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SIGNIFICANCE OF REDIRECTING FOSSIL FUEL SUBSIDIES TO THE DEVELOPMENT OF RENEWABLE ENERGY IN BANGLADESH

Dr. Sakib Bin Amin

Dr. Sakib Bin Amin highlights the critical need for Bangladesh to redirect fossil fuel subsidies towards renewable energy development to reduce dependency on fossil fuel imports, mitigate fiscal burdens, and address environmental challenges. He emphasizes the importance of a well-designed, time-bound roadmap, institutional support, and financial incentives to foster renewable energy adoption, enhance fiscal sustainability, and achieve long-term economic and environmental benefits.

Md Hasin Israq and Md. Tuhin Ahmed highlight the significant potential of wind energy in Bangladesh as a key solution to reducing reliance on fossil fuels and achieving sustainable energy security. They emphasize the need for tailored strategies, strengthened infrastructure, and supportive policies to overcome challenges and harness this untapped resource for a secure and sustainable energy future.

UNLOCKING BANGLADESH'S WIND ENERGY POTENTIAL: CHALLENGES AND WAY FORWARD

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WHY ENERGY EFFICIENCY MATTERS: FROM THE INDUSTRIAL PERSPECTIVE

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Afia Mubasshira Tiasha highlights the critical importance of energy efficiency in addressing climate change, enhancing industrial competitiveness, and ensuring economic and environmental sustainability in Bangladesh. She emphasizes the need for coordinated efforts among governments, industries, and international partners to overcome challenges, foster innovation, and achieve sustainable growth by prioritizing energy efficiency in the industrial sector.

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Significance of Redirecting Fossil Fuel Subsidies to the Development of Renewable Energy in Bangladesh

Dr. Sakib Bin Amin

Energy is widely regarded as one of the fundamental prerequisites for developing a sustainable economy. Existing literature suggests that no country has advanced beyond a subsistence level without ensuring a minimum supply of energy to its population. Therefore, policymakers, mostly in developing countries, constantly focus on providing energy subsidies to different stakeholders to ensure energy security and foster economic activities. This is typically achieved by maintaining energy prices below the full economic cost for low-income consumer groups and by subsidising fuel costs to support energy production. Generally, high fossil fuel subsidies are associated with increased usage of fossil fuels. Bangladesh is no exception to this practice.

Historically, the energy mix of Bangladesh has shown a significant dependency on fossil fuels. According to the recent statistics of the Bangladesh Power Development Board (BPDB), natural gas (including LNG) remains the dominant energy source, contributing 54.83% of total electricity generation, followed by oil at 21.83% and coal at 20.45%. These fossil fuels account for approximately 97.11% of the country's total electricity generation mix. Besides, it is worth noting that Bangladesh currently depends on imports for 50% of its fuel needs. Moreover, projections from the Power Sector Master Plan (PSMP) 2016 and the Integrated Energy and Power Master Plan (IEPMP) 2023 indicate that by 2041, this import dependency will increase to 90%, with the annual energy import bill anticipated to reach at least USD 40 billion. The Global Carbon Project (2024) also estimates that oil consumption alone generates 31.80 million tons of CO₂ emissions.

Furthermore, the higher price of fossil fuels in the international energy market in the recent past has created significant challenges for Bangladesh, triggering numerous issues ranging from commodity price inflation to disruption in industrial activities due to inadequate electricity supply. Although fossil fuel prices have started dropping in the international market since mid-2024, they remain highly vulnerable to geopolitical risks, posing macroeconomic challenges for the country. Additionally, the recent devaluation of the Bangladeshi Taka (BDT) has resulted in an additional cost of USD 12 million for crude oil imports, further worsening the country's fiscal burden.

To mitigate the adverse effects of rising fossil fuel prices, the government of Bangladesh has increased the amount of subsidies substantially. According to the International Energy Agency (2023) statistics, Bangladesh ranks among the top 25 countries where considerable government support has been directed toward fossil fuel subsidies. In 2023 alone, the government allocated over USD 11,181 million, which is around 2.56% of the country's GDP. Additionally, the government provided BPDB an average annual subsidy of USD 2263.67 million between 2020 and 2023, leading to a notable rise in per capita subsidy to USD 25.

