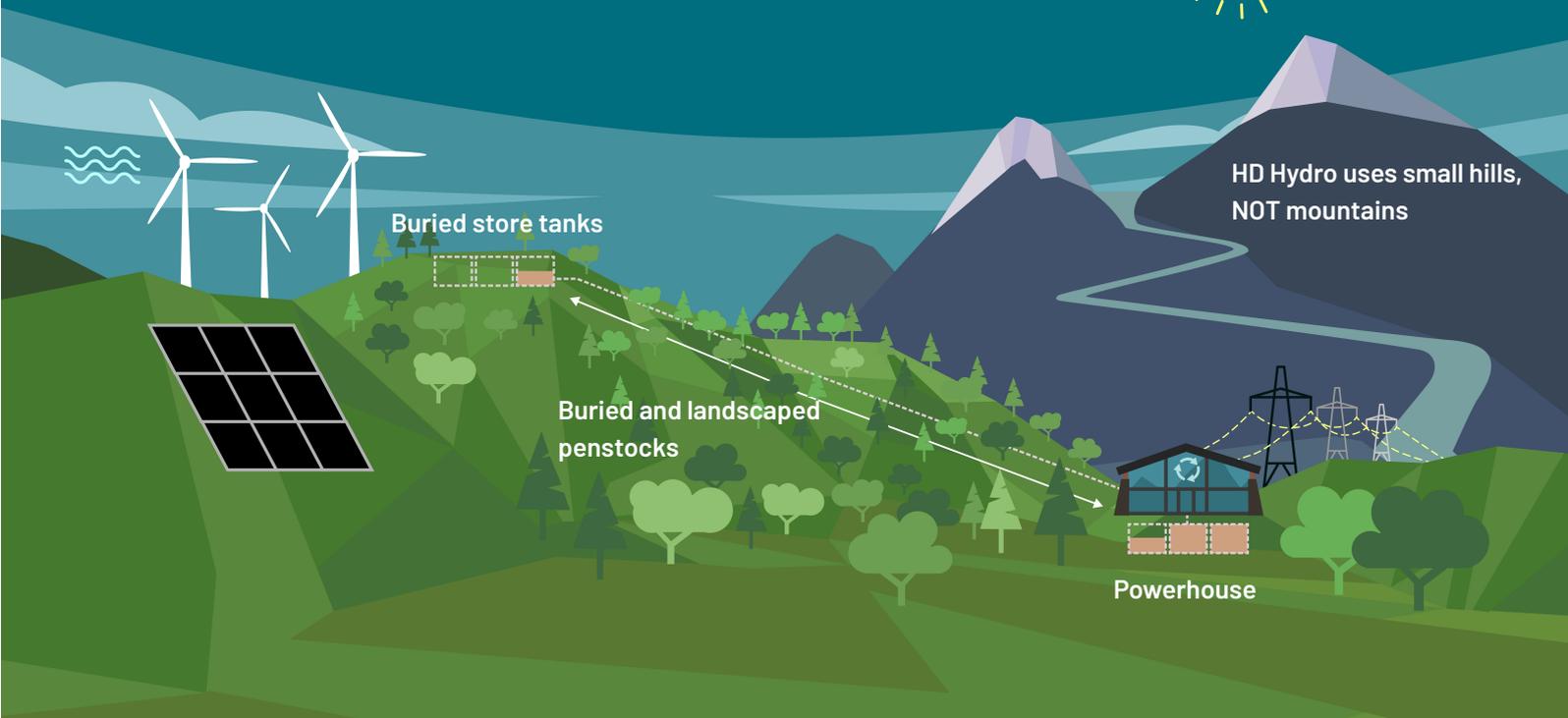


HD Hydro Energy Storage

Ultra-low cost electricity, from renewables, is used to fill the top storage tanks and then at times of high energy use the electricity is regenerated for consumers.



RheEnergise is bringing innovation to pumped energy storage.

We call our new system High-Density Hydro[®].

HD Hydro uses our proprietary HD Fluid R-19¹, which has 2.5x the density of water. R-19 gives RheEnergise projects 2.5x the power or 2.5x the energy when compared to water.

RheEnergise's energy storage solution incorporates innovations, including new significant IP, across six critical sub-systems:



RheEnergise projects provide **10MW to 50MW** power and 2 to 16 hours of storage capacity. Other High-Density Hydro advantages include:

- Projects can be installed on hills 2.5x lower than a project using water and still achieve the same power - there are many more hills at 150m than at 375m.
- 2.5x smaller, by volume, meaning dramatically lower construction costs, faster build times and easier landscaping; projects can be entirely hidden, meaning planning permission is simplified.

