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POLITICAL ECONOMY

ANALYSIS ON FUEL-EFFICIENT PUBLIC TRANSPORTATION AT DHAKA

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Abbreviation

AD	Assistant Director
ADB	Asian Development Bank
AEA	American Economic Association
AFOLU	Agriculture Forestry and Other Land Use
APC	Assistant Police Commissioner
AQI	Air Quality Index
ASEAN	Association of Southeast Asian Nations
BAU	Business as Usual
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BDT	Bangladesh Taka
BELA	Bangladesh Environmental Lawyers' Association
BERC	Bangladesh Energy Regulatory Commission
BNAAQS	Bangladesh National Ambient Air Quality Standard
BRT	Bus Rapid Transit
BRTA	Bangladesh Road Transport Authority
BRTC	Bangladesh Road Transport Authority
BSTI	Bangladesh Standard and Testing Institution
CAPEX	Capital Expenditure
CAPI	Computer Assisted Personal Interviews
CDM	Clean Development Mechanism
CNG	Compressed Natural Gas
CPD	Centre for Policy Dialogue
CSO	Chief Security Officer
DCC	Dhaka City Corporation
DC	Deputy Commissioner
DITS	Dhaka Integrated Transport Study
DMA	Dhaka Metropolitan Area
DMC	Dhaka Metropolitan Corporation
DMP	Dhaka Metropolitan Police
DMP	Dhaka Metropolitan Police
DMRTC	Dhaka Metropolitan Regional Transport Committee
DMTCL	Dhaka Mass Transit Company Limited
DoE –	Department of Environment
DTCA	Dhaka Transport Coordination Authority

DTCB	Dhaka Transport Coordination Board
DU	University of Dhaka
EE	Elevated Expressway
EEV	Energy Efficient Vehicle
EV	Electric Vehicle
FAMEII	Faster Adoption and Manufacturing of Electric Vehicles II
FEV	Fuel Efficient Vehicle
GDP	Gross Domestic Product
GDTPCB	Greater Dhaka Transport Planning and Coordination Board
GHG	Greenhouse Gas
GO	Government Order
GST	Goods and Services Tax
HV	Hybrid Vehicles
ICE	Internal Combustion Engine
IDCOL	Infrastructure Development Company Limited
IDI	INTOSAI Development Initiative
IPP	Independent Power Producers
IPPU	Industrial Processes and Product Use
KII	Key Information Interview
KW	Killo Watt
LDV	Light Duty Vehicles
LGA	Local Government Act
LGED	Local Government Engineering Department
LNG	Liquified Natural Gas
LPG	Liquefied Petroleum Gas
LV	Light Vehicles
MCPP	Mujib Climate Prosperity Plan
MoHA	Ministry of Home Affairs
MoHPW	Ministry of Housing and Public Works
MoLGRDC	Ministry of Local Government Rural Development Cooperation
MoRTB	Ministry of Road Transportation and Bridges
MRA	Metro Rail Act
MRT	Mass Rapid Transit
MVO	Motor Vehicle Ordinance
NBR	National Board of Revenue

NDC	Nationally Determined Contribution
NEMMP	National Electric Mobility Mission Plan
OPEX	Open expenditure
PEA	Political Economy Analysis
PM	Particulate Matter
PPP	public private partnership
RAJUK	Rajdhani Unnayan Kartripakkha
RHD	Roads and Highways Department
RSTP	Rapid Spanning Tree Protocol
SDG	Sustainable development Goal
SREDA	Sustainable and Renewable Energy Development Authority
SUV	Sport Utility Vehicle
TARA	Tara Climate Foundation
TED	Traffic Engineering Department
TED	Transportation and Engineering Department
TP	Toxicity Potential
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
WHO	World Health Organization
WRI	World Resource Institute

EXECUTIVE SUMMARY

Bangladesh, a rapidly urbanizing nation, faces a dual challenge: combating environmental degradation and improving air quality. Dhaka, the capital, with half of the country's urban population, has been continuously ranked among the least livable cities globally due to inadequate amenities, extreme traffic congestion, and inefficient transportation infrastructure. This scenario is further exacerbated by the city's burgeoning urban population and diverse land-use patterns, leading to a decline in service quality, comfort, safety, and operational efficiency of the transportation system. The average car speed in Dhaka has dropped alarmingly to 7 km/h, equivalent to the average walking speed, with a projected decrease to 4 km/h by 2035. This extreme congestion results in significant economic losses, with an estimated 3.2 million working hours lost daily, amounting to an annual financial loss of over 2.68 billion USD.

Rationale and Importance of FEVs and EVs

In response to these challenges and as part of its commitment to the Paris Agreement, the Government of Bangladesh has prioritized climate mitigation actions, including the introduction of Fuel-Efficient Vehicles (FEVs) and Electric Vehicles (EVs). These vehicles are pivotal in achieving multiple climate-related targets set by the government, addressing both environmental concerns and air quality issues. Fuel efficiency is a critical measure of how efficiently a vehicle converts fuel into kinetic energy, with significant variations observed in different countries based on vehicle size, weight, engine power, and consumer behavior.

Political Economy of Introducing FEV in Dhaka

Political Economy Analysis (PEA) plays a critical role in understanding and addressing these challenges. Politics and power significantly influence the public transport sector in Dhaka, with the governance and development of transportation infrastructure and services deeply intertwined with political dynamics and power structures. Public sector corruption, non-committed political leadership, and the influence of business and political elites on transport sector governance are significant barriers that need to be addressed for successful implementation of FEVs and EVs.

Despite the clear benefits, the introduction of these vehicles in Dhaka comes with its own set of challenges. Increased penetration of EVs can lead to power quality issues like harmonics, voltage sag, and transformer power loss, impacting the residential distribution network. Furthermore, the potential increase in electricity demand due to EV adoption poses a significant challenge, considering Bangladesh's current energy infrastructure and reliance on natural gas. Moreover, the city's urban development plans must align with the introduction of EVs and associated infrastructure like solar charging stations, to ensure sustainable urban development.

How supportive is the legal and policy regime toward FEV?

Bangladesh's commitment to addressing climate change is evident in its various policies and plans. The nation aims to reduce its transport sector emissions by 3.4 million tons of carbon dioxide by 2030, with the transport sector being the second-largest contributor to greenhouse gas emissions. To achieve this, the government has introduced the Electric Motor Vehicle

Registration and Operations Guideline 2023, which emphasizes discipline in electric vehicle operation and registration, aiming to reduce carbon emissions and environmental pollution.

The government's role in regulation, standardization, and incentivizing the EV market is critical for the sustainable growth of this sector. Several domestic and international companies are showing interest in investing in Bangladesh's EV sector, supported by government incentives and adherence to international protocols on motor vehicle standards. Collaboration among different ministries, including Industry, Finance, and Foreign Affairs, is essential to address regulatory needs and support international investment portfolios.

Efficiency-based incentives and regulations, such as taxes on fuel and vehicles, play a significant role in promoting the purchase of fuel-efficient vehicles. The *'Avoid, Shift, Improve'* framework suggests policies to incentivize avoiding discretionary journeys, shifting to energy-efficient modes, and improving vehicle efficiency.

Moreover, the Renewable Energy Policy (Draft) 2022 and the Mujib Climate Prosperity Plan emphasize transitioning from fossil fuels to renewable energy sources, highlighting the need for new renewable energy technologies and infrastructure, such as EV charging stations. The Integrated Energy and Power Master Plan (IEPMP) 2023 outlines strategies to promote fuel-efficient vehicles, including intelligent transportation systems and renewable energy-based EV introduction. However, the plan also reveals gaps in infrastructure development and consumer adoption strategies.

The Automobile Industry Development Policy 2021 focuses on sustainable development in the automobile sector, with objectives including converting a large portion of vehicles into fuel-efficient vehicles (FEVs) by 2030 and promoting local production of eco-friendly electric vehicles. The Renewable Energy Policy 2008, under revision, sets a target of 10% of all electricity from renewable sources by 2020, with an emphasis on solar and wind-based power charging stations throughout the country.

The Bangladesh Climate Change Strategy and Action Plan (BCCSAP) is a comprehensive plan based on principles like adaptation, disaster risk reduction, low carbon development, and technology transfer. It aims to build the nation's capacity to address climate change over a 20–25-year period.

The 8th Five Year Plan (8FYP) outlines Bangladesh's development goals from July 2020 to June 2025, highlighting the need for balanced allocation across various sectors, including transport, health, and education. The National Integrity Strategy (NIS) emphasizes values, morals, ethics, and integrity in promoting fuel efficiency and raising public awareness about the benefits of fuel-efficient vehicles.

