BATTERY STORAGE: DRIVING THE ENERGY TRANSITION

Wood Mackenzie – Wood Mackenzie
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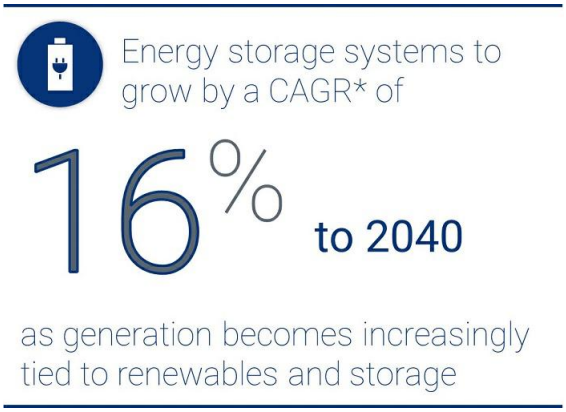
A radical energy transition is underway, driven by a combination of environmental, policy and technology factors. Our energy system is being electrified and decarbonised, switching away from fossil fuels into clean, renewable sources of energy. The effect will be transformational.

Power and road transport, which together contributed around two-thirds of carbon emissions in 2020 (source: International Energy Agency (IEA)), are a clear area of focus for the energy transition. A great deal has been achieved in the development of renewables power generation and electric vehicles (EVs). Breakthroughs in battery energy storage technology have been a key enabler:

Power. The growth in intermittent renewable energy, such as wind and solar, creates a greater need for flexibility and reliability in power markets. Battery storage can help smoothen supply and improve grid stability. This type of energy storage is often called 'stationary'.

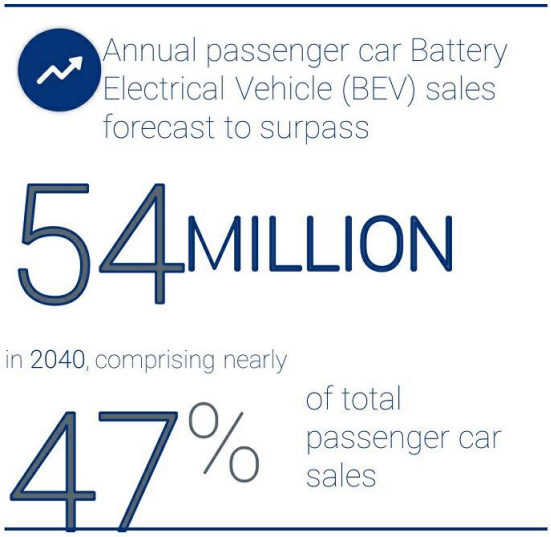


CAGR = Compound Annual Growth Rate

Source: Wood Mackenzie, Q4 2021 Market Outlook report.

Forecasts are not an indicator of future performance and any investments are subject to risks and uncertainties

Road transport. A battery can either displace or be combined with an internal combustion engine to create hybrid or fully electric vehicles.



BEV = battery electric vehicles

Source: Wood Mackenzie, Q4 2021 Market Outlook report.

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Lithium-ion technology dominates the market

The battery storage market is currently dominated by **lithium-ion** battery (LiB) technology. LiB batteries have useful attributes. They're lightweight, have a high energy density, and offer good charging and discharging properties.

Source: Wood Mackenzie, Q4 2021 Market Outlook report.

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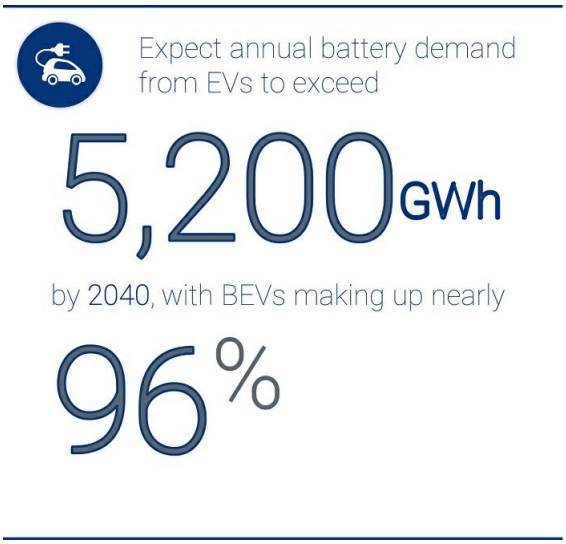
The first LiB was commercialised in 1991 by Sony, after 20 years of research. Until recently, the primary use was in portable electronics, including mobile phones. As the technology has improved and scaled, it has been used in EVs and stationary storage solutions. Going forward, while stationary storage will grow significantly, the biggest driver will be EVs – which already constitute more than half of battery demand.

