

Rent Seeking in the Power and Energy Sector of Bangladesh

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Abstract

As the power and energy sector of Bangladesh has become increasingly susceptible to external shocks like Ukraine war and dollar crisis, the growing dependency on imported energy is being questioned from the energy security point of view. While the technology and policy actors hold depletion of gas resources and the need for diversification as the reasons to justify increasing import dependency, the proponents for energy security using indigenous resources point out at the negligence in exploring potential indigenous gas reserve and the inability to deploy renewable energy. Why in last one-decade Bangladesh adopted new energies like coal, nuclear, and LNG, rather than exploring natural gas and incentivizing solar and wind, has still remained a puzzle. This paper uses the rent seeking framework to identify how rent seeking structures differ across energy technologies and whether the differences had any implications for incentivizing some energy use while not incentivizing others.

Key words: Rent Seeking, Political Economy, Energy Sector, Regulatory Capture, Electricity Crisis, Learning Rent, Resistance Capture

1. Introduction

The concept of rent seeking was developed from the need of explaining why policymakers repeatedly prefer economically inefficient policies to efficient ones creating high social cost, even when economists have been warning them about their problems. Bangladesh is currently going through a transition from indigenous gas dependency to imported coal, LNG and nuclear. The foreign currency reserve is depleting fast, putting immense pressure on the energy sector to sustain energy security. Despite the cost decline of solar, why Bangladesh adopted expensive nuclear, coal, and LNG remained unexplained. From the existing socio-technical perspective, diversification of energy and scale of technology are shown as the reason of adopting these expensive technologies. However, this explanation is not sufficient for understanding why solar has been so neglected while a very expensive technology like nuclear, despite being complex, risky, and requiring longer implementation time, was prioritized. The existing explanation also underscores the depleting indigenous resources to justify alternatives like coal, LNG and nuclear.

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This explanation is not sufficient to explain why solar has been undermined as an alternative energy source to diversify energy resources and reduce import dependency.

Since 2010, Bangladesh has been implementing a power systems master plan that targeted to import coal and import nuclear technology. As a result, Bangladesh became gradually import dependent. The Ukraine war and dollar crisis made it difficult for Bangladesh to pay for the expensive imported. Besides, the high subsidies given to the rental and quick rental power plants, that were being built since 2009, have also increased the burden of capacity charge, the social cost of which have been imposed on the consumers and businesses. As a result, the economy is facing electricity crisis and paying high social cost not only from high fuel and electricity price, but also from high inflation.

This paper intends to explore the existing rent seeking mechanisms in five sectors: gas, coal, LNG, solar, and nuclear and investigates the relationship between structure of rent seeking and regime formation of these technologies. The central questions are: what types of rent seeking exist, what are the process of rent seeking, and who are the rent seekers? Although the concept of rent seeking originated from public choice theory, the mechanism of rent seeking has been useful tool in other disciplines too. Rent seeking is widely used concept in political science, economics, political economy, and public policy but this concept has been less commonly used in environmental and energy research.

First, this paper will introduce the literature over the past five decades and discuss how the rent seeking concept was extended by different scholars. Second, the paper will analyze some evidences of different types of rent seeking in five energy technologies, gas, coal, nuclear, LNG, and solar. Here, the paper will try to find the commonalities and differences in the rent seeking structure of the technologies using the existing evidences. The result and conclusion section will summarize the pattern of rent seeking for each technology. The paper will conclude with discussing why the differences in rent seeking nature of energy technologies matter in policy of focusing more on some energies and less on the others.

2.Theoretical Framework: Literature Review

The concept of rent seeking is the process leading to creating social cost by giving effort (i.e., monetary spending or any other nonmonetary means of expending resources) to capture transfer of resources as a result of monopolization and regulation. Prior to Tullock¹, the transfer of resources was considered to be costless

¹ G. Tullock, The welfare costs of tariffs, monopolies, and theft, *Western Economic Journal*, Vol. 5, 1967, pp. 224-232.

redistribution among market actors. After Tullock introduced the idea that expenditures made to capture a transfer are a form of social cost, scholars started to apply the idea of rent seeking in conceptualizing social cost of various types of rent seeking efforts. Khan² pointed out that the value and variations of rent produced by rent seeking activities and the diversity of rent seekers need to be understood as a process where the effect of rent seeking on society depends on the social cost of spending resources on rent seeking and the social benefit or cost of rent outcome. Rent seeking theories shifted the focus from conventional idea of identifying social cost to the understanding diversity in the process of rent seeking and the value and efficiency of rent seeking from government intervention (i.e., subsidy, tax, quota etc.), other selective facilities (i.e., licensing, occupational permit), and regulatory capture limiting competition (i.e., industrial regulation, environmental regulation, special act etc.). The economic analysis did not remain limited within competition, efficiency, monopolization, and regulation, rather the analysis recognized the political and institutional variables in determining the input cost of rent seeking and the output as a result of rent seeking.

According to neoclassic economics, institutions and rights protecting rents should be removed to achieve efficiency and good economic performance. The way to do that is by regulating markets to secure free and fair competition. However, Schumpeter³ introduced the term “entrepreneurial rent” (a.k.a. Schumpeterian rent). According to Schumpeter, businesses make certain profit as a result of development of new processes that disturb economic equilibrium by temporarily raising revenue above resource costs. Innovators may earn entrepreneurial rent as long as the innovation is not successfully diffused. The entrepreneurial rent is seen as an incentive towards greater economic efficiency.

There is another kind of rent called “Rent for learning”, which is analytically very similar to Schumpeterian rent because both of these rents work as incentive to reduce cost overtime. While Schumpeterian rent can be earned after an innovation, rent for learning can be earned before innovation takes place. Unlike Schumpeterian rent that results from innovation, rent for learning results from policies to facilitate learning and innovation. Amsden⁴ argued that learning involves substantial amount of innovation. Learning does not only involve being able to use a technology, but also

² M. H. Khan, *Rents, Efficiency and Growth*, in: M.H. Khan and K.S. Jomo (ed.), ‘Rents, Rent-Seeking and Economic Development: Theory and Evidence in Asia’, Cambridge: Cambridge University Press, 2000.

³ J. A. Schumpeter. ‘The Theory of Economic Development; An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle’, Harvard University Press: Cambridge, MA, 1934

⁴ A. H. Amsden, ‘Asia’s Next Giant: South Korea and Late Industrialization, Oxford University Press’, New York and Oxford, 1989

adaptation to recipient country's social, political, economic and institutional condition. For example, policy-induced conditional subsidies may accelerate technological learning and can create rent for learning. However, the main difference between rents for learning as a result of subsidy and simple transfer of subsidy is that subsidy for learning are conditional upon learning over a specified time-frame, while there might be other political and economic motivation behind simple transfer.

