



IEA Technology Collaboration Programme

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

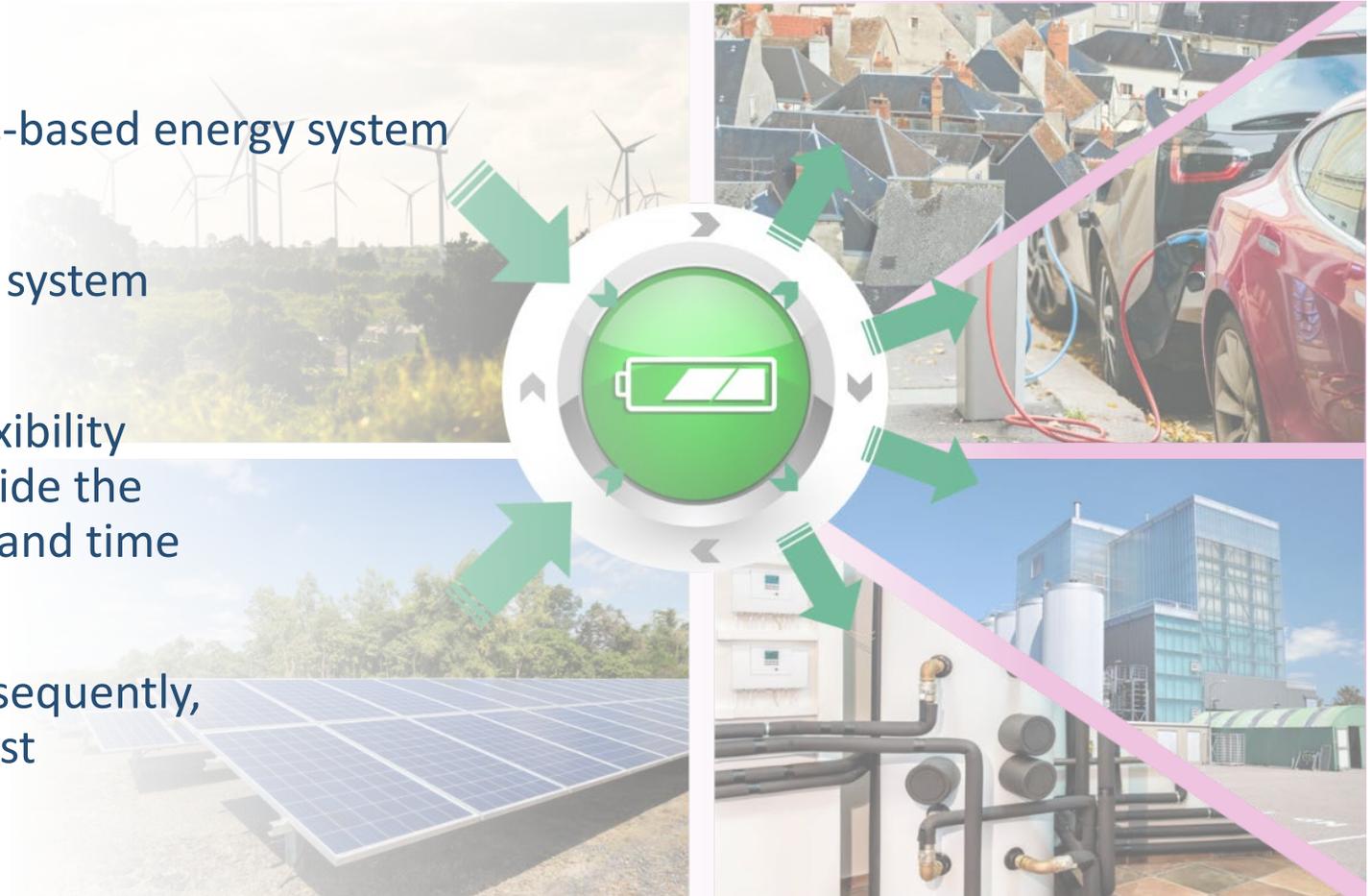
*Teun Bokhoven, Chairman of IEA ES TCP*