Stakeholder Analysis and Governance

Political economic analysis is crucial in understanding the relationships between stakeholders in the FEV governance context. The national government, particularly the Ministry of Road Transport and Bridges (MoRTB), the Ministry of Environment, Forest, and Climate Change (MoEFCC), the Ministry of Power, Energy and Mineral Resources (MoPEMR) and along with agencies like the Dhaka Transport Authority (DTA), hold significant power in shaping FEV policies. Private sector actors, such as bus operators and manufacturers, and civil society

organizations, including environmental NGOs and consumer groups, also play vital roles in influencing policy and adoption of FEVs.

Informal Rules of the Game in FEV Adoption

In the context of adopting Fuel-Efficient Vehicles (FEVs) in Dhaka, the "Informal Rules of the Game" play a pivotal role alongside formal regulatory frameworks. These informal rules encompass unwritten norms, practices, relationships, and power dynamics that significantly influence decision-making within the automotive industry. This includes industry customs, lobbying efforts, and the influence of key stakeholders, such as the existing power dynamics among industry players. For instance, the import policy and taxation heavily favor reconditioned fossil fuel-based vehicles, creating a barrier to FEV adoption. Moreover, there is an underlying influence of vested interests, particularly from groups closely aligned with the ruling political factions, which can steer policymaking in favor of private benefits over public good. This environment either facilitates or hinders the transition to FEVs, emphasizing the need for a nuanced approach that considers these intricate and often unspoken factors. Understanding and navigating these informal rules are critical for effectively promoting FEVs and achieving a sustainable and efficient transportation system in Dhaka.

Strategic Recommendations and Implementations for FEV Adoption

The successful implementation of Fuel-Efficient Vehicles (FEVs) in Dhaka requires a multifaceted approach, integrating financial incentives, public awareness, collaboration with key stakeholders, and infrastructure development. Effective strategies should encompass:

- **Financial Incentives and Policy Reforms:** Financial incentives such as subsidies or tax breaks are crucial to reduce the initial cost barrier for FEVs, making them more attractive for consumers and businesses. Immediate policy revisions, like reevaluating and amending tax policies to incentivize electric vehicle (EV) adoption, are essential. Introducing carbon taxes to discourage fossil fuel usage could also be a viable strategy
- **Public Awareness and Education:** Launching public awareness campaigns and educational programs is vital to inform the public about the benefits of FEVs and dispel misconceptions, encouraging acceptance among Dhaka's residents.
- **Infrastructure Development:** Supporting the development of EV charging infrastructure is a key step towards creating a comprehensive network throughout Dhaka, addressing the critical need for accessible charging options. This includes establishing transparent and predictable tariff structures for EV charging stations and ensuring compliance with safety standards.
- **Leveraging International Best Practices:** Learning from neighboring countries like India and China, which have implemented successful policies to promote EVs, can provide valuable insights and strategies for Bangladesh.
- **Addressing Infrastructural Roadblocks:** Overcoming challenges such as high import duties, lack of charging stations, and inadequate infrastructure is imperative for the adoption of EVs in Bangladesh.
- **Stakeholder Engagement and Governance Reform:** Engaging with stakeholders, including government bodies, private sector, civil society organizations, and the public, is crucial for successful policy implementation and FEV adoption. Efforts should be

made to break the existing oligopoly in the transport sector and replace it with a more equitable and efficient system.

- **Promoting Local Manufacturing and Customized Incentives:** Encouraging local manufacturing of EV components and offering tailored incentives for the EV market can foster a conducive environment for localized manufacturing.

In conclusion, the transition to a more sustainable and efficient transportation system in Dhaka requires comprehensive strategies that address financial, infrastructural, technological, and policy challenges. Collaborative efforts among government, private sector, and civil society, coupled with public support and awareness, are essential to promote the widespread adoption of FEVs, improve air quality, and enhance the overall transportation system in Dhaka.

1 INTRODUCTION

1.1 BACKGROUND

With the alarming global changes in the climate and environment, the significance of fuel-efficient public transportation cannot be overstated, public transport in Dhaka is in fact is one of the main contributors of CO2 emission in Bangladesh. CO2 emissions of Bangladesh increased from 3.5 million tons in 1972 to 106.9 million tons in 2021 growing at an average annual rate of 7.34% (*Bangladesh CO2 Emissions, 1970-2022 - Knoema.Com*, 2021).

Inefficient fuels, such as coal and oil, produce more greenhouse gases when burned than cleaner fuels, such as natural gas and renewable energy sources. The energy sector is the main source of greenhouse gas emissions in Bangladesh, and it is also the only sector with unconditional emission reduction targets are included under the country's Nationally Determined Contribution (NDC). This means that Bangladesh's reliance on inefficient fuels makes it more difficult for the country to meet its greenhouse gas reduction targets. Bangladesh needs to reduce emissions from the energy sector regardless of whether it receives international financial assistance.

1.1.1 CLIMATE ACTION AND TRANSPORT IN BANGLADESH

Dhaka, the capital of Bangladesh, has experienced significant growth in CO2 emissions, largely driven by environmental challenges associated with urban transport development (M. A. Hossain et al., 2021), the emissions originating from the fossil-fuel based transportation sector.

Dhaka is facing a severe air pollution crisis, with a significant portion of the city's average readings for PM10 (coarse particles of pollution like dust) and PM2.5 (fine particles mostly created by combustion) were six and nine times greater than World Health Organization (WHO) guidelines between 2003 and 2019 (Pavel et al., 2021). The annual economic burden of air pollution in Dhaka has been estimated at US$192 million (Sos-arsenic, 2023).

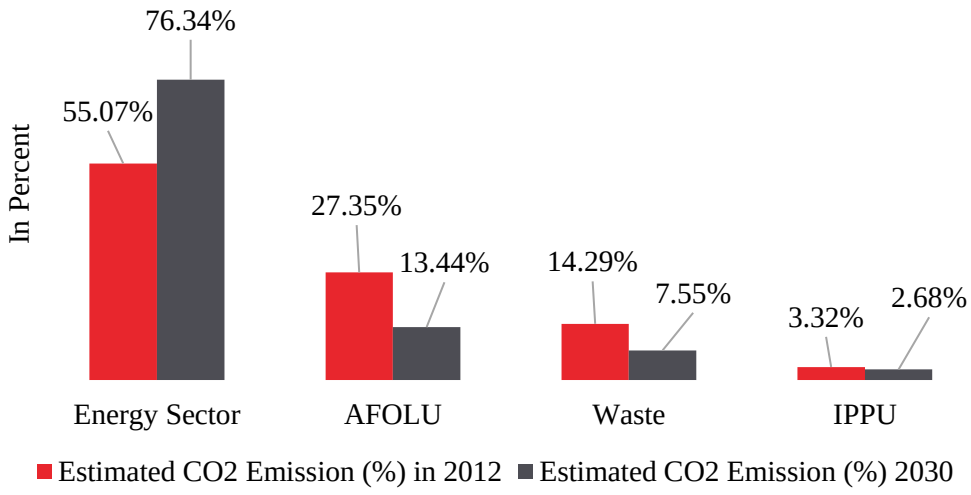


Figure 1.1: Contribution of energy in CO2 emission (%)

While these are alarming statistics, the picture is even more complex, one may point out Compressed natural gas or CNG is comparatively a cheaper and environment-friendly fuel, but, as evidence from other megacities suggests that simply converting vehicles to CNG may not be the silver bullet, potentially even exacerbating some aspects of the pollution problem. The results of CNG conversion in other megacities (Rio de Janeiro, Mexico City, and New Delhi) and the greenhouse gas (GHG) benefits of such conversion showed that switching from diesel vehicles increased high-emission particulates and black carbon, which are more potent as GHGs than CO_2 or CH_4. As a result of such adverse situations, Dhaka had very high (>1) toxicity potential (TP) values of $PM_{2.5}$ and PM_{10} and recorded the highest mortality and morbidity rates (hospital admissions) among the megacities studied, with about 7,000 deaths and 2,100 excess cases (cardiovascular and respiratory) each year". [1]

Bangladesh has set a target of reducing its greenhouse gas emissions by 25% by 2030, compared to 2005 levels *(Climate Change Initiatives of Bangladesh, 2022)*. This target is ambitious, but it is necessary if Bangladesh is to meet its obligations under the Paris Agreement. To meet its NDC targets, Bangladesh will need to invest in cleaner energy sources, such as solar and wind power. The country will also need to improve energy efficiency in all sectors of the economy. Energy transition and change are imperative to achieve the sustainable development goals that includes both climate and public health of the productive human resources of Bangladesh.

