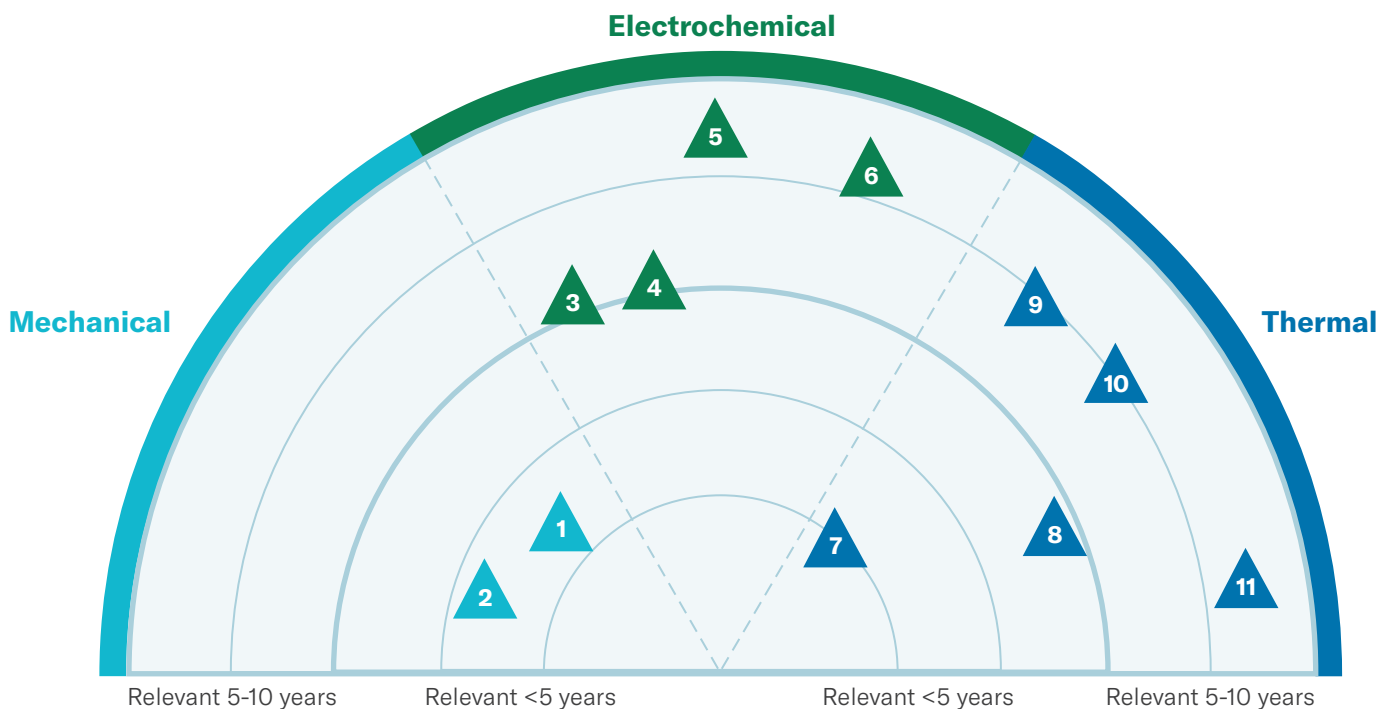


The Road to COP26

Electricity storage technologies: Maturity of technologies beyond pumped hydro and Li-ion batteries

As the generation mix continues to transition from traditional fossil fuel sources to more intermittent renewables sources, energy storage is becoming increasingly critical in bringing necessary flexibility to electricity systems. Until now, most storage capacity is provided by Li-ion batteries and pumped hydro, who can provide a range of flexibility and reliability services. As those needs grow, other options will need to be introduced in the market. In the graphic below, we look at other selected technologies and their maturity.



#	Technology	Type	Round-trip efficiency (%)	Installation cost estimate across use cases in 2030 (\$/kWh) ^{1, 2}	Potential use cases
1	Compressed Air Energy Storage (CAES)	Mechanical	> 90% (thermal efficiency)	400 – 870	Peak lopping (PL), load levelling, storing off-peak energy and frequency control
2	Liquid air (LAES)	Mechanical	> 90% (thermal efficiency)	400 – 870	PL, load levelling, storing off-peak energy and frequency control
3	Zinc battery	Electrochemical	75 – 85%	40 – 240	PL, weekly energy balancing (WEB)
4	Flow battery	Electrochemical	70 – 80%	50 – 240	PL, WEB, residential and large-scale stationary applications
5	Sodium-sulphur battery	Electrochemical	80 – 90%	140 – 570	PL, WEB
6	Hydrogen	Electrochemical	< 40%	4 – 5	Seasonal storage, various applications requiring high energy density (e.g. industrial processes)
7	Molten salt	Thermal	> 98%	< 15	Variable generation integration
8	Solid-state	Thermal	> 90%	< 15	Variable generation integration, bulk energy storage
9	Chemical looping	Thermal	45 – 63%	80 – 160	Variable generation integration, seasonal storage
10	Salt hydration	Thermal	50 – 60%	80 – 160	Variable generation integration, seasonal storage
11	High temperature phase change material (PCM)	Thermal	> 90%	25 – 35	Waste heat recovery, variable generation integration

Notes: 1 Based on 2020 cost projections in: “Storage cost and technical assumptions for BEIS”, Department for Business, Energy & Industrial Strategy, 8 August 2018 | 2 “Innovation outlook: Thermal energy storage”, International Renewable Energy Agency, November 2020