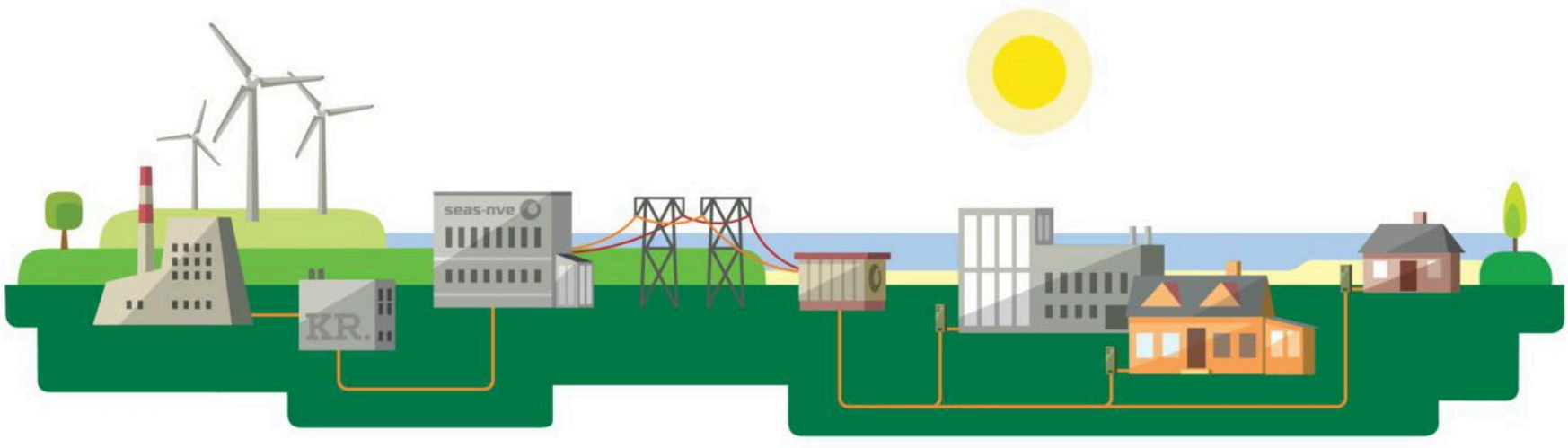
Instalment of High Temperature, Thermal Storage

About interconnection of energy systems

By Eva Sass Lauritsen



EUDP
Energiteknologisk udvikling og demonstration

seas-nve

The high penetration of variable wind power will require balancing through a combination of flexible supply, demand response, storage and electricity trade.

(Nordic Energy Technology Perspectives 2016 EIA)

SEAS-NVE believes that there will be many different types of storage,

...because storage must meet many different needs.

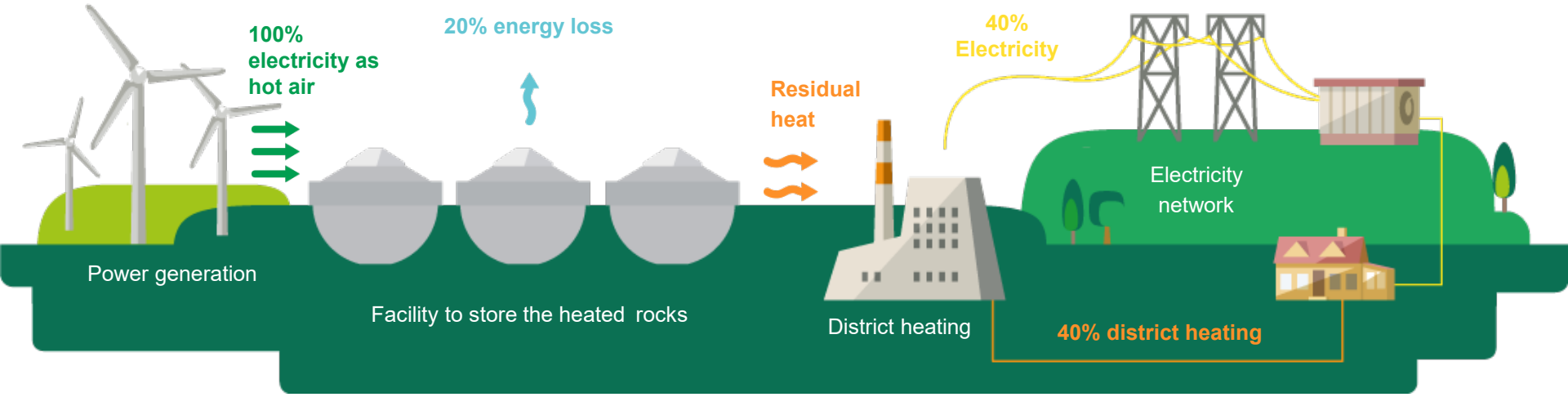
3 major types of energy storage

- Chemical
  - Batteries
- Mechanical
  - Hydropower
- Thermal
  - Heat and compression