1.1.2 ROLE OF TRANSPORT SECTOR IN GHG EMISSION

Fuel-efficient public transportation plays a crucial role in addressing this issue by reducing greenhouse gas emissions and promoting environmental stewardship. It helps decrease our reliance on fossil fuels, which contribute significantly to global warming, air pollution, and health problems. In today's world, given the advancement of research and technology, finding sustainable solutions is not just a preference but an imperative.

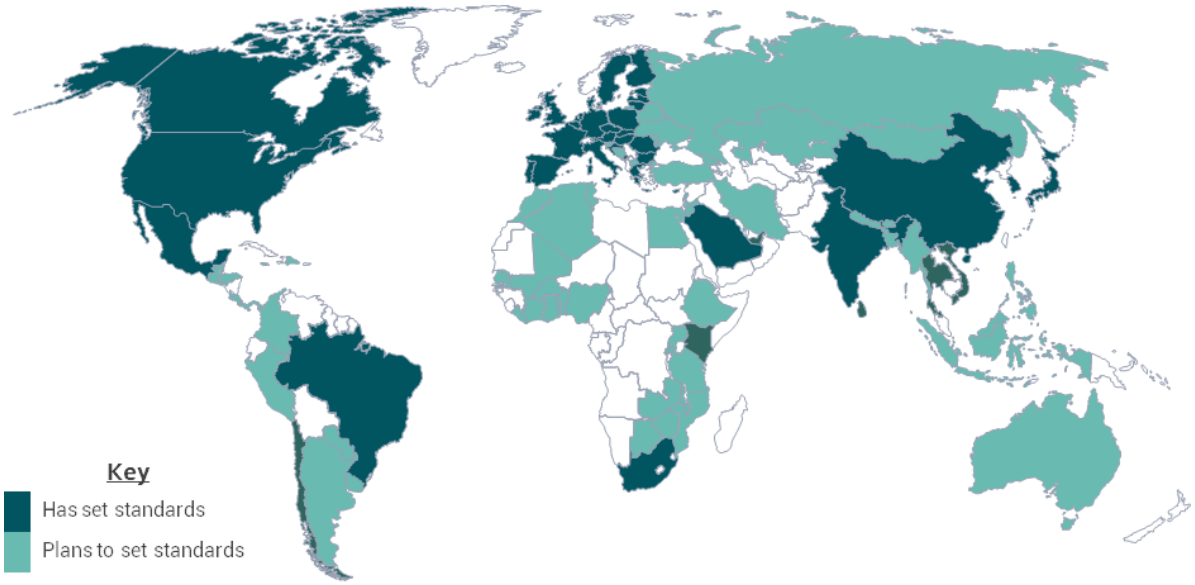
Despite having severe pollution problems, developing countries are lagging developed nations in the adoption of fuel-efficient transport such as electric vehicles (Asif, Jajja and Searcy, 2023). One of the most difficult goals for developing nations is to have all vehicles be electric (EVs) by 2030 (Govindarasu and Venkatesh, 2019), given the regulatory burden, financial incentives, economics of fuel imports, and manufacturing and market capacities. At the same time, many developing nations are testing numerous initiatives to deliver on these goals.[2] Moreover, the federal, regional, or local governments provide subsidies. It is uncommon to find local public transportation systems that receive nearly all their funding from higher levels

[1] https://www.iqair.com/bangladesh

[2] For examples, In India, providing green energy by removing CO2 emissions, developing rules and guidelines specifically for e-vehicles, regularizing separate lanes on e-highways, lowering fuel imports, and establishing subsidiaries for the e-vehicle industry are the government's main problems (Govindarasu and Venkatesh, 2019). The Government of India launched FAME (Faster Adoption and Manufacturer of Electric Vehicles) in April 2015 to promote the production of E-vehicles. China has the highest absolute number of EV in the world.

of government, but significant subsidies are given when metro or light rail services are available (Kos, 2015).

Fuel efficiency, also known as fuel economy, is a measure of how efficiently a vehicle converts the chemical energy stored in fuel into useful work, specifically kinetic energy, or work. In the context of transportation, fuel economy is typically expressed as the distance traveled per unit of fuel consumed. This ratio is influenced by several factors, including engine efficiency, transmission design, and tire design. In most countries that use the metric system, fuel economy is measured in liters per 100 kilometers (L/100 km) or kilometers per liter (km/L). EU fuel efficient standards are 3.3 L/100 km, but Bangladesh hasn't set such a standard yet. CO_2 emissions and fuel economy for all standards normalized to European test cycle (NEDC). Coverage of 'passenger vehicles' differs by country-SUVs are included in Japan, Korea, China and India, and all countries except Korea and India also have targets for light commercial vehicles (or light trucks).



Source: Compiled by Future Fuel Strategies citing numerous sources including "Global Fuel Economy An update for COP23," Global Fuel Economy Initiative, September 2018

Figure 1.2: Global LDV Fuel Efficiency Improvement

Twelve or thirteen years ago only four governments had introduced mandatory GHG emission and/or fuel economy standards: China, Japan, South Korea, and the United States, while the European Union and Canada had announced their intention to introduce such standards though neither had a legislative framework in place. Today Brazil, Canada, China, the EU, India, Japan, Mexico, Saudi Arabia, South Korea, and the U.S. have established fuel economy or GHG emission standards for light-duty vehicles (LDVs). Many of these countries are in Africa where urbanization, motorization, vehicle miles travel, and oil demand are increasing. All are among the top 15 vehicle markets worldwide: nearly 80% of new LDVs sold globally are currently subject to GHG emission or fuel economy standards. In addition, more than 40 countries are now in the process of developing LDV fuel economy standard policies that will

be implemented in the next few years. Figure 2 provides a status update on LDV fuel economy standard setting globally (Transport Energy Strategies, 2019).

The ecological impact of Dhaka's transport system, which is significantly larger than its bio-capacity, underscores the need for sustainable transportation systems. However, the city's public transportation system is particularly problematic, as it relies heavily on outdated and inefficient vehicles that contribute disproportionately to air pollution. Transitioning to a fuel-efficient public transportation system is crucial for improving air quality and reducing the city's environmental footprint. The need for fuel efficient public transportation is, therefore, the call of the hour.

To address the air pollution at Dhaka, early number of control measures were adopted to reduce the carbon emission including the prohibition of lead gasoline in July 1999 and the replacement of old two-stroke engine three-wheelers with compressed natural gas (CNG)-powered four-stroke three-wheelers in January 2003. The government of Bangladesh also introduced CNG-powered cars, buses, and trucks and regulated brick kiln emanations, which resulted in a reduction of airborne led concentrations and improved air quality than before (Pavel et al., 2021). However, since the introduction of CNG and the prohibition of two-stroke engines, which resulted in a reduction of airborne Pb concentrations and improved air quality than before, increasing traffic congestion in Dhaka city has reduced the positive effect and greatly worsened air quality, and Vehicular emissions and emissions from brick kilns as the two major sources of air pollution in Dhaka and stated that the government of Bangladesh is exploring various measures to minimize emissions from those sources through the adoption of regional policies (Pavel et al., 2021).

Introducing electric public transport vehicles in Dhaka could significantly reduce CO_2 emissions. For example, incorporating 15% EVs in the city can reduce 4.4% of CO_2 emissions by 2030, and even more with a lower emission primary energy mix (Akib et al., 2022). Because public and private are two interconnected yet politically distinctive modes of transportation, and the public transport transformation should be given priority, while private sector needs separate policies. Additionally, an alternative scenario involving the substitution of personal vehicles with buses and reducing traffic congestion could double fuel use and CO2 emissions in a more manageable way (Bose, 2007). However, this study identified that effective implementation of air-pollution reducing meaningful options is still scarce in Dhaka.

The feasibility of hybrid renewable energy-based electric vehicle charging stations (EVCS) suggests that such initiatives could reduce the burden on the national grid and save costs for EV owners, thus enhancing the socio-economic standard in Dhaka (Karmaker et al., 2018). Solar charging stations for electric cars could also effectively reduce electric loads and conserve natural resources (Mridul et al., 2020).