Regulatory capture is an economic theory that regulatory agencies introduce regulations not driven by public interest but to create rent seeking opportunities for the dominant interest groups in the society. Stigler⁵ first introduced this term in the 1970s. Stigler argued that governments do not create a monopoly in industries unintentionally. Rather, they deliberately protect the interests of producers who capture the regulatory agency, and use regulations to inhibit competition. The result of such monopolies – in the name of liberalization and competition – is often a transfer of public resources to private producers through price hikes, and at the expense of exorbitantly high social costs.⁶

Economic rent differs from political rent because of the nature of benefit. Economic rent is the rents of economic nature, the rents that give material benefits. And political rents are those rents that do not directly give material benefits but meet non-existential needs of political actors. Sekowski⁷ distinguished political rent and economic rent differently. Sekowski used the role of state as a distinguishing factor in differentiating between the two rents. He explained why not all the source of rents seeking opportunities are created unintentionally by natural monopoly, rather are intentionally created by rent seekers. According to Sekowski economic rents are consequences of economic phenomena, like monopolistic market structure, especially natural monopoly. Whereas Political rent requires state interference in the economy in order for rent seekers to pursue for it. Sekowski used both definition in his analysis of the pros and cons of rent seeking.

Technology characteristics literature (Grubler, Binz, Wilson) mostly focus on the scale of technology (i.e. lumpiness vs. granularity), complexity (i.e. complex vs. simple), duration of implementation (i.e. short duration and long duration),

⁵ G. J. Stigler, The Theory of Economic Regulation, *The Bell Journal of Economics and Management Science*, Vol. 2, No. 1, 1971, pp. 3-21

⁶ M. Sultana, How the Energy Sector Shut its door to the Public, *The Daily Star*, January 26, 2023. Available at <https://www.thedailystar.net/opinion/views/news/how-the-energy-sector-shut-its-doors-the-public-3230816> [Accessed on September 26, 2023]

⁷ S. Sekowski, 2021. The pros and cons of rent-seeking: Political rent in various research paradigms, *Studia z Polityki Publicznej/Public Policy Studies*, Warsaw School of Economics, Vol. 8(2), July 2021, pp. 1-17

availability (readily available vs. globally sticky), innovation system (standardized vs. customized)⁸. The technology characteristics study previously did not focus on the character of technology based on the beneficiaries of technology adoption. Although Innovation System literature differentiated technologies by conceptually differentiating global, regional, and national actors and developing the idea of regional, global, and national subsystems, the literature did not characterize the technology based on the interactions of those actors and how they benefit from the technology adoption. This paper will contribute to the existing literature by introducing the concept of rent seeking and how the energy technologies can be characterized based on the rent seeking opportunities.⁹

Tollison and Wagner¹⁰ argued that monopolists and transfer recipients will spend resources to resist any economic reform that threatens rent seeking in order to protect their transfers. This is similar to rent-protecting expenditures. And these expenditures may not defeat reform initiatives politically; rather, such expenditures defeat the utilitarian rationale for reform. The rent seeker in this case does not have to secure monopoly power, rather it needs to protect its already acquired monopoly power. For an incumbent monopolist it is worthwhile to defeat a utilitarian reformer by spending enough of its monopoly rents to make a reform socially unprofitable. Scholars have defined the cost of lobbying, bribe, commission as the cost of rent seeking but they have not so far distinguished the cost of managing people's resistance from other rent seeking cost. I introduce a term "resistance management cost" as one of the rent-protecting expenditures. Although it is not possible to estimate such cost of resistance management but it is possible to theoretically define this as social cost. The social cost of not meeting community's demand can be defined as the resistance management expenditure that doesn't contribute to any productive activity but facilitate access to resources for certain interest group. Suppressing social movements and manipulating community to create consent using various means can be termed as "resistance capture".

⁸ A. Grubler, C. Wilson, and G. Nemet, Apples, oranges, and consistent comparisons of the temporal dynamics of energy transitions, *Energy Research and Social Science*, Vol. 22, 2016, pp.18-25; C. Binz, and B. Truffer, Global Innovation Systems-A conceptual framework for innovation dynamics in transnational contexts, *Research Policy*, Vol. 46, 2017, pp. 1284-1298; C. Wilson *et al.*, Apples, oranges, and consistent comparisons of the temporal dynamics of energy transitions, *Energy Research and Social Science*, Vol. 368, 2020, pp.36-39

⁹ I. Jankovic, The Eco-Industrial Complex in USA-Global Warming and Rent-Seeking Coalitions, *Energy and Environment*, Vol. 19, No. 7, 2008, pp. 941-58, *JSTOR*, <http://www.jstor.org/stable/44397315>. [Accessed 29 July 2023]

¹⁰ R. D. Tollison and R. E. Wagner, 1991. Romance, realism, and economic reform. *Kyklos*, Vol. 44, pp. 57-70.

In this research I use all different types of terminologies associated with rent seeking framework and introduce typology of rent seeking for main five energy technologies: natural gas, LNG, coal, nuclear, and solar. I will incorporate the concept of rent seeking in the technology characteristics and show how lumpy and granular technologies differ because of the inherent character of the rent seeking opportunities they create.

3. Method

This research intends to construct a typology based on qualitative data analysis. It uses cross case comparison method to compare and contrast cases to gain an insight into the variations in evidences of rent seeking. Here, the cases are five main energy technologies: natural gas, LNG, coal, nuclear, and solar. The cases are selected in the context of Bangladesh. While natural gas has been an incumbent technology that has a well-established regime, the other four technologies are still gradually transitioning towards a planned outcome. While natural gas and solar technology are indigenous, LNG, coal, and nuclear technology are mostly imported or require high investment.

The research first identified five rent seeking tools: (i) regulatory capture, (ii) lobby, (iii) license or contracts, (iv) learning rent, and (v) resistance capture. Then it analyzed the qualitative evidence of rent seeking for each energy technology to explore how adoption of these technologies create scopes for involved actors to use the already identified five rent seeking tools. Based on the comparative analysis the research shows how some technologies use some rent seeking tools extensively, while others use those tools in limited scale. The purpose of the cross comparison is to explore how some tools are used for certain technologies while others are not used at all for other types of technologies. The cross-case comparison of the energy technologies within a single case of Bangladesh will develop a conceptual framework which can be tested in other countries in the future. The method is not only replicable in other contexts, but also applicable for other energy technologies as well.

The research will mostly use news published in credible newspapers, government documents including policy documents, annual reports, Acts, master plans, and roadmaps. The secondary data and other secondary literatures will provide evidence for and against any observation. The analysis of the data obtained from the sources will form the basis of typology. Finally, the observations from the cases will be compared to fit into the typology for explaining the causal linkages to energy outcome.