Indeed, subsidies contribute to justifiable social goals by lowering the cost of energy for both consumers and producers. However, the effectiveness of these subsidy schemes seems to be questionable as they place a heavy burden on government

finances and hamper economic development as evidenced in several Asian and African countries. The International Monetary Fund (IMF) argues that fossil fuel subsidies are both inefficient and inequitable for many developing countries. Moreover, it is argued by energy experts that subsidies to fossil fuel producers distort the market dynamics to a larger extent in comparison to consumer subsidies.

In fact, fossil fuel subsidies are costly and can divert resources away from high-priority government expenditures such as investments in infrastructure development, education, health, and social protection. Moreover, fossil fuel subsidies often send misleading price signals, encouraging overconsumption of energy and hindering the adoption of energy-efficient technologies. Energy market distortions lead to higher Greenhouse Gas (GHG) emissions, jeopardising sustainable development goals and commitment to the Paris Agreement on climate change.

Energy scholars advocate that the development of renewable energy sources is vital for energy transition and avoiding the financial burdens caused by fossil fuel subsidies. Nevertheless, the transition demands meticulous revisions of energy policies and subsequent institutional and regulatory reforms. However, ensuring adequate investment is a crucial factor for the energy transition. The UNCTAD's 2023 World Investment Report states that developing countries face difficulties in renewable energy development due to a lack of proper investments. Only around 11% of the world's renewable energy development investment is directed towards developing countries. Besides, political agendas, technological issues, and collaboration among financial institutions and international partners are some of the critical aspects that could determine a successful energy transition.

However, the share of renewable energy still shows a gloomy picture in the electricity generation mix in Bangladesh, despite some success in the dissemination of Solar Home Systems (SHS) to more than 25 million rural Bangladeshi population. While the derated installed capacity for grid-based renewable electricity is approximately 3.29%, its actual share in electricity generation stands at 2.89%. Evidence further suggests that Bangladesh may have successfully mitigated a long-term energy poverty penalty as a result of the dissemination of SHS. However, several institutional and socio-economic barriers, such as lack of credit schemes, high prices, after-sales issues, and absence of public-private collaboration, continue to impede the SHS program's effectiveness. Additionally, technical issues, including low-quality materials, inefficient use of storage batteries, and low technical knowledge, further contribute to the suboptimal levels of output of the aforesaid program. Investment also plays a crucial driver in the development of the renewable energy market, supported by various mechanisms such as foreign investment, funding from multilateral development banks, green bonds, private equity, and public-private partnerships. In addition to the investments, fossil fuel subsidy diversification has proven to be an effective tool for increasing renewable energy share in the energy mix. Lessons learned from several subsidy-reforming countries reveal that when designed carefully and implemented well, the reallocation

of fossil fuel subsidies can significantly contribute to the growth of renewable energy markets, adoption of renewable technologies, advance decarbonisation efforts, and drive economic prosperity.

The government of Bangladesh should consider designing a robust time-bound road map for the development of the renewable energy sector that would effectively address the adverse consequences associated with the increased usage of fossil fuels. The government could gradually redirect fossil fuel subsidies to support new electricity-generating companies entering the market with renewable, energy-efficient technologies or existing companies transitioning from traditional fuel-based electricity production to renewable energy. This approach, known as “Remove, Target, and Shift,” involves carefully balancing taxes, prices, and subsidies. Additionally, financial incentives derived from subsidy revenues, combined with institutional support, could encourage local producers of renewable energy equipment to increase the share of renewables in the energy mix. Alternatively, subsidies

could be redirected to Independent Power Producers (IPPs) to expand the solar energy ecosystem, despite the limited success of previous efforts to promote solar rooftops.

Since existing literature shows that any previous attempts of partial or total removal of subsidies without subsequent changes in taxes and prices resulted in social and economic unrest, the government should emphasize more on promoting Research and Development (R&D). It is expected that such initiatives could help Bangladesh in creating public awareness regarding the long-term benefits of the revenue-neutral subsidy diversification programs to ensure enhanced fiscal sustainability, a better balance of payments, a rise in investment, and sustained economic growth.

