

A National Framework to Monitor the Economy-wide Effects of Fossil Fuel Price Shocks: An Appraisal

AUTHORS

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1. Background and Rationale

The global energy transition is driven primarily by environmental imperatives, economic opportunities, and shifting geopolitics. These drivers dominate the international narrative on renewables. However, macroeconomic concerns cannot be overlooked in Bangladesh. Dependence on imported fossil fuels directly exposes the economy to global price shocks, which translate into inflationary pressures, higher import bills, fiscal strain, and risks to external trade competitiveness. While the environmental, economic, and geopolitical arguments for renewables remain compelling, for Bangladesh, the transition is equally a matter of macroeconomic stability and resilience.

Fossil fuels—oil, coal, natural gas, and liquefied natural gas (LNG)—remain central to the energy mix of many developing and emerging economies, including Bangladesh. These fuels not only drive industrial production, electricity generation, and transportation but also shape external trade balances and government fiscal stability. However, the international market for fossil fuels is highly volatile, influenced by geopolitical tensions, supply chain disruptions, technological shifts, and global energy transition policies. For import-dependent countries like Bangladesh, such volatility can create significant macroeconomic vulnerabilities.

Higher fossil fuel prices increase production costs and reduce competitiveness, while rising import bills put pressure on foreign exchange reserves and worsen the trade balance. The government faces fiscal strain as subsidies rise, limiting funds for other priorities. At the household level, energy price hikes reduce purchasing power, especially among low-income families. In addition, currency volatility and monetary challenges may arise, while uncertainty in energy costs can slow investment and industrial growth. Without a systematic framework to monitor these impacts, policy responses tend to be reactive and fragmented, limiting Bangladesh’s ability to manage risks and plan a resilient energy transition.

Figure 1: Transmission Channels of Fossil Fuel Price Fluctuations



Figure 2: Necessity of National Monitoring Framework



subsidy reforms, resource allocation, and fiscal planning. Third, it builds resilience to global

The monitoring framework is essential for managing the effects of energy price volatility. First, it helps safeguard macroeconomic stability by enabling early detection of price fluctuations that can affect inflation, exchange rates, and fiscal balances. Second, it supports evidence-based policymaking and budgeting by providing timely, accurate data that guide

shocks, helping the economy and households withstand external disruptions to energy markets. Finally, it guides energy transition and long-term planning, ensuring sustainable growth, reduced dependence on fossil fuels, and alignment with national development and climate goals.

2. Objectives of the Framework

The monitoring framework aims to:

- (i) **Track Indicators** – Monitor trends in domestic and international energy prices and key macroeconomic variables.
- (ii) **Assess Impact** – Evaluate the macroeconomic effects of fossil fuel price fluctuations.
- (iii) **Inform Policy** – Provide evidence-based insights and policy options to mitigate adverse effects.
- (iv) **Enhance Coordination** – Strengthen inter-institutional data sharing and collaborative analysis to ensure integrated energy and macroeconomic planning.
- (iv) **Guide Energy Transition** – Support strategic planning and implementation of sustainable energy policies, reducing fossil fuel dependence and promoting renewable energy adoption.

3. Institutional Arrangement & Governance

A multi-tiered governance structure is essential to ensure technical rigor, secure high-level political buy-in, and facilitate effective policy uptake. SANEM proposes establishing a clear hierarchy of roles and responsibilities to eliminate silos and mandate collaboration across institutions.

First, for strategic leadership and policy endorsement, the framework requires a National Coordination Committee.

