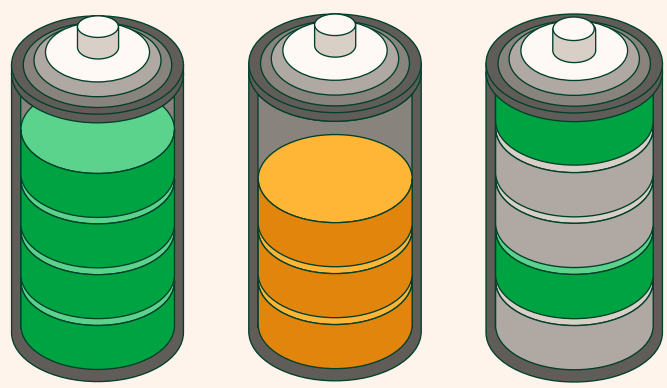


Emerging technologies for long-term storage

To meet the growing **demand** for **renewable energy**, and therefore the need for **long-term storage**, certain **technologies** are being developed:



Flow batteries

These are recognised for their **scalability** and ability to **separate capacity and power**, making them ideal for long-term stationary storage.



Solid-state batteries

Although still in commercial development, they are considered one of the most promising technologies due to their **safety and energy density**. They are expected to be deployed starting in **2028**, but were already attracting significant investment and development in 2025.



CAES (compressed air energy storage)

This is evolving with variants that **don't require underground storage**, increasing its commercial viability for **large-scale, long-duration storage**.



Advanced thermal storage

Heat-based solutions (molten salts, concrete, rocks) are becoming increasingly relevant, especially for **industrial applications and grid backup**.



Green hydrogen storage

Although **hydrogen** is an energy carrier, it can act as a **storage solution** by being generated from **renewable surpluses** (via electrolysis), stored for long periods, and converted back into electricity or used as a **clean fuel** when needed.



Gravitational storage

Although less commercially mature, it is gaining visibility as a **chemical degradation-free, low-maintenance alternative**, especially for industrial applications and grid backup.