4. Analysis: Rent Seeking in Power and Energy Sector

Each energy technology has its own characteristics that create a network of actors in resource formation and shape the regime in different socio-economic context. The gradual development of institutions, various combinations of technology, policy, and

social actors together create rent seeking network in which rent seekers take the opportunity of either natural monopoly or create their own opportunities with the help of government intervention. Often the energy outcomes blur the difference between the types of rent created in the process of adoption. The ultimate beneficiaries are hardly identified when it is seen through the general welfare point of view. The socio-technical and techno-economic perspectives often dominate and do not reveal that rent seeking also defines technology characters. For example, lumpy technology like nuclear, coal, gas, and LNG have more diverse actors involved in the technology diffusion process than technology like solar and wind that do not require huge investment in extracting energy, physical infrastructure, and interactions of various subsystems in innovation network. More complicated technologies may often create larger beneficiary groups who compete for rent and collude with other actors to obtain rent from that technology adoption. On the other hand, simpler and readily available technology may not create the network in rent seekers for whom ensuring rent seeking and sustaining it for longer period may be undesirable.

4.1 Gas

The gas market structure in Bangladesh is characterized by a single-buyer model. Petrobangla (the state-owned single buyer company) acquires indigenous natural gas from IOCs (International Oil Company) at the price set by the production sharing contract (PSC) and import LNG at both contract prices and spot market prices from abroad. Then the two sources are mixed to supply to the common pipeline. The government allocates gas to consumers and administers a bundled gas price set by BERC (Bangladesh Energy Regulatory Commission). According to the Gas Act 2010, the BERC regulates the downstream gas sector including the transmission, distribution, marketing, supply and storage of natural gas. BERC¹¹ applies the provisions of the Gas Act to issue, renew, amend and cancel licenses for pipeline construction and gas transmission, distribution, supply and storage, and sets prices. The Act also determines penalties for operating without a license or not following the license agreement.

4.1.1 Regulatory Capture

4.1.1.1 Special Provision to Deter Competition

The government enacted the Quick Enhancement of Electricity and Energy Supply (Special Provision) Act 2010.¹² This Act was intended to facilitate urgent measures to

¹¹ BERC, Bangladesh Energy Regulatory Commission Website, 2023, Available at: <http://www.berc.org.bd/site/page/36c5ee50-6ddc-4439-b66f-32445a1b7378/> [Accessed on July 25, 2023]

¹² GOB, "Quick Enhancement of Power and Energy Supply (Special Provision) Act 2010", Ministry of Power, Energy, and Mineral Resources, 2010.

enhance the generation, transmission, transportation and marketing of electricity and energy and ensure uninterrupted supply of electricity and energy. The government justified the Act by claiming that it would immediately meet the demand for electricity for agricultural, industrial, commercial and domestic activities and quickly import electricity and energy from abroad. It has also allowed implementation of the decisions on urgent extraction and utilization of minerals related to energy. However, While the Act 2010 gave the government sweeping powers to implement any projects related to the generation, distribution and marketing, it has also created the scopes of uncompetitive bidding. In the name of fast-tracking, the government made contracts on the basis of unsolicited negotiation and awarded contracts without any tendering process. The provisions of the Act provided indemnity to actions of the actors involved and their actions cannot be questioned in any court.

The Act was highly criticized by non-governmental anti-corruption groups including Transparency International Bangladesh (TI Bangladesh), as it undermines the government's pledge to improve transparency and accountability. The Act overrides all other laws including anything contained in the Public Procurement Act, 2006 (Act No. XXIV of 2006) or any other law in force. As the act empowers the government to avoid compliance with the Public Procurement Act 2006, which was introduced to ensure transparency in government procurement, the scopes of rent seeking were created for only pre-selected bidders, not based on competency, efficiency, or least cost pricing, but based on their political affiliation. The effectiveness of the Act was first extended in 2012, then in 2018 once, and in 2019 for another five years. Now, the Act is effective till 2024. This Act allows contract without bidding, lobby of interest groups, and suppression of resistance but does not allow any question to the relevant authority even when social cost is too high.

4.1.1.2 Absence of Independent Regulatory Body

There have been 5 bidding rounds under production sharing contract since 1974 (1974, 1993, 1997, 2008, 2012, and 2016) through which 20 PSCs have been signed. In the last round in 2016, there was no bidding. The companies submitted expression of interests based on which the PSCs were signed. Among these Chevron supplies around 50% of the natural gas produced in Bangladesh.

Bangladesh has an independent downstream regulation known as BERC. The Gas Act 2010 regulates the downstream gas sector which includes the transmission, distribution, marketing, supply and storage. However, there is no independent regulatory body for upstream regulation. Petrobangla plays the role of an upstream regulator, supervises and monitors the PSCs. At the same time, Petrobangla is the counterpart to the contracts. It also self-regulates its own operations, including all the subsidiaries. The lack of independent regulator always creates scopes for potential

conflicts of interest. Besides, self-regulation may result in lack of accountability and transparency in auditing, decision making, and planning. For example, now there is no transparency in auditing cost gas and profit gas. This creates scope for over estimation of cost and under estimation of profit.¹³

4.1.1.3 Ineffective Regulatory Body

The Bangladesh Energy Regulatory Commission (BERC) is an autonomous body. It was established based on the Bangladesh Energy Regulatory Act 2003. The objective of the body was to improve power and energy infrastructure and hold public hearing for new price setting. The law was amended thrice in the past, including the recent amendment in December 2022. This amendment empowered the government to set power and energy tariffs on its own under “special circumstances”, without a public hearing by the BERC. Before the amendment, BERC used to consider any price hike proposals after a public hearing, in which consumer associations, businesspeople, bureaucrats, experts, civil society and rights-based organizations could raise their concerns.¹⁴ Through the amendment the mechanism of all kinds of public engagement in decision making was completely eliminated. Right after the amendment the Energy and Mineral Resource Division raised electricity price by 5 percent and gas price by 78.2 percent in the beginning 2023. This has imposed social cost on the consumers and businessmen in a time when the economic crisis has already been exacerbated by high inflation and electricity crisis. Making the regulatory body ineffective is a way of imposing social cost on the citizens without ensuring any accountability.