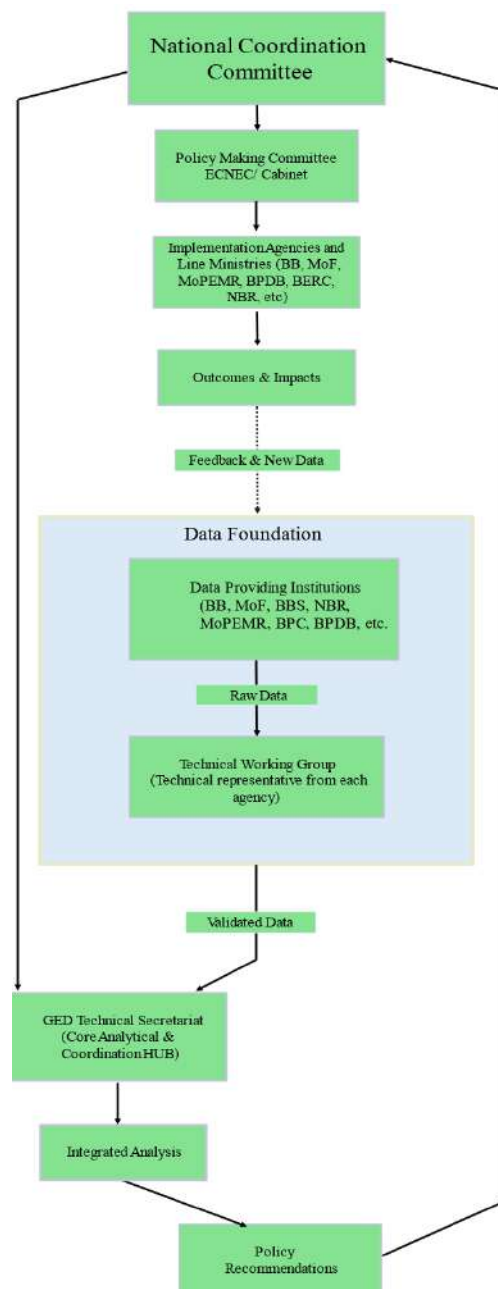


Figure 3: Institutional Hierarchy & Governance Structure

Box 1: National Coordination Committee

Chair: Principal Secretary to the Prime Minister's Office

Members: Secretaries of the Ministries of Finance, Planning, Power, Energy & Mineral Resources, Commerce, Governor of Bangladesh Bank; Chairman of NBR.

Key Responsibilities:

- (i) Provide the strategic mandate and high-level direction for the entire monitoring framework.
- (ii) Review and endorse comprehensive reports and policy recommendations prepared by the GED Secretariat.
- (iii) Resolve inter-ministerial conflicts related to data sharing or policy jurisdiction.
- (iv) Forward endorsed policy recommendations to the Executive Committee of the National Economic Council (ECNEC) or the Cabinet for final approval.
- (v) Meet quarterly, or as needed during crises.

Second, for the operational core and analytical hub, the framework requires a GED Technical Secretariat.

Box 2: GED Technical Secretariat

Host: General Economics Division (GED), Planning Commission.

Composition: A dedicated unit comprising energy economists, econometricians, data scientists, and policy analysts.

Key Responsibilities:

- (i) Serve as the central node for data integration, management, and analysis.
- (ii) Develop and maintain advanced economic models (e.g., VAR, Input-Output, Microsimulation) to assess impacts and simulate policy scenarios.
- (iii) Prepare all monitoring reports, dashboards, and policy briefs for the National Coordination Committee.
- (iv) Coordinate the activities of the Technical Working Group.
- (v) Manage the central data repository and ensure data security protocols.

Third, for data coordination and validation, the framework requires a Technical Working Group.

Box 3: Technical Working Group

Composition: Technical-level representatives (e.g., Joint Secretary, Chief Economist) from each data-providing agency.

Key Agencies: Bangladesh Bank, Bangladesh Bureau of Statistics (BBS), National Board of Revenue (NBR), Ministry of Finance, Ministry of Power, Energy & Mineral Resources (MoPEMR), Bangladesh Energy Regulatory Commission (BERC).

Key Responsibilities:

- (i) Ensure timely, standardized, and validated data flow from all member agencies to the GED Secretariat.
- (ii) Resolve technical discrepancies in data methodologies and definitions.
- (iii) Meet monthly to review data pipelines and address operational challenges.

Together, these three tiers establish a coherent governance structure that combines high-level political authority, robust technical analysis, and reliable data flows. This integrated arrangement ensures that the monitoring framework is both technically sound and institutionally anchored, enabling effective policy responses to fluctuations in fossil fuel prices.

4. Core Monitoring Framework: Indicators and Data Sources

The framework's analytical foundation rests on a structured set of indicators spanning energy prices, macroeconomic performance, household welfare, and policy variables, drawn from a range of national and international data sources on a regular and systematic basis (Table 1).

Table 1: Key Indicators and Data Sources

Domain	Key Indicators	Frequency	Source Agency
Energy Prices	Domestic energy prices (oil, gas, LNG, coal, electricity, petroleum products)	Monthly	BERC, MoPEMR, BBS
	International energy prices (oil, gas, LNG, coal)	Monthly	World Bank, IMF, IEA, BP Statistical Review, Our World in Data
Macroeconomic Indicators	Inflation	Monthly	BBS
	GDP, Sectoral GDP	Quarterly	BBS
	Subsidy expenditure	Quarterly	MoF
	Fuel Tax Revenue	Quarterly	NBR
	Fuel Import Volume & Price	Monthly	BB
	Current Account	Monthly	BB
	Trade Balance	Monthly	BB

