



IEA Technology Collaboration Programme

Energy Storage in a transforming energy system; activities of ES TCP

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Conference: „Highlights of Energy Research 2021“
Energy Storage – Key element to energy transition
November 23, 2021- Online

- **IEA Technology Network**
 - Advancing research, development, and innovation of energy technologies
 - Providing the basis for international public and private research partnerships
- **ES TCP: one of 38 TCPs of the IEA**
 - 42 years of international RD&D collaboration, founded in 1979
 - Today, 21 countries with more than 150 experts participating in Tasks
- **ES TCP anticipates on the energy system transformation**
 - Solutions to battle climate change, sector coupling, need for flexibility and energy storage
- **Scope**
 - RD&D - Thermal (heating and cooling), electrical, chemical, and system aspects
- **Objectives**
 - International RD&D collaboration, outreach to (other) organisations, TCPs and sectors, increased deployment of storages, key messages for policy makers and IEA analysis

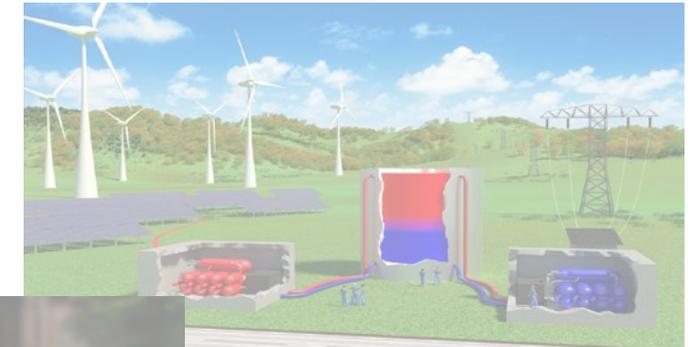
■ Situation

- Decarbonisation calls for a renewables-based energy system
- Electricity moves into the heart of this system
- Energy storage becomes crucial for flexibility and sector interaction, helping to provide the right form of energy at the right place and time
- Energy storage gains in value and, consequently, in scientific, public, and political interest



■ Challenges

- **Optimizing the balance** between (renewable) production, changing demand profile and energy infrastructure by flexibility options
 - Fitting energy storage in the system
 - Demand response, bi-directional communication
 - Opportunities in IoT and AI
 - Sector coupling
- Taking advantage of **new business models** and value chains
 - Economic value of energy storage
- Advance the **storage technology**



■ Research Priorities

- **System transformation** to decarbonized energy using storage
 - Bridging the time of production to demand
 - Sector coupling
 - Maximization of renewable production
- **Storage solutions** that are safe, affordable, compact and cost effective
 - Electrical (focus on new concepts and system aspects)
 - Thermal (TCM, PCM, Sensible heat/cold)
 - Hybrid Options (P2H, P2G as carrier serving system flexibility and integration)



■ Energy Storage in Energy Systems

- Modelling of Energy Storage for Simulation Optimization of Energy Systems
 - Open Source energy storage models in **Task 32**
- Flexible Sector Coupling
 - Distribution of renewable electricity to other sectors by energy storage in Task 35
- Smart Design and Control of Energy Storage Systems
 - A.I. for net-zero energy buildings in **Task 37**
- Large Thermal Energy Storages for District Heating
 - Decarbonisation of DH systems and enabling a more flexible operation in **Task 39**
- Economics of Energy Storage
 - Evaluate the economic efficiency of energy storage (planned new Task)
- Large Scale Medium Duration ES
 - Focusses on introduction of medium duration ES (planned new Task)

