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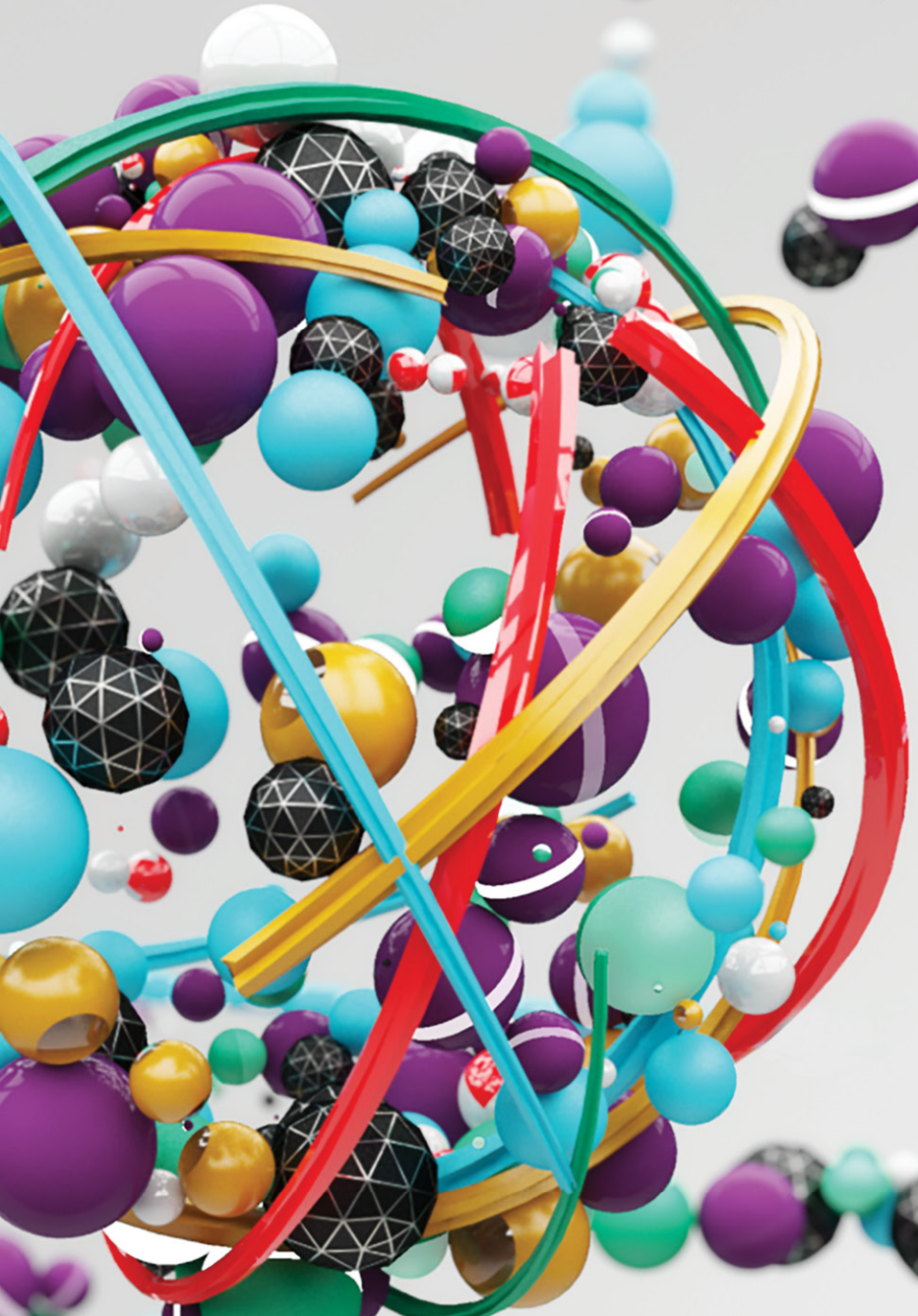

Energy Conservation through Energy Storage : (ECES TCP)

Gaps & Barriers for Energy Development and Deployment

Teun Bokhoven , Chair IEA TCP –ECES

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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:

