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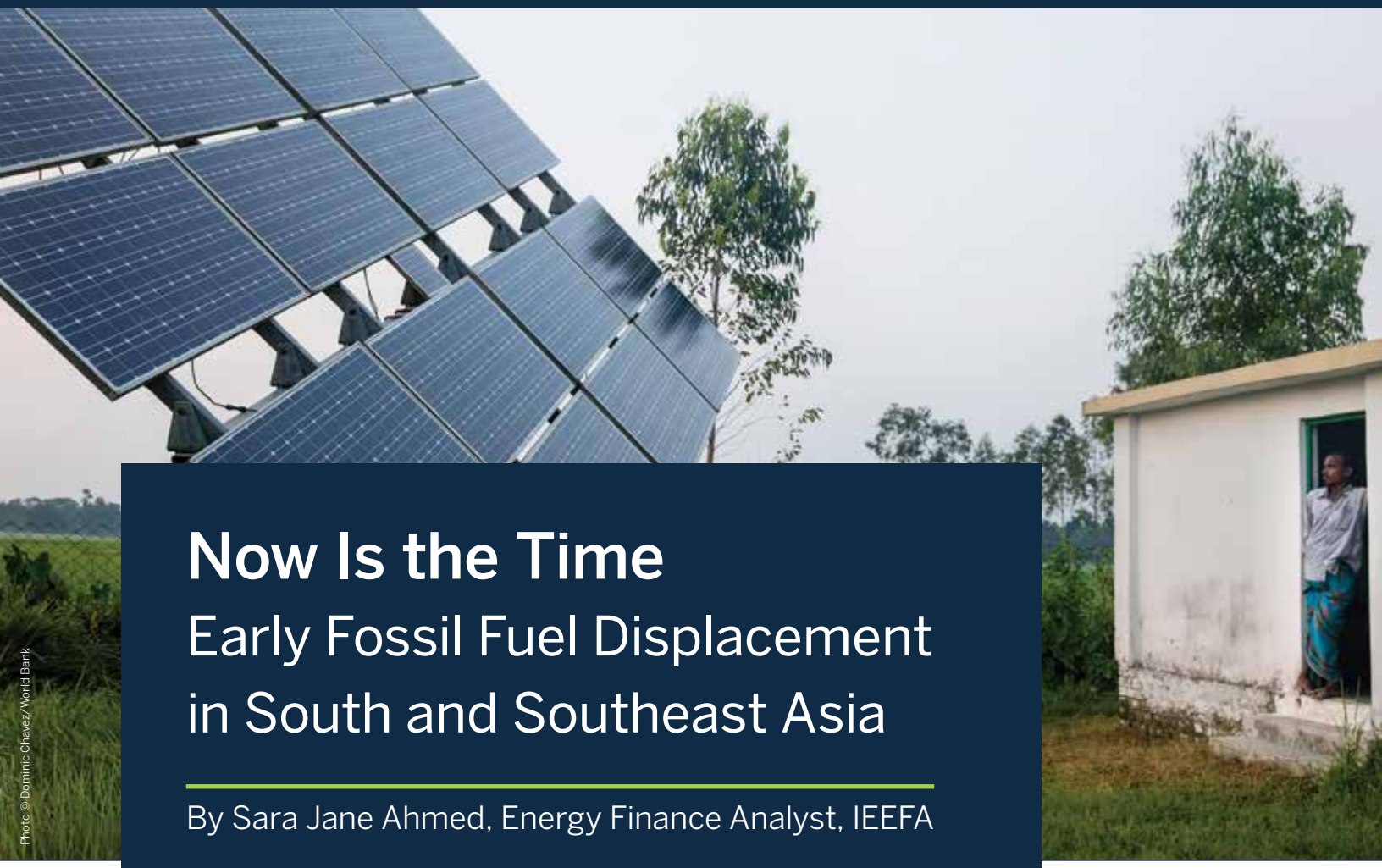

