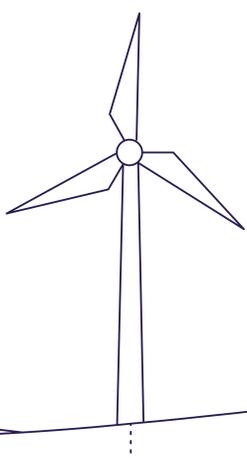


Same forces.

In our mission to fight climate change, the forces of nature are gaining ground. Unstoppable like the wind that keeps blowing, relentless like the sun that keeps shining – at least during the day, not always at the time when needed. So with the increasing penetration of renewables new tasks are arising.



Weather causes a large discrepancy between supply and demand of renewable energy.



New rules.

The intermingling of interests, assets and engineering solutions form a Gordian knot – best met with a radical change: putting you in control of nature's energy.

Unpredictability of renewables
Causing indirect dependency on fossil fuels.

Curtailement
Wind energy production is forced down in times of low demand.

Grid operators
Need to balance out peaks and supply.

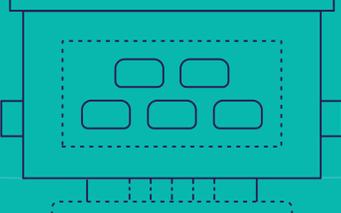
System at limit
Landlines running at full capacity.

Fossils kept alive
CO₂-emitting power plants used as back up.

New player – New rules

Electric Thermal Energy Storage (ETES)

Overproduction of renewable energy is "parked" on a gigawatt-hour scale. Allowing the feedback of power when it's needed.



ETES Base

- Store the forces of nature as heat – and return it as heat, process steam or electricity.
- Sell curtailed energy rather than waste it
- Make use of arbitrage opportunities
- Compensate fluctuations in the grid



Electricity
Steam turbine to produce up to 100 MW of electricity

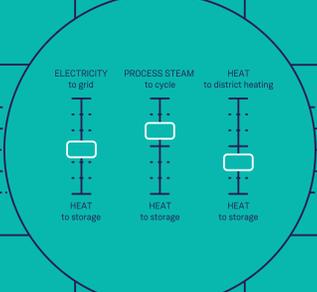
Heat
Used for district heating

Process steam
For energy-intensive industry

ETES Add

Never change a running system – upgrade it! Flexible scalability of charging power, discharging power and storage capacity make ETES a tailored solution for any existing business. And future ones.

- Modular and scalable to your demands
- Fully adaptable to existing infrastructure
- Reuse 100% of existing components



- Flexibilize the heat cycle – store and add heat
- Provide district heating

- Energy arbitrage
- Supply management
- New revenue streams

ETES Switch

Turn conventional power plants into CO₂-free storage plants: Instead of closing down a fossil power plant it can be converted into a GWh-scale storage facility. Keeping grid connection point, steam turbine, generator, condenser and other parts of the infrastructure – as well as the operation and maintenance staff of the steam cycle.



Use of existing steam cycle and O&M processes

Rebirth as CO₂-free storage plant

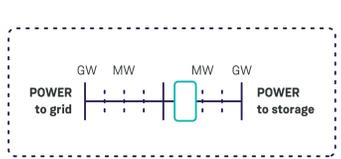
Replace furnace with heat storage

Put the elements under new management.

Profit from low prices – profit from high prices. Demand-side management and energy arbitrage are now easy to implement. With ETES, turning weather uncertainty into reliability. Now it's no longer important what nature has in store for you – but what you have in storage.

Discharge

The hot stones heat the air current, which then heats a steam boiler. Its pressure drives a steam turbine that produces electricity – up to 100 megawatts of electricity for up to 24 hours a day.



High demand, low level of supply
Profit from high prices – convert stored thermal energy into electricity, feed back into the power grid.

Charge

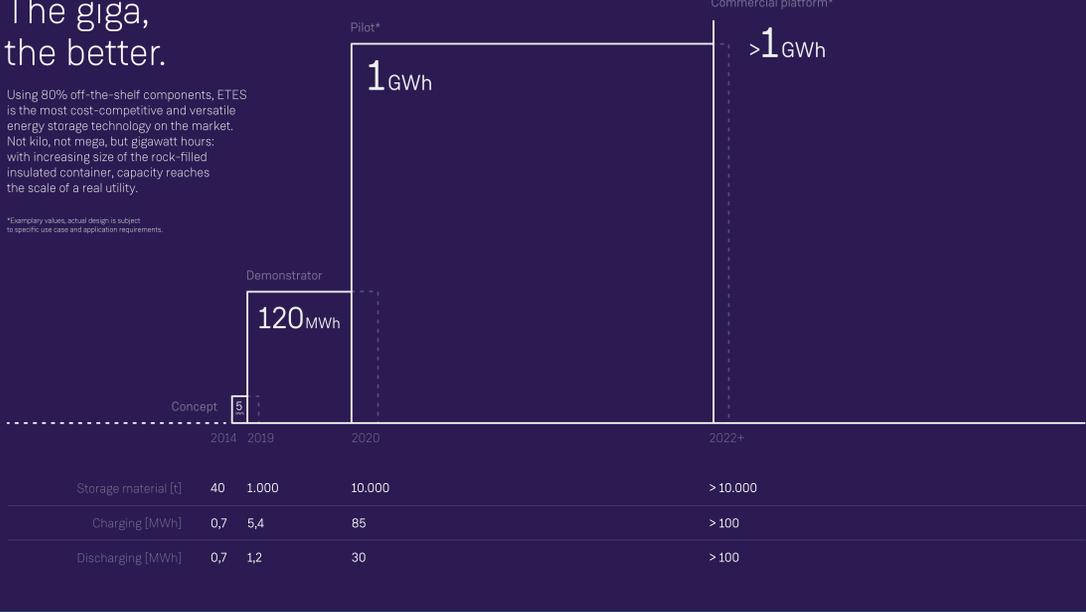
Hot air is transferred into the storage, heating up the rock-fill to the desired temperature. The storage has been tested at temperatures up to 800° Celsius.

Low demand, high level of supply
Profit from low purchasing costs and relieve the landlines at their capacity limits by feeding electricity to the storage.

The giga, the better.

Using 80% off-the-shelf components, ETES is the most cost-competitive and versatile energy storage technology on the market. Not kilo, not mega, but gigawatt hours: with increasing size of the rock-filled insulated container, capacity reaches the scale of a real utility.

* Exemplary values, actual design is subject to specific use cases and application requirements.



Power on the hour.

Renewable energy, made versatile.
Varied sizes and output classes, and thus always extremely economical. Independent scalability of charging, discharging and storage capacity. The only limit to the concept is your imagination.

New markets, made accessible.
React to price signals on the electricity market, resulting in reduced energy costs and emissions and new revenue streams.

Ambitious goals, made achievable.
Real GWh-scale storage, needed to reach zero emission targets. ETES Switch – Turning preventers into driving forces of the energy transition. An opportunity for regions economically dependent on power plant jobs.