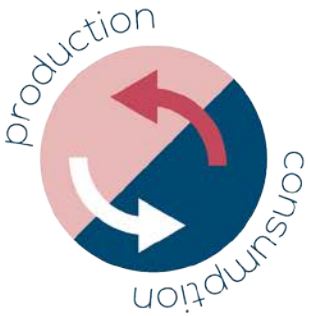
- Joint RD&D + pre-standardisation work.
- Scope: Both heating & electricity; Central & Decentralised
- Integral solutions, impact on other domains like Solar, Heat pumps, SG, DHC, Energy Conservationetc

	Participating countries
Contracting Parties	18
Sponsors	2

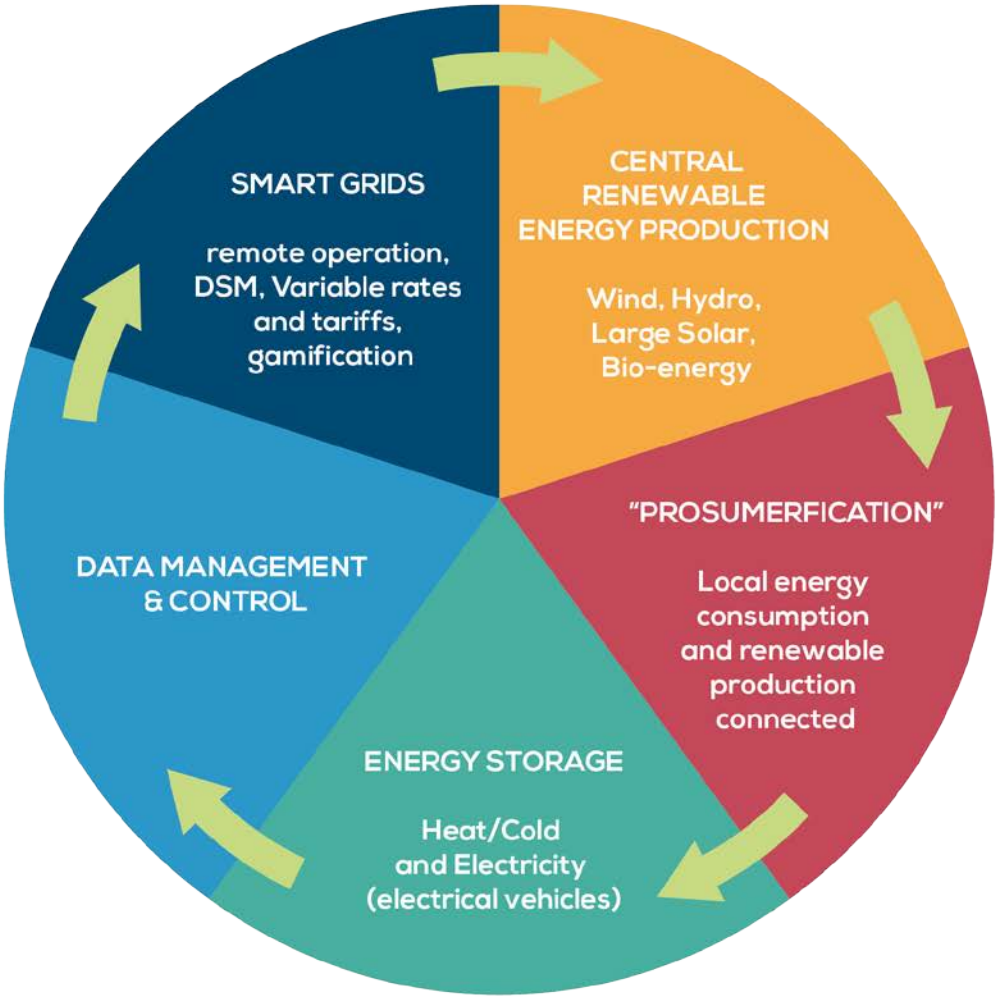
About ECES TCP

- **Current high-priority themes for energy storage in ECES**
  - **Thermal energy:**
    - 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

