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The true value of energy storage

Energy storage implementation will increase the levels of wind and solar that can be accommodated by the electricity system and be a crucial component of future renewables growth. However, the positive ramifications go well beyond the energy sector. For government, industry and society, storage will bring value in multiple ways from power quality, reliability, security of supply, price stability to environmental and other social benefits. The full potential of energy storage and its true value are yet to be discovered.

The prospect of energy storage deployment on a large scale is seen as a “game changer” for the global energy industry. Alongside renewables, energy storage can provide a real solution to the volatility and integration challenges of wind and solar electricity generation. At the grid level, it can provide a multitude of ancillary services and be instrumental in the deferral of grid investment.

While the interest in energy storage continues to grow, the industry overall is still at

a nascent stage and, as of today, there are too few installations on the ground to truly set benchmarks. Estimates of costs, performance and other criteria tend to vary dramatically from source to source. However, the rapid developments in battery technologies over the last few years has created the need for side-by-side comparisons. “Most analysis is centred around energy production costs expressed in kWh, which taken in isolation can be a misleading metric” comments Luis Collantes, CEO of HydraRedox Iberia, “these

costs are not based on the same number of hours of storage nor take into account the life expectancy of the battery.”

Indeed, such fundamental differences make side-by-side evaluations very difficult. For closed batteries such as Lithium Ion, the relationship between power and energy is fixed, as is the cost, - and their life expectancy is seldom estimated beyond 6-8 years. In batteries such as HydraRedox, power and energy are completely independent and can be tailored to individual needs. Here, the