Competition:

RheEnergise solves the many disadvantages with other competing energy storage and grid flexibility solutions:

- Land use and construction times are comparable to both gas-peaking plants and Lithium-Ion battery projects and significantly shorter than the near decade-long construction associated with traditional pumped hydro.
- HD Hydro avoids the CO₂ emissions and pollution associated with both gas and diesel peaked plants, and the end-of-life liabilities associated with batteries.
- Avoids social and environmental issues associated with traditional pumped hydro including flooding valleys.

¹ R-19 is environmentally benign, non-toxic, non-corrosive, non-reactive. It is a suspended solid in water. An additive is used to stabilise the suspension.

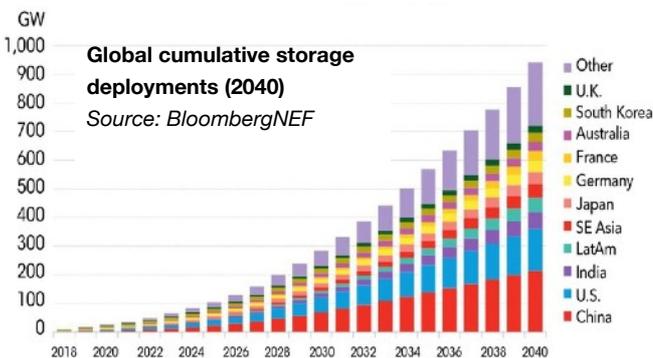
The problem:

Energy systems need to decarbonise to prevent dramatic climate change. There are many solutions to generate energy without using fossil-fuels; wind power and solar PV now generate electricity at significantly lower cost than fossil-fuel generation. However, renewable sources of energy are intermittent; there is a mismatch between the variability of supply from renewables and consumer demand.

The solution:

Energy storage is the solution, however not all energy storage systems are the same in terms of costs and environmental impact. Energy storage has been around for over a century in the form of pumped hydro, used to balance constant base-load generation from coal and nuclear with variable demand. However there is nowhere near enough energy storage for a zero-carbon energy system that includes transport, power and heat. According to the LDES Council, we need to increase our installed storage capacity by a factor of 10x by 2040.

A smaller footprint and reduced costs means that RheEnergise



projects outperform (on a levelised cost basis) other storage technologies, such as batteries.

RheEnergise’s High-Density Hydro solution:

Critical to any energy storage solution are costs, environmental impact and longevity.

Costs are compared using levelised costs. Analysis shows that RheEnergise’s HD Hydro will be ~40% below a Lithium-Ion battery project, and ~15% below gas peaking plants.

The environmental impact of batteries is principally measured in the effects of their disposal at the end of their usable life, while gas (and diesel) projects create significant emissions during day-to-day operations. On the other hand, HD Hydro projects have very few end of life liabilities and zero emissions in operation. HD Hydro projects have a predicted life in excess of 60 years, making them a true infrastructure asset.

How RheEnergise pumped energy storage works:

At times of low energy prices, the benign HD Fluid R-19 is pumped up a small hill to an upper reservoir, using abundant, low-cost renewable energy. As demand rises, the HD Fluid is released from the top (buried) storage tanks and electricity is regenerated via a specialised HD Turbine™ and supplied to the grid for consumers to use.

Round-trip efficiencies are ~83%, without the parasitic cooling loads associated with batteries.

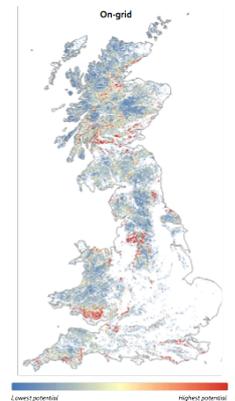
Opportunity:

Aurora Energy Research forecast a £6bn UK requirement for 13GW of new flexible assets by 2030.

BloombergNEF predict an energy storage market worth ~\$620bn by 2040.

The UK’s Climate Change Committee states that energy storage is the key enabler necessary to achieve a net-zero carbon energy system.

RheEnergise’s digital mapping analysis show that there are ~6,600 UK site opportunities, ~116,000 in Europe, ~345,000 in North America, ~61,500 in Australia, ~36,500 in Indonesia, ~445,000 in Africa and ~74,000 in Middle East.



There are suitable sites nearly everywhere.

The HD Fluid R-19 in a closed system can be installed nearly anywhere, including in areas short of water such as desert climates. In addition, HD Hydro project efficiencies are unaffected by hot weather, unlike batteries.



Summary:

Projects are smaller, faster to build, easier to reinstate and landscape. A typical small project is 1 hectare (1.5 football pitches). New habitats for wildlife can be provided.

Projects cost less to build. Operation and maintenance costs are highly predictable, meaning that the levelised cost of storage are extremely low and low risk. Commoditised parts can dramatically lower costs further.