

Technology Collaboration Programmes

Energy Storage

Future Buildings Forum
Singapore, 24/25th October 2017

*Teun Bokhoven , Chair IEA TCP –ECES
October, 2017*



About ECES TCP

■ Mission and scope

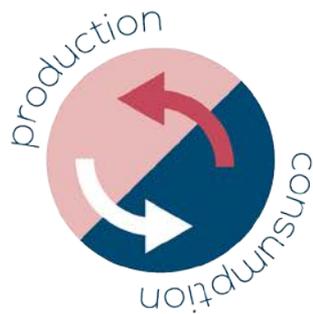
The TCP-ECES mission is to contribute in the energy transition toward a renewable energy based energy system by:

- Joint R&D + pre-standardisation work.
- Scope:
 - ◆ heating, cooling & electricity;
 - ◆ Central & Decentralised
- Integral solutions, impact on other domains like Solar, Heat pumps, SG, DHC, Energy Conservation.

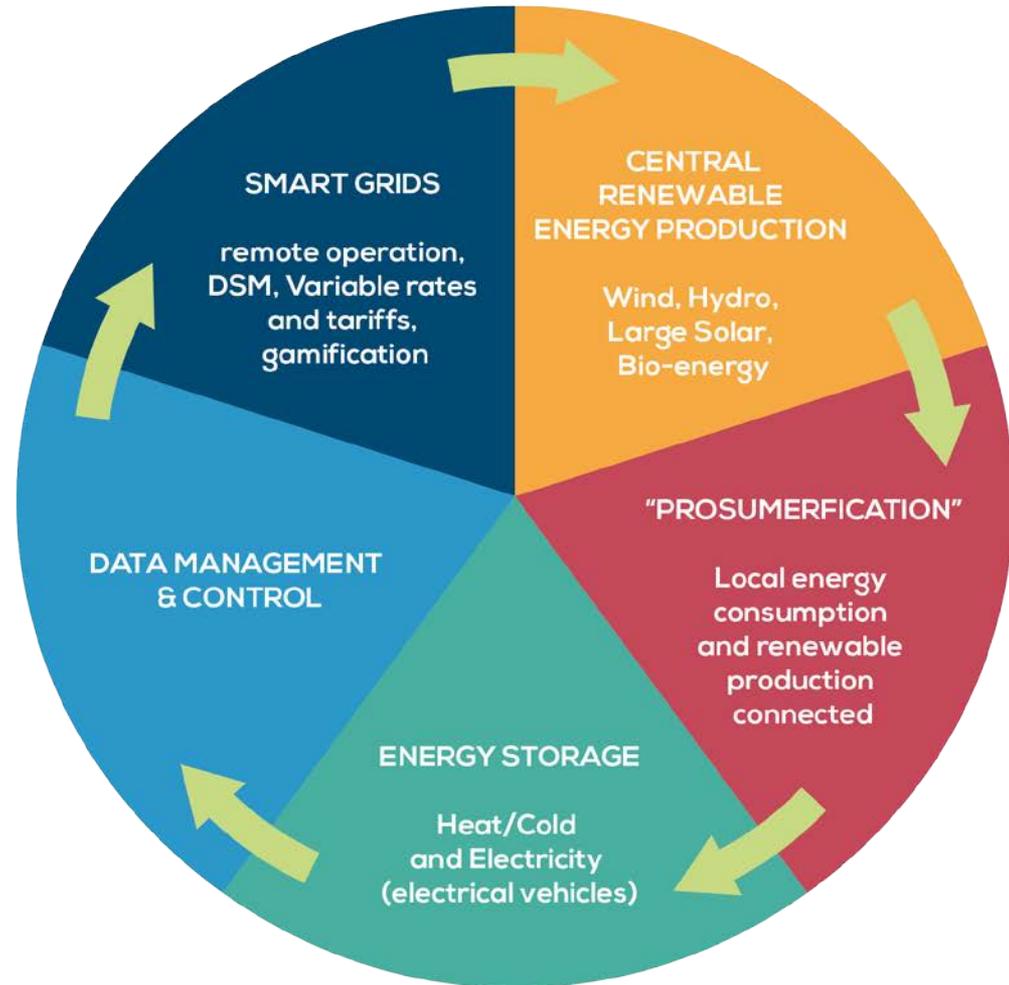
About ECES TCP

- **Current high-priority themes for energy storage in ECES**
 - **Thermal energy (for cooling & heating):**
 - ◆ Underground energy storage
 - ◆ Compact thermal storage
 - **Electrical energy:**
 - ◆ integration aspects in grids,
 - ◆ Storage in buildings and electric mobility
 - **Modelling:**
 - ◆ improve position of energy storage in models