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# Now Is the Time

## Early Fossil Fuel Displacement in South and Southeast Asia

By Sara Jane Ahmed, Energy Finance Analyst, IEEFA

In the face of rapidly declining costs and technological advances in renewable energy and storage, reliance on fossil fuels makes less and less sense, particularly when they are subsidized and/or imported. The rapid pace of technological advancements and its impact on advancing the transition to a more sustainable, low-carbon economy means that electricity should no longer be expensive or subsidized in perpetuity. This paper aims to (1) describe the economic and financial case for an accelerated energy transition in those countries considered to be the last bastions of coal growth in South and Southeast Asia that are finding mounting challenges due to fossil-fuel lock-in in the form of higher prices and growing subsidies required, (2) illustrate that the region's governments and investors can displace early to reduce exposure to nonperformance while installing new cost-competitive capacity, and (3) recommend corrective measures as part of the COVID-19 recovery packages toward a cost-competitive and resilient power system.

The COVID-19 pandemic has led to demand drops in South and Southeast Asia of up to 40 percent, revealing weaknesses in aspects of the energy market and financing design as per unit

electricity costs increase, with some consumers affected by up to 50 percent price increases. While the force majeure clause has been successful in the Philippines and can be used to trigger negotiations on inflexible standard clauses of fossil fuel power purchase agreements, key questions to ask are (1) can national governments continue to afford growing power subsidies and can they convince consumers to accept tariff increases despite there being cheaper alternatives? (2) will the planning norm be reconsidered in light of evidence that too high a new fossil fuel mix results in system lock-in due to inflexible contractual obligations that require baseload dispatch even when new lower cost renewables can reduce system prices?

Current poorly designed power market policies increase the plant life of underperforming fossil fuel assets with guaranteed contracts, translating to further costs in the form of higher electricity prices paid for by end users, write offs by investors, nonperforming loans for creditors, or subsidies/bailouts from government, which are ultimately paid for by taxpayers. To start, all subsidies to the power sector should be redirected to become a purely one-time capital-expenditure subsidy with an eventual exit strategy, as opposed to the current pattern of subsidies found in markets such as Vietnam, Indonesia, and Bangladesh, where subsidies often become embedded in the economy as recurring operational expenses in perpetuity. Moreover, part of the investment and policy response to stranded-asset risk could be a displacement strategy for uneconomic options. Given that the project economics of fossil fuel plants deteriorate in the face of new cost-competitive technologies, a delay in the modernization of the power sector translates into higher costs for governments or investors and/or higher prices for end users.

The COVID-19 pandemic has created an opportunity for power sector planners and stakeholders to reset energy development policy to enable more renewable absorption by grid systems and redirect resources to support economic fundamentals and energy price stability.

The COVID-19 pandemic has created an opportunity for power sector planners and stakeholders to reset energy development policy to enable more renewable absorption by grid systems and redirect resources to support economic fundamentals and energy price stability. However, with government revenues in decline due to the pandemic, it is recommended that the modernization of the power sector is accompanied with investment and system-level recovery packages. For example, the recovery packages can focus on financing and enabling distributed energy resources and microgrids to facilitate energy access and improved reliability, multilateral development banks can contribute concessional finance toward the execution of renewable energy auctions, and technical assistance can be provided to assess grid upgrading needs and consequently invest and aid coinvestment in such upgrading.

In addition to a cost-competitive and resilient power system, it is important to highlight the role of financial regulators, investors, and bankers. Specifically, financial regulators have a responsibility to safeguard the financial system from the evolving material risks, including nonperforming stranded-asset risk, and responsible managers in investment companies and banks have a fiduciary duty to factor in known financial risks. This is the time for regulators, investors, and bankers to consider whether directors can be held personally liable if they have breached their fiduciary duty to act in shareholders' best interests by ignoring fossil fuel risks. The International Monetary Fund (IMF) can take a proactive approach in engaging with countries to ascertain the degree of exposure of the financial sector and the public sector to fossil fuel lock-in and its accompanying nonperformance stranded risk. South and Southeast Asian governments and investors, as well as the governments of Korea, Japan, and China as key financiers of fossil fuel growth in the region, need to understand the size and nature of public assets and obligations that are exposed to stranded-asset risk.

