

The logo for AEE INTEC, featuring a yellow rectangular area above a dark blue curved banner containing the text "AEE INTEC" in white, bold, uppercase letters.

AEE INTEC

The logo for energy storage, with "energy" in green and "storage" in blue, connected by a blue circular arrow. Below it, the text "IEA Technology Collaboration Programme" is written in a smaller font.

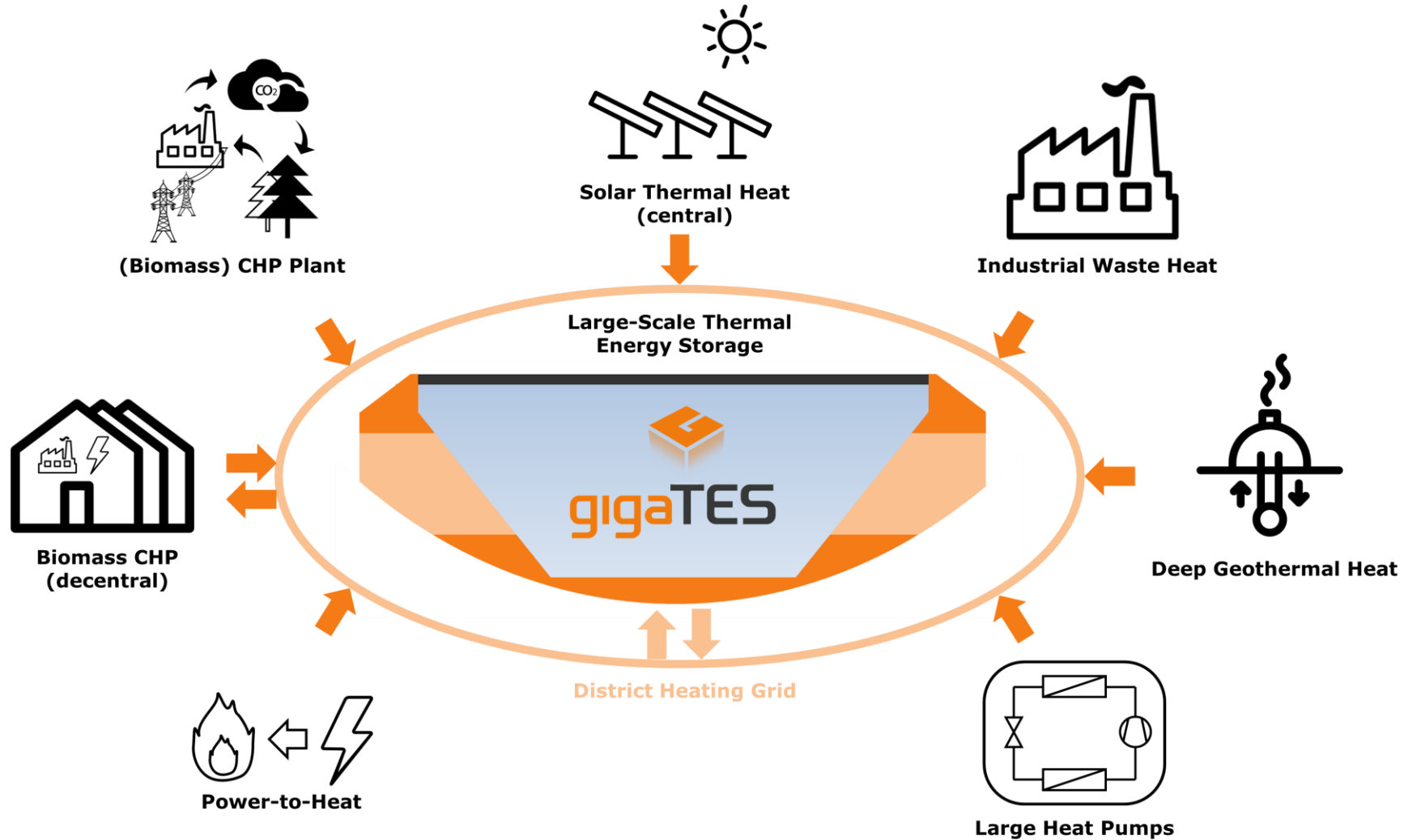
energy
storage
IEA Technology Collaboration Programme