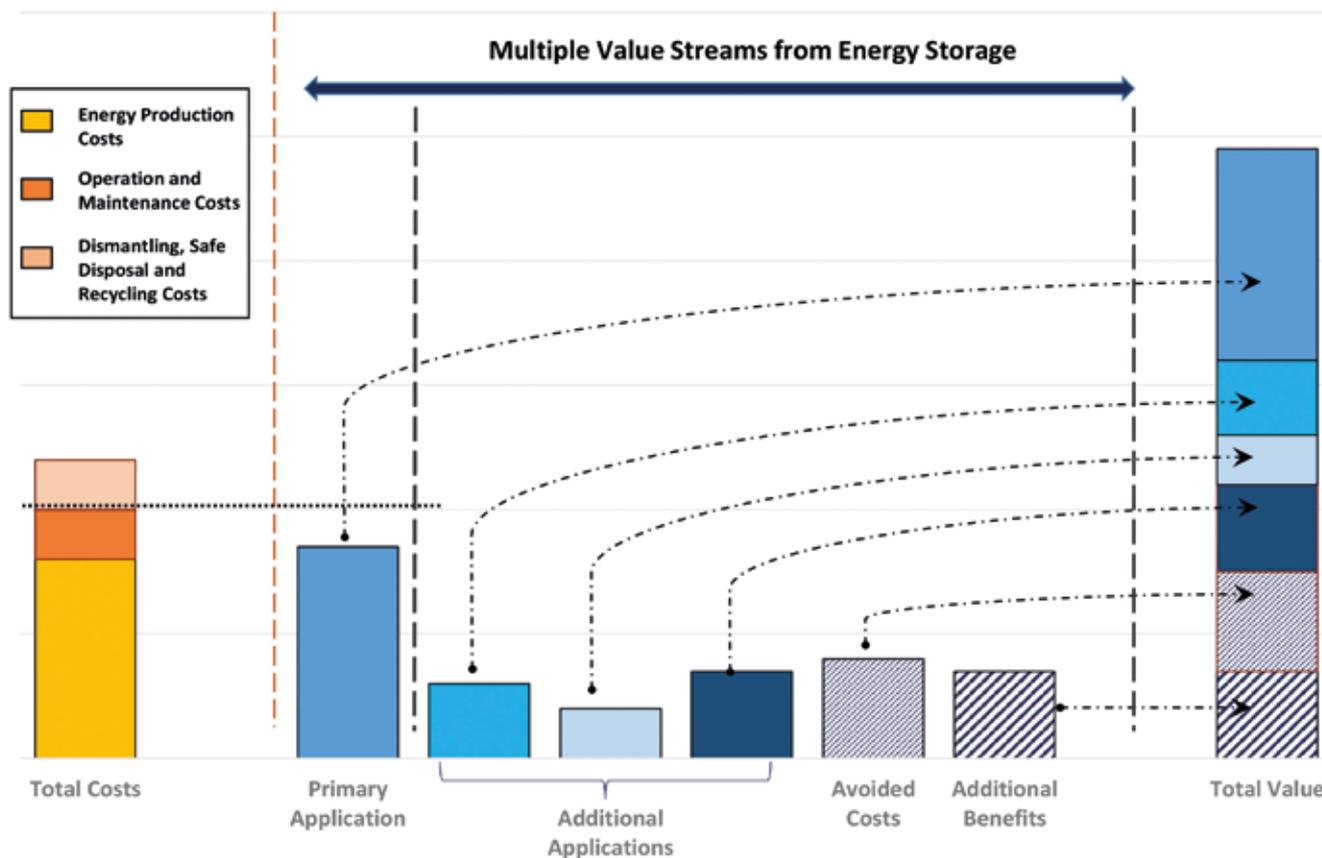


Chart 1: Cost & Value from Energy Storage

overall cost is a function of the number of hours of storage and long duration storage brings the Euro/kWh rate down sharply. This, together with a much longer life expectancy, makes these batteries clearly stand out from an economic perspective.

In addition, any complete evaluation and comparison of technologies should go beyond just the specific costs of production and include operation and maintenance costs as well as disposal costs at the end of the useful life. "Reliability and ease of maintenance throughout the life of the system, coupled with environmental neutral disposal can make the difference in selecting a storage solution" adds Collantes.

There is a general view at the industry and government level that in order to be implemented on a large scale and be economically viable, energy storage costs will need to fall rapidly in the next 3-5 years. Battery manufacturers believe that this will be achievable because of two strong trends: first, the rapid progress in technology developments witnessed over the last few years and second, the potential for large economies of scale and improvements in manufacturing - which will be fuelled by an increased use of storage with renewables.

While cost reduction is at the forefront of everyone's mind in the storage sector, the other side of the equation - revenues - is equally important. Cost reduction of storage is fundamental, yet the overall value is a function of both cost and revenue. "Assessing and quantifying revenues is however fundamentally more complex" Collantes says. Energy storage can seldom be justifiable for single applications.

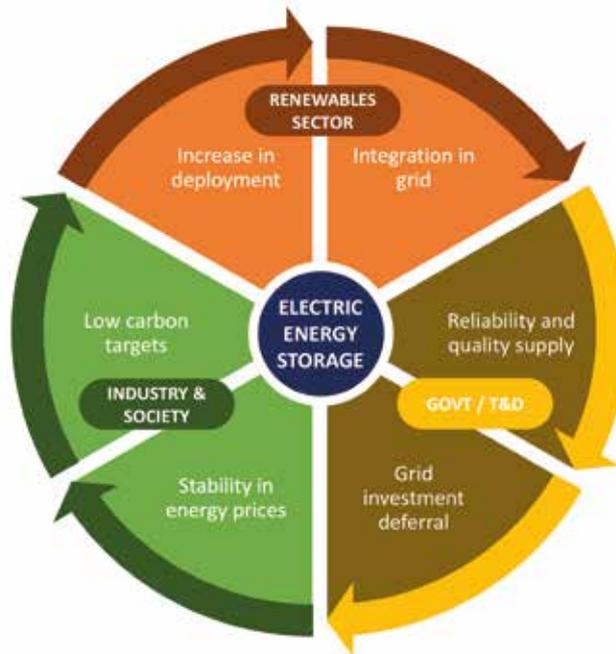


Chart 2: Energy Storage benefits for Government, Industry & Society.

Batteries deployed for a single application end up being unused or underutilized for half of the system's lifetime. For example, an energy storage system dedicated solely for demand charge reduction is utilized for only 5-50% of its useful life. However, technologies which offer flexibility of design can be used for a primary application while at the same time provide supplementary services that will deliver additional revenue streams to offset costs and create value. The example above shows how total costs on one side are offset by multiple stacked sources of "value".

Taking an example of an off-grid installation powered by renewable sources, the primary application could be long-term energy storage to provide power instead of or alongside diesel generators. This main application could be complemented by a series of additional applications (for example UPS or frequency regulation). Even if a simple sum of applications does not always reflect the operational realities of energy storage - i.e. in some cases, a system optimized to per-

form one application may not be suited for others or it may not be possible to perform all services simultaneously - there is no doubt that a higher utilization rate of the battery will create value. In addition to revenue streams from these multiple applications, storage also has two other sources of value for the user. The costs avoided by the utilization of storage can be very significant. Following up on the off-grid example, battery storage could significantly reduce the use of diesel and therefore reduce exposure to oil price volatility and the risks and complications associated with transportation.

Often harder to quantify, but just as important, is the intrinsic value of storage (identified as additional benefits in the chart above). This includes so many indirect positive consequences which can have a huge impact but may be hard to monetize. In our off-grid scenario, it could be the decrease in noise pollution from diesel generators in a pristine area trying to develop eco-tourism or the benefits to a local population of having reliable electricity supply for the first time at a school.

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