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SwissSTES - Swiss Seasonal Thermal Energy Storage Action Plan and Implementation

11th Swiss Symposium Thermal Energy Storage
January 26th – HSLU, Horw
Prof Dr Luca Baldini

Photo: Dronninglund Fjernvarme

Project goals / promise

“Swiss STES action plan and implementation”

- Holistic assessment of STES potential for Switzerland
- Identification of bottle necks and obstacles for STES implementation
- Provision of new / adapted technical STES solutions for the Swiss context
- Evaluation and showcasing of STES benefits through district heating case studies

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Challenges

- Climate change requires rapid decarbonization of heat
- Dunkelflaute events challenge the availability of supply in winter
- Renewable surplus heat in summer is wasted
- STES technologies are not readily available
- Low acceptance and recognition of STES
- Lack of proper economic STES evaluation

Major knowledge and experience gaps of seasonal thermal energy storage

Objectives

- Foster STES implementation for decarbonization and increasing security of supply.
- Quantification of Swiss STES potential
- Development and improvement of STES technologies and solutions
- Identification of technical and non-technical barrier

Research partners



SwissSTES Flagship (2024 – 2027, 48 months)

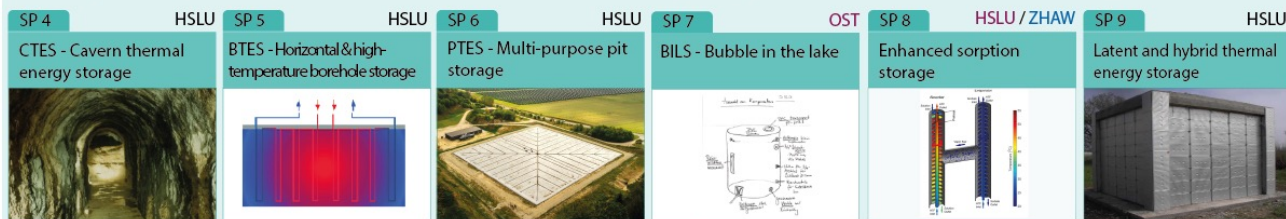
Sub-project (SP) 0

Flagship coordination and management

ZHAW

Technological development of seasonal thermal energy storage (STES)

Technological development of a portfolio of different concepts for seasonal thermal energy storage with different scales, requirements or technology readiness levels.



STES-potential assessment

SP 1

UNIGE

STES/supply potential
Identification and characterization of heat storage potentials, establishing geothermal heat sources and developing techno-economic assessment methods.

SP 2

UNIGE

GIS-based assessments
Application of GIS methods to create STES archetypes, multi-criteria analysis, renewable energy supply integration, and pre-assessment of STES options.

SP 10

OST

Case studies

Analysing the integration of STES in specific cases with industry partners. The case studies are aimed to initiate the realization of STES in Switzerland as pilot and demonstration projects.



SP 3

ZHAW

Non-technical STES evaluation

Multi-disciplinary identification of non-technical challenges to propose regulatory improvements, business models and explore the social acceptance to support an accelerated update of STES.

SP 3.1

Legal perspective

SP 3.2

Spatial planning perspective

SP 3.3

Social acceptance perspective

SP 3.4

Business model perspective

Synthesis - STES implementation and action plan

Development/improvement of new/established STES technologies	Identification of technical & non-technical barriers for STES implementation	Identified/quantified Swiss STES potential, available as data layers	Roadmap to address non-technical barriers for STES implementation
National inventory of storage opportunities & spatial hotspot maps	Design guidelines and implementation deduced from case studies	Measures best suited to close winter gap with STES	

Added value & impact

Environment

- Maximising the local integration of non-dispatchable renewables to support decarbonization of heat
- Effective peak shaving to save carbon-intensive generation
- Resource assessments to inform the potential to use STES to save emissions

Economic

- Lowering energy cost by reducing volatility as well as providing competitive costs (0.01-0.04 CHF/kWh)
- Reduction of winter gap in the order of 3-4 TWh

Society

- Coordinating stakeholders, capacity building and providing information and guidelines to enable STES implementation
- Reducing import dependency and improving the resilience of Switzerland
- Technological solution for supporting the Swiss energy transition
- Knowledge to build-up the required storage capacity for integrating renewables and addressing the winter gap



Bridging / closing the gaps ...

- **the knowledge gap**
- **the awareness / acceptance and expectation gap**
- **the technology gap**
- **the interdisciplinary collaboration gap**
- **the implementation gap**

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Partners

academic partners

implementation partners

advisory board