1.1.3 OVERVIEW OF PUBLIC-TRANSPORT SITUATION AT DHAKA CITY

About half of Bangladesh's urban population lives in Dhaka, one of the country's most populous cities. However, throughout the past ten years (2011–2021), it has continuously been listed among the top ten least livable cities in the Global Livability Ranking report. Even with a high rate of urbanization and a fast-expanding population, the city is not providing the necessary

amenities to its residents to the desired degree. One of the main obstacles to the city's expansion is the current transportation infrastructure, which depends mostly on road travel. Due to the city's extreme density, scarcity of livable land, and poor infrastructure, there is extreme traffic, which makes it difficult for the transportation system to give people the necessary mobility. In Dhaka, the city's rapid urban population boom and diverse urban land-use patterns also led to significant travel demand and a host of transportation issues. It has led to a decline in accessibility, a reduction in service quality, a compromise in comfort and safety, and a decrease in operating efficiency. Thus, Dhaka is Bangladesh's administrative, commercial, and cultural center, these issues affect the entire country.

According to a 2019 study, about seven percent (7%) of Dhaka's total built-up area is made up of its road networks. (Rakibul Ahasan, 2023) Over 21 million journeys are made by city dwellers on a daily workday, primarily using rickshaws and public buses for transportation. Although the city's transportation options are classified as "multi-modal," it is estimated that private vehicles account for more than two-thirds of all motorized vehicles that are in use during peak hours; nonetheless, the city roadways have a varied modal mix, with roughly 45% of cars being private, 30% being non-motorized, and only 10% being public buses (Ahasan et al., 2019). Remarkably, this small share of public buses carries more than 75% of all passengers. Although Dhaka's transportation network is not extensive, it does have a well-connected bus service with 152 routes within the metropolitan area. The city's streets are consistently congested with vehicles, experiencing gridlock for most of the day and night. This extreme congestion results in increased travel times and reduces the commercial speed of the vehicles, ultimately leading to a decline in the overall functionality of the transportation system. However, it is alarming that the entire system operates without any supervisory authorities or guiding outlines or government incentives. (Ahasan et al., 2019)

According to the study of (Copenhagen Consus Center), the average car speed has dropped to 7 km/h, which is as slow as the average walking speed, however, over 20 years, the more space-efficient buses could provide greater transport capacity while compared with the RSTP scenario a 15% cost reduction, equivalent to the cost of four and a half Padma Bridges. The combined benefits from reduced traffic congestion and reduced transport system costs would mean that each taka spent would do about 6 takas of good. Moreover, an estimated 3.2 million working hours are lost daily in Dhaka due to traffic congestion. The annual loss resulting from these working hours is USD 2.68 billion, or more than half of the whole development budget. The combination of fast- and slow-moving cars on the street was blamed for this in the same investigation. Nonetheless, the city has been implementing several mass fast transit options in recent years. The Strategic Transportation Plan (STP) for Dhaka city initially introduced the concept of mass rapid transit options with the aim of improving the performance of the existing system. After undergoing various modifications, the city is preparing to introduce its first metro rail in 2023.

1.1.4 CURRENT POLICY RESPONSES

Bangladesh’s Intended Nationally Determined Contribution (INDC) proposed for 12 million tons (5%) unconditional reduction in GHG emission from Business as Usual (BAU) scenario by 2030 and a further 24 million tons (10%) conditional reduction in GHG emission with

support from the international community taking the base year 2011. Keeping pace with the global efforts and reflection of the global commitment at the NDC in 2021 the Automobile Industry Development Policy 2021 has created provision for the policy support, including tax holiday and fiscal incentives, for local assembly of electric vehicles and development of technologies and infrastructures for energy efficient vehicles. The policy projects that at least 15% of registered vehicles will be powered by environmentally friendly electricity in 2030. However, despite having a plan and decision of FEV as well as renewable energy-based transport in different legal and policy regimes there is very little progress in introducing FEV at Dhaka.

Addressing this issue requires a holistic approach at the national level, emphasizing the interconnectedness of urban and national transportation policies (Sarma, 2011). Furthermore, Dhaka's transportation problem is not just local but national, with vehicles from all over the country contributing to the city's congestion. A proposed solution for improving Dhaka's public transportation is the establishment of a public-private partnership framework. This approach suggests creating an umbrella organization to consolidate service providers and ensure seamless transit service across jurisdictions, thus addressing the city's fragmented transport system (Chowdhury, 2014).

BRTC has planned to introduce the 50 electric buses at Dhaka-Chattogram as part of the government's first ever electric vehicle initiative, aimed at lessening carbon footprint with the potential supports from the Asian Development Bank, South Korea, and other donors for funds. The plan is to establish two ways of recharging-on-route while operating and overnight at bus depots. Moreover, around 20 electric vehicles of global automotive brands such as Tesla and Porsche have been registered with the Bangladesh Road Transport Authority (BRTA) since September 2022.[3] The BRTA has decided to develop appropriate policies and instruments to improve the average fuel economy of the national light-duty vehicle fleet under the "Developing Clean and Efficient Vehicle Policies for Bangladesh" in 2022. The project, which is being implemented by the BRTA and Bangladesh's Roads and Highway Department (RHD) with support from the Global Fuel Economy Initiative (GFEI) through UN Environment and Clean Air Asia. It aims to contribute to at least 50 percent improving the average fuel economy (liters/100km) for the global light-duty vehicle fleet by 2050 (the campaign "50by50") and by 2030 for new vehicles.[4]

The automotive sector, especially EVs, is gaining traction in Bangladesh. The government, recognizing the dire air pollution condition, is taking steps to foster the EV market. The Bangladesh government's draft Automobile Industry Development Policy, 2020, highlights a keen interest in providing policy support to EVs from the initial stages. Emphasis is placed on research and development, with a focus on critical components like batteries and charging stations.

[3] EVs to dominate future car market | The Daily Star https://www.thedailystar.net/business/economy/news/sales-electric-vehicles-rising-gradually-3274786

[4] Bangladesh starts process of developing fuel economy policies (globalfueleconomy.org)

The government's role in regulation and standardization is critical for the sustainable growth of the EV industry. Adherence to international protocols, particularly UN Agreements on motor vehicle standards, ensures safety and compatibility. Tax reforms, environmental regulations, and phased market liberalization are expected to further bolster the EV sector. Strategic initiatives, such as creating a "Technology Acquisition Fund," signify the government's commitment to investing in the sector and facilitating access to technology for local manufacturers. The overall policy orientation emphasizes local manufacturing, steering away from heavy reliance on imports.

The electric vehicle (EV) industry in Bangladesh is growing rapidly. The government has adopted the Draft Automobile Industry Development Policy, which proposes tax incentives for EV manufacturers and restrictions on the import of completely built units. The government is also working to standardize regulations for EVs in line with international protocols. Private companies are also investing in the EV industry, such as Omega Seiki, in setting up EV development projects in Bangladesh. The future of the EV industry in Bangladesh is bright, and the country is poised to become a major player in the global EV market (The Business Standard 2021). However, the cross-border imports of fossil fuels or importers play a significant role in policy framing.

Fuel economy and CO_2 emissions have become increasingly important considerations due to growing concerns over energy consumption and environmental impact. Several countries have implemented fuel economy and/or CO_2 emission labeling schemes and vehicle taxation systems based on these factors. Various technical parameters, such as engine displacement, transmission type, fuel type, engine aspiration type, and engine power, influence fuel economy and CO_2 emissions at the vehicle level (Cuenot & Fulton, 2011). Private car buyers consider various factors when making purchasing decisions, including price, fuel type, parking availability, design, safety, interior space, cargo volume, performance, reliability, and brand image.

1.2 CONTEXTUAL DEFINITION OF FUEL-EFFICIENT VEHICLES (FEV)

Fuel-efficient vehicles require less fuel to operate compared with fossil-fuel based old pattern vehicles; and emit less greenhouse gases.[5] FEV emits less carbon dioxide, a leading cause of climate change, and other harmful pollutants, FEV plays a crucial role in reducing the environmental impact of transportation.[6] In the specific context of Bangladesh, the adoption and integration of FEVs play a critical role in addressing the multifaceted challenges posed by the country's transport landscape.

