Global Rush Toward Renewables Faces Challenges

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The global trend toward renewable energy is undeniable and commendable. In 2018, 10Power announced that it would work to create commercial-scale solar and energy storage solutions in Haiti. Earlier this year, Angola announced that it would invest $500 million in two solar projects.

In Australia, the state of South Australia has set a target of net 100% renewables by 2030, and announced two renewable energy projects worth $670 million combined. Despite efforts toward implementing renewables, a look at the preparedness of these countries for renewables reveals concerns about power delivery, and returns on investment are being overlooked.

Haiti. Haiti has one of the lowest electrification rates in the world. Less than a quarter of the population has regular access to electricity; those with access may have power for as little as five hours a day. Haiti's power grid and infrastructure are old and poorly maintained. The country's energy losses reach 65%. In fact, Haiti estimates its existing energy grid could only absorb 10–20 MW of renewable energy due to its small size and unreliability.

Haiti depends heavily on diesel, but generators on the regional and village grids are often oversized for the loads they serve. Power suppliers tend to run these generators at low setpoints that consume fuel at very low efficiency. The takeaway is that Haiti's first step should be to update its grid and optimize the efficiency of its existing generators, rather than a shift to renewables at a substantial cost for installation and development.

There is no doubt Haiti should welcome solar power investments from donors targeting the rural population. However, an investment in solar by the government or investors would be premature because solar plants require a substantial initial capital investment, and Haiti's grid conditions make effective and efficient recovery of such investment daunting.

Angola. As of 2016, only 40.5% of Angola's population had access to electricity (70.7% of that in urban areas; 16% in rural). Under the Energy Sector Efficiency and Expansion Program (ESEEP), Angola, with funding from African Development Bank Group, plans to create an interconnected national grid supplying north, central, and south Angola, to create a 60% electricity access rate by 2025.

This goal appears difficult to achieve. Technical electricity losses reach 14%, and aggregate technical and commercial (AT&C) losses reach 43%. Whether and how this expansion will affect electricity loss remains to be seen. Still, Angola has taken a first step to address AT&C losses by updating its tariff system to better reflect the cost of electricity. This tariff scheme will raise electricity bills for all categories of consumers. Industrial consumers will, for example, receive electricity bills almost 82% higher.

However, tariffs will not remedy the underlying challenge: solar energy is still more expensive than fossil fuels or hydro sources, especially if the cost of storage for nighttime supply is considered. The cost of solar energy plus storage would have to drop by at least 30% from its current cost to be competitive with the average sub-Saharan Africa grid levelized cost of energy. Indeed, in a sub-Saharan Africa country like Angola, the economic net present value (ENPV) of a solar photovoltaic (PV) plant at a real discount rate of 12% is negative $28.191 million. Even if the ENPV is assessed considering the economic value of greenhouse gas (GHG) emission reductions, the overall value of a solar PV plant is still a negative $16.372 million. For these reasons, the profitability of the solar plants to be built by Angola is dubious at best.

Australia. South Australia (SA) in September 2016 faced a statewide blackout that left about 850,000 customers without electricity. The Australian Energy Market Operator (AEMO) issued a final report explaining that the blackout was caused, in part, by the grid's inability to handle a quick reduction in power output from wind farms. Wind and solar farms generate fluctuating (non-synchronous) levels of energy, posing challenges to grid stability. The grid, though well-developed in the region, does not address other inadequacies with the grid stability. In its rush to boost renewable energy, SA failed to properly address the risks of lacking sufficient synchronous energy to stabilize the grid. This led to further problems and serious power shortages during periods of peak usage.

During April 2017, AEMO found that because half of SA's power supply came from wind and solar, the number of electricity shortage and blackout incidents was expected to rise. The state in August 2017 had to commission two mobile gas turbines from APR Energy to prevent continued shortages. Notably, SA has the highest energy prices in Australia. Consumers in developing countries are unlikely to be able to afford the price tag for renewables at current rates.

While increasing reliance on solar and wind energy is a worthwhile goal, public and private utilities must not dismiss the need for synchronous and supplemental or temporary energy supplies. They should first prepare their grids to receive and properly utilize renewables before rushing to them as the exclusive or principal source of power generation for their customers.

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