

Energy storage

Renewable energy sources are crucial in helping us meet the UN Sustainable Development Goals and in avoiding dangerous levels of future climate change. Many renewable energy sources however, suffer from supply and demand imbalances. Electricity is only generated under certain conditions which do not necessarily match with periods of high electricity demand. To address this imbalance we need to supplement renewable electricity sources with grid scale energy storage options which use excess electricity to enable energy to be stored and used in periods of high demand. Geoscientists are vital in developing and implementing energy storage techniques as they require an in depth knowledge of the subsurface.

1 NO POVERTY	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION
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The Geological Society supports the UN Sustainable Development Goals

Pumped storage

1 During times of low energy demand, cheap electricity is used to pump the water from the lower reservoir back up to the upper reservoir. The water can then be used again to generate electricity during periods of high energy demand.

Surplus electricity is generated using renewable sources such as solar and wind power during times of low energy demand.

Pumping mode

Generating electricity

2 Water is collected in an upper reservoir and flows down hill under the influence of gravity into a lower reservoir. As it flows the water's kinetic energy is used to spin a turbine to generate electricity.

2 Hydrogen can be stored as a compressed gas or liquid for later use. It is stored underground in salt caverns and can probably be stored in depleted oil or gas reserves or in aquifers (rocks able to store water). Hydrogen can be stored for long periods of time and in large volumes.

Compressed air storage

1 Air is compressed using excess electric power and stored under pressure in containers or underground salt caverns - salt does not react with air.

2 When electricity is required, the pressurised air is released and it expands. This is then able to spin a turbine and drive a generator to generate electricity.

Hydrogen

Compressed air