Bangladesh, with its burgeoning population and expanding urban centers, confronts pressing issues related to air quality, energy sustainability, and vehicular emissions. The contextual definition of FEVs in Bangladesh extends beyond mere fuel efficiency; it encompasses a comprehensive approach to reduce the environmental footprint of the transport sector. FEVs in this context include a spectrum of vehicles, such as electric vehicles and hybrid models. Given the distinctive socio-economic and infrastructural characteristics and growing air pollution at

[5] Sustainable Transportation and Fuels | Department of Energy
[6] The Environmental Impact of Fuel-Efficient Vehicles - Energy Savings Lab

Dhaka, the definition of FEVs was considered only the renewable energy-based vehicles that have zero pollution. This contextualization is crucial for aligning policy measures and promoting technologies that not only enhance fuel efficiency but also contribute to the broader goals of environmental sustainability and resilience in Bangladesh's unique transport ecosystem.

1.2.1 STANDARD

Fuel economy standards set explicit targets to enhance vehicle efficiency and reduce emissions.[7] These standards incentivize manufacturers to invest in innovative technologies. In markets without significant vehicle manufacturing, alternative measures such as fiscal incentives (e.g., feebates) accompanied by a clear vehicle labeling scheme might be more practical. Testing is necessary for vehicle labels, but leveraging existing certification systems can streamline the process. Import restrictions based on vehicle age and technology can also be employed to regulate the type of vehicles entering the country. Bangladesh Standard and Testing Institute (BSTI) is solely responsible for determining the standard for each product and services. However, the BSTI Act 2018 did not include the specification of standards for FEV or any other transports like that.

1.3 RATIONALE OF STUDY

As a signatory of the Paris the Government of Bangladesh has revised her Nationally Determined Contribution (NDC) in 2021 and prioritized climate mitigation actions to implement by 2030. According to the "business as usual" (BAU) scenario, the total GHG emission in 2030 is predicted to be 409.4 Mt CO_2e, up 2.4 times from the base year of 2012 (NDC, 2021). Regarding contributors of GHG, the energy sector is the second highest emitter which includes different sub-sectors, e.g. electricity and heat production (46%), other fuel combustion (21%), manufacturing and construction (20%), and transportation (14%) (World Resource Institute-WRI, 2015).

1.3.1 THE PROBLEM

Inextricably linked with climate change, Bangladesh faces a dual challenge of curbing environmental degradation and addressing the pressing issue of air quality. The study positions FEVs and EVs as pivotal tools in achieving multiple climate-related targets set by the government. As Bangladesh grapples with severe air pollution, primarily attributed to the transportation sector, adopting FEVs and EVs emerges not only as a remedy for cleaner air but also as a strategic move to align with global climate policies. But, promoting FEVs in Dhaka has challenges.

One crucial aspect is the political economic feasibility of FEVs in the Bangladeshi context. For instance, Fuel Cell Electric Vehicles (FCEVs) are not currently cost-competitive with conventional automobiles in Bangladesh due to high acquisition and fuel costs (S. M. Islam et

[7] Govt takes positive e-vehicles policy to counter emission | The Business Standard (tbsnews.net)

al., 2022). This suggests the need for economic incentives or subsidies to make these vehicles more accessible to consumers.

Increased penetration of electric vehicles can lead to power quality issues like harmonics, voltage sag, and transformer power loss (Karmaker et al., 2019). There are also concerns about the impact on the residential distribution network, including increased power and energy demand, losses, and voltage security margin violations (Abid et al., 2021).

Moreover, the implementation of EVs and fuel-efficient technologies can have broader impacts on the city's infrastructure and energy demands. The potential increase in electricity demand due to EV adoption poses a significant challenge, considering Bangladesh's current energy infrastructure and reliance on natural gas (Murshed, 2021). Additionally, the introduction of EVs and the associated infrastructure, like solar charging stations, should align with the city's urban development plans. Such integration can reduce electricity generation costs and environmental pollution, contributing to sustainable urban development (C. A. Hossain et al., 2019).

Finally, the political will and commitment of the government and relevant stakeholders are crucial in driving the adoption of these technologies. This includes not only policy effectiveness but also addressing barriers such as illegal settlements, lack of explicit policies, and poor infrastructure that restrict access to legal energy services, particularly for the urban poor (Lipu et al., n.d.).

UNDP in an assessment has identified several roadblocks including high import taxes and duties which are hindering effective introduction of the FEV. Earlier, the UNDP Bangladesh allocated $1.78 crore support to enhance policy institutional framework for EVs and EV charging stations and tailored capacity building.[8]

1.3.2 POLITICAL ECONOMY ANALYSIS (PEA)

The political economy of Dhaka is crucial in the context of introducing new fuel-efficient and electric vehicles (EVs). Politics and power play a significant role in shaping the public transport sector in Dhaka. The governance and development of Dhaka's transportation infrastructure and services are deeply intertwined with political dynamics and power structures at various levels. Political acceptability is perhaps the greatest obstacle to the implementation of road pricing and vehicle standardization. It is therefore important to understand what determines it (Mittal, 2020).

The influence of politics and power in Dhaka's public transport sector extends into various other aspects as well. For example, the evolution of transportation institutions and policy provisions in Dhaka City since the 1960s reveals the challenges of efficient coordination among various authorities, which is crucial to meet the city's growing transportation demands (Ahasan et al., 2020). This points to the importance of political leadership and institutional frameworks in shaping effective transport policies.

[8] Govt takes positive e-vehicles policy to counter emission | The Business Standard (tbsnews.net)

In addition, public sector corruption, exacerbated by non-committed political leadership and bureaucratic inefficiency, affects various sectors, including transportation in Dhaka (Zafarullah & Siddiquee, 2001). Such corruption can hinder the effective implementation of transport policies and the equitable distribution of transport resources. Moreover, the influence of business and political elites on the governance of Dhaka's transport sector further indicates the complex relationship between economic power and policymaking. These elites can shape government decisions to favor certain transport modes or projects, which may not always align with the public interest or sustainable urban development goals (Hasan, 2021).

Hence, Political Economy Analysis (PEA) of introducing the Fuel-efficient vehicle (FEV) is the effective tool for our drive which would help to determine why change occurs or does not occur in specific contexts. PEA would help in identifying the power dynamics, incentives, and constraints that influence the actions and relationships of various actors. PEA can assist us in making more informed political decisions and designing more effective interventions to influence change. Political economy tries to incorporate the incentives and constraints which are at play within a democracy in the analysis of governmental institutions (Transport and Decentralization | ECMT Round Tables | OECD I Library, n.d.).

1.4 GOALS AND OBJECTIVES OF PEA

Public transportation plays a crucial role in the development and progress of any country, facilitating the movement of people and goods, reducing congestion, and promoting sustainable mobility. This political economy analysis explores the current condition of public transportation in Bangladesh especially in Dhaka, commuters' opinion, and thoughts on introduction of the fuel efficient vehicle, highlighting the challenges faced by the system, government initiatives and polices to improve it, the role of private organization in transforming the sector, sustainable solutions for enhanced accessibility, and the impact of public transportation on traffic congestion, air pollution and health. However, the following objectives have been devised.

Specific Objectives

- Determine the suitability and efficiency of the existing public transportation system at Dhaka and its efficiency in terms of economic and environmental sustainability in the context of the Fuel-Efficient Vehicle (FEV).
- Mapping stakeholders of the political economy analysis (PEA) and understanding the gaps and hindering factors of transforming public transportation to a fuel-efficient system.
- Find out the potential way forwards particularly incentives for promoting fuel-efficient public transportation for Dhaka.

1.5 ANALYTICAL FRAMEWORK

The framework formulated by Daniel Harris named Problem Driven Framework**,** serves the intended study plan and the structure itself is quite flexible which can be changed or restructured should there be in need. The primary framework structure is provided below:

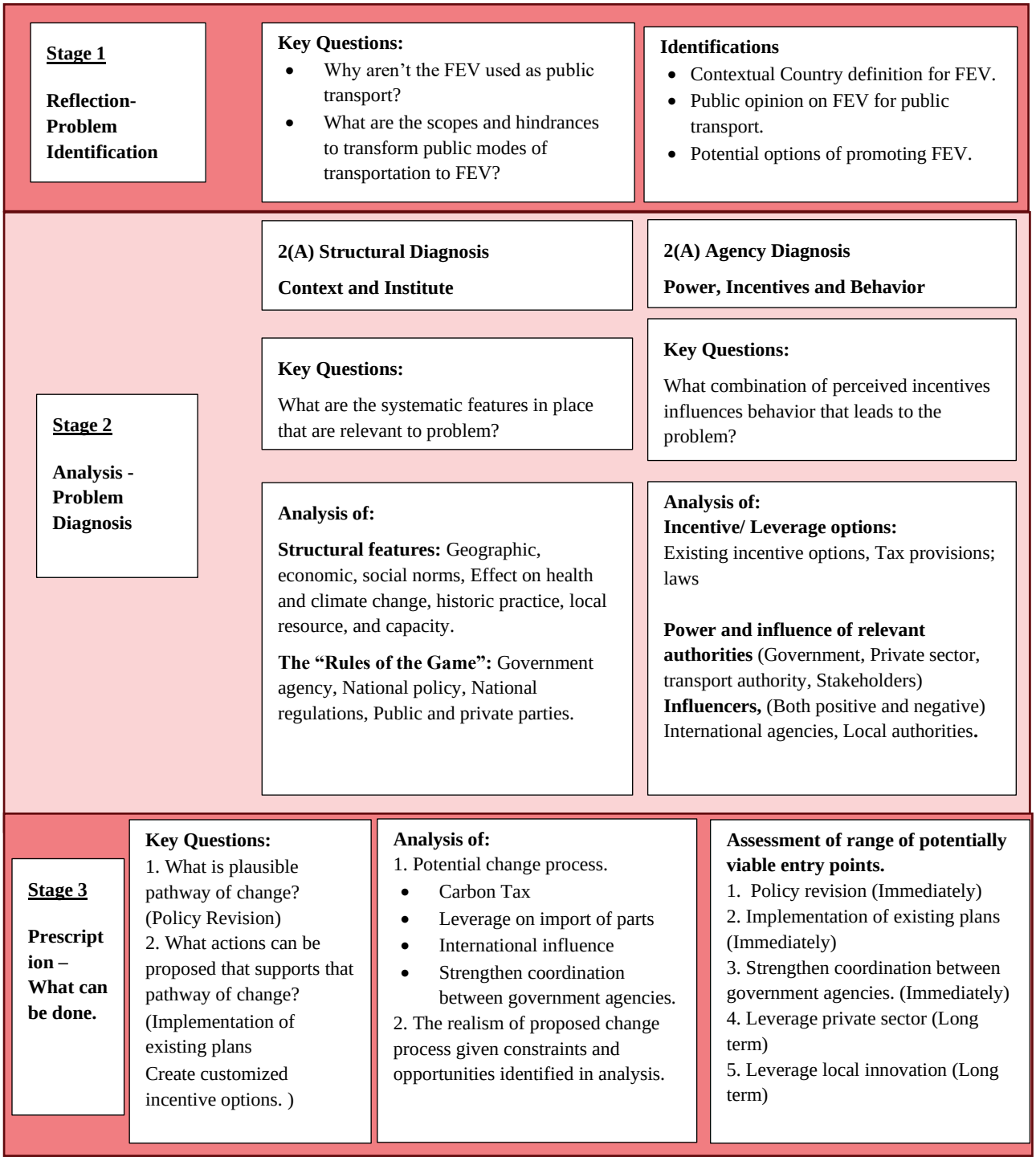


Figure 1.3: Political framework for promoting FEV.

The research used a mixed method approach implementing a survey and KIIs, which were carried out from July to December 2023. The survey was conducted with 429 public transport commuters in different routes at Dhaka, and the KIIs were conducted with 20 stakeholders, including government officials, experts, CSOs. However, due to the ongoing political unrest in Bangladesh, data collection was challenging; and several KIs were found unavailable. To ensure the quality the cross-verification of the collected data was ensured.

2 DEMYSTIFYING POLITICAL ECONOMY OF FEV PROMOTION AT DHAKA

While FEV hold significant promise for Bangladesh's NDCs and Sustainable Development Goals (SDGs), their rise to prominence necessitates a closer look. NDCs become crucial instruments to fulfill its international commitments under the Paris Agreement and secure vital climate finance. FEVs offer a clear pathway to achieve NDC targets by demonstrably reducing emissions compared to current vehicles. This directly contributes to global climate goals and positions Bangladesh as a responsible stakeholder. Understanding the "why" behind this trajectory requires dissecting the intricate interplay of international pressures, domestic policy priorities, and stakeholder interests that shaped this agenda. Bangladesh, grappling with the stark realities of rising sea levels, floods, and cyclones, recognizes the urgency of climate action.

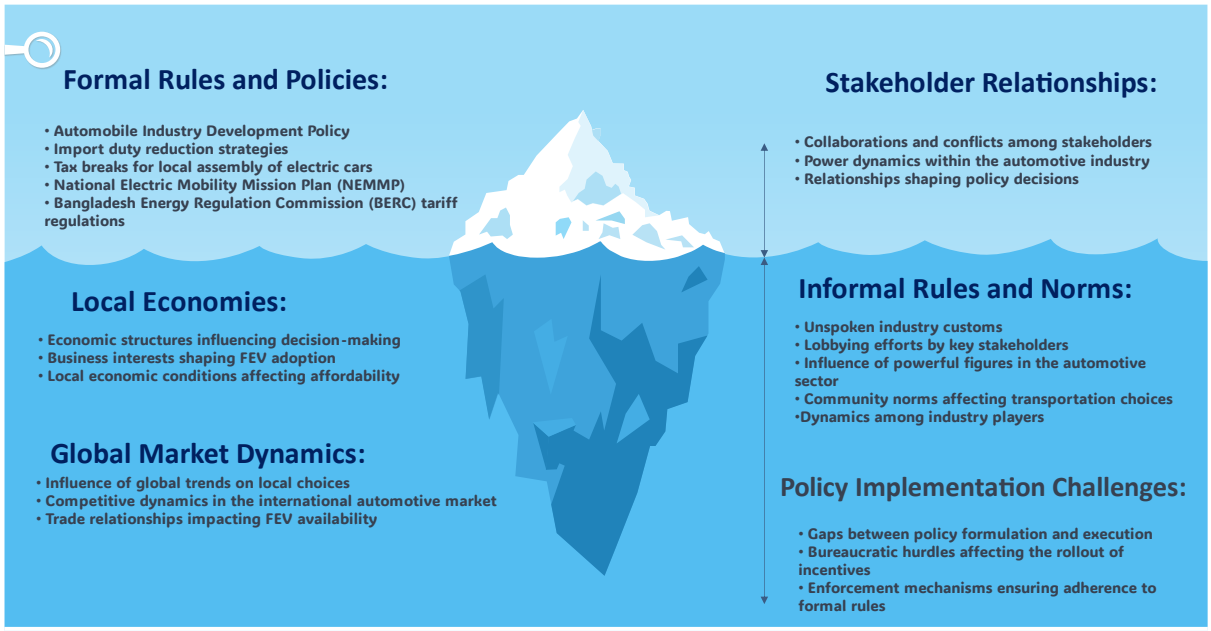


Figure 2.1: Iceberg diagram for the context of Fuel-Efficient Vehicle (FEV) adoption in Bangladesh

Source: Author

Beyond climate change, FEVs promise cleaner air, reduced noise pollution, and potential fuel savings, impacting public health, environmental sustainability, and economic efficiency. These co-benefits strengthen their appeal. Public transport improvements, renewable energy integration, and land-use planning are recognized as complementary strategies. However, FEVs are perceived as offering quicker, more tangible results within existing infrastructure limitations. Government ministries, environmental agencies, development partners, the private sector, NGOs, and potentially affected communities all have a stake in NDC and SDG formulation. Recognizing their diverse interests is crucial.

2.1 FORMAL RULES OF THE GAME

Effective strategies for encouraging a more efficient vehicle stock vary across countries and often involve a combination of regulatory, fiscal, and economic instruments. Fuel economy policies, crucial for reducing emissions and enhancing vehicle efficiency, primarily encompass the following measures:

Figure 2.2: Relevant National Polices, Plans and Acts

These policies are all important for a political economy analysis of fuel-efficient public transportation in Dhaka for several reasons:

- Nationally Determined Contribution (NDC): The NDC sets national climate goals and mitigation strategies, potentially including public transportation electrification or efficiency plans.
- Urban Transport Policy: The UTP directly shapes Dhaka's public transportation system, outlining goals, regulations, and investments for efficiency and emissions reduction.
- Renewable Energy Policy 2008: The REP Influences the feasibility and adoption of renewable energy sources for public transportation, like electric buses.
- Bangladesh Climate Change Strategy and Action Plan (BCCSAP): The BCCSAP guides national climate change response, likely featuring measures related to cleaner transport solutions.
- Sustainable Renewable Energy Development Authority (SREDA) Act, 2021 (Draft): The revised Act establishes SREDA as dedicated to promoting sustainable and renewable energy, potentially supporting electric bus infrastructure or technology development.