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**



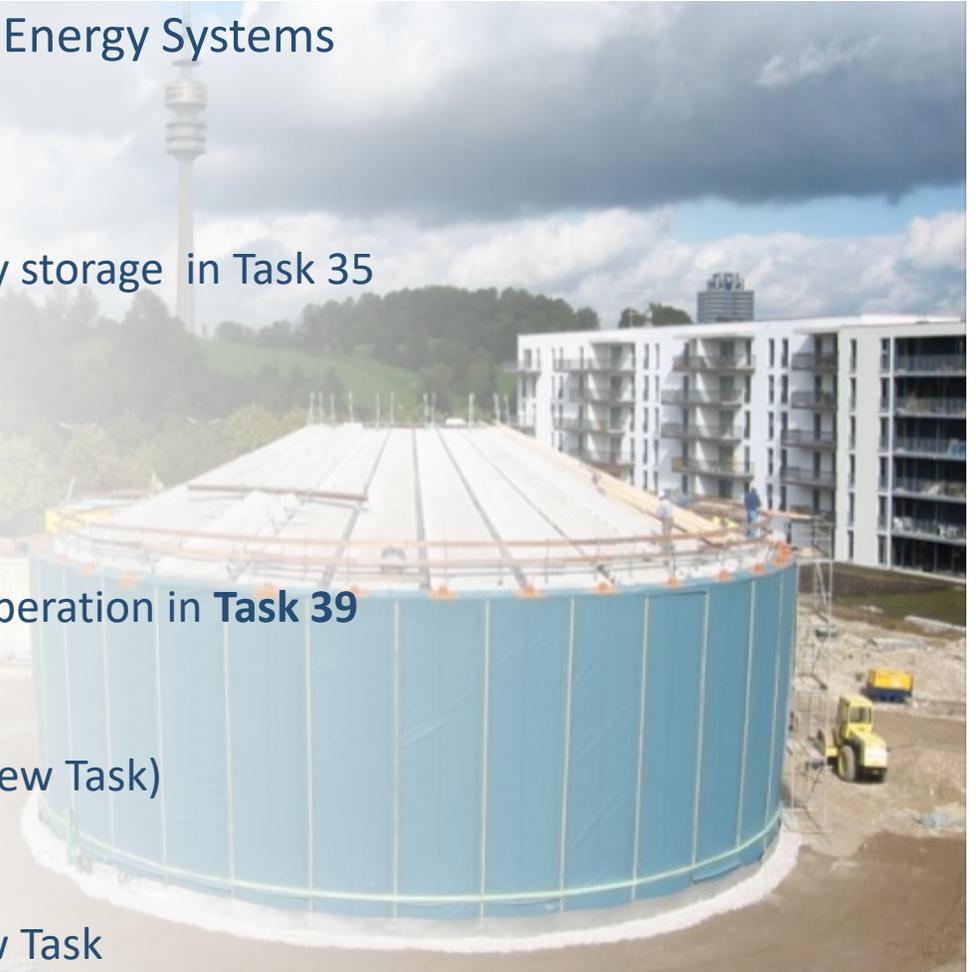
## ■ Research Priorities

- **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)

