

»» Battery storage systems: new options for energy transition in global North and South?

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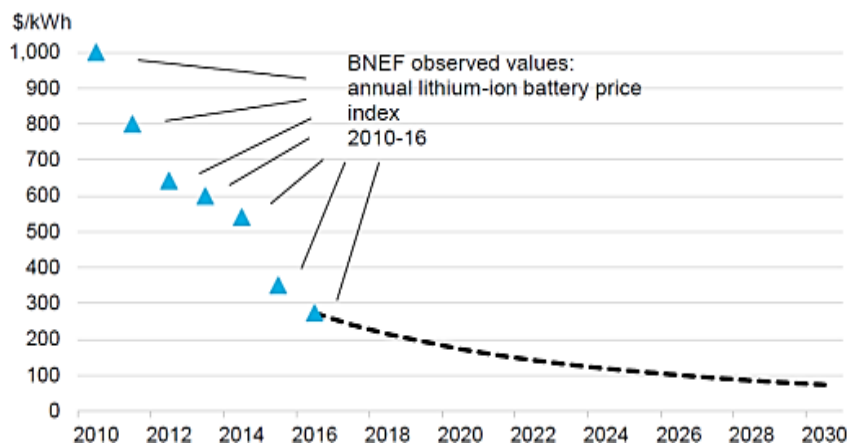
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Increased reliance on decentralised and renewable power generation is an important component in the energy transition taking place in many industrialised countries, but poses major challenges for power supply systems that were originally designed to work with large centralised power plants. In developing countries, on the other hand, power supply systems are in many cases being built for the first time. The new requirements can therefore be taken into account in the planning stage, thereby helping to reduce costs. One key point in these considerations is the fact that renewable energies like water, solar and wind power are often not continuously available, so efficient interim storage is necessary to ensure a steady supply of power. Battery storage systems, which have seen significant cost reductions over the past few years (see diagram), are a particularly promising option in this regard, and also crucially important in the transition towards electric vehicles.

Battery storage systems offer a flexible range of uses for power supply

There is a key distinction between decentralised storage by end users and battery banks in the distribution grid. Battery storage systems located “off the grid”, in combination with decentralised power generation (e.g. solar home systems), already play an important role in the electrification of rural areas. They also provide a partial alternative to diesel generators, which are widely used as a backup power source when power outages occur. In the distribution grid, battery storage systems are used to store and release the power generated by fluctuating renewable energy sources. They also provide ancillary grid services for frequency and voltage control, since they can store and release electric power within seconds. However, large battery banks have not yet been extensively tested in locations with high

Graph 1: Price trend for lithium-ion battery capacity



Source: Bloomberg New Energy Finance (BNEF).

levels of fine-particle pollution, high humidity and high ambient temperatures.

Challenges on the path to widespread use

Despite the many benefits of battery storage systems, their use is neither straightforward nor uncontroversial: lithium-ion batteries have become the leading technology due to their high storage density. So whether the expected drop in price actually occurs is critically dependent on the availability of lithium as a raw material, which is found in sufficient concentrations mainly in salt lakes in Bolivia, Chile and Argentina. However, lithium production is not free of environmental risks either since it requires evaporating large volumes of water. As an alkali metal, lithium is highly reactive too, making batteries a source of safety hazards both during use and in the recycling and disposal process.

Experience has also shown that new technologies only achieve widespread use when they are “worthwhile” from the users’ perspective. So far this has only been achieved to a limited extent. As with all new technologies, battery

storage systems will have to overcome significant hurdles in the early stages of deployment: high production costs due to small quantities, risk-averse buyers (lack of experience with the new technology), limited market transparency (lack of quality certification, inconsistent standards), and in some cases an uncertain regulatory framework for their use. State-supported market incentive programmes (temporary subsidies, low-cost loans, etc.) can help to overcome these initial barriers.

Conclusion: Battery storage has solid potential – but still faces hurdles

Meeting global climate goals will require substantial reductions in greenhouse gas emissions – especially in the energy and transport sectors. Battery storage systems have a central role to play in the development of low-emission power supply systems and the transition to electric vehicles in industrialised, emerging and developing countries. Obstacles include inadequate regulation, storage costs that are still relatively high, and concerns relating to the safe and sustainable construction of battery storage systems. ■