

## **Executive Summary**

Bangladesh's transition toward high-middle-income status depends on a national energy system that is no longer tethered to global fuel price volatility. The current reliance on imported gas and coal creates a persistent drain on foreign exchange reserves and exposes the national budget to external inflationary shocks that disrupt long-term planning. This roadmap is motivated by the urgent need to secure a predictable, domestic energy foundation that supports industrial maturity without the land-use conflicts typical of utility-scale projects. By prioritizing decentralized infrastructure, the state can align its development goals with a resilient macroeconomic framework that transforms energy from a fiscal burden into a permanent pillar of national self-sufficiency and economic resilience.

Econometric modeling indicates that the trajectory for national power demand is shifting significantly as the economy matures. Total demand of Bangladesh is forecasted to grow to 157,850 GWh by 2030, eventually reaching 316,500 GWh by 2040. To maintain system stability and meet national climate commitments, the roadmap calculates that the power system must successfully integrate:

- 7,449 MW of renewable energy by 2030.
- 21,514 MW of renewable energy by 2040.

The recommended path follows a decentralized, "Zero-Arable Land" strategy requiring a cumulative investment of \$32.82 billion. This strategy avoids the displacement of agricultural soil by utilizing vertical industrial spaces and underutilized water bodies. By adopting the Localized Stability model, the roadmap integrates 21,514 MW of capacity with dedicated storage systems. This ensures that intermittent generation becomes dispatchable during evening peaks, providing a bankable alternative to expensive national grid overhauls. This approach provides a clear technical roadmap for three primary sub-sectors:

- Industrial Rooftop Solar: 12,048 MW.
- Solar Irrigation: 3,442 MW.
- Floating Solar: 1,721 MW.

Mobilizing this capital requires a transition from public-debt-led models to a multi-dimensional financing architecture. The roadmap provides a methodology to redirect capital from planned gas infrastructure toward domestic assets, yielding substantial economic benefits through avoided technical losses and long-term price stabilization. Furthermore, the framework taps into innovative social and community finance mechanisms. This includes utilizing the vast potential of

wealth-redistribution funds to provide debt-free ownership for marginalized communities and issuing dollar-denominated bonds to capture the savings of the global diaspora. By pairing these with carbon market integration and institutional de-risking tools, the roadmap converts renewable energy generation into a high-yield, sovereign-backed asset class that attracts institutional capital while empowering the productive base of the economy through direct asset ownership.

Ultimately, this study demonstrates that energy sovereignty is a measurable outcome of smart resource management and institutional reform. By shifting toward a market-facilitator model, the state can regulate a diverse ecosystem of energy producers while decentralizing the risks inherent in the transition. This roadmap is not merely a technical proposal; it is a strategic necessity for safeguarding the nation's fiscal health and providing a foundation for community stewardship. Transitioning to a decentralized renewable energy system ensures that Bangladesh remains insulated from global volatility, anchoring its future in a resilient, self-sufficient, and economically strategic power network that fosters localized economic dignity, enhanced industrial competitiveness, and long-term prosperity for the entire population.