The transition of our energy system

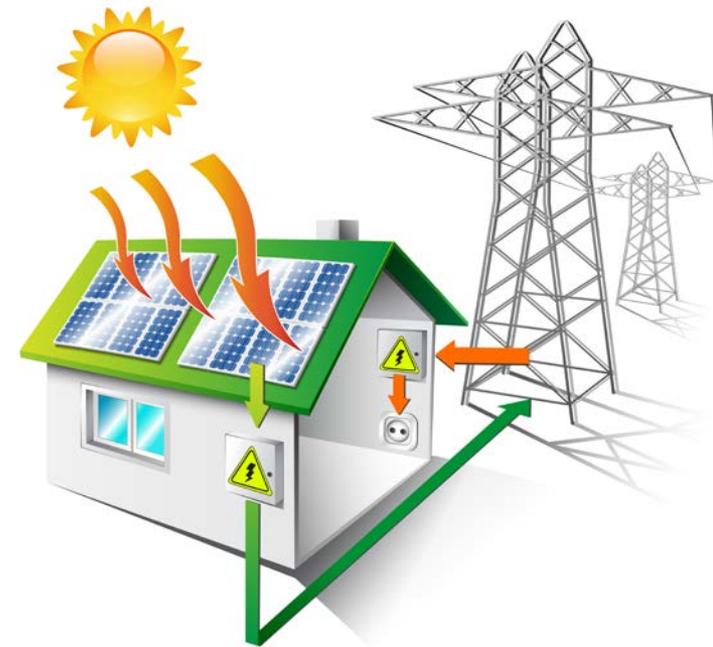
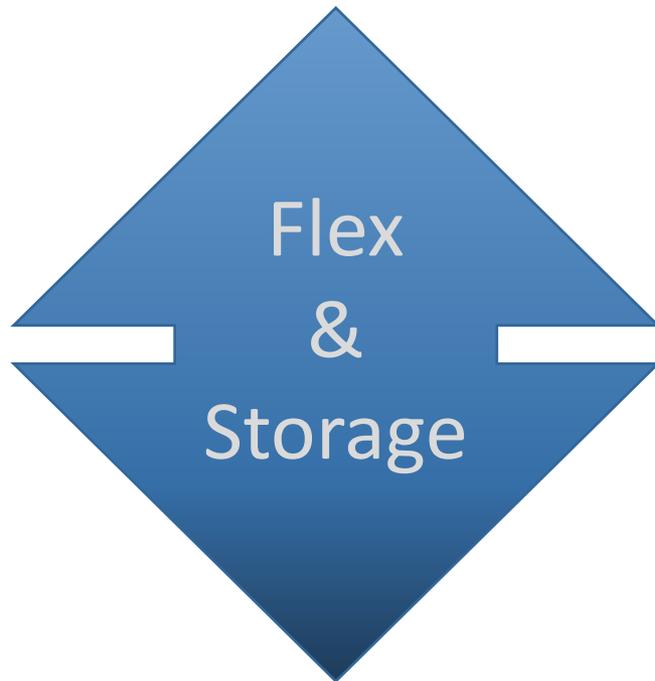


"old model"



The transition of our energy system

- Abundant (variable) renewable energy production



- (Changing) variable load profiles

Focus on storage and flexibility

■ Development

- Historical focus mainly on production and energy savings for heating, cooling and electricity consumption
- New domain: matching variable production and variable load profiles (+increased cooling demand and EV)
- Sector coupling required for comprehensive approach (P2C, P2H, P2P, P2M2P, etc)

→ Position of Energy Storage and Flexibility:

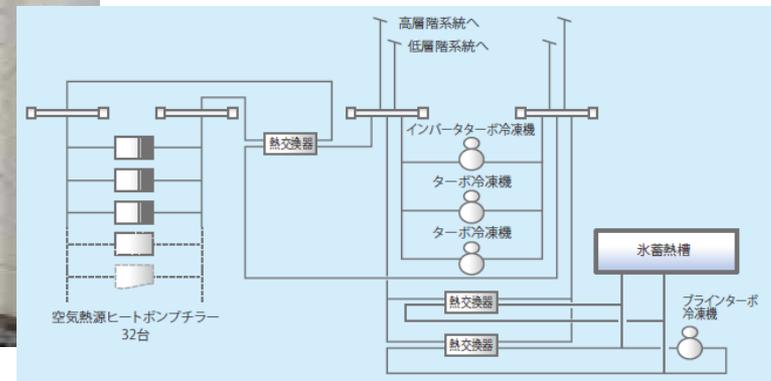


Storage and Cooling

■ Developments Cold Storage

- Decentralised options:
 - mainly for office buildings
 - proven technology
- Example: Japan

Abeno HARUKAS Buld. (OSAKA)



Storage and Cooling

■ Developments Cold Storage

● Centralised options:

- Mainly district cooling
- Using UTES (Underground storage) / Aquifers
- Proven technology

● Example: Netherlands

Greenhouses and office districts



Storage and Cooling

- Value (\$/€) and economics:
 - Value for storage determined by:
 - ◆ Cooling load / (additional) electricity cost for infrastructure
 - ◆ High dependency on day/night rates electricity
 - Economics require:
 - ◆ Dynamic pricing
 - ◆ Long term stability in pricing structure

ECES TCP / Mission Innovation

■ Challenge #7: affordable heating and cooling

Increased international effort to address need for decarbonisation of fast growing heating and cooling demand.

● Priority areas like:

- ◆ Energy storage (TES- heating / cooling)
- ◆ Heatpumps
- ◆ Cooling / heat rejection
- ◆ Predictive maintenance

● Work plan under development

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Thank you

Website: [www. https://iea-eces.org](https://iea-eces.org)

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