



DEVELOPING ASIA'S ENERGY INNOVATION OPPORTUNITY

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Energy demand is projected to almost double in the Asia and Pacific region by 2030. The Asian Development Bank (ADB) has estimated the region will need to invest \$14.7 trillion in power infrastructure between 2016 and 2030 to meet demand.

This “new normal” poses a critical question: How can developing Asia speed up energy infrastructure development that supports sustainable development?

The opportunity to use high-level technology to “leapfrog” to more advanced energy systems is a compelling vision for developing countries. Multiple trends are driving the transformation of global energy systems. The “digitization of everything” and the “electrification of everything,” as well as increased focus on decentralization and decarbonization are pushing this agenda.

Rapid—and rapidly expanding—deployment of technologies such as photovoltaics, battery storage, electric vehicles, smart grids, and more broadly the “Internet of Things” highlights a major shift in global energy systems. These advanced technologies have the potential to transform most traditional energy infrastructure; but this is only one part of the story. Energy technologies progress in an uneven manner. Some develop quickly and gain significant market share; some move forward at a slow but steady pace. Solar photovoltaic technology, for example, has exhibited double-digit growth in deployment for several years, with the appearance of suddenly moving from niche to mainstream. Large scale deployment of technologies such as carbon capture utilization and storage, hydrogen fuel cells, and next-generation renewable fuels, meanwhile, have been “5 years away” from commercial reality for well over 5 years. Others always hold promise for cost effective use, but do not evolve as rapidly as expected, such as concentrating solar power and demand-side energy efficiency.

This technology uncertainty presents risks—both perceived and real—that must be addressed in energy system planning. Developing countries may be reluctant to embrace cutting-edge technologies with public sector funds, given the potential downside risks and limited resources available for energy sector development. Risk avoidance is the norm and exceptions typically require external drivers and support to minimize the potential for failure.

At the same time, any developing country can leverage technology to advance faster, cleaner, and more cost-effectively. Many countries in Asia and the Pacific appreciate this opportunity. Innovative technology can help meet a country's development objectives, but only when well-defined objectives are clearly articulated.

Three main challenges can be articulated around the following questions:

- How to plan and deploy energy assets with design lifetimes of 20-60 years in the context of rapid technological changes?
- How to utilize limited financial resources to manage potential risks of leading edge technologies?
- How do countries adopt and integrate new approaches requiring advanced capabilities that may not be available in their country?

These challenges can be addressed by deliberately deploying technologies that address energy system issues today, while leaving room for new approaches in the future. Such agile energy systems require “no regrets” investments that leverage international experience to minimize risk.

Planning and building electricity systems today can and should anticipate progressively higher shares of renewables in the future. More flexible thermal generation, with smart grid technologies to enable reliable operations, followed by more advanced technologies including energy storage and automated demand response can be used to prepare for that future.

ADB is supporting agile energy systems. In India, for example, projects are implementing high voltage transmission expansion and upgrades to integrate several gigawatts of new solar and wind capacity into the existing grid. Energy storage technology is being introduced into the Cook Islands to facilitate 100% renewable electricity. And in the Kathmandu Valley of Nepal smart grid technology is being integrated into the distribution network.

In partnership with its developing member countries, ADB is supporting policy evolution and technology transfer, and providing financial assistance to make the transition to advanced clean energy systems. ADB encourages innovative technology in every energy project it supports and ensures that best-in-class approaches are used.

This approach must be continued, and a new fund is in place to support greater deployment of potentially game-changing options. ADB's High-Level Technology Fund will provide grants for technical assistance, pilot projects, investment support, capacity building, and recruitment of technology experts to promote the integration of advanced and innovative solutions throughout the project cycle—from identification to implementation. The fund is intended to encourage and accelerate widespread adoption of advanced technologies to address development challenges across ADB's developing member countries.

The energy technology landscape will continue to change. As Asia ramps up investment in its energy future, ADB will be an active partner in managing this change and accelerating sustainable growth and development.