- Mujib Climate Prosperity Plan (MCCP): The MCCP prioritizes a low-carbon economy, potentially including initiatives for fuel-efficient public transport in Dhaka.
- 8th Five Year Plan of Bangladesh: The 8FYP allocates national resources for development, potentially including investments in Dhaka's public transportation system.
- Automobile Industry Development Policy, 2021: This Policy influences the production and affordability of fuel-efficient vehicles, including buses, impacting their availability for public transport.
- Electric Motor Vehicle Registration and Operation Guideline 2023: The Guideline defines regulations for electric vehicles, impacting the feasibility and adoption of electric buses in Dhaka.
- Bangladesh Road Transport Corporation Act 2020 & Road Transport Act 2018: The BRTA Act sets the legal framework for road transport and govern the BRTC, a key provider that influence the formulation of the fuel efficiency regulations and practices.

Policy Interplay and Influence:

- Analyzing these policies together reveals their interplay and influences on fuel-efficient public transportation.
- For example, the Urban Transport Policy may be shaped by the NDC's climate goals and benefit from funding allocated in the Five-Year Plan.
- Understanding these connections is crucial for a comprehensive analysis.

Stakeholder Dynamics and Power Structures:

- These policies often reflect the interests and power dynamics of different stakeholders.
- Analyzing how different actors, like government agencies, transport companies, or environmental groups, influence and are affected by these policies is essential for understanding the political economy of the issue.

Analyzing these policies is crucial for understanding the context, opportunities, and challenges surrounding fuel-efficient public transportation in Dhaka. By examining their content, interactions, and stakeholder dynamics, you can gain valuable insights into the political economy of this critical issue.

2.1.1 ANALYZING POLICIES

Bangladesh plays a crucial role in global climate politics, mostly driven by its climate vulnerability to climate change and commitment to climate justice. The global position of Bangladesh on climate diplomacy and Bangladesh advocates for urgent action to limit global warming and address loss and damage caused by climate change. Moreover, Bangladesh emphasizes the UNFCCC principle of "common but differentiated responsibilities" by which the developed countries, historically responsible for the most GHG emissions, should bear greater responsibility for mitigation and adaptation support. Moreover, equity and climate justice has been priority agenda for Bangladesh and LDCs along with Bangladesh champions equitable solutions and calls for required financial and technological support from developed nations to achieve ambitious climate goals.

A) Integrated Energy and Power Master Plan (IEPMP) 2023

The Integrated Energy and Power Master Plan (IEPMP) 2023 of Bangladesh outlines several strategies and actions to promote the use of fuel-efficient vehicles. The IEPMP 2023 includes measures like Intelligent Transportation Systems (ITS), upgrading roads, and providing pedestrian sidewalks, which are conducive to promoting high-efficiency and alternative fuel vehicles. The plan focuses on proactively introducing energy-efficient vehicles (EEVs), including a variety of fuel-efficient vehicles, hybrids, electric vehicles, and vehicles using alternative fuels like CNG, LPG, biodiesel, ethanol, and hydrogen fuel cells. There is an emphasis on qualifying these vehicles based on carbon emissions and fuel consumption criteria, which aligns with global trends in vehicle efficiency. The IEPMP proposes international standards, such as those from the UNECE World Forum for Harmonization of Vehicle Regulations and fuel efficiency standards. However, challenges or gaps remained in the IEPMP to attain the renewable energy-based EV introduction, which are illustrated below-

- Globally, the shift towards fuel-efficient vehicles includes a broad spectrum of technologies like those mentioned in the IEPMP. However, the success of such initiatives often depends on extensive supporting infrastructure, such as charging stations for electric vehicles, which is not detailed in the IEPMP.
- The IPEMP 2023 has proposed the contribution of renewable energy in the overall primary energy supply would be only 2.6% and 4.2% by 2041 and 2050 respectively. This estimate contradicts to the target of the NDCs to Paris Agreement on climate change, Mujib Climate Prosperity Plan, Renewable Energy Policy and most importantly the commitment of the Prime Minister to supply 40% of electricity from renewable sources by 2041. This IPEMP would discourage the national and international flow of investment to transition to renewable energy e.g. FEV that get momentum in 2022.
- While the IEPMP addresses various aspects of fuel efficiency in vehicles, there appears to be a potential gap in the specific strategies for phasing out older, less efficient vehicles. Also, the focus seems to be more on the supply side (availability of efficient vehicles) rather than on demand-side measures such as consumer awareness programs or initiatives to increase the adoption of public transportation as an alternative to private vehicle ownership.

- The plan does not outline specific policies or regulatory frameworks that could accelerate the adoption of EEVs, such as import taxes on less efficient vehicles or subsidies for EEVs The IEPMP does not explicitly address the infrastructure development needed for supporting these technologies, such as widespread and accessible charging stations for electric vehicles. There is limited mention of incentives or support mechanisms for consumers and manufacturers, which are critical for the adoption of EEVs.
- To make the policy more effective, there should be a clear roadmap for infrastructure development, especially for electric and hybrid vehicles. Moreover, regulatory measures, such as stricter emission standards and efficiency requirements for new vehicles are absent.
- Public awareness campaigns and educational programs about the benefits of EEVs could help in increasing consumer interest and acceptance.
- The policy's emphasis on regulating and incentivizing fuel-efficient vehicles, especially in the context of the high percentage of imported used vehicles in Bangladesh, suggests a significant potential impact. By focusing on both new and used vehicle markets, the policy addresses a broad spectrum of the automotive sector, which could lead to a considerable shift in consumer preferences and market dynamics towards more fuel-efficient vehicles.

Overall, the IEPMP 2023 demonstrates a forward-looking approach towards promoting fuel-efficient vehicles in Bangladesh. However, enhancing focus on consumer behavior, public transportation, and comprehensive phasing out strategies for inefficient vehicles could further strengthen the policy's effectiveness.

B) Nationally Determined Contributions 2021

Bangladesh has submitted its updated Nationally Determined Contribution (NDC) in 2021 to the United Nations Framework Convention on Climate Change (UNFCCC), outlining its plans to reduce greenhouse gas emissions by 27.56 Mt CO2e (6.73 percent) below BAU in 2030. Bangladesh's updated NDC (2021) sets ambitious emission reduction targets, aiming for 22% cuts by 2030 compared to 2012 (with international support). This showcases its commitment to climate action despite its limited resources. Bangladesh's climate policy positions are deeply ingrained in notions of vulnerability, historical responsibility, and climate justice. These principles influence the goals and strategies outlined in its NDCs. However, concerns remain about ensuring equitable implementation and addressing potential social and economic impacts of proposed solutions like FEVs. The NDC outlines plans for a low-carbon development pathway, promoting renewable energy, energy efficiency, and climate-smart agriculture.

Alignment with International Commitments:

- Mitigation Goals: Promoting FEVs aligns with Bangladesh's NDC goal of reducing emissions from the transportation sector, contributing to achieving its overall target.
- Sustainable Development: Shifting to FEVs can contribute to the UN Sustainable Development Goals (SDGs) by supporting cleaner air, improving public health, and promoting energy efficiency.

- Technology Transfer: International collaborations for developing and deploying FEV technology can help Bangladesh leapfrog outdated systems and accelerate its transition to a low-carbon economy.

Concerns about Just Transition and Climate Justice around the NDC Implementation:

- Equity in Mitigation Burdens: Some argue that Bangladesh's ambitious targets put undue pressure on a developing nation, while major emitters don't contribute enough.
- Fossil Fuel Dependence: Bangladesh's current energy mix still relies heavily on fossil fuels and the recent IPEMP 2023 undermined the NDC targets on renewables, concerns remain about the pace of transition and potential lock-in to unsustainable technologies.
- Access to Finance and Technology: Bangladesh relies on international support for achieving its NDC goals. Ensuring equitable access to climate finance and technology transfer is crucial for fair and effective implementation.
- Abrupt Phase Out of Fossil-Fuel based Public Transport and Adoption of FEV: The adoption of FEVs can contribute to emission reductions but raises following key concerns about affordability and accessibility for Bangladesh and LDCs:
    - Affordability: The government needs to ensure FEVs are accessible to all income levels through subsidies, financing schemes, or promoting locally produced, lower-cost options.
    - Cost of FEVs: The upfront cost of FEVs may be higher than conventional vehicles, within current economic crises making the owners less accessible to access the less-costly investment as well as risks of higher burdens for the low-income populations in Bangladesh.
    - Infrastructure and Technology: Introducing FEVs requires supporting infrastructure, like charging stations for electric vehicles, which must be developed equitably and inclusively and available at all locations. maintenance facilities, and training for technicians are crucial to support widespread FEV adoption.
    - Local Production and Employment: Policies must address potential job losses in the traditional fuel sector and provide training and support for workers transitioning to the FEV industry. The local production of FEVs can create jobs and boost the economy, but technology transfer and knowledge sharing are crucial to ensure developing countries benefit from this transition.