## The Current Energy Situation

According to the International Renewable Energy Agency, solar prices have fallen 82 percent since 2010 and fell 13 percent between 2018 and 2019, and since 2010, concentrated solar power has fallen 47 percent, onshore wind 39 percent, and offshore wind 29 percent.

Both onshore and offshore wind prices fell 9 percent between 2018 and 2019. The deflationary trend in renewable energy means that replacing the costliest 500 gigawatts of coal capacity with solar and wind would cut annual system costs by up to $23 billion per year and yield a stimulus worth $940 billion, or around 1 percent of global gross domestic product (GDP).[1]

At the end of 2019, according to BloombergNEF, battery prices fell 87 percent in real terms over the past decade.[2] Lithium-ion battery prices have fallen 24 percent since 2016, while energy density is increasing at a rate of 5 to 8 percent per annum.[3] In April 2020, global levelized cost of energy benchmarks for utility-scale batteries with a four-hour duration including charging costs were cost-competitive with gas peaker plants.[4]

While the pace of energy transition accelerates and new system options emerge, the power sector in Asia is still struggling to contain the damage from COVID-19. The pandemic has revealed weaknesses in aspects of the energy market and financing design and accelerated trends such as the need for secure, flexible, and reliable power. For example, in Bangladesh, industry demand fell by approximately 50 percent and commercial demand by approximately 40 percent during the economic lockdown.[5] The Philippines' largest grid operator had demand drops of up to 40 percent during its lockdown. Indonesia's largest grid saw a reduction of 9.6 percent, while Vietnam had a demand drop of 6.8 percent, which is a reflection of the soft lockdown measures.[6] The demand drops have caused the per unit price of electricity across these four countries to increase as a result of guaranteed capital recovery on investment, with typically a 14 to 19 percent internal rate of return for independent power projects (IPPs).

The pandemic also revealed unexplained charges for retail customers. In May 2020, 2.4 million consumers in the Philippines were billed more than double their average consumption,[7] and in Vietnam, 3.1 million consumers saw bills jump over 30 percent compared to the previous month, while 1 million consumers reported a 50 percent increase and 215,000 consumers saw a 300 percent increase in bills.[8] In June 2020, 4.3 million consumers in Indonesia saw bills increase by 20 percent over the previous month while others saw bills jump more than five times.[9] In Vietnam, 7.2 million consumers reported a 30 percent rise in bills, 4.4 million reported an increase of over 50 percent, up 4.4 times compared to May, and 326,000 consumers reported a 300 percent rise in bills.[10]

As demand weakness robs the leading power companies of revenue, governments will be forced to look at tariff increases to shore up finances when the pandemic recedes. For state-owned utilities in countries such as Indonesia, Vietnam, and Bangladesh, there will need to be an increase in the tariff along with increased use of tax revenue. In the case of the Philippines, with privately owned utilities, there is no reason to increase tariffs for consumers unless fossil-fuel lock-in persists.

In the Philippines, the force majeure clause has been used to trigger negotiations with coal power providers in order to protect consumers from the inflexible standard clauses of the power purchase agreement. In the absence of force majeure, consumers in the main grid would have had to pay 15 percent more on a per unit basis.[11] When competition from cheaper alternatives becomes a reality for the Philippine market, the question is whether consumers will be forced to pay for fossil fuel lock-in and resulting price instability and high prices or whether the system will permit force majeure-style circuit breakers that will open the door to cheaper domestically resourced options such as renewable energy and storage.