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Unlocking Bangladesh’s Wind Energy Potential: Challenges and Way Forward

Md Hasin Israq and Md. Tuhin Ahmed

Bangladesh stands at a critical juncture in its energy transition, with the need to meet growing energy demand while reducing reliance on fossil fuels. With an energy infrastructure heavily dependent on fossil fuels, the country is facing significant sustainability and economic challenges. Currently, 23.05% of the country’s electricity generation capacity relies on coal and 39.76% on gas, whereas only 4.66% is sourced from renewable energy (SREDA, 2025). However, this capacity figure does not reflect actual energy usage from renewables. In practice, hydro (0.69%) and other renewable sources (0.76%) contribute only 1.45% of the total energy generated (BPDB, 2023). This overdependence on non-renewable sources has been a key factor in economic vulnerabilities, as seen during the post-COVID-19 pandemic, when volatile fuel markets, particularly LNG pricing, triggered an energy and economic crisis.

In contrast, neighboring countries like India, Nepal, Bhutan, and Pakistan have made much more progress with renewable energy. Renewable sources account for 39.3% and 46% of installed electricity generation capacity in India and Pakistan, respectively. For Nepal and Bhutan, this figure is 100% (IRENA, 2025). This contrasting picture in neighbouring countries highlights where we are lagging behind and underscores the urgency to shift toward renewable energy, where wind energy emerges as a highly viable option.

Geographically, Bangladesh’s 724-kilometer-long coastline along the Bay of Bengal offers immense potential for wind energy generation. Despite this, progress in harnessing this resource has been limited. By December 2024, the country had installed only 62.9 MW of wind capacity—a modest achievement compared to its vast potential (SREDA, 2025). Accelerating the adoption of wind energy is crucial to addressing Bangladesh’s energy challenges and achieving a sustainable future.

Potential

Bangladesh has incredible untapped potential when it comes to

wind energy, particularly along its coastal regions. Firstly, the consistent wind speeds in some of these areas make them ideal for wind farms, however, the distribution of suitable sites is unevenly scattered around the coastline, which complicates large-scale onshore development. Offshore wind power is also a promising option, but realizing its potential depends on building strong transmission networks to deliver energy to key demand areas like Dhaka which is currently non-existent (IEPMP, 2023).

Research by the Ministry of Power, Energy, and Mineral Resources (MoPEMR), with support from international organizations like NREL and USAID, found that more than 20,000 square kilometres of land could support wind speeds of 5.75 m/s to 7.75 m/s, equating to a gross potential of over 30,000 MW of wind energy (Jacobson et al., 2018). The National Solar Energy Roadmap (2021–2041) suggests that the southern coastal region offers the best opportunities, especially at hub heights between 140 and 160 meters. Then again, the region’s vulnerability to cyclones makes it tricky to achieve these hub heights without careful design adjustments. Again, offshore studies also support the potential of the Bay of Bengal, where wind speeds at 160 meters range between 6.3 and 8 m/s, making it an excellent location for larger-scale projects (Joshi et al., 2024).

Therefore, tapping into wind energy could bring significant benefits to Bangladesh. It would also strengthen the country’s energy security by reducing dependence on expensive imported fossil fuels, which are prone to global price volatility (Raihan et al., 2024). On the environmental side, it would help reduce greenhouse gas emissions, which is a critical step toward meeting Bangladesh’s commitments under the Paris Agreement. Economically, wind energy development could stimulate local industries, generate jobs, and attract foreign investments (Shuvo, 2023). Moreover, cyclone-resilient technologies, if implemented, would ensure stable electricity supplies even in disaster-prone areas, addressing energy reliability concerns during extreme weather events (Jacobson et al., 2018). Now we

are in a situation where despite promising developments such as the 60 MW wind farm in Cox's Bazar, operational since March 2024, and planned projects like the 220 MW initiative by JT New Energy Co. and the 100 MW Matarbari project, the overall potential of wind energy in Bangladesh remains largely untapped ([SREDA, 2025](#)).

Challenges

Despite having immense promise, the wind energy sector in Bangladesh faces numerous challenges that have slowed its growth. One key issue is the lack of infrastructure- many resource-rich coastal areas lack proper transmission networks, making it difficult to deliver electricity to major demand centres such as Dhaka ([Chowdhury, 2020](#)). Financially, wind energy projects also require substantial upfront investment, and the reliance on imported technologies, due to not having local customized solutions, makes them even more expensive ([Miskat et al., 2020](#)).

