

POWERING SOLAR WITHOUT OVERLOADING THE GRID

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Trapped in its worst-ever primary fuel supply crisis for power generation, the Government of Bangladesh has launched commendable initiatives to expand solar power generation on a massive scale, both on and off the grid. It plans to generate up to 10,000 MW of renewable energy, mostly from solar, by 2030. The government has announced various fiscal and financial incentives and pledged to offer loans on favorable terms. Homeowners, government offices, factories and industries have also been encouraged to supply surplus electricity generated from rooftop solar systems to the grid through net metering.

However, given the current state of the power grid and the lack of smart metering, integrating more rooftop solar generation into the grid carries obvious risks. Bangladesh could learn from Sri Lanka's power grid collapse, which raised concerns about the challenges of managing high levels of solar generation. It could also draw lessons from Australia's innovations in reliably and efficiently integrating more customer-generated rooftop solar power into the grid. Australia's national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), received the 2026 International Smart Grid Action Network (ISGAN) Award of Excellence for demonstrating how existing electricity networks can be used more dynamically.

CSIRO's research, titled Dynamic Operating Envelope Integration Via an Interoperable Utility-Distributed Energy Resource Communication Standard, highlights Australia's journey in developing and adopting Dynamic Operating Envelopes (DOEs), which facilitate the flexible export of rooftop solar electricity to the grid.

Australia has one of the world's highest rates of rooftop solar adoption. On sunny days, homes and businesses can generate more electricity than they consume, leaving surplus power available for export to the grid. In some areas, however, local electricity

networks can accept only a limited amount of solar power at certain times.

System operators manage this challenge by setting fixed export limits, restricting how much electricity customers can send to the grid, even when additional network capacity may be available. When spare capacity exists and grid demand is higher, more electricity can be accommodated from rooftop solar systems. When demand is lower, or network constraints become more pronounced, export limits can be reduced accordingly.

Dynamic management of this kind requires smart meters that allow operators at load dispatch centers to monitor electricity flows in real time. Bangladesh will therefore need to upgrade its metering infrastructure. Until the grid is sufficiently upgraded, some future renewable energy capacity, particularly rooftop solar, could be integrated into local distribution networks.

Before discussing the integration of Dynamic Operating Envelopes in detail, let us examine Bangladesh's renewable energy plans, the present state of its power grid and the integration of rooftop solar into the national grid through the net metering system.

Bangladesh's Power Supply Chain

Bangladesh has an installed power generation capacity of 32,688 MW, comprising 29,143 MW of grid-connected capacity and 3,545 MW of off-grid capacity. Its fuel mix is dominated by natural gas, both domestically produced and imported as LNG, coal from domestic and imported sources, and furnace oil. The country also imports electricity from neighboring countries. However, the contribution of clean energy sources, particularly hydropower and solar, remains negligible.

Over the past decade, Bangladesh has shifted from almost exclusive dependence on domestic primary energy resources to increasing reliance on imported fuels. Wars and conflicts that disrupt key trade routes, including the Strait of Hormuz, have exposed the country to volatility in global fuel markets and supply-chain disruptions. Against this backdrop, increasing the contribution of renewable energy, particularly solar and wind, has been identified as a major component of the strategy to address the country's severe energy crisis.

The announcement of various fiscal and financial incentives has generated considerable enthusiasm in Bangladesh for the rapid development of both rooftop and grid-connected solar power generation. However, it is important to recognize that the country's power grid has limited capacity to accommodate rooftop solar generation. Moreover, the net meters currently in use in Bangladesh are not smart. This prevents the National Load Dispatch Centre (NLDC) from assessing the grid's capacity to accommodate rooftop solar exports on a real-time basis.

Bangladesh plans to generate up to 10,000 MW of renewable energy by 2030. Recently, the prime minister expressed the expectation that an additional 3,000–4,000 MW of solar power could be added to the grid by the beginning of next summer, around March 2027. If achieved, this would be a major boost. But a critical question remains: Can the grid accommodate surplus electricity generated by rooftop solar systems? System operators must determine what upgrades will be required and how electricity exports can be monitored and managed. Bangladesh may need to plan for and introduce Dynamic Operating Envelopes to manage this integration.