For Indonesia and Bangladesh, the question is whether their national governments can continue to afford growing power subsidies or whether they can convince consumers to accept tariff increases despite there being cheaper alternatives. By 2021, Indonesia's state-owned PT Perusahaan Listrik Negara may have to increase its capacity payments to coal IPPs along with increased fuel costs to an unsustainable $7.2 billion.[12] In 2018–2019, the overall power capacity utilization in Bangladesh was only 43 percent, leading to $1.1 billion in capacity payments for unused power. Before COVID-19, Bangladesh was anticipating another increase in the subsidy, to $1.1 billion, highlighting that the economics of coal were already under structural pressure. Now, with depressed demand, the subsidy for capacity payments will be much larger if force majeure is not invoked.[13]

Power sector planners often assumed that biasing the system toward baseload fossil fuel generators would deliver benefits from scale. This planning norm is likely now being reconsidered in light of evidence that too high a new fossil fuel mix results in system lock-in due to inflexible contractual obligations that require baseload dispatch even when new lower cost renewables can reduce system prices. Unfortunately, this lock-in problem is worse for countries that import coal, such as Vietnam, the Philippines, and Bangladesh, due to exposure to price volatility and negative effects on the trade balance. This lock-in problem rings true for fossil gas, which requires a large infrastructure build of regasification units, associated pipelines, retail connections, and storage units. Because fossil gas is neither incremental nor economical without scale, it will require the same capital recovery guarantees as coal- and oil-fired generation. Moreover, taking into consideration the financial lessons learned from the COVID-19 pandemic, power sector planners may wish to enable investment in greater domestic energy security and system flexibility, as well as take advantage of the deflationary price trajectory of renewable energy and storage.

## Displace Early to Reduce Exposure to Nonperformance and Enable a Cost-Competitive Electricity System

Southeast and South Asian markets are growth markets and thus anticipating high energy demand, which means power-sector stakeholders are likely assuming there is no need to displace existing capacity because the focus should be on adding capacity. However, to remain affordable for households and competitive for

industry to attract foreign manufacturing businesses looking to diversify their supply chains, electricity must be least cost.

Fossil fuel lock-in has left South and Southeast Asia with high prices and subsidies due to progressive nonperforming fossil fuel asset risk. This stranded-asset risk can be triggered by a number of causes, including (1) fuel and/or technology becoming uneconomical or obsolete due to competition from cheaper alternatives, (2) grid design problems that result in dispatch problems for poorly located power plants, (3) excess capacity due to inaccurate demand forecasts or a surplus of reserve power, (4) higher than anticipated construction costs, (5) operational inefficiency of the power plant often due to substandard maintenance, and (6) long-term contracted fuel supply exceeding demand.

Part of the strategy response to stranded-asset risk could be a displacement strategy for uneconomic options. When certain conditions are met, it can make economic and financial sense to force out expensive options in power generation, such as operational cost of the thermal plant, including fuel and/or the capital recovery and operating cost of the thermal plant. Box 1 provides an overview of three modernization scenarios for fossil fuel and thermal plant displacement to enable a cost-competitive power system.[14]

### Box 1. Technical Overview of Three Modernization Scenarios

**Fuel displacement:** When the highest level of demand is fully met by fossil fuel plants and the average cost of renewable energy is less than the variable costs of fossil fuel generation such as fuel, electricity produced by renewable energy can compete economically and can thus displace the imported fossil fuel. In other words, it is more economical not to run the fossil fuel plant because the cost of fuel is higher than renewable energy.

**Meeting incremental capacity:** An incremental capacity approach brings additional electricity-generation capacity at a lower cost than new fossil fuel and at a quicker pace and with a greater degree of stability than the fuel-displacement model. Adding solar and wind capacity incrementally to the electricity-generation mix makes economic sense because renewables now offer lower average energy costs than fossil fuel generation.

**Full displacement:** When the average cost of renewable energy and storage technologies plus capital recovery cost from existing fossil fuel contracts is less than the true cost of fossil fuel generation, all fossil fuel generation can be displaced.