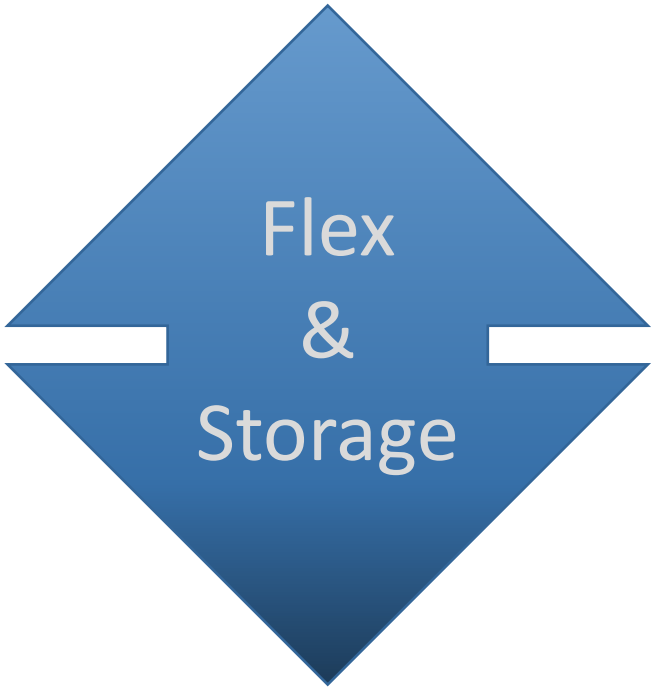


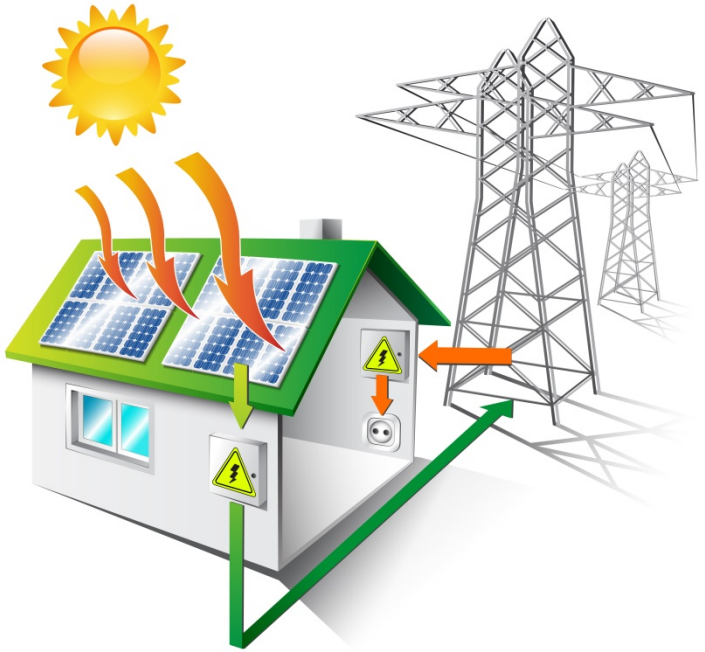
"old model"



The transition of our energy system

- **Abundant (variable) renewable energy production**





- **(Changing) variable load profiles**

Gaps & Barriers

- **Development**
  - Historical focus only on production and conservation
  - New domain: matching variable production and variable load profiles (incl. EV)
  - Sector coupling required for comprehensive approach (P2G, P2H, P2P, P2M2P, etc)

  → Position of Energy Storage and Flexibility:

Gaps & Barriers

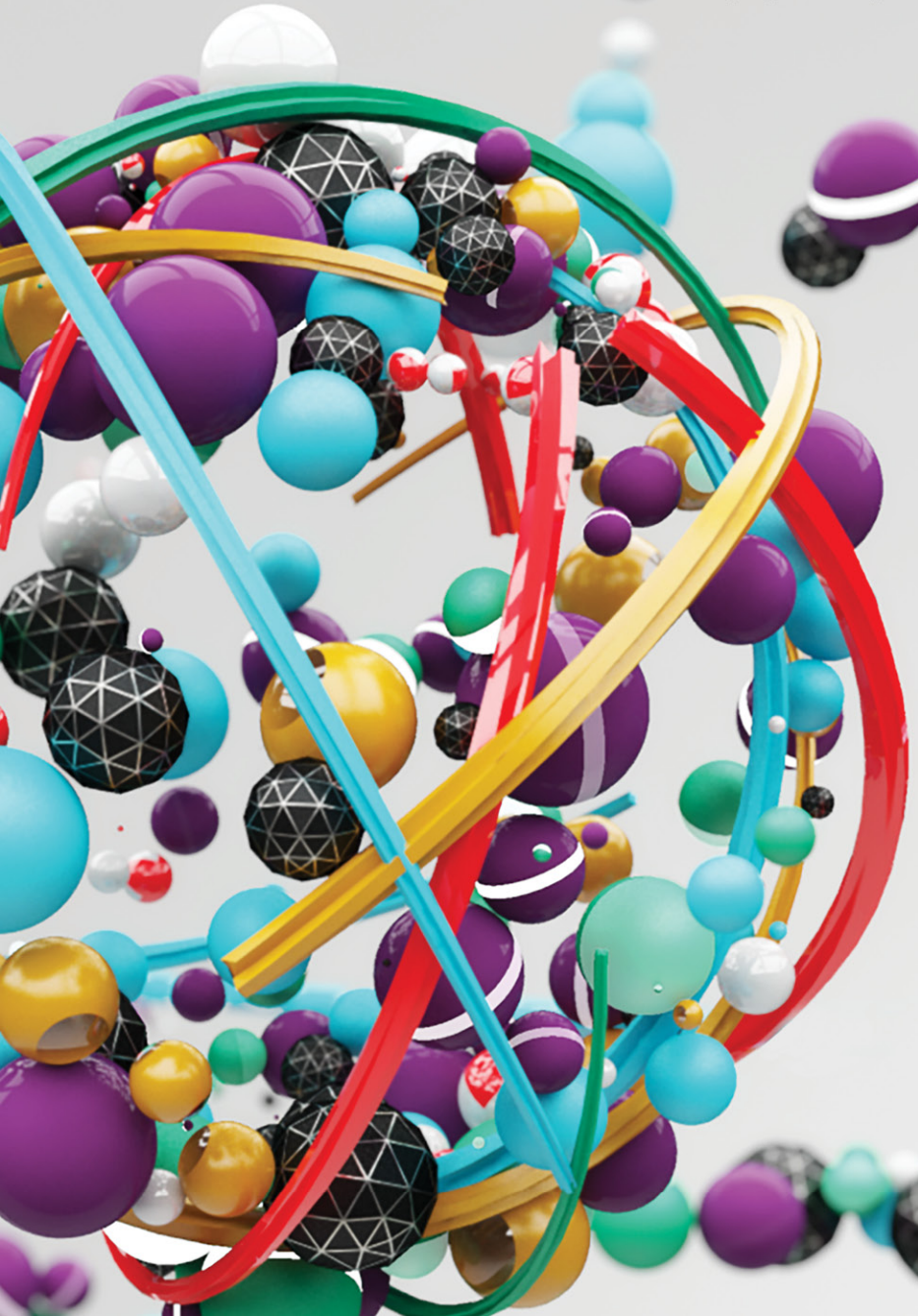
- **Deployment**
  - Regulatory barriers i.e.:
    - role of DSO/TSO
    - Dynamic pricing
    - Grid access
    - Prosumerfication
    - E-mobility
  - Value ($€) of flexibility and storage:
    - Grid cost vs cost for flex and storage
    - Pricing in energy markets
    - etc

Activities ECES TCP

Highlight of activities

Need for more fact-based information and development of technological solutions addressing efficient energy storage.

- Electricity grids (sec- hours);
- Buildings (to facilitate prosumerfication- both E & H)
- Low-temp heating / cooling by combined (compact) Storage & Renewables, like solar and heat pumps
- High temp. industrial applications (facilitate flex)
- Storage (and flex) in models
- Power to Heat, Power to Gas, etc



