Long Duration Energy Storage (LDES)

Pumped Thermal Energy Storage (PTES)

Engineered to Fill the LDES Gap to Enable the Global Energy Transition.

Low cost — Offers a lower levelized cost than currently available technology – CapEx, OpEx and end-of-life.

Scalable — No topographical or geologic dependencies; can be built anywhere with a fully domestic supply chain.

Flexible — Modular solution that can uniquely serve high power needs at both medium and longer GWh durations. Provides grid inertia and other ancillary services.

Longest asset life — Unlike lithium or chemical batteries, power generation equipment has no loss in capacity or capability over time.

Sustainable — No chemical, fire or safety risks; Long asset operational lifespan (50 years+); low carbon footprint and fully recyclable at end-of-life.

Proven Technology Currently Being Deployed in First Commercial Applications

Innovative Design Coupled With Tested Technology

Advanced Supercritical Carbon Dioxide (sCO_2) Technology

- Efficient heat pump and heat engine cycle
- Echogen is a world leader developing sCO_2 systems for power generation

Unique, Patented Thermal Storage Solution

- Engineered concrete thermal batteries
- Low-cost materials

Proven Components

- Power turbine and low-temperature compressor are derivatives of existing designs
- Heat exchangers, piping, valves, controls are of similar design to existing sCO_2 systems
- Printed Circuit Heat Exchangers (PCHE)

Example PTES Site Layout

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Proven Technology

Leveraging Existing Equipment and Known Components

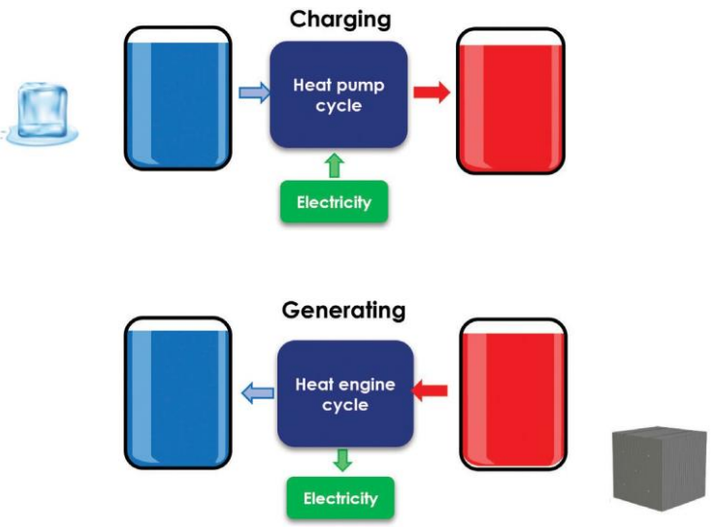
Thermodynamic cycles transform energy between electricity and heat

Charging Cycle (Heat Pump)

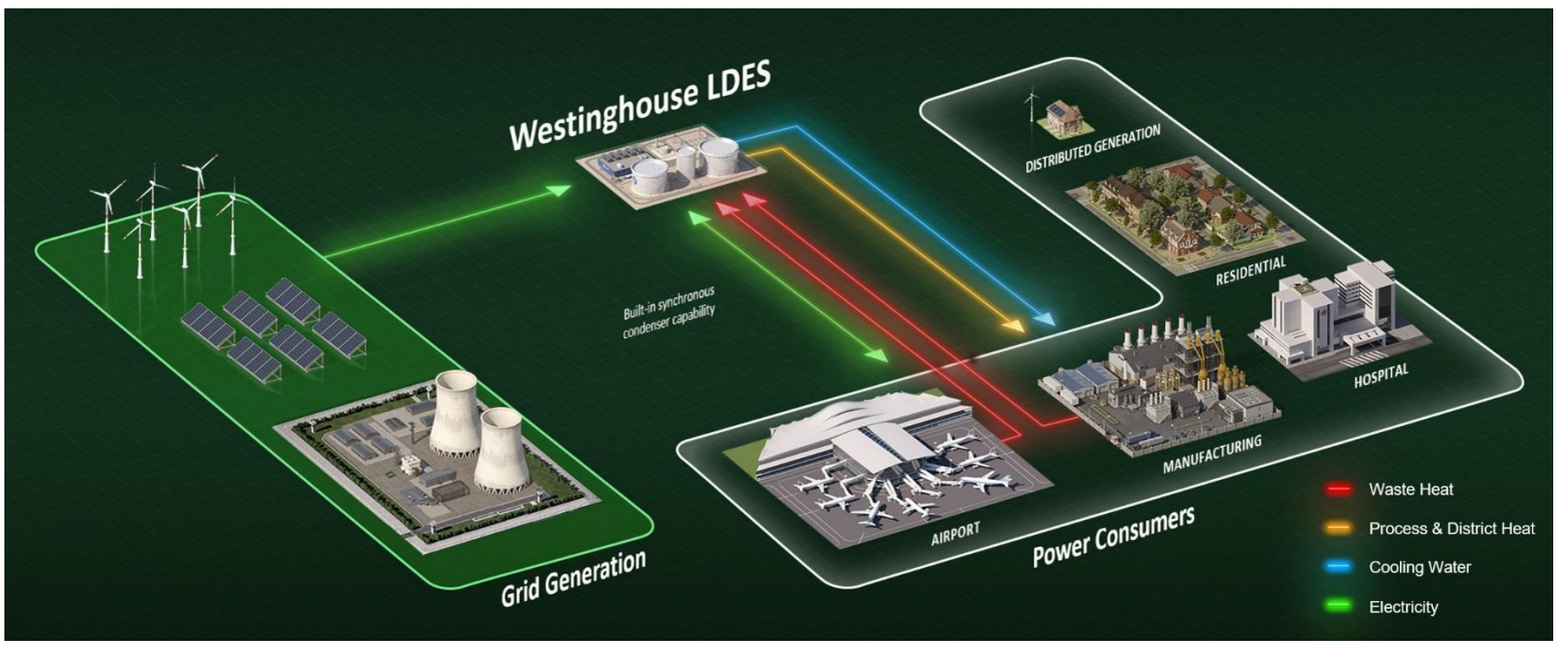
- Supercritical CO_2 heat pump (refrigeration) cycle
- Uses electrical power to move heat from a cold reservoir to a hot reservoir
- Creates stored energy as both "heat" and "cold"

Generating Cycle (Heat Engine)

- Supercritical CO_2 heat engine (power) cycle
- Uses heat stored in hot reservoir to generate electrical power



Application Example



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