Contrary to popular belief that energy transition triggers higher costs, it is important to realize that nonperforming stranded assets today are already being paid for by end users, taxpayers, investors, creditors, or some combination of all four. The solution to this starts with solid policies to encourage energy transition that can change the generation mix and permit the deflationary nature of renewable energy and storage technologies to insulate the system from future nonperformance and stranding. So when badly designed power market policies increase the plant life of underperforming fossil fuel assets with guaranteed contracts, it will translate to further costs in the form of higher electricity prices paid for by end users, write-offs by investors, nonperforming loans for creditors, and/or subsidies/bailouts from government, which are ultimately paid for by taxpayers (see figure 1 on page 5).

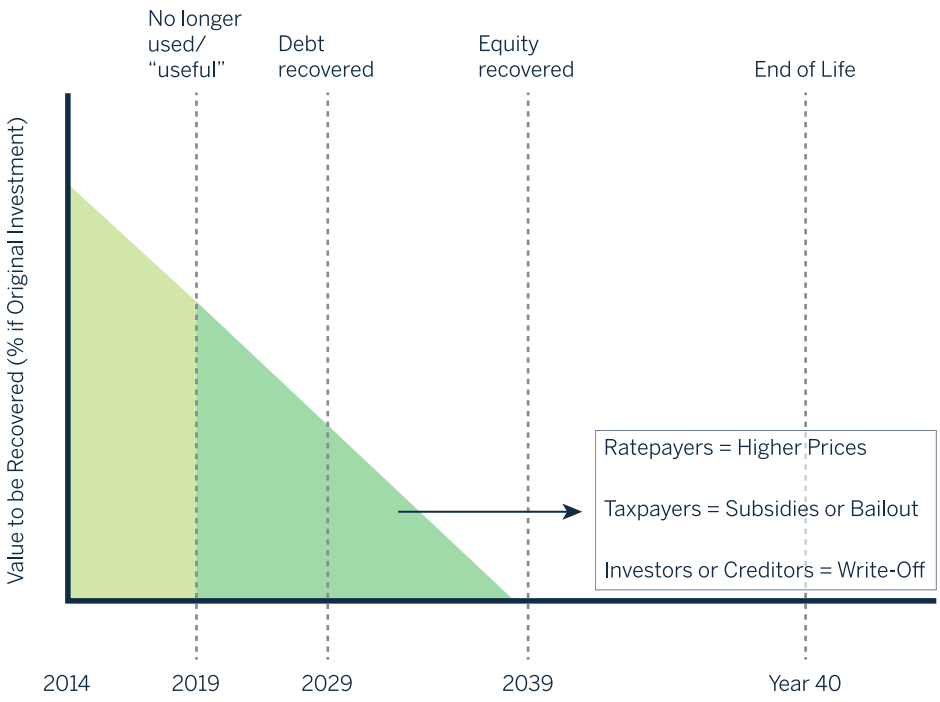
Due to the way that the project economics of fossil fuel IPPs deteriorate in the face of new cost-competitive technologies, the more that countries delay modernization of their power sector, the greater the cost of displacement. This means that the likelihood of fossil fuel asset stranding rises, resulting in higher nonperforming loans, write-offs, and subsidies/bailouts. While the transition makes economic and financial sense, the key is to buy down the cost and the speed of this transition. While the displacement modernization scenarios highlighted above do not take carbon pricing into account, carbon pricing implementation would accelerate these trends and protect end users, investors, creditors, and taxpayers from growing nonperformance/stranded risk. The current displacement scenarios take into consideration cost savings. The addition of a carbon price to take into account carbon and/or pollution externalities would also include a revenue line in the equation. From a regulatory perspective, the ability to displace expensive fossil fuel power for a cheaper portfolio of alternatives will require the support of the power sector regulators to ensure that power purchase agreements are technology agnostic. This would give both utilities and generators the ability to replace uneconomical technology with more-economical options.

