

# Electricity: Seasonal Storage

**This lever controls the sub-levers listed in the table, and ambition levels are for the end year shown on the right-hand side.**

Seasonal storage of electricity allows an over-supply of electricity generated in the summer to be stored and used in the winter months when demand is highest. An over-supply in the summer could be due to the generation of electricity from solar panels (or other renewables) exceeding the demand. In the winter, shorter days and colder temperatures mean that supply from solar panels is lower at the same time as demand for electricity for lighting and heating is higher. Seasonal storage allows winter electricity demands to be met by electricity generated in summer that would otherwise be wasted.

In the Calculator, seasonal storage is delivered by converting excess electricity into hydrogen which can then be pumped underground into salt caverns. This can then be converted back into electricity in the winter. Some of the energy is lost in conversion to and from hydrogen as well as during storage (compression and leakage of H<sub>2</sub>).

The UK already uses salt caverns to store around 10,000GWh of natural gas<sup>1</sup>, with the largest cavern being 600,000m<sup>3</sup>. Smaller salt caverns are also used by the UK and USA to store H<sub>2</sub> used in chemical plants and oil refineries.

There are over thirty large caverns in use in the UK. Caverns in East Yorkshire, Cheshire and Teesside were appraised for the Energy Technologies Institute for their hydrogen storage potential<sup>1</sup>.

## Key Interaction

Seasonal storage can help maximise the useful output from solar.

### Level 1

There is no conversion and storage of excess electricity to H<sub>2</sub>.

### Level 2

Half of the potential salt cavern capacity in East Yorkshire, Cheshire and Teesside is used.

### Level 3

All of the potential salt cavern capacity in East Yorkshire, Cheshire and Teesside is used.

### Level 4

Twice the salt cavern capacity in East Yorkshire, Cheshire and Teesside is used<sup>1</sup>.

<sup>1</sup><http://www.eti.co.uk/insights/carbon-capture-and-storage-the-role-of-hydrogen-storage-in-a-clean-responsive-power-system>

**Default Timing** Start year: 2020, End year: 2050

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Seasonal Electricity Storage	TWh	0	0	15	30	60

