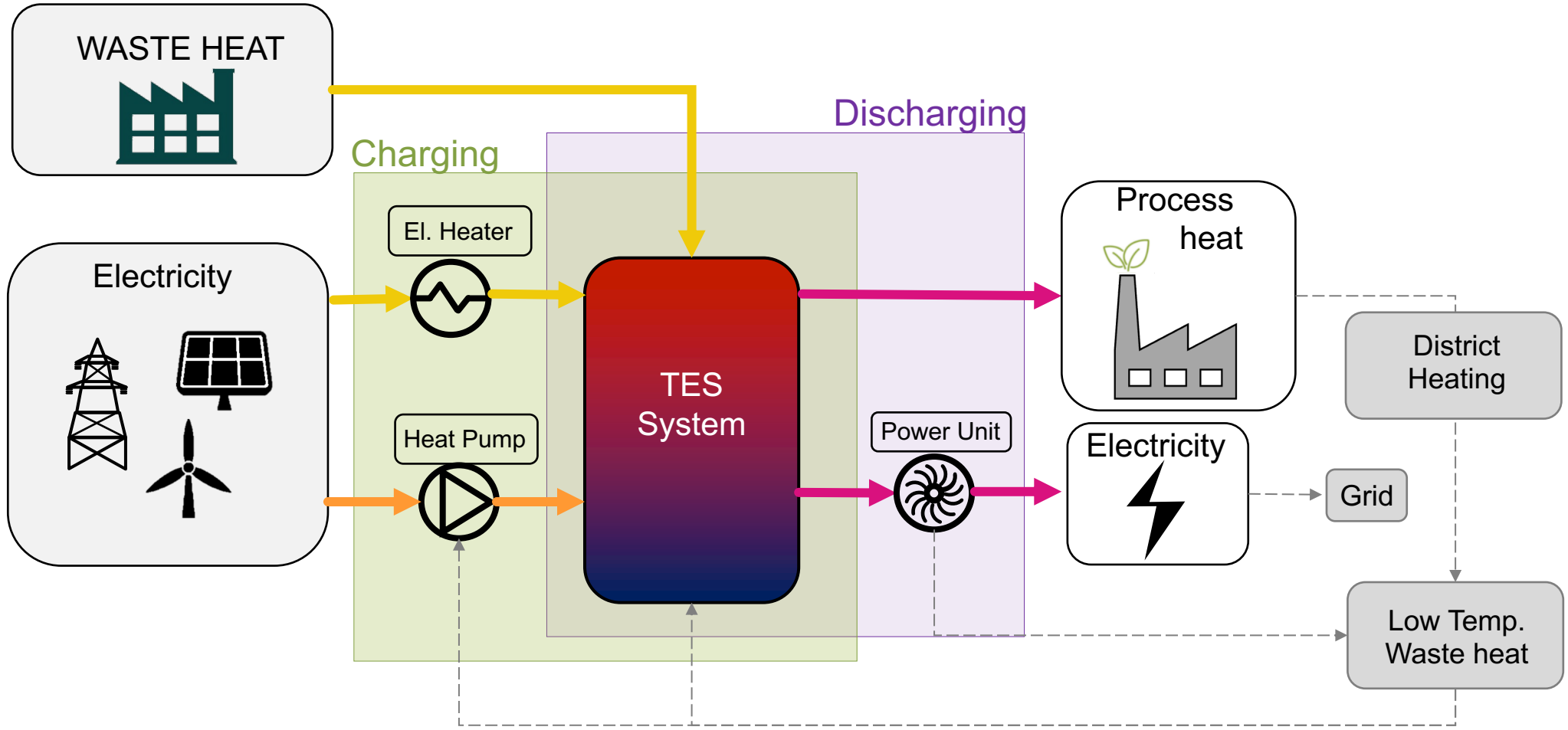
Towards generalization and market interaction

Proposed Tasks

Which? *(Task no., title)*	**<u>Tbc: Offshore Energy Hubs</u>**
Why? *(Why necessary)*	• The scale of offshore wind development -aiming at supplying wind power for end-user power consumption as well as supplying PtX transforming the energy systems • The urgency of the investments given the security of supply crisis • The novelty of the concept –not been done before at this scale • The mission-driven approach that embraces multiple and cross-disciplines
Who? *(Operating Agent, participating countries)*	Proposer: DTU Wind and Energy Systems Others tbc Preparing a Task under IEA Wind TCP – with active engagement with other relevant TCPs, e.g. Hydrogen and Energy Storage
When? *(Start/end dates)*	Task work plan to be discussed at next ExCo
How? *(Subtasks)*	Definitions –very new topic, need for definitions and terminology Information exchange –already some research projects on the topic, it would accelerate the knowledge creation Research gaps –identify, classify and propose roadmaps
What? *(Status, findings, etc.)*	

Which? *(Task no., title)*	**<u>TBC: Zero-carbon (industrial) heat and power supply</u>**
Why? *(Why necessary)*	Heat integration with thermal storage an excellent way to integrate large shares of renewable electricity in the heating sector and thus drive the decarbonisation of the heating sector. A systematic techno-economic and environmental assessment of this potential and the flexibility in design for power vs. heat is not characterised.
Who? *(Operating Agent, participating countries)*	Proposed by DLR Extends the work of Task 36 on Carnot Batteries
When? *(Start/end dates)*	Presenting to ExCo for approval, Nov 2023
How? *(Subtasks)*	To establish a platform that brings together experts from the industry and academia, to • systematically identify and assess the role of Power-to-Heat and heat integrated Carnot Batteries in the Energy Transition • and strengthen the international visibility of this option and create a common understanding of its potential in industry & policy.
What? *(Status, findings, etc.)*	

Scope - Multi Vector Energy Technologies
Power-to-Heat-to-[Heat & Power]



Which? *(Task no., title)*	**TBC: Follow-Up for Task 39: Large Thermal Energy Storage for District Heating**
Why? *(Why necessary)*	LTES is now broadly seen as solution to 100% renewable and independent DH systems, while outlook on cost balance has improved considerably The Task will work on technologies and applications on higher TRL, as in practice there is a large demand for knowledge on planning, design, building and operating LTES.
Who? *(Operating Agent, participating countries)*	Proposed by AEE INTEC
When? *(Start/end dates)*	Will present workplan at next ExCo, November 2023
How? *(Subtasks)*	Numerical Simulation LTES Materials Database Performance Checks Standards Dissemination Inventory
What? *(Status, findings, etc.)*	

Which? *(Task no., title)*	**<u>CCB2 – for hot and humid climates</u>**
Why? *(Why necessary)*	To highlight technological developments, opportunities, and challenges for “Comfort and Climate Box” solutions for specific warm and humid climates.
Who? *(Operating Agent, participating countries)*	BDH (NL)
When? *(Start/end dates)*	TBC
How? *(Subtasks)*	TBC
What? *(Status, findings, etc.)*	Proposal presented to ExCo, June 2021. More detailed work plan to be presented to ExCo, Nov 2021 The scope will include both residential and commercial buildings.

6. Discussion

7. Next steps