Domain	Key Indicators	Frequency	Source Agency
	Exchange Rate	Monthly	BB
	Forex Reserve	Monthly	BB
Welfare Indicators	Poverty Rate		BBS
	Real Income		BBS
	Real Consumption		BBS
Policy Variables	Interest Rate	Monthly	BB
	Broad Money	Monthly	BB

5. Analytical and Modeling Framework

The GED Secretariat will employ advanced analytical techniques to move from description to prediction (Table 2):

Table 2: Analytical Models and Their Descriptions

Sl. No.	Models Name	Description
1.	VAR, SVAR Model	To capture the dynamic pass-through of fossil fuel price shocks to key macro variables, including inflation, GDP, the exchange rate, the trade balance, and interest rates. SVAR allows identification of structural shocks.
2.	VECM	To examine the long-term cointegration relationships between energy prices and macroeconomic variables (e.g., GDP, inflation, trade, reserves), while also capturing short-run dynamics.
3.	ARIMA	To forecast domestic energy demand and supply scenarios (oil, gas, electricity) in the medium and long run, using historical time series trends.
4.	Microsimulation modelling	Using Household Income and Expenditure Survey (HIES) data to simulate the distributional impact of fossil fuel price changes on household welfare, poverty, and inequality across income groups and regions.
5.	Macroeconometric Modeling	A structural model linking energy prices, fiscal policy, trade, monetary policy, and output, useful for policy simulations (e.g., subsidy reforms, taxation).
6.	Dynamic Stochastic General Equilibrium (DSGE)	To analyze the impact of energy price shocks on the economy under forward-looking expectations, accounting for households, firms, government, and external shocks. Useful for policy experiments such as subsidy removal or renewable energy transition.
7.	Input-Output (I-O) Analysis	Using Bangladesh's I-O table to measure how increases in fossil fuel prices ripple through production costs across sectors (textiles, agriculture, transport, manufacturing), identifying vulnerable and energy-intensive industries.
8.	Social Accounting Matrix (SAM)	Extends I-O analysis by incorporating households, government, and institutions, allowing analysis of income distribution and welfare effects of energy price changes at the macro-meso level.
9.	Computable General Equilibrium (CGE)	A comprehensive economy-wide model capturing interlinkages across sectors, households, and external trade, suitable for assessing the combined welfare, fiscal, and growth effects of energy price shocks and alternative policy responses (e.g., subsidies vs. cash transfers).

6. Reporting and Policy Integration Protocol

To ensure that monitoring outcomes meaningfully inform decision-making, the framework establishes a multi-layered reporting and response protocol that creates structured channels through which findings are systematically communicated to appropriate stakeholders at each level of governance (Table 3). Beyond information sharing, the protocol is action-forcing; each reporting cycle is directly linked to a structured response mechanism that translates monitoring signals into concrete, targeted policy interventions.

Table 3: Tentative Reporting Framework

Sl. No.	Report Name	Description
1.	Monthly Dashboard	A concise, visual dashboard for the PMO and Ministry of Finance, highlighting early warning indicators.
2.	Quarterly Monitoring Report	A comprehensive technical report for the TWGs and line ministries, providing a detailed analysis.
3.	Semi-Annual Policy Brief	A non-technical, actionable summary for the National Coordination Committee, with clear policy recommendations
4.	Special Assessment Reports	In-depth analysis of specific crises or policy proposals, produced as needed.

The ultimate value of the framework lies in its ability to trigger pre-emptive and targeted policy actions (Table 4). Based on monitoring outcomes, a structured four-tier response mechanism is activated:

Table 4: Tier-Based Policy Response Mechanism

Tier	Lead Institutions	Possible Responses:
Tier 1: Macroeconomic Stabilization	Bangladesh Bank, Ministry of Finance	Monetary policy adjustments (e.g., interest rate, exchange interventions), fiscal management (e.g., subsidy space assessment, buffer fund mobilization).
Tier 2: Sectoral Support	Line ministries (Power, Energy, Commerce, Industry), BEREC	Identification of highly exposed sectors (e.g., textiles, transport), targeted support packages (tax relief, retraining programs), or energy efficiency upgrades to safeguard competitiveness and prevent mass layoffs.
Tier 3: Household Protection	Ministry of Finance, Ministry of Social Welfare	Activation of targeted social safety nets, utility subsidies, or direct cash transfers to identified energy-poor households, ensuring protection of the most vulnerable from welfare erosion due to rising energy costs.
Tier 4: Guide Energy Transition	GED Secretariat, MoPEMR, SREDA, BEREC, Ministry of Environment, Forest and Climate Change	Use monitoring insights to recalibrate renewable energy targets, optimize strategies to reduce LNG and gas dependency, and align subsidy reforms with the transition roadmap. This tier ensures that short-term responses contribute to long-term structural transformation, energy diversification, and resilience to global shocks.