The philosophy behind the project

- Use of known charging and discharging systems
- Eco-friendly, abundant and cheap materials for storage
- Integration of energy systems that support the DK Energy Strategy
- Can be combined with existing power plants, district heating or compressed air (CAES) technologies

Principle behind the storage



Simulations from DTU Mechanical Engineering 2016 demonstrate the storage solution's theoretical 40% efficiency, and indications that it may provide long term savings.

(The feasibility study with the Balmorel scenario for electricity trading in 2035)

Future theoretical storage needs

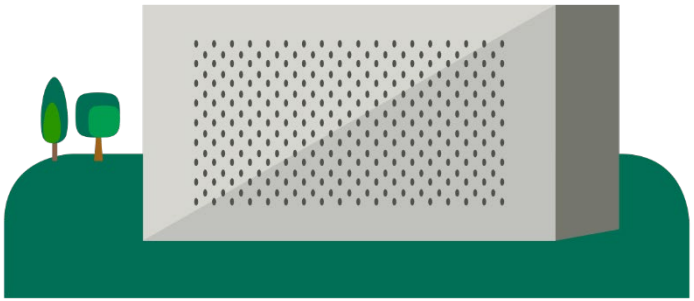
- DTU has identified future storage needs of 10% of 1.4 GW in 2035.
- 830 hours per year at full capacity.
- Storage requirements are equivalent to 1 storage solution of 1.227 million m3.
- The storage solution may be designated as a nature reserve

HT-TES as a possible flexible device

Heat sources

- Electricity generation
- CSP - Concentrated Solar Power plant
- Residual heat from production
- Residual heat from the compressed air storage

