Device that stores electrical energy

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While these are imperative to a decarbonised future, they can"t generate power all the time, and this can cause gaps in electricity supply. One possible solution is storage. If we can store renewable electricity from intermittent sources when they are able to generate, it could then be utilised at times when they"re not.

The race to develop it is well under way, and several companies are working on building ever bigger, more efficient electricity storage methods. From pumping water up mountains to turning air into liquid, here are the emerging storage technologies (and some incumbent ones) shaping the storage landscape:

Pumped hydropower storage uses excess electricity to pump water from a lower reservoir up to a higher one (for example up a mountain or hill) where it is stored. When electricity is needed, the water is released from the higher reservoir and runs down the natural incline, passing through a typical hydro-power turbine to generate electricity.

Pumped hydro is one of the largest-capacity forms of grid power storage and currently accounts for 99% of all bulk storage globally. The Bath County Pumped Storage Station in Virginia, USA is often referred to as the "world"s biggest battery", and boasts a generation capacity of more than 3 gigawatts (GW), which is almost as much as the power output of Drax Power Station or Hinkley Point C.

So what"s the catch? While pumped-hydro storage is efficient and capable of holding huge capacity, its major drawback is it requires a suitable mountain or hill to be converted into a giant battery. Unsurprisingly, not every landscape offers one. Great Britain has limited potential - but has a number of pumped storage facilities including the impressive Dinorwig in the Snowdonia region of Wales, known as the Electric Mountain which, like Drax, doubles up as a tourist attraction.

The first works by spinning a rotor (or flywheel) to very high speeds using electrical energy. This process creates kinetic energy which is effectively stored within the spinning rotor until it"s required, at which point the kinetic energy is converted back into electricity.

Supercapacitors take a similar approach but store power electrically. With the combined properties of a battery and a capacitor, they store energy as a static charge, but unlike conventional batteries there is no chemical reaction during charging or discharging.

Lithium-ion batteries are already the go-to power source for most home electronics thanks to their high-energy density and low self-discharge rates. But companies are looking to extend their usage by rapidly advancing the technology to take on bigger and better uses, most notably electric vehicles (EVs) and providing security of supply to national and regional electricity networks.

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In South Australia, Tesla has just finished installing the world"s biggest lithium-ion battery facility. At 100 megawatts (MW), it will be able to supply 30,000 homes for an hour, such as when the wind drops and the turbines of the wind farm it is connected to are not producing much power.

Lithium-ion batteries are now the most widely used in EVs, but manufacturers are still facing the challenge of lowering the cost of their manufacture to a point at which to make EVs widely accessible.