4.1.2 Contract Without Bidding

In 2010, a few days after the Act was passed, the government announced that it would soon sign deals with 25 foreign and local firms to buy 3,000 MW of electricity to add to national grid in the next six months. Although the Processing committee was supposed to communicate, consult, and bargain with organizations and recommend for best public interest on the basis of competency, experience, and financial capability, in reality, controversial decisions were made. One such example is signing contract with Gazprom, Russia’s state-owned energy company. The first Alexey Miller, Chairman of the Management Committee of Gazprom met Syed Abdus Samad, then Cabinet Minister and Executive Chairman of the Board of

¹³ Ramboll, Gas Sector Master Plan Bangladesh- 2017, 2018. Available at <https://policy.asiapacificenergy.org/sites/default/files/Gas%20Sector%20Master%20Plan%20Bangladesh%202017.pdf> [Accessed on July 29, 2023]

¹⁴ M. Sultana, How the Energy Sector Shut its door to the Public, *The Daily Star*, January 26, 2023. Available at <https://www.thedailystar.net/opinion/views/news/how-the-energy-sector-shut-its-doors-the-public-3230816> [Accessed on July 26, 2023]

Investment of Bangladesh in April 2010. The parties prepared an MOU to get it signed by Petrobangla and develop possible cooperation projects.¹⁵

In 2012, Bangladesh awarded the job of drilling 10 onshore gas wells to Gazprom as a fast-track solution¹⁶ to the gas crisis. Gazprom got the contract at a higher cost than what Bapex would require. It was possible as the Quick Enhancement of Electricity and Energy Supply (Special Provisions) Act 2010 indemnified the officials concerned against prosecution for making such decisions. The authorities justified it by claiming that Bapex did not have the capacity to work on several wells at a time. Since then Gazprom has drilled a total of 20 wells. In 2023, they used the same excuse of lack of capacity to allow Gazprom to drill 5 more gas wells without tender.¹⁷

Gazprom's previous track record does not justify contracting Gazprom again. First, while Bapex can drill a well at maximum of Tk. 80 crore, Gazprom charged more than Tk. 180 crore.¹⁸ Second, because of technical flaws five of the 10 wells drilled by Gazprom in the first phase stopped producing gas shortly afterwards.¹⁹ Bapex later had to spend additional Tk. 52 for each well to drill those five wells again to resume gas production. Third, Gazprom hire third parties to perform drilling. Gazprom engaged Eriell Oilfield Services for drilling at a lower cost and took the commission from the total earning.²⁰ Bapex could save the money by contracting to other firms in lower cost and could save the public money lost in the process of rent seeking.

4.1.3 Lobby

In Bangladesh the single buyer purchases gas and cross subsidizes the expensive imported LNG. It is difficult to introduce dual market for LNG and natural gas

¹⁵ Star Business Report, Gazprom agrees to explore areas of cooperation with Bangladesh, *The Daily Star*, April 8, 2010, Available at <https://www.thedailystar.net/news-detail-133431> [Accessed on November 19, 2023]

¹⁶ S. Khan, Govt. Relies on False Hope, *The Daily Star*, June 9, 2013. Available at <https://www.thedailystar.net/news/govt-relies-on-false-gas-hope> [Accessed: July 26, 2023]

¹⁷ Mohiuddin 2023. Russia's Gazprom to get more work without tender, *Prothom Alo*, July 13, 2023. Available at <https://en.prothomalo.com/bangladesh/feunngrz7s> [Accessed on July 26, 2023]

¹⁸ M. Arifuzzaman, Gazprom given work at high cost, BAPEX deprived, *ProthomAlo*, September 2020. Available at <https://en.prothomalo.com/bangladesh/gazprom-given-work-at-high-cost-bapex-deprived> [Accessed on July 26, 2023]

¹⁹ M. Ahsan, Five Gazprom-drilled gas wells require more investments. *New Age*, October 1, 2016. Available at <https://www.newagebd.net/article/51/five-gazprom-drilled-gas-wells-require-more-investments> [Accessed on July 26, 2023]

²⁰ Arifuzzaman, Gazprom to drill Bhola gas wells for additional Tk. 1.32b. *Prothom Alo*, November 2020, Available at <https://en.prothomalo.com/bangladesh/gazprom-to-drill-bhola-gas-wells-for-additional-tk-132b> [Accessed on July 28, 2023]

because businesses get privileged access to cheaper gas. Bangladesh currently practices a cross subsidy system that benefits handful of private power and energy producers (both foreign and local) at the expense of government owned producers. This subsidy indicates the presence of a special interest groups who have lobbied or managed to develop their businesses and got access to resources using their influence to ensure rent.

Previously when there was resistance against gas price increase, the government justified the price increase by committing to use the extra revenue to create a gas development fund. According to the BERC regulation, that fund was supposed to be spent on gas exploration, production, development and distribution of gas. However, as the Ukraine war started Petrobangla spent Tk. 2,000 crore from the Gas Development Fund (GDF) to import LNG without the permission of Bangladesh Energy Regulatory Commission.²¹ This shows how the fund meant to explore gas was used for importing expensive LNG. The social cost increased as public fund was used to buy more expensive fuel.

Bangladesh is building a special economic zone in Mirsarai, where Indian companies will get privileged access to gas. Petrobangla used the gas development fund to construct a pipeline to deliver gas to the economic zone. Instead of investing the public fund in gas exploration this pipeline will be used to supply gas and LNG. This misallocation of gas fund created the scope of transferring public fund generated from high price given by the citizens to private companies.

During the electricity crisis in 1990s, Bangladesh started to use natural gas based captive power to solve the immediate crisis of some industries. Since 1996, when the industrialists lobbied to ensure gas supply for captive power, the use of captive power grew very fast and by the end of 2000, captive electricity generation consumed around 15 percent of the total gas consumption. According to the Policy Guidelines for Power Purchase from Captive Power Plant captive power plants are required to acquire license to distribute electricity.²² As Gas has become a cheaper source of power generation than the grid electricity and it became lucrative, the demand for gas

²¹ Staff Correspondent, Tk. 2,000cr meant for gas exploration but Petrobangla spent on import, *The Daily Star*, August 3, 2022 Available at <https://www.thedailystar.net/news/bangladesh/news/meant-gas-exploration-spent-import-3086291> [Accessed on July 27, 2023]

²² Power Division, “Policy Guidelines for Power Purchase from Captive Power Plant”, Ministry of Power, Energy and Mineral Resources People’s Republic of Bangladesh, 2007. Available at https://berc.portal.gov.bd/sites/default/files/files/berc.portal.gov.bd/policies/37a75205_8c94_434e_b8e8_0dd643b2a00d/Policy%20Guidelines%20for%20Power%20Purchase%20from%20Captive%20Power%20Plant,%202007.pdf [Accessed on July 27, 2023]

for captive generation increased. However, captive power is not an efficient source of power. According to Islam (2008) captive power failed to achieve economic scale and inflated energy demand.²³The increasing dependency on captive power has distorted the gas market and now it has become difficult to reverse the option.