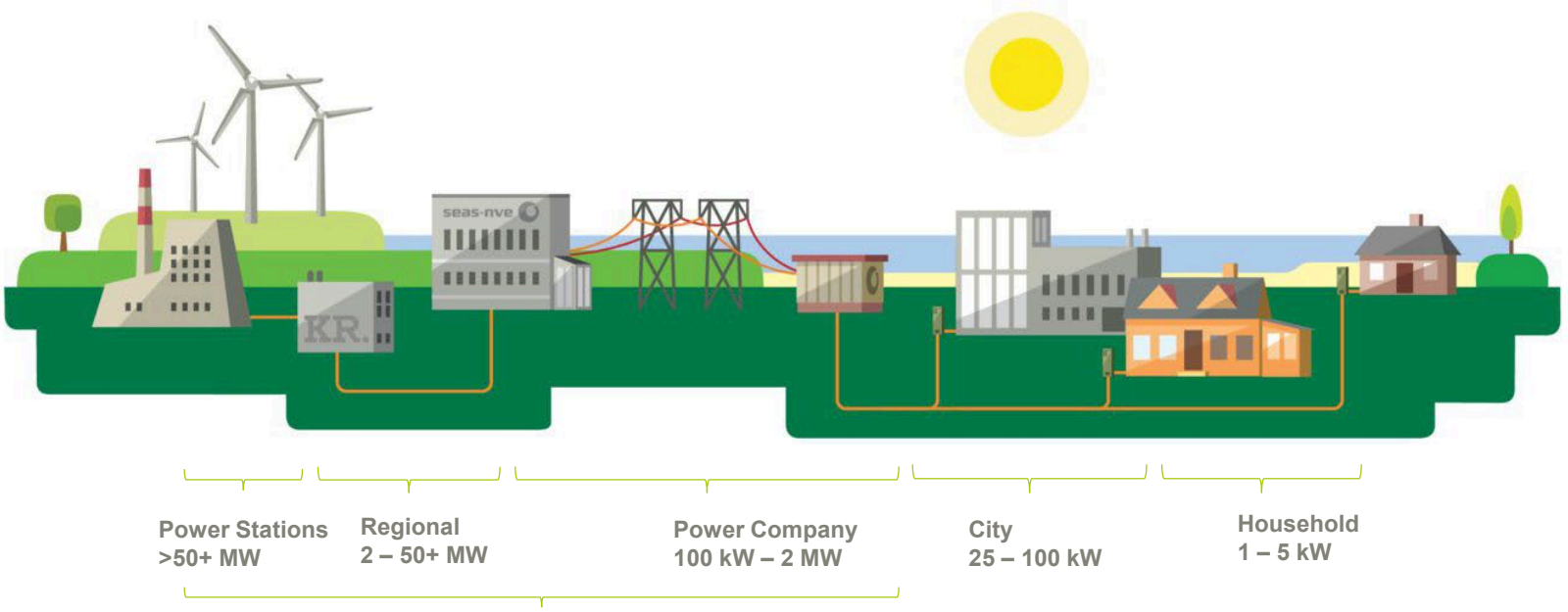
Rocks or waste from the local area



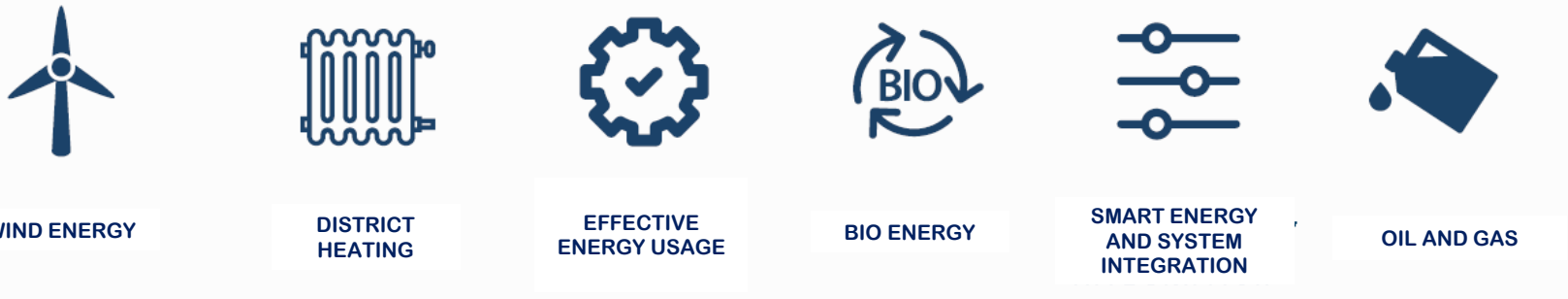
Heat users

- Electricity
- District heating
- High temperature heating for processes

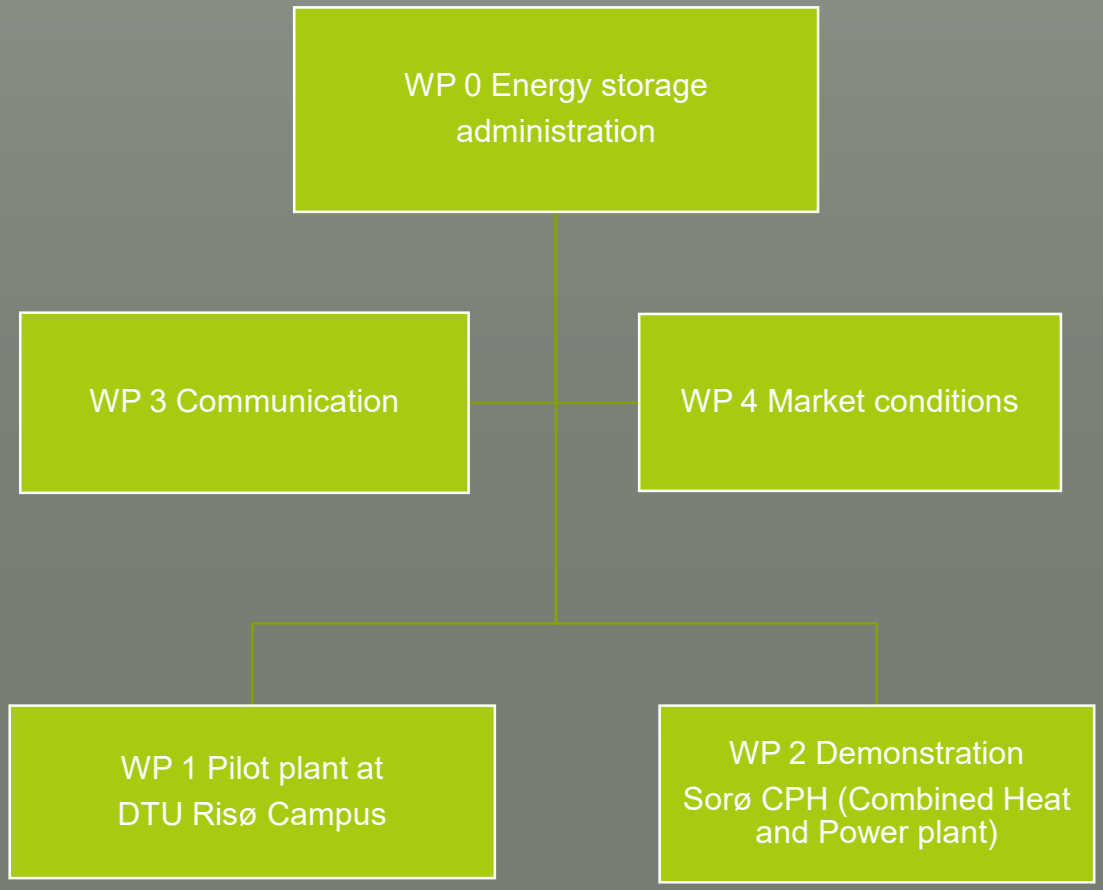
Storage can take place at many places in the supply chain. This storage is done centrally