IEA ES Task 45: Accelerating the Uptake of Large Thermal Energy Storages

IEA Energy Storage Onseminar, 23 April 2026

Wim van Helden, AEE INTEC, Austria

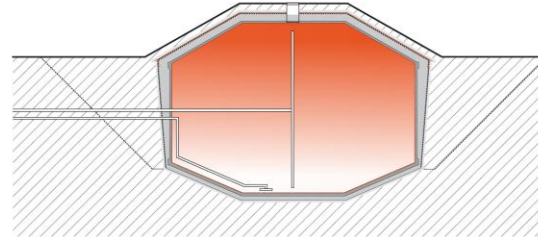
LTES as flexible element in future district heating systems and in industrial heat systems



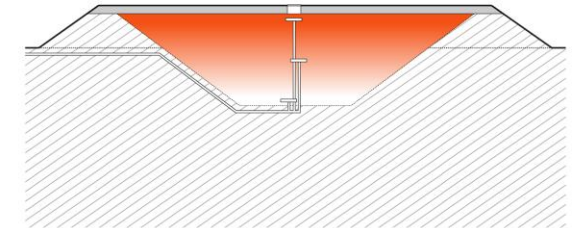
6 Large Ground-Based TES Technologies

Abbreviation	LTES technology
ATES	Aquifer TES, using water bearing layers in the subsoil
BTES	Borehole TES, vertical heat exchangers in the ground
CTES	Cavern TES, natural or artificial caverns in rock
MTES	Mine TES, using the water in old coal mines
PTES	Pit TES, water pits covered with an insulating lid
TTES	Tank TES, steel above-ground tanks

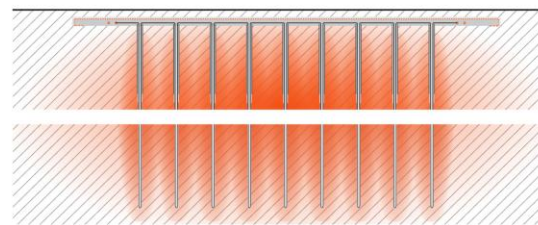
Tank thermal energy storage (TTES)



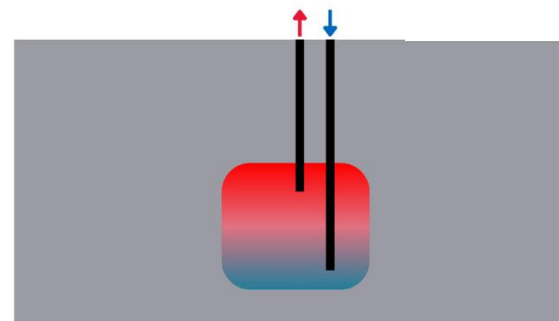
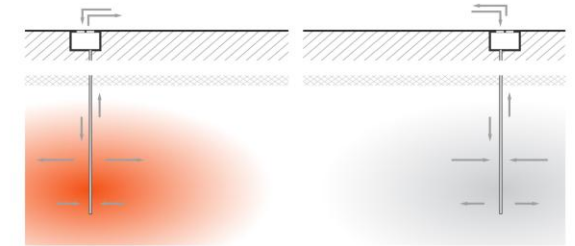
Pit thermal energy storage (PTES)



