IEA-ES TASK 39
LARGE THERMAL
ENERGY STORAGES
FOR DISTRICT HEATING

Geoffroy Gauthier

PlanEnergi

energy storage
IEA Technology Collaboration Programme
WHY FOCUS ON LARGE THERMAL ENERGY STORAGES (FOR DISTRICT HEATING)?
HEAT IS EVERYWHERE

• Target of 100% renewable energy generation
• 50% of the world energy use is heating & cooling
• Heat is:
  • Easy to produce
  • Can be stored at very large scale (GWh)…
  • …over long periods
  • Cheap to store at large scale
• Yet hardly known/developed/invested in
HEAT IS CHEAP TO STORE

• How cheap?

From 4€/kWh to less than 1€/kWh

(PHS: 175€/kWh)

HEAT ENABLES RENEWABLES

• LTES provide:
  • More flexibility in DH Systems
  • Higher share of renewables and waste heat
  • Peak shaving, P2H (sector coupling)
  • Large variation of operational conditions: short term, long term, middle to very large district heating systems

• Larger storages are needed:
  • To serve larger DH systems and other large applications
  • To further reduce specific costs of renewables
WHAT IS IEA-ES TASK 39?
AN INTERNATIONAL TCP ON LTES

• 11 countries
• 33 organizations
• Many R&D partners…
• …and industrials

<table>
<thead>
<tr>
<th>Country</th>
<th>Organisation</th>
<th>Type</th>
<th>Role</th>
<th>Country</th>
<th>Organisation</th>
<th>Type</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>AEE INTEC</td>
<td>R&amp;D</td>
<td>OA</td>
<td>Italy</td>
<td>CREAR (Univ. Firenze)</td>
<td>R&amp;D</td>
<td></td>
</tr>
<tr>
<td>AIT</td>
<td>R&amp;D</td>
<td></td>
<td></td>
<td>RSE</td>
<td>University of Florence</td>
<td>R&amp;D</td>
<td></td>
</tr>
<tr>
<td>UIBK</td>
<td>R&amp;D</td>
<td></td>
<td></td>
<td>University</td>
<td>R&amp;D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JKU</td>
<td>R&amp;D</td>
<td></td>
<td></td>
<td>Ecovat</td>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOLID</td>
<td>Industry</td>
<td></td>
<td></td>
<td>IF Technology</td>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>NRCan</td>
<td>R&amp;D</td>
<td></td>
<td>University</td>
<td>R&amp;D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>PlanEnergi</td>
<td>R&amp;D</td>
<td>WPL</td>
<td>Absolicon</td>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DTU</td>
<td>R&amp;D</td>
<td></td>
<td>MG Sustainable Engineering Afi</td>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rambol</td>
<td>Industry</td>
<td></td>
<td>Cukurova University</td>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aalborg University</td>
<td>R&amp;D</td>
<td></td>
<td>Gazi University</td>
<td>R&amp;D</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aalborg CSP</td>
<td>Industry</td>
<td></td>
<td>United Kingdom</td>
<td>Nottingham Trent Univ.</td>
<td>R&amp;D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CEA</td>
<td>R&amp;D</td>
<td></td>
<td>Birmingham Univ.</td>
<td>R&amp;D</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Newheat</td>
<td>Industry</td>
<td>WPL</td>
<td>United States</td>
<td>US Army Corps of Engineers</td>
<td>R&amp;D</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>Sollies</td>
<td>R&amp;D</td>
<td></td>
<td>WPL</td>
<td>Energy Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SIZ energie+</td>
<td>R&amp;D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TH Ulm</td>
<td>R&amp;D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solmax</td>
<td>Industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vattenfall Wärme Berlin</td>
<td>Industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fernwärmennetz Gräfeling</td>
<td>Industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AGFW</td>
<td>platform</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INVESTIGATING 4 MAIN LTES TECHNOLOGIES

• Water or soil
• Volumes >10’000 m³

• Daily, weekly and seasonal storage
• District heating or industries
WITH 4 SUBTASKS

Subtask A: Application Scenarios, Assessment of Concepts, Integration Aspects
- Requirements
- Cost Data
- Application Scenarios
- Simulation Results

Subtask B: Components and Materials Database
- Database

Subtask C: Round Robin Simulation
- Storage Concepts
- Best Practice Examples
- KPIs
- Planning Aspects

Subtask D: Knowledge Base for Decision Makers
- Simulation Guidelines
APPLICATION SCENARIOS & CONCEPTS

• List of projects
• List of KPIs
• Use cases
• Typical LTES implementation procedure
• Techno-economic analysis methodology
MATERIALS

• Materials database
• Materials test references
• Water treatment guidelines
SIMULATION MODELS

• List of tools/models
• Modelling guidelines, reference and comparison methodology
• LTES > 50’000 m³

Source: SOLITES
DISSEMINATION

• Assess information need

• Share task results: leaflets, upcoming workshop

• 14 countries for dissemination
  • More to come?
CREATING A GUIDE FOR DECISION MAKERS & PROJECT DEVELOPERS / OWNERS

1. Opportunity phase
   - Policy makers & general public

2. Design
   - Researchers & engineers

3. Tender
   - Project developers & contractors

4. Implementation/operation
   - Main actor
   - Target group

"Task 39 gives tools, references and methods to guide LTES projects stakeholders through the process"
INTERESTED?

- Contact the Task Manager or your national IEA ES TCP delegate, or me
  (see https://iea-es.org/)
THANK YOU!

Geoffroy Gauthier

gg@planenergi.dk

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