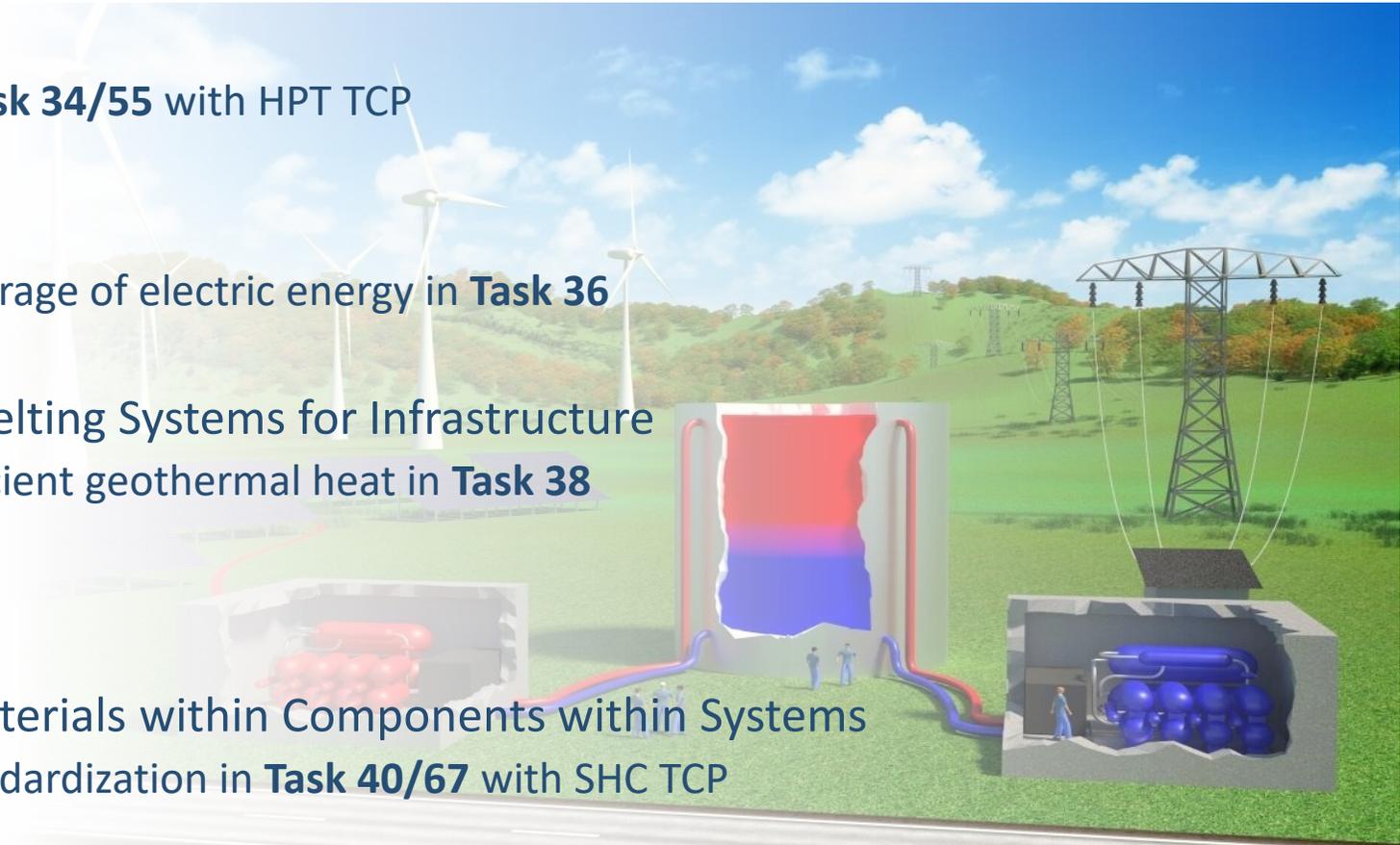


## ■ Technology Improvements

- 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

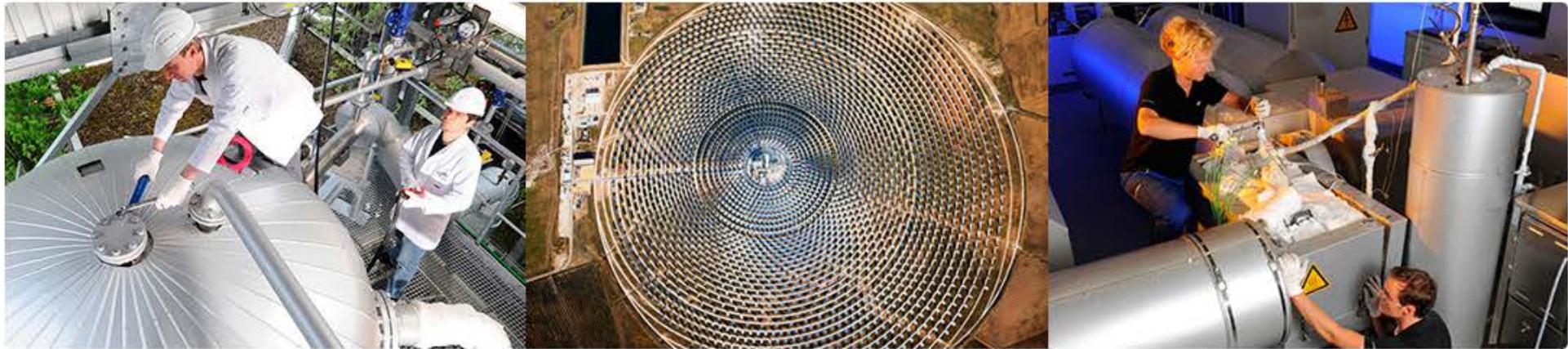


# Join our Community

- Check our website for more information on activities and Tasks

## Energy Storage Technology Collaboration Programme

Read our mission



- Sign up for our newsletter
- <https://iea-es.org>



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

*Views, findings, and publications of the ES TCP do not necessarily represent the views or policies of the IEA Secretariat or its individual member countries.*