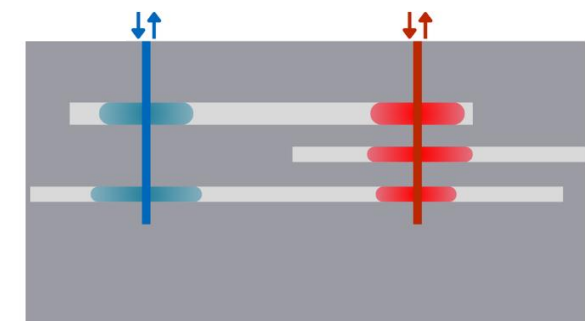
Borehole thermal energy storage (BTES)



Aquifer thermal energy storage (ATES)



(c) Cavern TES



(d) Mine TES

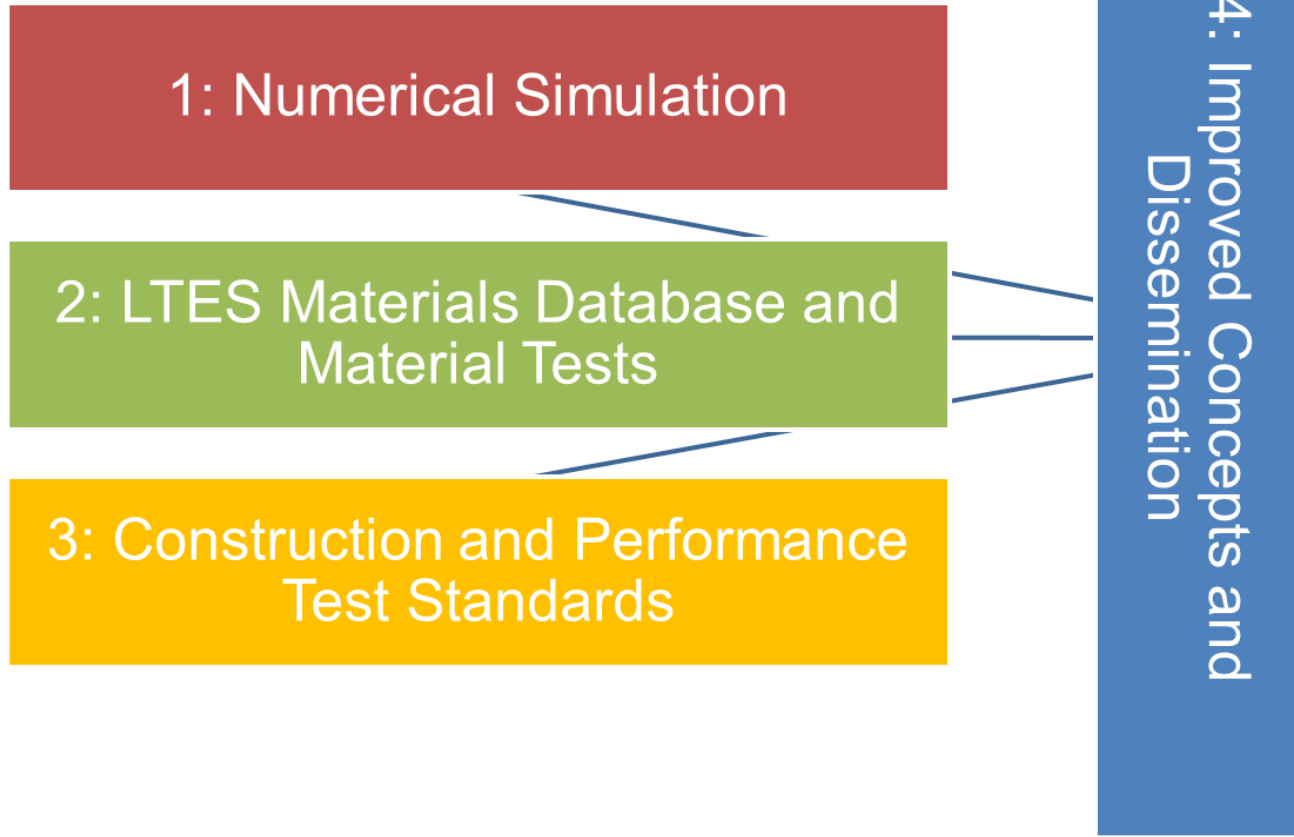
LARGE TES



The Task45 experts in one of the four large tank thermal energy storages of Aalborg Forsyning under construction.