Lobbying is a common strategy used by multinational companies to sign production sharing contracts with host countries from where resources need to be extracted. Bangladesh is not an exception in case of signing PSCs. Muhammad²⁴ pointed out that “US involvement in lobbying, conspiring, pressurizing peripheral governments for ensuring corporate interest especially in energy sector has been well known.” Behind every PSCs signed since 1990s there were lobbies of either the direct lobbies of IOCs or indirect lobbies through diplomatic channel and the World Bank. Wikileaks occasionally leaked some evidence of US lobbying in support of PSC signings.

4.1.4 Resistance Capture

Since late 1990s when the losses and gains from signing production sharing contracts were gradually being revealed, in Bangladesh conscious citizens from different backgrounds and platforms organized resistances to protect national interest. Although in the beginning there was no significant attempt from the governments to resist the movements against gas export option in PSCs, violent attack on the protests were observed mostly in 2009 and 2011 when Model PSCs had options to export gas. The government business nexus also indirectly used consultants, media, and experts to influence public opinion for gas export. Although the evidence of monetary rewards offered to the consultants by the lobbyists were not directly visible, the professional connections of the consultants with the companies made it obvious that there was tacit understanding between those consultants and the companies.

Although in the face of the movement Bangladesh ultimately cancelled the option to export, later in the following PSCs the export option was included. The effort given to resistance management has gradually declined as there was no significant interest from the IOCs to explore gas in deep sea water. However, since the Ukraine war has started in early 2020s and the energy crisis started to cripple the economy, the interests of IOCs and government in signing new PSCs are growing again.

²³ M. N. Islam, Energy Security in the Ganges, Bramhaputra and the Meghna (GBM) Basins: Bangladesh Perspective. In *Situation Analysis on Energy Security: Ecosystems for Life – a Bangladesh-India Initiative*. Gland, Switzerland: International Union for Conservation of Nature (IUCN), 2014.

²⁴ A. Muhammad, ‘State, Natural Resources, and Energy Security’ in Development Re-examined. University Press Limited, Dhaka, 2021.

4.2 Coal

In 2023, the installed capacity of coal-based power plants stood at 4188 MW, which is about 16.8% of the total capacity.²⁵ Five years ago, the capacity was only 2.76%. Currently Chinese, Indian, and Japanese companies are partnering with state-owned enterprise and private companies to operate the power plants. Compared to other new energy technologies coal grew faster than all other technologies in last one decade. Coal as a technology involves many different kinds of actors including coal mining companies, workers association, logistic companies, distributors, power plants, and a big network of beneficiaries from coal technology expansion. Because of the diverse network of stakeholder coal lobby is usually stronger across countries, hence have greater influence on the decision makers. Development of coal technology use regulatory capture, license, lobby, and resistance management more extensively than other technologies as tools to form a regime.

4.2.1 Regulatory Capture

Under the Quick Enhancement of Electricity and Energy Supply (Special Provisions) in 2010, four power plants, Rampal, Bashkhali, Barisal, and Matarbari power plants were constructed in partnership with India, China, Japan. More are under construction. There were protest against all of these power plants. According to the Bangladesh Environment Conservation (Amendment) Act (2010) “Ecologically critical Areas” (ECA) are areas rich in unique biodiversity and in need of protection or conservation of cultural and natural heritage threatened by destructive activities. In 1999 the Government of Bangladesh has declared Rampal coal power plant location close to Sundarban as ECAs. Undermining the potential environmental and social cost in Bangladesh, the coal power plants were built to create opportunities for the rent seekers. In the name of ensuring quick supply Bangladesh signed a contract with an Indian private company Adani to import electricity from a coal-based power plants at a high cost. IEEFA has called this too expensive, too late, and too risky project.²⁶

4.2.2 Resistance Management/Resistance Capture

Initially in 1994, Bangladesh government awarded a coal exploration license to BHP Minerals, an Australian company for mining. Because of multiple environmental and engineering complexities the company decided not to run coal mining operation and

²⁵ Bangladesh Power Development Board, Power Generation Unit, 2023. Website Available at http://119.40.95.168/bpdb/power_generation_unit [Accessed on July 27, 2023]

²⁶ IEEFA “Adani Godda Power Project: Too Expensive, too Late, and too Risky for Bangladesh” 2018, Website available at <https://ieefa.org/resources/adani-godda-power-project-too-expensive-too-late-and-too-risky-bangladesh> [Accessed on August 15, 2023]

in 1999, BHP transferred its licenses to Asia Energy. The local community was against the project from the beginning. In August 26, 2006 in a demonstration against the open pit coal mining, law enforcers fired and three protesters were killed. The violent effort to stop resistance was backed by the coal lobby that was growing stronger with the government cooperation. Similarly, there has been a strong movement against building a coal power plant near Sundarbans. The law enforcers were instructed to attack the protestors. As a result of the violent attack on the protestors many were injured. Five workers at the Bashkhali power plant were killed in a protest by the local communities.²⁷ During all of these movements the consultants, media, and experts were hired to influence public opinion on behalf of the companies and government. In fact, public money was used to run campaign using the media about the positive sides of the coal power plant. These investments to manage the resistance and influence public opinion is the cost the rent seekers paid to ensure their rent seeking activities.

4.2.3 License for importing coal

When initially 29 coal powered projects were planned, 25 of the 29 proposed coal projects planned to import coal. Were those implemented they would require to import coal from Australia, India, Indonesia, and South Africa. License for importing coal is a great source of rent seeking as it excludes other competitors in the market and gives the licensee exclusive right to supply coal for long period of time. To secure the license the suppliers compete with each other. However, in 2021 Bangladesh scrapped the plan to construct ten coal-based power plants. However, rest of the coal power plants including those in Rampal, Matarbari, Banshkhali, and Payra are dependent on the foreign coal and the purchase of coal is a great source of generating rent by private companies.

4.2.5 Indirect Lobby:

A new interest group representing industrialists, who are building industries around the Sundarbans' ecologically critical area, reinforced the lobbying for the Rampal coal power plant. The government permitted license to 190 industrial and commercial units in the ecologically critical area (ECA) of the Sundarbans. According to the experts, the industries will pose serious threat to the biodiversity. According to a DoE report submitted to the High Court of the industrial units, at least 24 of the industries fall under the "red category", meaning those are extremely harmful to the fragile

²⁷ F.M. Rahaman and M. Yousuf, "Banshkhali Power Plant Site: 5 workers killed as cops open fire", *The Daily Star*, Updated on April 18, 2021, Available at: <https://www.thedailystar.net/frontpage/news/banshkhali-power-plant-site-5-workers-killed-cops-open-fire-2079153> [Accessed on September 29, 2023]

biodiversity.²⁸ Giving permission to these industries is a way to giving benefit to a diverse interest group who for their own interest will continue to lobby on behalf of occupying the land and converting the ecologically critical area to industrial area.