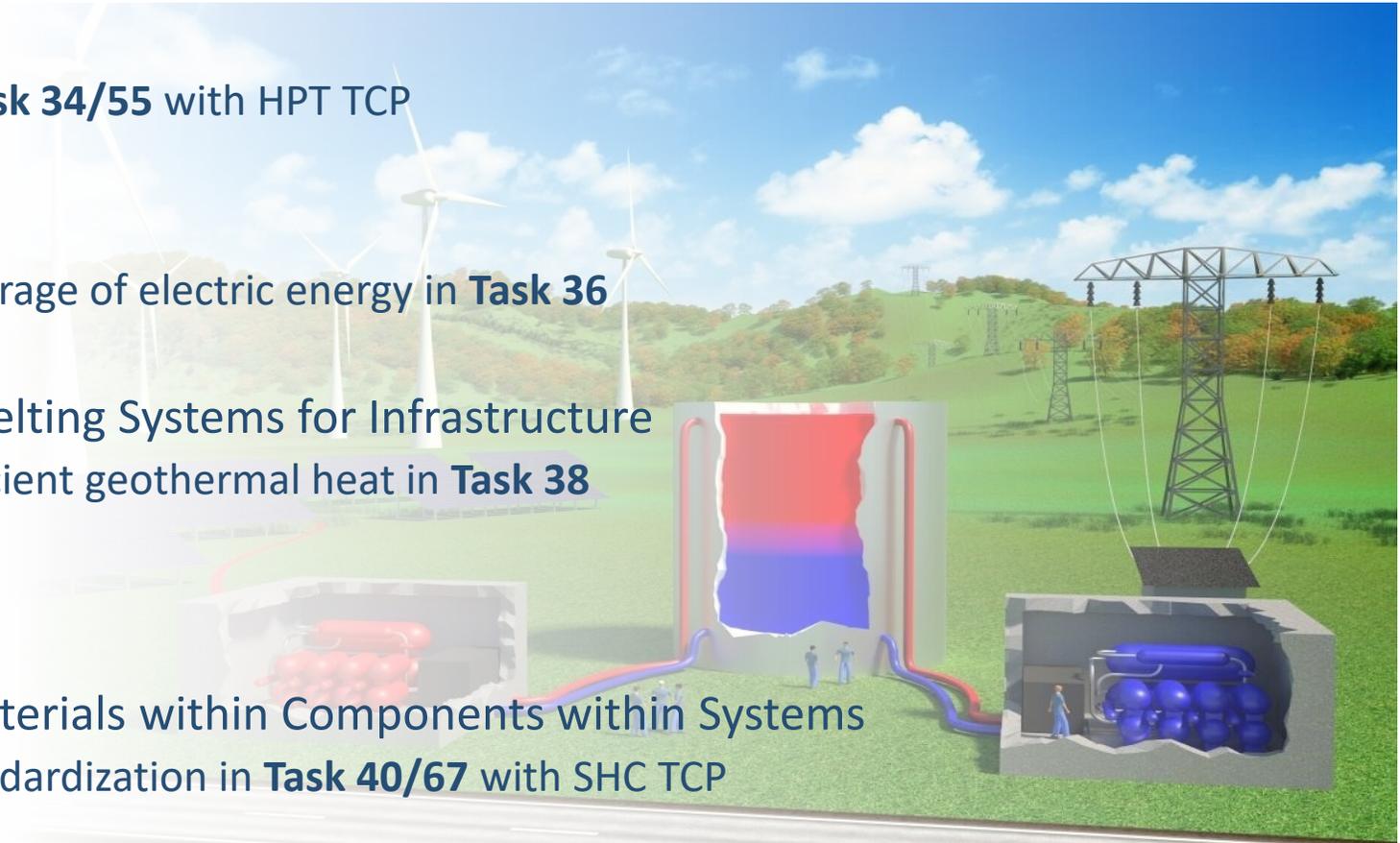


■ Technology Improvements

- Comfort & Climate Box
 - Heat pumps and energy storage in **Task 34/55** with HPT TCP
- Carnot Batteries
 - Inexpensive and site-independent storage of electric energy in **Task 36**
- Ground Source De-Icing and Snow Melting Systems for Infrastructure
 - Environment friendly and energy efficient geothermal heat in **Task 38**

■ Materials and Components

- Compact Thermal Energy Storage Materials within Components within Systems
 - PCM and TCM Development and Standardization in **Task 40/67** with SHC TCP

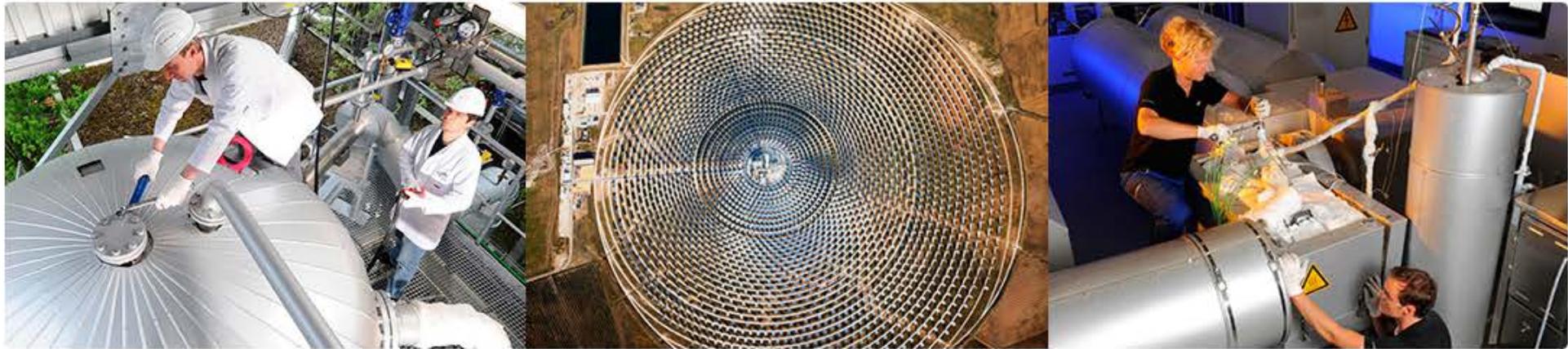


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- Check our website for more information on activities and Tasks

Energy Storage Technology Collaboration Programme

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**The Energy Storage TCP
Thank you for listening!**

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