Dynamic Operating Envelopes (DOEs)

DOEs are time-varying import and export limits for distributed energy resources (DERs), calculated on the basis of real-time grid conditions to maintain voltage stability and comply with thermal and network constraints while maximizing the capacity of the grid to accommodate distributed generation. They determine how much power a customer, device or community can inject into or draw from the grid at any given time, based on actual network conditions rather than fixed limits designed around worst-case assumptions. These operational boundaries adjust throughout the day, across seasons and over the year as network conditions change.

Why should Bangladesh consider DOEs? They can unlock additional network capacity by replacing conservative, static export limits with more flexible ones. They can also facilitate the integration of solar systems, batteries, electric vehicle (EV) charging and community energy systems. In addition, DOEs can help ensure a fair allocation of available network capacity among downstream users.

Applications of DOEs

DOEs have several practical applications, including setting export and import limits for households and businesses based on grid conditions; controlling EV charging in response to local voltage conditions; enabling energy communities to manage shared import and export limits; and supporting active network management to maintain voltage stability and comply with thermal constraints.

Conclusion

We commend the government's initiatives to harness the country's renewable energy potential, particularly through the expansion of solar power and, more specifically, rooftop solar. However, extensive research is needed to assess the grid's condition and capacity to integrate variable renewable energy (VRE) at different times of day and across locations. The assessment must take into account variations in electricity demand and the limits on how much additional generation individual parts of the network can accommodate.

Until the grid is upgraded and smart meters are installed to facilitate real-time monitoring of rooftop solar generation and electricity exports, some of the additional solar power could be utilized locally through the establishment of microgrids.

Bangladesh must also study how Australia manages the integration of a high share of rooftop solar into its electricity network. CSIRO could potentially provide valuable technical assistance to Bangladesh's power sector. EP

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ROAD MAP FOR CONFRONTING THE GAS CRISIS

The BNP government has announced a roadmap to drill and overhaul 150 wells by 2031, aiming to add 1,752 MMCFD of new gas to the national supply chain. While there is little reason to question the rationale behind this ambitious initiative, its implementation will inevitably encounter several roadblocks. These include challenges in the project approval process, land acquisition, uncertainty over the discovery of gas through exploration, and the technical and financial constraints facing Petrobangla and BAPEX.

It may be recalled that, during the latter part of the Awami League regime, Petrobangla and the Energy and Mineral Resources Division (EMRD) undertook a 48-well drilling program, subsequently revised to 50 wells, with a target completion date of 2025. They also initiated another program to drill 100 wells by 2028. Following the change of government, the interim administration revised the target completion date to 2030. The BNP government's new roadmap now envisions completing the drilling of 150 wells by 2031.

Meanwhile, production from domestic gas fields, which once peaked at 2,750 MMCFD, has declined to around 1,650 MMCFD. Experts have warned that the country's entire proven gas reserves could be depleted by 2031 if no major new resources are discovered and added to the reserve base soon. Against this backdrop, the roadmap announced by the present government merits meticulous scrutiny.

The Roadmap

The government plans to implement the program in two phases. The first phase is scheduled for completion by January 2028, while the second will run from February 2028 to December 2031. Considering Bangladesh's track record in well drilling and the existing capacity and capabilities of Petrobangla and BAPEX, such an ambitious target appears unrealistic, if not overly optimistic.

Reliable sources say that, of the 150 wells, 104 will be new wells and 46 will undergo workovers. It is not clear how the locations of the proposed exploration wells were selected or whether they are supported by the required seismic surveys and interpretations conducted by qualified experts.

Sources have indicated that drilling proposals for 77 wells under 27 projects have been approved by the boards of directors of BAPEX, Bangladesh Gas Fields Company Limited (BGFCL) and Sylhet Gas Fields Limited (SGFL). Of

the 51 wells approved so far, work on 32 has already been completed, 11 are under implementation, and work on eight more is expected to begin soon. Proposals for drilling 26 wells under 10 projects are awaiting approval. Proposals for the remaining 73 wells will be submitted for approval in phases.

We are all aware that any drilling project in Bangladesh requires the preparation and processing of a Development Project Proposal (DPP), followed by a multilevel approval process that takes at least a year. The process also requires an environmental impact assessment conducted by a third party. Executing agencies cannot initiate the necessary land acquisition process before formal DPP approval and the allocation of funds. In many locations, pre-drilling activities, such as constructing access roads and drill pads, also involve considerable challenges.