Energy transition has created an opportunity for power sector planners and stakeholders to reset energy development policy to enable more renewable absorption by grid systems and redirect resources to support economic fundamentals and energy price stability. This is a unique opportunity to utilize recovery packages to reduce overall system cost while improving domestic energy security, resilience, and job creation.

## The Energy Transition—A Cornerstone of Recovery Packages Toward a Resilient and Cost-Competitive Power System

In the face of rapidly declining costs and technological advances in renewable energy and storage, power planning biases that favor fossil fuels make no sense, particularly when linked to energy policies premised on high levels of subsidies or import exposure, or accompanied by guarantees that insulate project sponsors dumping unmanaged risks on end users. The rapid

**Figure 1. Prospective Fossil Fuel Plant**




pace of technological innovation and its impact on advancing the transition to a more sustainable, low-carbon economy means electricity should no longer be expensive or subsidized in perpetuity. All subsidies to the power sector should be redirected to become a purely one-time capital-expenditure subsidy with an eventual exit strategy, as opposed to the current pattern of subsidies found in markets such as Vietnam, Indonesia, and Bangladesh, where subsidies often become embedded in the economy as recurring operational expenses in perpetuity. The political will needed to eliminate energy subsidies is hard to mobilize, but the payoff for society is high. Redirecting energy subsidies can improve procurement incentives for utilities to buy the lowest-cost power while ensuring a more equitable and sustainable solution.

The analysis of energy transition and modernization scenarios helps frame the current discussion concerning recommendations for developing country technical assistance and investment recovery packages by multilateral development banks (MDBs). An improved market system design including a repositioning of regulatory incentives can drive investment in the sector, thus taking advantage of deflationary renewable energy, storage, and associated technology solutions (such as an energy management system). The recovery packages, reflected in the six technical assistance tracks below, can provide developing countries with support to modernize their power sector development outcomes and enable significant contributions in support of the Climate Vulnerable Forum (CVF) goal of establishing 1.5°C as the threshold of the Paris Agreement.

### Track 1. Energy Access and Improved Reliability through Distributed Energy Resources

Over 370 million people in climate vulnerable countries[15] lack access to energy, and millions more lack access to reliable power. To reach the last mile of electrification, a domestic modular renewable energy system with battery storage can be a cost-competitive solution, as it is a good substitute for capital-intensive grid infrastructure while being able to supply power at the point of demand. This recovery package can focus on financing and enabling distributed energy resources and microgrids to facilitate energy access and improved reliability.

### Track 2. A Just Energy Transition Scenario Toward a Resilient and Cost-Competitive Power System

Correctly implemented, power sector displacement and modernization strategies can catalyze change at the country level that will create new investment opportunities that attract investors in search of high-quality infrastructure assets. In addition to driving investment, cost savings may also be assessed in the form of lower subsidies and lower tariffs due to energy transition. The assessment can also include cost trajectory analysis of power sources (both domestic and imported), the value of storage until 2040, estimated just transition costs (to compensate workers and provide them reemployment programs to be redeployed in renewable energy or other industries), and the key drivers of speed of the transition.

### Track 3. Facilitating Auctions in Developing Countries with Concessional Finance from MDBs

One of the most important catalysts for cost-competitive energy transition is the shift to capacity procurement via auctions. System operators are transitioning to competitive renewable capacity auction programs that combine enhanced system planning with targeted renewable additions that derisk project economics. The merits of this shift are supported by data indicating that the number of countries that have transitioned to renewable energy auctions increased from 9 in 2009 to at least 48 by 2018. Transparent auctions can deliver the kind of low-cost power that CVF countries need for growth and competitiveness. Auctions would help introduce greater clarity and competition into the generation sector. To enable auctions, MDBs can cofinance or grant concessional loans to successful projects.

