



electrical energy storage

Thursday, September 05, 2019

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ACCELERATING MARKETS FOR BATTERY STORAGE IN DEVELOPING COUNTRIES

With 25% of global greenhouse gas emissions associated with producing electricity and heat, transforming the world's power systems could make one of the largest contributions to fighting climate change. A clean energy transition is already underway, with a significant increase in the deployment of solar, wind and other forms of renewable energy.



However, this transformation is happening at a much faster pace in the industrialized world than in least developed countries (LDC[1]), facing greater challenges. In particular, severely inadequate electricity grid infrastructure limits them from taking advantage of falling renewable energy costs—while increasing their dependency on polluting fuels such as diesel and heavy fuel oil (HFO)—; difficult operational environments and

low technical capacity that might reduce equipment availability; and lack of a sound regulatory framework hindering cost recovery.

Today, about 840 million people lack any access to electricity, mainly in Sub-Saharan Africa and South Asia. Even providing basic electricity access through off-grid and mini-grids is stymied by the lack of reliable and environmentally sustainable ways to store the energy these systems generate. In this context, accelerating development and deployment of reliable, safe and affordable energy storage can be a potential game changer for the power sector in the developing world.

The battery market for the power sector is at a nascent stage in developing countries and deployment of batteries is limited to pilot projects in middle-income countries such as China, India and South Africa. But there is a tremendous amount of interest in scaling up this market to manage the increasing amounts of variable renewable energy being deployed. Ambitious programs to scale up batteries are being considered by these countries' governments.

Some of the former and current LDCs, such as the Central African Republic and the Gambia, are now at an early stage of considering grid-scale solar with battery storage. The economics of solar-battery hybrid projects is attractive in markets where diesel and heavy fuel oil are still used extensively for power generation.

Besides helping provide access and decarbonize the power system, batteries can also provide grid services, help manage demand and provide greater resilience to the grid during extreme climate events that are only likely to increase in the future with intensifying climate change.

Different storage options such as pumped hydro and molten salts have been around for decades, but batteries are an attractive option for several reasons: they are modular, easy to implement in a matter of months as opposed to years or even a decade for other options and, most importantly, are getting cheaper rapidly—by about 75% in the last 7 years—primarily driven by the growth of electric vehicles in OECD markets.

A critical issue hindering the uptake of batteries is the challenge in valuing the benefits that they can bring to the power system. The range of benefits—including a reduced curtailment of energy from renewable energy projects, smoothening and firming up of supply from variable renewable energy projects, grid services to maintain stability, and reducing greenhouse gases, among others—cannot be captured easily, due to limited availability of data, and the complexity of evaluation, often requiring very detailed modeling. This problem poses an enormous challenge even for the most progressive regulators; and, in combination with issues around asset classification and licensing, explain why the regulatory framework for battery projects remains underdeveloped in most LDCs. In this context, the incentive for both public or

private investments is weak as the commercial framework investments cannot evolve without policy and regulatory certainty.

To this end, the World Bank launched an investment program with a goal of mobilizing US\$1 billion in World Bank Group (WBG) financing, US\$1 billion in concessional climate finance and an additional US\$3 billion in other financing to support developing countries deploy batteries at scale while evolving applications as well as policy and regulatory frameworks for commercialization. This WBG program aims to finance 17.5 GWh of storage to catalyze 200-400 GWh in developing countries by 2025, compared to 4 GWh installed today.

This is critical because a lot of the current battery technologies are designed for electric vehicles and portable electronics, which are not optimized for stationary applications. Indeed, stationary batteries used in power systems, have different needs. While they do not need to be as compact, they need to be resilient, able to withstand harsh conditions—including high temperature and humidity in developing countries— they need to function for much longer durations, have low toxicity, high recyclability and, naturally, lower cost.

The World Bank, through the recently launched Energy Storage Partnership (ESP), is working with over 30 organizations to address these issues. The partnership is convening research institutions, industry associations, international organizations, and development agencies to foster international cooperation to develop and

adapt new storage solutions that are tailored to the needs and conditions of developing countries. The ultimate goal is to turn the spotlight on the needs of developing countries and redirect some of the ongoing global research and development in storage to evolving solutions for these critical, growing markets.

This is also crucial because the clock is ticking on climate change, and we need to accelerate adoption of low carbon technologies to have any chance of avoiding a +1.5 degree world and providing clean electricity access for all.

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*[1]The **Least Developed Countries (LDCs)** is a list of developing countries that, according to the United Nations, exhibit the lowest indicators of socioeconomic development, with the lowest Human Development Index ratings of all countries in the world.*

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