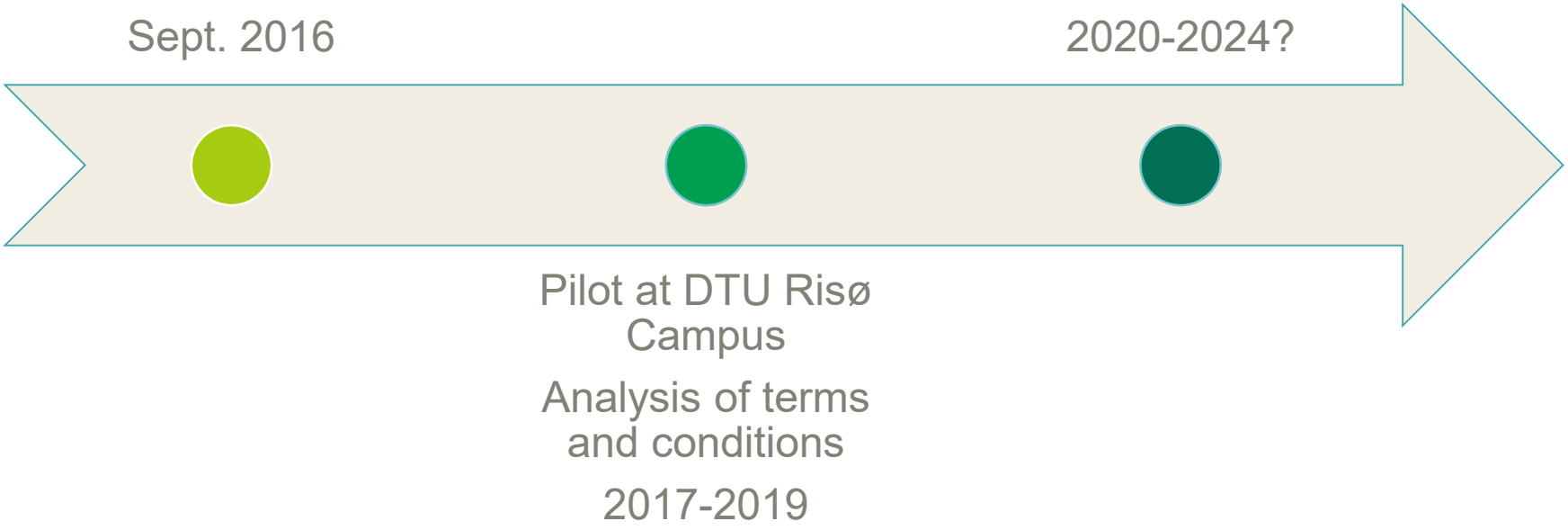
The 2017-19 EUDP strategy regarding industrial potential and Danish positions of strength
- The project affects many of the positions of strength



Work packages



Schedule


Approval of the project
Sept. 2016
Demonstration at Sorø CPH
2020-2024?
Pilot at DTU Risø Campus
Analysis of terms and conditions
2017-2019

Partners

ENERGINET.DK

ROCKWOOL
FIRESAFE INSULATION

DTU Technical University of Denmark

AARHUS UNIVERSITY

DANISH ENERGY ASSOCIATION

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