Well-designed reverse auctions would:

- Help push down prices for consumers and/or reduce subsidies for government.
- Clarify and streamline the procurement process for developers, utilities, and regulators.
- Ensure that procurement of generation to meet renewable energy targets results in cost-competitive outcomes.
- Provide the most competitive means of capturing economies of scale delivered by industrial-scale variable renewables for consumers.
- Align with global best practices in mobilizing domestic and international equity investment in project development, construction, and operations.
- Help attract domestic and international debt financing to support projects with a reliable revenue source.

Moreover, countries need to understand what happens when renewable energy is part of the mix and begins to erode baseload economics and existing market structures and regulatory incentives.

### Track 4. System Design of the Future—Promoting Investment, Pricing, and Markets for Grid and Nongrid Services

Power markets of old were not designed with variable renewable energy in mind. As a result, power market reform remains a barrier even though renewable energy is in many markets now cost competitive with fossil fuels. Moreover, countries need to understand what happens when renewable energy is part of the mix and begins to erode baseload economics and existing market structures and regulatory incentives.

In the past, power sector planners often assumed that biasing the system toward baseload fossil fuel generators would deliver benefits from scale economies. This planning norm is now being reconsidered in light of evidence that too high a fossil fuel mix results in system lock-in due to inflexible contractual obligations that require baseload dispatch even when new lower cost renewables can reduce system prices.

Market structures and market design should have country-specific assessments because some power sectors are not privatized, which creates a scenario where nonperforming/stranded assets are a public burden. Moreover, regulators must begin to price grid and nongrid services (e.g., storage, power reserves, system services) to enable the success of generators and utilities in navigating the energy transition. Countries and systems can progress to have revenue models for system services, which can fit better-configured long-term system design.

Most recently, there have been examples of solar plants providing grid services at commercial rates while performing better than fast gas-turbine technologies. Such grid services include primary frequency control, ramp rate control, and voltage regulation.

Moreover, technologies like energy storage can improve grid stability and reliability. The recovery package can thus assist developing countries in accessing and implementing applications of energy storage that can:

- Reduce peak demand in the substations of distribution utilities, flatten their load profiles, and provide primary and secondary reserve, as well as other grid services.
- Use behind-the-meter commercial and industrial facilities to reduce peak demand, do "energy arbitrage," or charge during off peak to reduce on-peak consumption.
- Integrate into existing or new utility-scale renewable energy projects to assist with firming up variable output, reducing ramp rates and allowing for more-efficient use of transmission connections.
- Build energy security for all by providing more-reliable off-grid energy access, particularly in conjunction with rooftop solar.

To enable the applications above, the recovery package can create a platform for entities from developing countries to populate and access typical load profiles of distribution utilities and commercial and industrial facilities. This information can help developing country power sector stakeholders understand areas/conditions where energy storage can be viable and thus attract investment.

### Track 5. The Grid of the Future to Lower System Prices, Improve Resilience, and Enhance Reliability

Grids in developing countries often lack the functionality needed to support the integration of low-cost renewables. As a result, energy planners have a very narrow range of options, leading to high-cost choices. Upgrading the grid and utilizing grid management technology are often a precondition for the integration of renewable technology promising better energy security, better domestic sourcing, more diversification, less pollution, and lower emissions. To enable this, there must be improved financing of grid modernization upgrades and grid management technology[16] to unlock renewable energy potential and ultimately to optimize renewable energy penetration. This recovery package can support technical assistance to assess grid upgrading needs and consequently invest and aid in coinvestment in such upgrading.

### Track 6. National Resilient Energy Transition Scenario Analysis and Feasibility Study

In many markets, the potential for 50 or even 100 percent renewable energy grids are yet to be fully explored. The recovery package could provide resourcing to assess on a country and area-within-a-country scale the potential for grids to go up to 100 percent renewable in the coming decades. These studies would seek to identify promising areas for development of renewable energy, including technologies that are not yet fully at scale such as floating solar or offshore wind. A 50 percent supply mix interim target of renewable energy would get the process moving, lock in development of the easiest transition steps first, and then provide the momentum to continue on to a full energy transition over time. Moreover, the national resilient energy transition scenario analysis takes into consideration that energy is a facilitator for adaptation and can build adaptive capacities and cost savings for the public and private sectors by reducing climate-induced disasters using distributed, low-cost, domestically sourced renewable energy and storage technology.