4.3 Nuclear:

Construction of the two units of nuclear power plants in Rooppur, each producing 1200 MW of electricity is scheduled to be completed in 2024 and 2025 respectively. The construction of more than 12-billion-dollar project started in 2017. Although the first unit was supposed to start operation in 2023, the project has been delayed. Initially this was a nuclear cooperation between Russia and Bangladesh. Later India got involved in the project for training human resource and capacity building.

4.3.1 Regulation in favor of nuclear

The main regulation regarding nuclear power project is the Nuclear Power Plant Act 2015. The Act sets up the Nuclear Power Company of Bangladesh (NPCB) to operate the plant, however, Bangladesh Atomic Energy Commission (BAEC) remained as an owner of the power plant. The law does not contain any provisions for the consequences of any disaster and provide indemnity protection to the operator. Bangladesh does not have any comprehensive law on nuclear power production to guide the future safe energy production to regulate nuclear safety and liability rules.

In 2019 Bangladesh signed a deal with Russia for the supply of uranium for the Nuclear Power Plant (RNPP). Under the deal, Russia will supply the nuclear fuel needed for the plant during its entire life cycle. In 2017, the two countries have also signed 'spent fuel sent back' agreement for managing the high-level nuclear waste of plant. Bangladesh government has not given sufficient attention to the technical issues associated with storage, transportation and disposal of mid-level and low-level radioactive material and the waste except forming a company to manage the waste. In case Russia does not take the nuclear waste back it could raise the risk of serious environmental damage to Bangladesh.

Large energy deals generally have a higher risk of rent-seeking. There are rent seeking risks in large projects like nuclear power plant which involves large infrastructure development, involvement of different types of vendors, licensee, and subcontractors.²⁹ It creates a network of actors competing with each other for vendor

²⁸ Staff Correspondent, License to harm Sundarbans, *The Daily Star*, April 6, 2018, Available at <https://www.thedailystar.net/frontpage/licence-harm-sundarbans-1558918> [Accessed on July 27, 2023]

²⁹ B. Martin and H. Winkler, "Procurement models applied to independent power producer programmes in South Africa", Energy Research Center, University of Cape Town, 2014.

contract, licenses, and concessions. Countries prepared to offer public support to nuclear power plant are generally given support for nuclear power projects. However, in case of large size nuclear power plant projects (between 1 GW and 1.6 GW) this support is often facilitated by rent-seeking and corruption.

The government of Bangladesh has exempted the NPP from all taxes and duties, including regulatory duty, import duty, advanced VAT, and other supplementary duty on all imported goods, parts and machinery. These monetary incentives create scope for earning both learning rent and monopoly rent. For construction of nuclear power plant, the government of Bangladesh took extremely large amount of loan. Although the project was expected to cost US\$12.65 billion, the cost can escalate further because this is “cost-plus-fee” contract. The vendor may come up with any cost escalation into the contract amount. The final cost of generating power could be “at least 60 percent higher than the present retail cost” of electricity in Bangladesh. Generally, one of the reasons of this escalating cost is rent seeking by a network of rent seekers, both within public sector and private sector.

4.3.2 Rent for Learning

According to the nuclear agreement, Russia would supply all main components, build the plant and operate it until Bangladesh has the capacity to operate independently. The Russian state-owned company is training local technicians in Bangladesh, who will take over the operation of the plant 10 years after its launch. Bangladesh government has undertaken the Human Resource Development program in nuclear science and technology involving Universities.³⁰

India, Bangladesh and Russia signed an agreement to allow Indian firms in construction and installation works in the “non-critical” category and cooperate in personnel training, exchange of experience and consulting support.³¹ Nuclear as a priority strategic project of the government received government support to develop capacity for a specified period of time. It allowed the network of actors receive learning rent from developing capacity, which is largely missing in other energy technologies.

³⁰ R. Sharma, With first nuclear power plant, Bangladesh focuses energy on training manpower, *Nuclear Asia*, December 1, 2017. Website Available at <https://www.nuclearasia.com/feature/first-nuclear-power-plant-bangladesh-focuses-energy-training-manpower/1542/> [Accessed on 28th July]

³¹ D. Vashkaran, *Mint*, March 1, 2018. Website Available at <https://www.livemint.com/Industry/QD5ex7YkwRkooAmYgWPVHK/India-Russia-Bangladesh-sign-pact-for-Rooppur-atomic-plant.htm> [Accessed on July 28, 2023]

4.3.3 Resistance Capture

There are three ways through which anti-nuclear resistance has been controlled in Bangladesh. First, from the very beginning the planned suppression of potential antinuclear movement at the local level by forcibly repelling protests and by threatening any dissenting voice reduced the risk of cancellation of the project. Second, lack of any visible protest in the media helped to manipulate the idea of public acceptability. Government sponsored campaign to disseminate partial knowledge about the risk of the projects to influence public opinion. Third, currently there is no major antinuclear resistance that can channel public opposition towards the project, especially because the environmental impact assessment was not disclosed to the public. The government paid the cost of all the campaigns and mobilized local resources to suppress the initial movement.

4.4 Liquefied Natural Gas (LNG)

Bangladesh has started to import LNG from 2018. Bangladesh used to use around 650mmcf to 800mmcf capacity from imported LNG to the national grid before global LNG spot market price increased because of Ukraine war. In 2022 and 2023 the import has come down to around half of the capacity (500-553mmcf). The LNG price increase and the unused capacity has created enormous social cost as the businesses started to shrink output, residential consumers suffered from heavy load shedding, and inflation crippled the lives of the poor and middle class.³²

4.4.1 Regulatory Capture

When Bangladesh planned to increase its dependency on LNG, LNG was already expensive compared to the natural gas. The gas sector master plan 2017 recommended the government to explore indigenous gas rather than spending on importing costly LNG. Independent experts have also been advising the government for many years to prioritize onshore and offshore gas exploration. But, to serve the interests of the LNG lobby, the government focused on importing LNG. At that time the Quick Enhancement of Power and Energy (Special Provision) Act 2010, created a ground for taking such economically inefficient decision. As a result, in 2023, the government is paying around USD 202,500 capacity charge daily even without regasification. This is an example of both regulatory captures to create rent seeking opportunities.