Thank you

Website: www. https://iea-eces.org

Teun Bokhoven
teunbokhoven@consolair.nl

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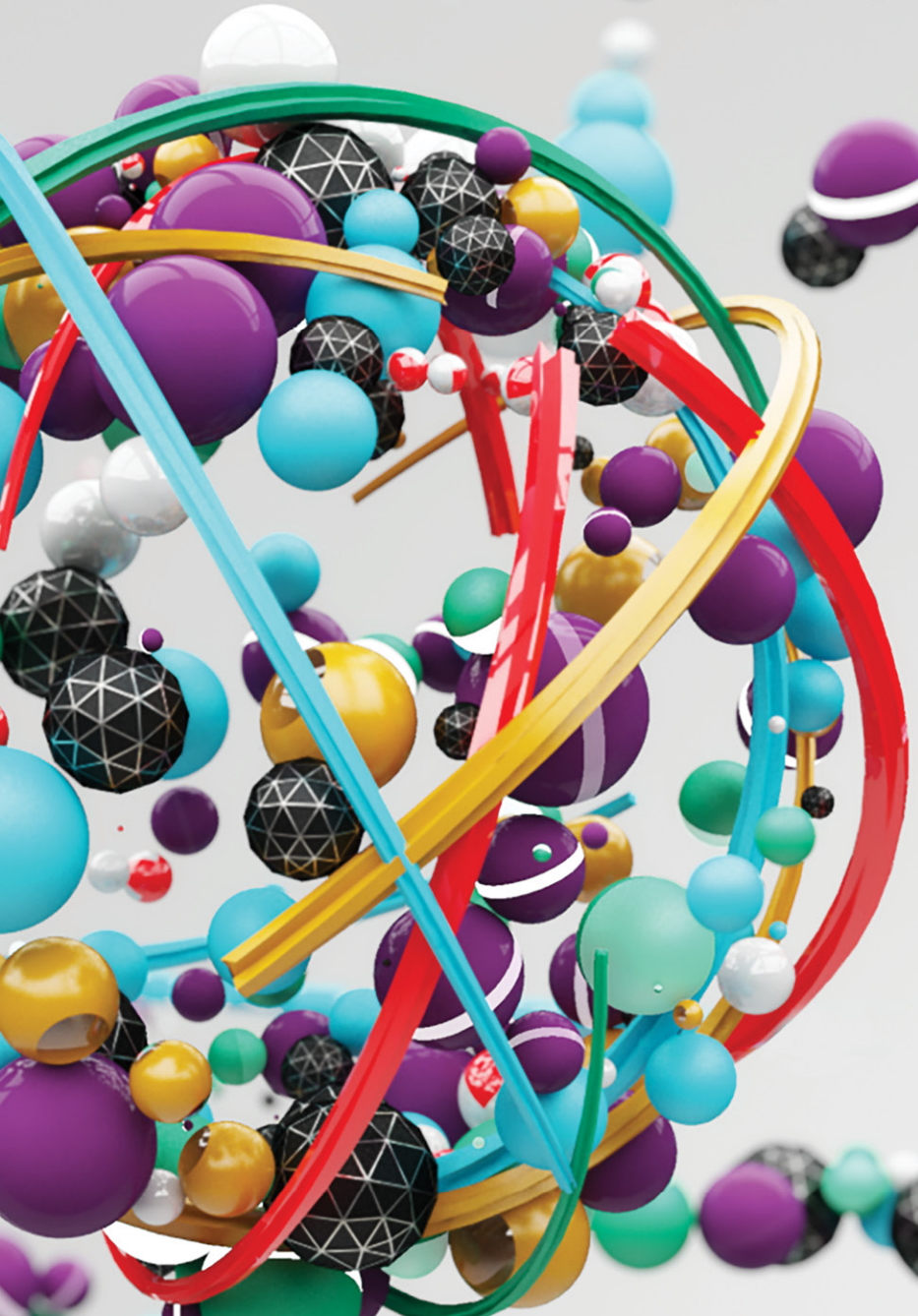

BACK-UP

Priorities for Energy Storage R&D

- Everything will be connected to everything
  - Sectorial Cross-overs
  - Flexibility and deployment of energy storage
- Electricity
  - Balancing (sec-minutes) + Storing to match production and demand
  - Power to “x”
- Heating
  - Collective heating and cooling, using underground storage
  - High temperature, new materials and applications
  - Electrification, where (compact) storage can reduce impact om (smart) grids, integration with E-mobility, heat/cold batteries for prosumers
- Focus
  - Existing building stock (compactness and price), further electrification and providing integral solutions.

Mission Innovation Challenges

- **#1: Smart Grids**
- **#2: Off-Grid Access to Energy**
  - **2 challenges to enhance energy storage to become “smart” or “off-grid ».**
- #3: Carbon Capture
- #4: Sustainable Biofuels
- #5: Converting sunlight
- #6: Clean Energy Materials
- **#7: Heating and Cooling of Buildings**
  - 3 Priority Areas addressed:
    - **1: Thermal Energy Storage**
      - Adapting variability of renewable sources,
      - Improving match with weekly and seasonal demand profiles
      - Responding to decentralised market demands
    - 2: Heat Pumps
    - 3: Heat Rejection

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