Another challenge is the erratic wind speed, which makes energy generation inconsistent. This issue often requires hybrid systems and advanced storage solutions to stabilize the energy supply ([Uddin & Rahman, 2019](#)). Then, the country's vulnerability to natural disasters further complicates matters. Cyclone-prone areas like Bangladesh's coastal regions demand specially designed, resilient turbines, which increases costs significantly ([Jacobson et al., 2018](#)). On top of these technical and financial hurdles, there is also a lack of public awareness and support- concerns about land use, environmental impacts, and reliability create resistance among local communities ([Chowdhury, 2020](#)).

Furthermore, regulatory barriers have made things more complex. The absence of clear policies and incentives for private sector participation has been discouraging investment. Without a robust framework for permitting, grid integration, and compliance, the sector remains underdeveloped ([Raihan et al., 2024](#)). These interconnected challenges, hence, highlight the need for a comprehensive strategy to move wind energy forward in Bangladesh.

Way Forward

Bangladesh's venture into renewable sources of energy should learn from the neighbouring countries of India, Pakistan, Nepal, and Bhutan which have significantly integrated renewables into the national energy mix. They have made such successful achievements after developing specific solutions suited to their unique geography and climatic conditions. It must also invest in wind energy systems designed with challenges that are very well suited to it.

A key customized solution for Bangladesh is using the Vertical Axis Wind Turbines (VAWTs). These turbines are particularly suited to Bangladesh's low and erratic wind conditions, as they can operate efficiently at low wind speeds and with variable wind directions, unlike traditional Horizontal Axis Wind Turbines (HAWTs). VAWTs, such as the Magnus VAWT, leverage the Robins-Magnus Effect, making them effective in both low-velocity wind conditions and high-pressure scenarios. Thus, they offer resilience during cyclonic events. They have been proven successful in similar climates like the Philippines. Again, VAWTs require less maintenance while maintaining dependable power generation. Their adoption in rural and coastal regions Would ensure a more robust energy supply while mitigating disruptions

caused by natural disasters ([Babu et al., 2022](#)).

Another promising approach is the development of hybrid wind-solar systems with offshore deployment. Coastal regions such as Mongla, Sandwip, and Saint Martin's Island exhibit stable wind speeds, which makes them suitable for hybrid energy projects. Combining wind and solar energy in a single system will also ensure consistent electricity generation, as solar power will compensate for low wind periods, while during overcast seasons, excessive wind speed can compensate for lost solar energy. Thus, this synergy, between solar and wind, enhances system stability and ensures uninterrupted energy availability, even during seasonal variations and extreme weather conditions.

Advanced energy storage technologies are also important to achieve a robust energy grid. Centralized battery storage units at the substations owned by the state can stock up on excess electricity during windy and sunny conditions. The electricity stored can then be used on periods when there is a low supply. For remote locations which are not connected to the grid, electricity supply during disastrous weather is especially important and these enhance the chances of doing so. By enhancing the energy infrastructure with centralized storage technologies, the country would be able to provide power alongside America's energy solutions for developing areas and disaster susceptible regions.

From an economic perspective, wind energy development in Bangladesh needs efforts to minimize high initial costs and promote locally customized efficient technologies. Investing in local research and development (R&D) is essential to create technologies that are optimized for Bangladesh's specific climate and geography. For example, developing cost-effective, cyclone-resistant VAWTs through local innovation can reduce project costs, and support domestic industries, while also lessening dependence on expensive imports. The success of local solutions, such as the Mongla project, which provides electricity at a competitive rate of Tk 12.5 per kWh, shows the potential for both economic and operational efficiency ([Shuvo, 2023](#)).

Cost-sharing approaches through hybrid infrastructure also offer a practical path forward. Hybrid wind-solar systems, as mentioned before, allow for shared use of transmission lines, substations, and storage facilities, reducing both capital and operational costs. Consolidating these resources also makes hybrid projects more economically viable and scalable, paving the way for broader adoption of renewable energy across the country ([Shuvo, 2023](#)).