Goal and Subtasks

Goal: To provide the framework and the knowledge to enable an accelerated uptake of LTES technologies by the market.



How to accelerate the uptake of LTES systems?

Measures to accelerate the uptake of LTES

Raising awareness

- Information about technologies, processes, permits, procedures, ...
- Active dissemination to and participation of stakeholders

Reduce uncertainties

- Awareness on permitting; uniformity of procedures
- Work on standardisation; key performance indicators

Shorten the realisation time

- Uniform communication and protocolling; experience exchange

Decrease costs

- Component and process developments; experience exchange

Subtask 2: LTES Materials Database and Material Tests

Subtask Manager: Bijan Adl-Zarrabi, Chalmers University, SE.

Goal: Create database with material properties, work on descriptions of measurement methods at higher temperature and describe lifetime calculation models

- 2.1: TES Materials Database

Validate and broaden the present database and find agreements on standards for testing.

- 2.2: Material Test Methods (Influence of moisture at higher temperatures and of oxygen)

Establish a fast measurement method for determination of the moisture- and oxygen dependent material properties and determine influence on lifetime.

- 2.3: Lifetime Calculation Models

Development of methods to determine the materials lifetime, including the effect of moisture.

Subtask 3: Construction And Performance Checks Standards

Subtask Manager: Nathan Fournier, Newheat, FR.

Goal: Development towards a set of standards that are fully adapted to LTES, addressing all the steps of the project development.

- 3.1: Guidelines for Construction and Legal Aspects
Collection and analysis of existing documentation on project realisation, legal aspects and environmental assessments.
- 3.2: Guidelines for LTES Performance Assessment
Propose guidelines on the test procedures to quantify the KPIs from Task39.
Validate the procedures with case studies.

Links:

Leaflets and further Documentation on the Task39 Website:

<https://iea-es.org/task-39/>


Giga_TES final report: <https://gigates.at/index.php/en/publications/reports>

TREASURE: <https://www.treasure-project.eu>

InterStores: <https://interstores.eu/>

USES4HEAT: <https://www.uses4heat.eu/>

Task45: <https://iea-es.org/task-45/>

 Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie

 **IEA Forschungskooperation**
im Rahmen von open4innovation

All information material on the T39 website

Guide/overview of IEA-ES Task 39 deliverables

Subtask A Deliverables

Leaflet – Task brochure – Introduction

Leaflet – Task brochure – Use Cases

Report – Method to carry out an LTES project – Important questions and KPIs – Synthesis

Report – LTES project development case studies

Feasibility study – Analysis of LTES application for public/military communities located in different climate zones

Main report (STA) – Method to carry out an LTES project – Main stages, case studies and KPIs

Database – List of LTES projects

Subtask B Deliverables

Main report (STB) – Components and materials database

Annex 1 (STB) – Requirements for water quality in pit thermal energy storages

Subtask C Deliverables

Report – Numerical models list – Overview and collection of model fact sheets

Report – Modelling guidelines – Round robin test case description

Template – Modelling guidelines – Stage 1 load profiles for test cases

Template – Modelling guidelines – Stage 1 result template for test cases

Filled templates – Results of stage 1 round robin test case simulations – Result files

- Results from test case **ATES-1**
- Results from test case **BTES-1**
- Results from test case **PTES-1-C**
- Results from test case **PTES-1-P**
- Results from test case **TTES-1-AG**
- Results from test case **TTES-1-UG**

Subtask D Deliverables

Policy workshop – Are LTES a key element of the future energy system?

Website – LTES live and historical monitoring data



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IDEA TO ACTION

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<https://iea-es.org/task-45/>