## An Opportunity to Reduce Exposure to Nonperforming Stranded-Asset Risk While Attracting Investment in Cost-Competitive and Domestically Secure Power Systems

Financial regulators have a responsibility to safeguard the financial system from the evolving material risks, including nonperforming stranded-asset risk. Power sector planners and regulators have a corresponding responsibility to safeguard consumers and industry interest, which means protection from unnecessarily high prices and/or high subsidies. And finally, responsible managers have a fiduciary duty to factor in known financial risks. This is the time for regulators, investors, and bankers to consider whether directors can be held personally liable if they have breached their fiduciary duty to act in shareholders' best interests by ignoring fossil fuel risks.

The IMF can play a role by taking a proactive approach in engaging with countries to ascertain the degree of exposure for the financial sector and the public sector to fossil fuel lock-in and its accompanying nonperformance stranded risk. Fossil fuel investments are often backed by sovereign guarantees, which have implications for public-sector balance sheets in terms of what the state owns and owes or guarantees. When these guarantees come into effect, it is often the taxpayers and ratepayers who bear the cost in higher electricity prices.

Considering rising external debt in combination with reductions in GDP growth, a decline in remittances, and a large fiscal effort during the COVID-19 lockdown and recovery, it is prudent for South and Southeast Asian countries as well as key financiers of fossil fuel growth in the region—Korea, Japan, and China—to understand the size and nature of public assets and obligations that are exposed to stranded-asset risk. Early assessment can enable better risk management and policymaking toward early displacement, improved resilience of public finances, and a more cost-competitive power sector. Identifying these risks within the balance sheet at an early stage means power sector stakeholders and governments can mitigate these risks early rather than dealing with the consequences.

The reset offers an opportunity to reduce exposure to nonperforming stranded-asset risk while enabling investment in domestic energy security by adding modular renewable energy systems that will fit a better configured long-term system design.

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[15] "Climate vulnerable countries" refers to the 48 developing country members in the Climate Vulnerable Forum.

[16] "Grid modernization upgrades" and "grid management technology" refer to such actions as improving the grid operator's ability to monitor and respond to system conditions, having real-time metering and real-time rates, shifting from one-way switches in the distribution system toward bidirectional switches to accommodate two-way power flows for self-generating alternatives, and grid investment to accommodate lower cost renewables.

## About the Author

Sara Jane Ahmed has steered efforts focused on the energy transition in the Philippines in her role as an energy finance analyst at the Institute for Energy Economics and Financial Analysis (IEEFA). She is an author of several studies on island grid transition to renewables, coal stranded asset risk, rooftop solar, auctions, and energy transition prospects, covering both the Philippines and Bangladesh markets. She has also acted as an adviser to public and private institutions on the integration of transition risk and physical climate risks in development and investment strategies.

Ahmed is a finance adviser at the Global Center on Adaptation for the Vulnerable Group of Twenty (V20) Ministers of Finance. She holds an MS in finance from the Simon Graduate School of Business, University of Rochester in New York and a BA in economics and development finance and energy from Knox College in Illinois, USA. She is completing an MS in applied economics from Johns Hopkins University.

*Analysis and New Insights are thought-provoking contributions to the public debate over peace and security issues. This Analysis and New Insights is part of the Playbook for Paradigm Shift paper series, a collaborative effort of the Stanley Center for Peace and Security and E3G to develop bold ideas and practical solutions for faster climate action and a fairer economy out of this crisis. (Cover photo: A solar pump operator for Nusra works near the solar panels in Rohertek, Bangladesh. Nusra is an NGO working to bring solar irrigation to farmers and solar home systems to families in Rohertek. (Photo © Dominic Chavez/World Bank/https://flic.kr/p/N1ZtUY).*

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