³² M. A. Rahman, Govt. struggles to clear LNG bills, amid dollar dearth. *Financial Express*, May 29, 2023. Website Available at <https://today.thefinancialexpress.com.bd/latest-page/govt-struggles-to-clear-lng-bills-amid-dollar-dearth-1685298405> [Accessed on July 15, 2023]

4.4.2 Lobby

From the experience of high import dependency on LNG and difficulty in buying expensive LNG during dwindling foreign reserve, the government has not changed its LNG dependent policy. Rather the government has been considering contracts with the private operators to build two more LNG import terminals. Recently the cabinet committee on Economic Affairs approved the third LNG terminal with capacity of 600 mmcf to be set by Summit group. (TBS Report 2023)³³

After the gas crisis intensified in 2022, Bapex drilled nine wells and saved at least Tk 1 lakh crore on LNG import by spending only Tk 812 crore. To buy the same amount of LNG through a long-term contract, government would have to spent foreign currency equivalent to Tk 96,000 crore. To buy it from the spot market, government had to spend Tk 1,70,000 crore. From 2018-19 it spent Tk 85,000 crore on importing LNG. This sets an example of how lobby of private and international investors have influenced the decisions of the government in energy planning.

4.4.3 Rent for Learning

The two floating gas and re-gasification unit (FSRUs) at Maheshkhali of Cox's Bazar have 1000mmcf capacity to inject gas to the national gas transmission grid per day. One FSRU is run by Excelerate Energy of the United States with 500 million cubic feet per day capacity and another by a national company Summit Group. The government exempted VAT, duty and other supplementary duties on materials and services for construction of the terminals. This has reduced the cost for suppliers of new technology. It enabled to create rent for learning for LNG technology.³⁴

4.5 Solar

In 2016, the Power System Master Plan of Bangladesh set a target to produce 10% of Bangladesh's electricity from renewable sources by 2041.³⁵ To achieve the target, the government was considering unsolicited proposals from the private investors to establish solar projects.

³³ TBS Report, Summit to set up 3rd floating LNG terminal at Moheshkhali, *The Business Standard*, June 14, 2023. Website Available at <https://www.tbsnews.net/bangladesh/energy/summit-set-3rd-floating-lng-terminal-moheshkhali-649742> [Accessed: 15.7. 2023]

³⁴ D. A. Mala, Summit LNG project gets tax exemption, *Financial Express*, December 22, 2017, Website Available at <https://thefinancialexpress.com.bd/trade/summit-lng-terminal-project-gets-tax-exemption-1513917976> [Accessed on October 3, 2023]

³⁵ GoB, Government of the People's Republic of Bangladesh, Power Systems Master Plan-2016, Japan International Cooperation Agency (JICA) Power Division, Ministry of Power, Energy and Mineral Resources, Government of the People's Republic of Bangladesh.

4.5.1 Regulatory Capture

The 2010 Quick Enhancement of power and energy supply Act started to give government the power to bypass the open competitive bidding process and fast-track and simplify power plant approvals. It has also given development rights directly to local and foreign investors to submit unsolicited proposals. The revision of the law in 2014 ensured extension of the time needed to win approval for energy and electricity projects until October 2021. In case of renewable this particular incentive has not been successful as expected. Bangladesh Power Development Board (BPDB) has issued letter of interest (LOI) to eighteen companies, out of which only 8 companies have been able to sign the Power Purchase Agreement (PPA), but there has not been any significant progress in implementation. One of the reasons is developers usually need to get more than 30 permits from different offices which makes the process lengthy and difficult. Although the power cell decided not to invite any unsolicited proposal from 2019 and initiated to organize auction, unsolicited proposals continued. Auction in the formative phase does not provide incentives to firms. Thus, the solar developers could not sufficiently benefit from the regulatory capture. However, recently there has been some examples of uncompetitive bidding through which some utility scale solar power plants have signed PPAs to sell to PDB at high tariff. This is creating interest among private firms to enter the market.

4.5.2 Lobby

Although there is no clear evidence of lobby for solar, the slow growth of solar, particularly for rooftop and utility scale indicates that the solar lobby is almost nonexistent. Even if it exists, it is very weak compared to other energy technologies. The solar developers who have been lobbying to market irrigation technologies are trying to supply excess electricity to the grid to reduce cost, but the government has not done anything to meet their demand. Besides, the solar manufacturers who were lobbying for government incentive to survive also lobbied to get incentive but had to shut down because of lack of incentives.

4.5.3 Rent for Learning

According to the Bangladesh Energy Regulatory Commission (Tariff for Roof Top Solar PV Electricity) Regulations, 2016 (Draft) there is option to consider incentive or subsidy while determining tariff.³⁶ However, Subsidies in buying at high cost is contradictory to auction and it is not clear how Bangladesh is going to manage these two contradictory approaches simultaneously. Besides, local level extortion,

³⁶ Bangladesh Energy Regulatory Commission (Tariff For Roof Top Solar Pvt. Electricity) Regulations, 2016 (Draft), Available at: http://berc.portal.gov.bd/sites/default/files/files/berc.portal.gov.bd/page/a250b6fc_8bcf_4c96_bb20_3c3de230467a/berc_tariff_regulations_rooftop_solar%28draft%29.pdf [Accessed on July 30, 2023]

bureaucratic red tapes, availability of land, difficulty in getting license, and need for adaptation to local condition raise the risk of the projects. In a developing country like Bangladesh, where renewable investment is costly because of high risks involved in the process and the process of learning requires government support, there is a need for allowing the producers to earn learning rent either in the form of low interest, price subsidy, any other raw material subsidy, infrastructural and administrative support that reduces the cost. Rather than creating any such learning rent to reduce cost, the government imposed 1% customs duty on solar panels and 37% customs duty on inverters. This shows that there is an absence of rent for learning in the renewable energy sector. This indicates that the renewable entrepreneurs are deprived of earning rent for learning if they have to operate in the competitive environment from the very beginning.

5. Result

Rent seeking opportunities are different for five energy technologies. Bangladesh has already established a strong gas regime. The process has started since 1980s when after the oil shock, most of the countries in the world were searching indigenous energy resources. At that time Bangladesh has started to drill new wells. Bangladesh signed a number of PSCs through which foreign investors have started to extract natural gas. Slowly Petrobangla has started to develop its capacity. Towards the end of 1980s BAPEX (Bangladesh Petroleum Exploration and Production Company) was formed to explore gas in Bangladesh. Overtime, BAPEX developed its capacity. However, Bangladesh government continued to hire foreign firm like Gazprom in exploring gas. The Quick Enhancement of Electricity and Energy Supply (QEEES 2010) Act 2010 facilitated the contracts in many ways. The foreign actors lobbied to sign PSCs with the government. The World Bank directly advocated for investment of the multi-national oil companies to extract indigenous gas resources of Bangladesh.