In the end, to realize its renewable energy goals, Bangladesh must invest in tailored technological solutions, strengthen infrastructure, and implement supportive policies. By adopting customized strategies and learning from the experiences of neighboring countries, we can overcome current challenges and harness the full potential of wind energy for a sustainable and secure energy future.

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Why Energy Efficiency Matters: From the Industrial Perspective

Afia Mubasshira Tiasha

The need to tackle climate change involves an increase in energy efficiency. Global energy intensity has been declining annually since 2015, which has profound implications for businesses, governments, consumers, and the environment. Energy security, climate change, and economic stability are more pressing than ever, and both developed and developing countries need to take action to address these issues in light of the rising worries over energy price volatility and the worldwide focus on reducing carbon dioxide emissions.

In developing countries, where energy consumption and the search for clean energy sources are only growing, energy efficiency is becoming an increasingly important instrument for both financial stability and energy security ([USAID, 2020](#)). Furthermore, in developing countries like Bangladesh, energy efficiency has emerged as a crucial component, owing to its commercial and industrial competitiveness and energy security advantages. In addition, the environmental benefits such as lowering CO2 emissions are making it increasingly valuable.

Over 10.35% (FY23) of Bangladesh's GDP comes from its industrial sector, especially its ready-made garment (RMG) industry ([Bangladesh Bank, 2024](#)). This sector employs millions of people and is the main driver of economic growth. Also, in terms of satisfying the increasing demands for environmental, social, and governance (ESG) for international clients, energy efficiency is essential for Bangladesh's industries. For example, Bangladeshi garment manufacturers need to meet foreign consumers' requirements to reduce greenhouse gas emissions.

Challenges to Energy Efficiency Adoption:

Although energy efficiency has many advantages, several obstacles are preventing its widespread use in the industrial sector of Bangladesh. Many industrial operators are unaware of the financial and environmental advantages of energy efficiency, and there is a lack of qualified workers to handle and deploy these technologies. Another major obstacle to energy efficiency is the high upfront cost of energy-efficient technologies and the absence of financial incentives. Furthermore, energy performance requirements and incentive gaps exist while enforcement of some laws to foster energy efficiency is weak. Another barrier is it is hardly possible for businesses to shift to modern energy-efficient systems without major investment and technical know-how, as many businesses still cling to outdated, ineffective equipment and manufacturing practices.

One of the key obstacles that industries deal with is the high upfront costs associated with implementing energy-efficient technology. The swift development of energy-efficient technologies creates a knowledge gap since some industries do not have the know-how needed for successful deployment.

Existing infrastructures and legacy systems in industries may not readily merge with newer, more energy-efficient technologies. Moreover, industries may be reluctant to comply with new laws or mandated guidelines meant to increase

energy efficiency. In addition, a lack of knowledge about the advantages and opportunities accessible to organizations is a widespread obstacle to energy efficiency. A major gap still exists in the application of standardized frameworks for energy efficiency.

Strategies for Promoting Energy Efficiency:

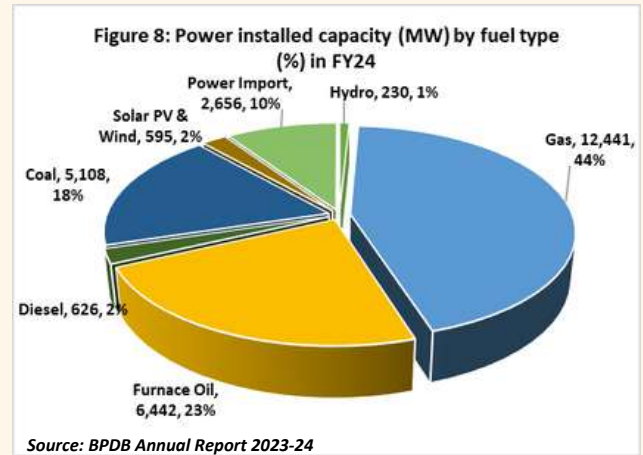
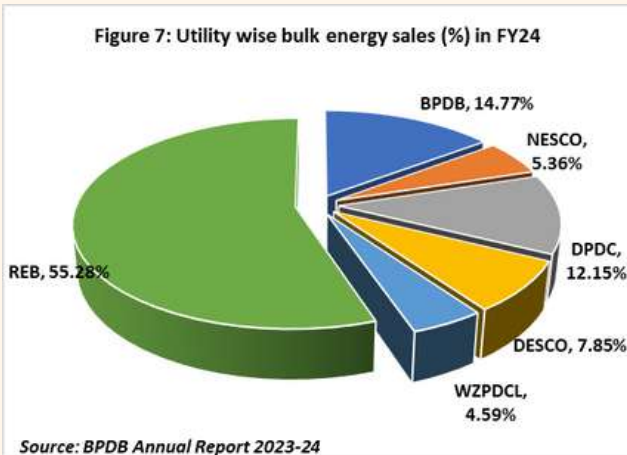
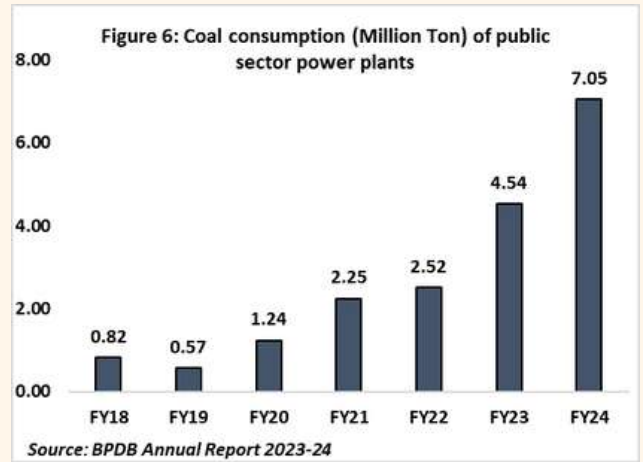
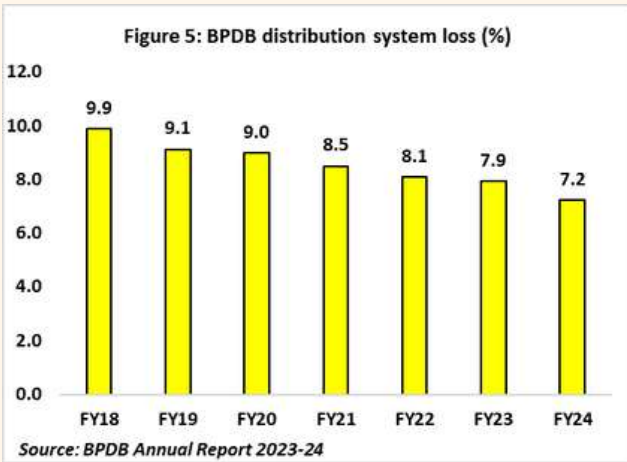
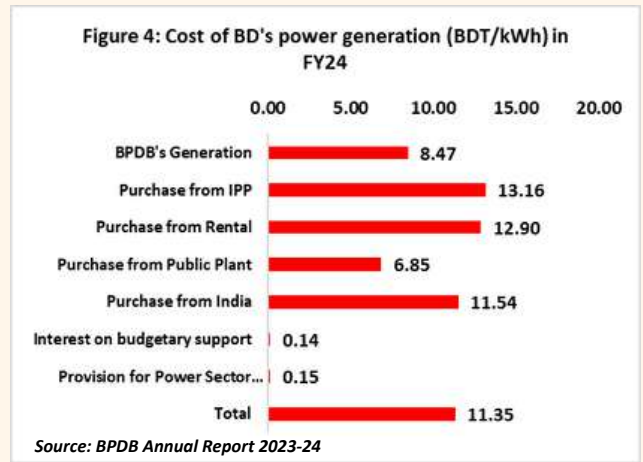
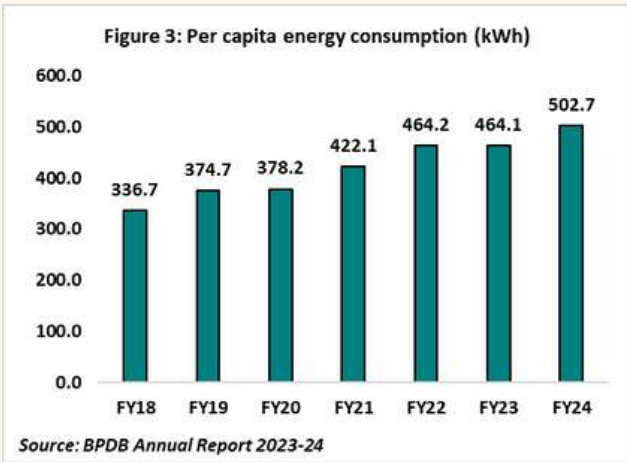
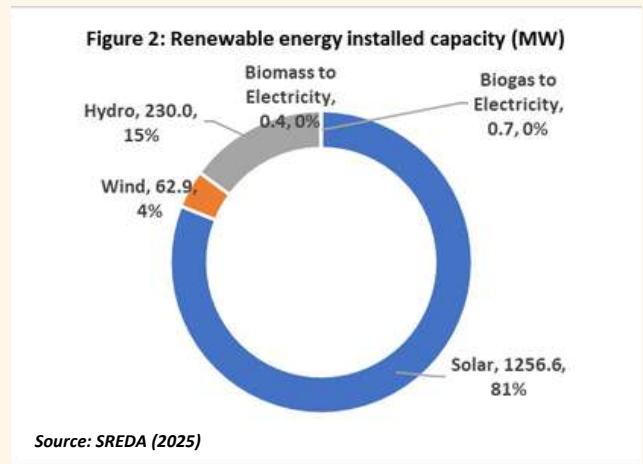
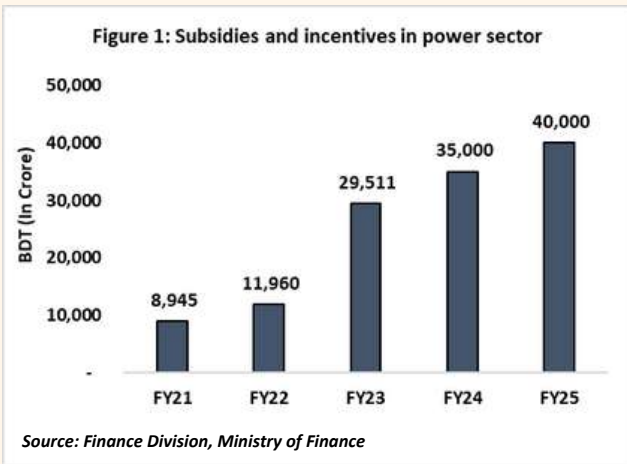
Governments around the world understand the critical significance of energy-efficient technologies in combating climate change and decreasing industrial energy usage. Tax incentive schemes can encourage businesses to invest in energy-efficient equipment. Grants may be used to fund projects that improve energy efficiency, encourage renewable energy integration, or develop novel technology with environmental benefits. Provide funding channels, incentives, and support systems to reduce the initial investment burden. Mandatory energy efficiency targets encourage businesses to invest in technological upgrades, operational improvements, and environmentally friendly practices. International collaborations enable the exchange of knowledge and experiences, allowing countries to learn from one another's triumphs and failures in boosting energy efficiency.

Moreover, collaborative projects bring together experts from several countries, encouraging innovation and the development of cutting-edge technology that improves energy efficiency and encourages waste reduction to help develop a more sustainable and environmentally conscious industrial landscape. Governments should foster a conducive environment for joint ventures, research collaborations, and knowledge sharing. Also, increase investment in R&D to address new technical problems and gaps, encourage innovation in energy-efficient technology, enhance existing solutions, and develop new techniques.

In Bangladesh, energy efficiency is essential for the industrial sector. As the country endeavours to become a middle-income country and increasingly integrated into the global economy, maintaining growth and competitiveness will depend heavily on efficient energy use. Beyond financial benefits, energy efficiency tackles important social and environmental issues and supports both international sustainability goals and national development goals.

To achieve energy efficiency, coordination is crucial. To remove obstacles and realize the full potential of energy efficiency, government regulations, business dedication, and international assistance must come together. Bangladesh can set a strong example for other developing countries by transforming its industrial sector into a model of sustainable growth by placing a high priority on energy efficiency. It's time to take action. For industries, the economy, and future generations, the risks are high, but so are the rewards.

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