7. Implementation Roadmap and Resource Requirement

Translating the monitoring framework from design to operation requires a phased and well-resourced implementation plan, underpinned by clear institutional timelines, adequate human capital, and sustained financial commitment.

Table 5 outlines a three-phase implementation roadmap spanning from initial institutional setup through system development to full operational status, providing a structured timeline for translating the framework from design into practice. Table 6 details the core capacity and resource requirements, spanning human capital, technical infrastructure, and budget, necessary to sustain the framework's analytical functions over the long term.

Table 5: Implementation Roadmap

Phase	Duration	Description
Phase 1: Institutional Setup	6 Months	Formalize TORs, establish committees, and finalize data protocols.
Phase 2: System Development	6 Months	Develop the data platform, build initial models (starting with VAR and I-O), and produce the first baseline report.
Phase 3: Full Operation	Ongoing	Regular production of all reports and continuous model refinement, including the incorporation of microsimulation.

Table 6: Capacity and Resource Needs

Capacity Needs	Description
Human Resources	GED requires a dedicated unit with energy economists, data scientists, and econometricians.
Technical Infrastructure	Investment in modeling software (Stata, R, GAMS), computing power, and secure data servers.
Budget	An annual allocation is required to cover staffing, software, hardware, and operational costs, ensuring the sustainability of this critical function.

8. Recommended Actions

The persistent threat of energy price volatility necessitates a systematic, institutionalized response that moves away from ad hoc crisis management. This National Framework provides the structure for coordinated monitoring, analysis, and policy integration. We recommend the following immediate actions:

(i) **Formal Endorsement of the Framework:** Secure Cabinet/ECNEC approval and mandate the establishment of the National Coordination Committee for strategic leadership and policy endorsement.

(ii) **Operationalization of the GED Technical Secretariat:** Direct the General Economics Division (GED) to establish the Technical Secretariat, recruit/assign a dedicated team, and commence analytical and reporting functions.

(iii) **Institutionalization of Data Sharing Protocols:** Issue directives to all data-providing agencies (Bangladesh Bank, BBS, NBR, MoPEMR, BEREC) to ensure timely, standardized, and validated data flow to the GED Secretariat.

(iv) **Launch of the Monitoring and Reporting Cycle:** Initiate the Monthly Dashboard and Quarterly Monitoring Report within six months of adoption to provide decision-makers with early warning systems and policy-ready evidence.

By adopting and operationalizing this framework, the Government of Bangladesh will significantly strengthen its capacity to safeguard macroeconomic stability, protect household welfare, and guide the energy transition, while building resilience against future global energy market shocks.

9. Conclusion: Towards a Resilient and Sustainable Energy Future

This comprehensive framework shifts Bangladesh from passive reaction to active management of energy price risks. By integrating macroeconomic, sectoral, and household-level monitoring, it creates a holistic evidence base critical to effective policymaking in a volatile global energy landscape. Its successful implementation is closely tied to Bangladesh's broader energy transition agenda, as articulated in the Renewable Energy Policy 2025. By systematically quantifying both the economic costs of fossil fuel dependence and the distributed benefits of renewable energy adoption, the framework strengthens the economic rationale for accelerating clean energy investment.

In doing so, it enhances resilience against global energy shocks, safeguards household welfare, and promotes sustainable industrial growth. Ultimately, the framework will contribute not only to achieving SDG 7 (Affordable and Clean Energy) but also to Bangladesh's broader development objectives, supporting a transition toward a resilient, inclusive, and sustainable energy future.

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The South Asian Network on Economic Modeling (SANEM), established in 2007, is a Dhaka-based non-profit research organization. Over the past nearly two decades, it has grown into an international platform for economists, researchers, policymakers, and institutions committed to promoting high-quality, evidence-based economic analysis and informed policy advocacy in Bangladesh, South Asia, and beyond. SANEM conducts both quantitative and qualitative research on a broad range of development issues, including macroeconomics, international trade, poverty, inequality, labor markets, climate change, political economy, renewable energy, human capital, agriculture, social protection, and sustainability, and translates its findings into policy briefs, technical papers, and public discussions aimed at supporting effective decision-making. Through collaborative projects, training programs, conferences, publications, and initiatives for young economists, SANEM plays a key role in strengthening research capacity, fostering policy engagement, and contributing to inclusive and sustainable economic development in the region.

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