	Regulatory capture	Lobby	License/Contract	Learning Rent	Resistance Capture
Gas	√(QEEES 2010 active after regime formation)	√(Lobbies behind PSCs)	√(Contract)	√	(Strong resistance against gas export)
LNG	√(QEEES 2010 active)	√(Strong Lobby)	√(Contract for LNG import)	√(Infrastructure development)	None
Coal	√(QEEES 2010 active)	√(Strong Lobby)	√(License for Coal import)	√(Financing and Infrastructure development)	√(Strong resistances were suppressed)

Nuclear	√(QEEES 2010 active)	Strategic Cooperation	√ (Contracts for construction)	√ (Infrastructure and human resource development)	√(Suppressing movement and campaign for nuclear)
Solar	√(QEEES 2010 active at limited scale)	√ Weak lobby	N/A	None	Limited

Towards the end of 1990s and the beginning of 2000s when foreign firms were willing to sign more PSCs with the condition of export, there was strong resistance from the people of Bangladesh and at one point the government was forced to take out the condition of export from the PSC.

Although LNG is a relatively new technology in Bangladesh, its use and economic efficiency has been questioned from the very beginning because of the expense of technology. Local investor Summit Group and Excelerate Energy of the US got the license to establish the FSRU LNG terminal. Initially they obtained license with the excuse of dwindling gas reserve and meeting the demand of gas. The government supported heavily in developing the infrastructure. Developing capacity of a private company also set an example of creating learning rent in this technology.

In case of coal all types of rent seeking tools have been used to facilitate coal expansion. Regulatory capture was used for almost all coal-based power plant. The coal lobby has always been active. Almost all power plants, especially Payra Power plant, Rampal power plant, and Bashkhali Power plant faced strong resistance from the civil society. The Phulbari coal mine had to be postponed because of resistance from local people. The operation of power plants depends on the imported coal for which license needs to be issued. License as a form of rent seeking thus exists in coal sector. Besides, Bangladesh's import of coal from Indian coal power plant of Adani in Jharkhand is also an example of strong coal lobby and license.

Nuclear power plant is an exceptional establishment because it is a strategic cooperation rather than a commercial deal. Although it involves three governments, Bangladesh, Russia, and India, the cooperation is not free from rent seeking. The huge infrastructure associated with building a nuclear power plant involves multi party license, agreements, contracts etc. To stop resistance and heavily run campaign for nuclear the government has been making good investment through TV commercials, publications, and nuclear bus tour campaign.³⁷

³⁷ TBS Report, The Second Annual Bus Campaign for Nuclear Power, The Business Standard, November 30, Website Available at <https://www.businessinsiderbd.com/tech/news/31694/nuclear-bus-starts-journey-to-create-public-interest-in-science-technology> [Accessed on October 3, 2023]

In case of solar, although there is no learning rent, all the other rent seeking opportunities including license, lobby, and regulatory capture exist in a very limited scale. The solar lobby is very weak compared to other technologies like coal, gas, LNG, and nuclear that have a long history of establishing regime locally and internationally.

In case of Bangladesh there have been several examples of people's resistance that have been suppressed either by using security force, threats by local goons, restricting right to rally and human chain, violent attack on protesters, manipulating information, bribing some leaders of movement, and using advertisement to form public opinion in favor of environmentally harmful projects. In case of coal and nuclear the resistance management expenditure is higher than in case of solar and LNG.

6. Conclusion

Comparison of five energy technologies reveals that all rent seeking opportunities are relatively more limited in case of solar than coal, gas, LNG, and nuclear technologies. The coal sector in Bangladesh set an example of how fast a coal regime can develop in a country that did not use almost any coal in electricity generation about a decade ago. Although Bangladesh has a strong gas regime, the negligence of indigenous gas exploration implies how other rent seeking opportunities in LNG, coal, and nuclear were so rewarding that other technologies like LNG, coal, and nuclear developed fast over the last one decade.

Among these technologies coal has the highest rent seeking opportunities involving various actors. Although coal developed very fast, the existing coal plants like Rampal, Payra, Bashkhali stopped commercial operation as the government cannot spend dollar to buy coal in 2023. These are now going through uncertainties because coal price has increased and Taka depreciated against dollar. The social cost to the consumers increased with the electricity price hike and consequent inflation. In the time of crisis of early 2020s, the coal lobby has again become active to extract coal in Bangladesh.

Although the gas reserve in Bangladesh is depleting fast, still there is a great potential of unexplored deep-sea natural gas. The rent that a monopoly firm can secure from signing a PSC is huge. Unless a suitable monopolist is found, that could share the rent through collusion, unexplored gas remains as a strategic reserve for future political negotiation. Although natural gas extraction technology is complex and has huge rent in the process of extraction, distribution, and electricity generation, the inactivity during the last one decade and recent PSC approval and attempt to sign PSC with ExxonMobil before election indicates that the untapped rent seeking

opportunities throughout the last one decade was a strategic decision of the government.

Nuclear market is very limited worldwide and this technology usually diffuses from only few core countries and it usually diffuses very slowly because of the lumpy and complex character of the technology. For example, the human resources in Bangladesh may be trained to work in the nuclear power plant, but in reality, the control over the technology will remain only on the core country Russia. Although in case of nuclear, fuel purchase is not required as frequently as in case of LNG and coal, therefore it does not have regular source of rent seeking from fuel purchase and logistics. However, the set-up of complex technology, maintenance, and operation afterwards require involvement of diverse group of actors, who for securing their rents, create a network of lobby group that further reinforces the strategic position of the core and host countries.

It was never unpredictable that the price of LNG and coal may become unstable anytime during any global crisis and the variable cost may increase. The growing import dependency is an outcome driven mostly by the rent seeking and rent protecting behavior of the suppliers. For example, Japan's policy to expand its coal technology has led JICA to develop power systems master plan in which coal technology has been given priority. The worldwide increase in LNG use has overcome the challenge of transporting gas with pipeline. The growth of LNG market as a transition fuel has become widely accepted in many countries including Bangladesh. However, undermining the gas exploration potential of Bangladesh, and over emphasizing the use of LNG has raised the question about the rent seeking incentives in LNG technology. The evidence shows that even after the experience of high LNG price, the government approved new LNG terminal despite existing capacity remains unused.

The market price based net metering pricing policy in solar does not effectively incentivize rooftop solar technology growth. Government support for land leasing, infrastructure building, grid upgradation, and other economic incentives are missing largely because rent seeking incentives are very limited in solar technology. Once the solar panels are set, the technology relies mostly on the maintenance and efficiency increase. There is no need for regular import of fuel through which rent seeking opportunities are usually created for other technologies like coal and LNG. However, after the energy crisis has started the recent purchasing power agreements signed without bidding is creating scopes for private firms to enter the market.

All energy technologies have their own characteristics, pace of diffusion, network of actors, and context specific elements that make the technologies adoptable for the countries. The rent seeking incentives associated with these energy technology

adoptions have largely been undermined in the literature when technology characteristics are defined. This research shows that not only technology's risk and complexity, role of state, market, and capital availability, but also the type of rent seeking opportunities associated with each technology plays an important role in determining why certain technologies have become more feasible than the others.