The rise in battery storage is fuelled by falling costs. LiB costs have declined 80% this decade, primarily driven by two things.

Economies of scale. Every doubling of production capacity results in a 5-8% reduction in cost.

Energy density improvements. Market competition accelerates improvements that lead to reductions in battery prices.



Source: Wood Mackenzie, Q4 2021 Market Outlook report.

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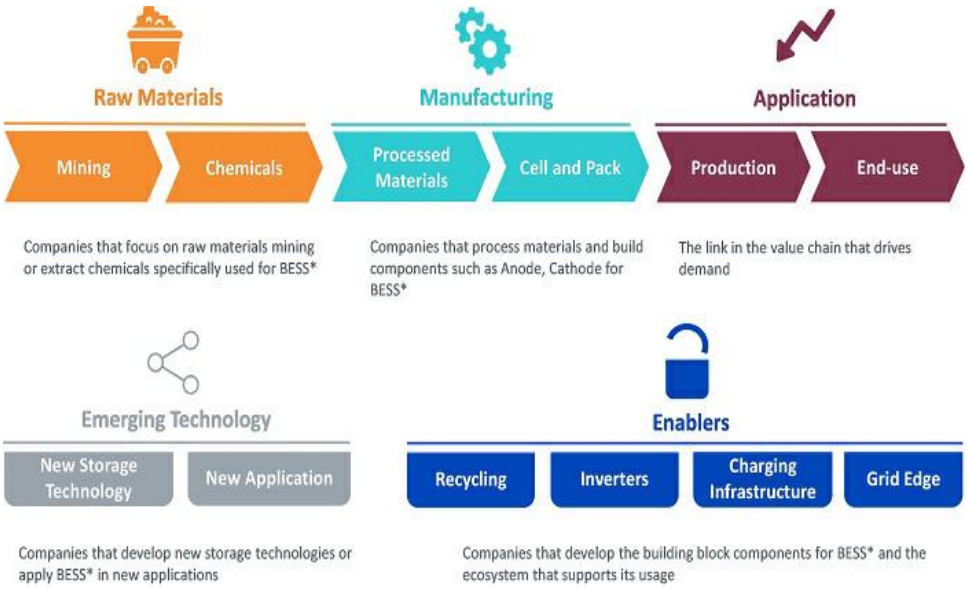
The speed of this cost decline has consistently been underestimated. Wood Mackenzie anticipates costs will continue to fall as economies of scale and energy densities further improve.

Next generation technology will help satisfy growing demand

The battery storage sector is constantly evolving. We expect next generation LiB batteries will be commercialised in the coming decade, notably solid state batteries.

A range of technologies will be required to fully satisfy storage demand. Flow batteries, liquid air, hydrogen and power-to-gas can all complement LiB – offering different properties to suit a range of applications.

The battery value chain is also evolving



BESS = Battery and Energy Storage Solutions

Source: Wood Mackenzie, WisdomTree.

The battery value chain is made up of a myriad of industries across the globe. The mining and chemical industries each provide raw materials to manufacture battery cell components. Cells are then packed for different applications – such as the increasingly popular EVs. At the end of life, batteries are recycled or used for secondary applications, such as Employee self-service (ESS). Many companies stretch across different elements of the value chain, perhaps integrating the sourcing of raw materials with manufacturing.

In addition, a series of industries evolve symbiotically with this value chain. Charging infrastructure and smart grid software providers can both benefit from, and support, the growth of the EV industry.

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