Whether executing agencies use their own rigs or engage contractors, they must follow the required procedures. Even if drilling takes only 90–120 days, assuming no unexpected incidents occur, the entire process—from project initiation to bringing a well into production—cannot realistically be completed in less than two years. Given these constraints, completing 150 wells by 2031 appears highly optimistic.

A government source has said that the 32 completed wells have secured 270.8 MMCFD of new gas, of which 139.60 MMCFD has been evacuated into the national gas grid. Some of the newly discovered gas is located on Bhola Island, which is not connected to the national gas grid.

EMRD officials have also informed us that 11 wells were completed during the tenure of the BNP government, creating the potential to add 58.8 MMCFD of new gas. Of this, 41.9 MMCFD has been evacuated into the grid.

The following works are currently under implementation.

The 11 wells under field implementation include Sundalpur South-1, Bhola North-3, Bhola North-4, Shahbazpur North East-1, Srikail Deep-1, Mubarakpur Deep-1 and Fenchuganj South-1 under BAPEX; Titas-29, Bakhrabad-7 and Titas-31 Deep under BGFCL; and Rashidpur-13 under SGFL.

The wells on Bhola Island cannot contribute to the national grid until a gas transmission pipeline—under discussion for a long time—is constructed to connect the resources to the grid. The deep wells at Titas, Bakhrabad and Srikail offer promising prospects. Any significant gas discovery from these wells could change the country's gas supply outlook. We also need to examine how the gas discovered at Haripur Sylhet-10 and 10A can be evacuated into the grid.

Judging from developments in well drilling at the prolific Titas field, the recently approved Titas-32 and Titas-33 wells also appear highly prospective.

Bangladesh's coincident peak gas demand is now around 3,800 MMCFD. Depleting domestic gas fields supply approximately 1,600–1,650 MMCFD. When both floating storage and regasification units (FSRUs) are operating, they add around 1,050 MMCFD to the national grid. Another 5–10 MMCFD of new gas is added through development wells and workovers in fields connected to the grid. However, production declines from existing wells are much faster.

In this situation, panic sets in even when one FSRU undergoes scheduled maintenance. Bangladesh desperately needs to evacuate the stranded gas resources on Bhola Island as a top priority. At the same time, at least one additional FSRU must be in place by 2029. That may be possible only if the government renegotiates the contract with Summit Energy. The contract currently under negotiation with a Chinese company is in no way more favorable than the agreement previously negotiated with Summit.

In addition to these measures, we would recommend that the government announce a production-sharing contract (PSC) bidding round for onshore frontier areas, while retaining provisions for BAPEX to participate. If 10 drilling rigs, including those operated by BAPEX, can be deployed by the end of 2027, Bangladesh may be able to discover 3–5 trillion cubic feet (TCF) of new gas by 2031.

We must bear in mind that, given current global realities, Bangladesh cannot afford to become excessively dependent on imported LNG for its gas supply security. The roadmap is a plan, but its success will depend on the implementation agencies and the technical and financial capacity of the executing organizations to overcome the roadblocks and reach the destination.

We are not sure how Petrobangla or EMRD arrived at the estimate of adding 1,752 MMCFD of new gas through the drilling and workover of 150 wells. Not every exploration well leads to a discovery. In the gas industry, a discovery of less than 500 billion cubic feet (BCF) is generally not considered commercially viable unless the location is close to the gas grid. Unfortunately, over the past decade or so, Bangladesh's exploration success, apart from the discoveries on Bhola Island, has been negligible. Owing to the indecision of policymakers, the resources on Bhola have yet to be monetized.

Recommendations

The 150-well drilling program is a continuation of the initiative undertaken by the previous government, with the present administration further revising its targets and timeline. However, the factors that have historically obstructed the timely implementation of drilling projects remain largely unchanged.

We cannot understand why drilling at Chattak and Tengratila continues to be delayed. Why has no action been taken to pursue further exploration of prospects in the Chittagong Hill Tracts? Why has the PSC bidding round for onshore areas been held up? Why does the government remain undecided about constructing a gas transmission pipeline from Bhola? What makes the government hesitant to renegotiate the contract with Summit Energy for a third FSRU?

Unless the government reforms the DPP approval process and introduces special land acquisition and requisition procedures that treat drilling projects as top-priority national initiatives, we are not confident that the roadmap will reach its destination. We appreciate the efforts of BAPEX, BGFCL, and SGFL. However, these companies need extensive capacity development to strengthen their technical expertise and operational capabilities. EP

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