Potential Disconnects:

- Equity Concerns: Domestic policies might not adequately address the needs of vulnerable populations who could be disproportionately affected by the shift to FEVs, potentially exacerbating existing inequalities.
- Ambition Gap: Bangladesh's ambitious international NDC targets might not translate fully into domestic policies due to resource constraints, competing priorities, or lack of institutional capacity.

- Implementation Challenges: Turning international commitments into concrete action plans on the ground can be hampered by bureaucratic hurdles, inadequate infrastructure, and insufficient public awareness.

Bangladesh's FEV policy has the potential to align with its international commitments, achieving true alignment requires comprehensive considerations for affordability, infrastructure development, and social impact. Only by addressing these concerns can Bangladesh ensure a just and equitable transition to a low-carbon future. Access to finance, technology, and affordable clean energy solutions will be crucial for Bangladesh to achieve its ambitious climate goals and build a resilient future while advocating for global climate justice.

C) Electric Motor Vehicle Registration and Operations Guideline, 2023

The purpose of the guideline is to bring discipline in approving electric vehicle's operation, fixing a registration process, registration fees, economic life of vehicles, and reducing carbon emission and environment pollution, reads the guideline. As per the guideline, electric vehicles are those that are run by one or more electric motors powered by electric charge or rechargeable batteries only, battery-run rickshaws, vans and bicycles will be outside the purview of this guideline.

Bangladesh, under Nationally Determined Contribution, has promised to reduce emission of 3.4 million tons of carbon dioxide from the transport sector by 2030, reads, means that at least 30 percent of motor vehicles will have to be electric ones by 2030. Currently, BRTA provides registration and receives fees from the electric vehicles following an executive order by the Road Transport and Highways Division. Existing provision and scopes have of this Guideline has been mentioned below-

- The Guideline claimed that each electric vehicle will need to obtain registration[9]. Dealers, agents, importers, local manufacturers, or producers will not hand over electric three-wheelers or motorcycles to owners without registration. However, it is not clear whether the registration process would be automated, time-bound with affordable fees.
- Existing unsafe electric vehicles must be retrofitted following a safe model issued by the government-approved entities. However, how, and when existing fossil-fuel based vehicle will be phased out in which mechanism that has been absent in the guideline.
- Registration of an electric vehicle will be given for a specific period following the "economic life" of the vehicle and the registration will be scrapped after the time expires. The vehicle will have to be scrapped then, this should be strictly maintained, the obstacles from the political elites who are also owners of the public transports are the barriers for any phase out.
- Section 7 of this policy specifically outlines the fixed registration fees/charge of the electric vehicle that will be determined based on motor capacity (kW) or engine CC. The Road Transport and Highways Department in consultation with the Ministry of

[9] like vehicles with an internal combustion engine require in addition to existing requirements for the registration, fitness certificate, tax token and route permit.

Finance shall fix/redetermine the fees/charges for electric vehicles following the Road Transport Rules, 2022. However, to determine the equitable fees and how the consultation will be inclusive and transparent needs to be ensured.

- 7.3 have claimed that the National Board of Revenue will arrange special incentives for manufacturers and importers to convert at least 30% of motor vehicles used in road transport sector in Bangladesh to electric motor category by 2030. Different government agencies, including the National Board of Revenue, will announce special incentives to popularize electric vehicles. However, the NBR has yet to issue any circular yet.

D) Renewable Energy Policy (Draft) 2022 and Mujib Climate Prosperity Plan, 2022-2041

The Renewable Energy Policy (Draft) 2022 and the Mujib Climate Prosperity Plan (MCPP) both emphasize the importance of moving away from fossil fuels and towards renewable energy sources. The plans call for the development of new renewable energy technologies, as well as the creation of a system to support these technologies. Both plans also recognize the potential for regional cooperation on renewable energy.

The Renewable Energy Policy (Draft) 2022 prioritizes the use of regular hydrogen energy, while the MCPP favors the generation of green hydrogen through electrolysis powered by wind energy. However, using hydrogen as an alternative fuel shouldn't be encouraged without lack of extensive testing and the need for fossil fuels for the creation of regular hydrogen.
Bangladesh's renewable energy sector is still in its early stages of development. The country's primary hydroelectric power plant, the Karnaphuli Hydro Power Station, generates 230 MW of electrical energy, making it the sole facility of its kind in the nation.

Despite the formulation of the MCPP, limited progress has been made in the development of renewable energy sources, resulting in a relatively small contribution to overall power generation. While electric vehicles (EVs) are yet to gain popularity, the absence of a robust charging infrastructure has also hindered its widespread adoption. It is imperative for Bangladesh to promptly commence the establishment of EV charging facilities to meet the impending surge in demand for EVs.

There is a major lack of policy coordination among stakeholders in Bangladesh's renewable energy sector. The simultaneous execution of multiple programs by different stakeholders has led to mismanagement and inefficient usage of resources. The government needs to start planning effectively in coordination with the relevant stakeholders to achieve the objectives of the REP (Draft) 2022 and the MCPP. This includes the development of grid resilience and modernization measures, as well as the integration of environmental data disclosure into the supply chain.

E) Automobile Industry Development Policy, 2021

Formulation of an automobile industry development policy containing specific incentives and necessary guidelines for the management and control of all matters related to automobiles including vehicle design, production technology, import-export activities, maintenance, use and recycling, testing, and servicing has become imperative. Considering the important role of

the automobile sector in the economic and socio-economic development of the country, the government has formulated the Automobile Industry Development Policy, 2021 to provide full cooperation in the sustainable development of this sector. The proper definition of the following terms is given in Section 2 of the policy:

2.8 Electric Vehicle (EV): Electric Vehicle (EV) means a vehicle propelled only by a single or multiple electric motors whose traction power is provided by a rechargeable battery installed in the vehicle, but a battery-operated cycle or rickshaw (easy bike) electric vehicle or not considered as EV.

2.9 Energy Efficient Vehicle (EEV): Those vehicles which can meet the conditions of carbon-emission and fuel consumption at a specified level are considered as energy efficient vehicles or EEV vehicles. Fuel-efficient Internal Combustion Engine (ICE) vehicles, Hybrid (HVs) vehicles, electric vehicles and vehicles running on alternative fuels such as: CNG, LPG, Biodiesel, Ethanol, Hydrogen fuel will be considered as Energy Efficient Vehicles (EEV).

Chapter VI outlines the policy of "Increasing production of environment-friendly vehicles". The policy states:

6.1 One of the objectives of the policy is to rapidly convert a large portion of the vehicles produced by 2030, especially passenger and commercial vehicles, namely buses, trucks, three-wheeler auto rickshaws, passenger cars, etc. into the category of FEVs.
6.2 The policy gives special importance to local production of eco-friendly electric powered vehicles in the country so that the emission standards of motor vehicles are at minimum level.
6.3 The government will undertake special incentive programs to make Bangladesh a hub for energy efficient vehicle production by attracting strategic investment, introduction of improved technology in the domestic market and entry into regional and global markets by 2030.
6.4 The Government will provide tax incentives (i.e.10 years tax holiday) for investments in addition/production of Energy-Efficient Vehicles (EEVs) irrespective of where the factory is in or outside the Economic Zone.
6.5 Ensuring mass production of EV in the country and keeping the emission standards of motor vehicles at minimum levels will provide the following benefits:

6.5.1 Financial Incentives e.g. Purchase Incentives, Scrapping Incentives, and Loan Interest Waiver.
6.5.2 Exemption of road tax for a specified period, introduction of reduced registration fee.
6.5.3 Establishment of charging station and battery recycling industry.
6.5.4 Establishment of quick-service EV cells in BRTA and extensive publicity activities aimed at increasing public awareness about the benefits of electric powered vehicles.
6.5.5 To undertake adequate training programs to ensure institutional environment for fuel-efficient vehicles and to set up multiple skilled centers for job creation.
6.5.6 Establishment of a National Fuel-Efficient Vehicle Production Fund (NFEVPF) to ensure institutional development of fuel-efficient vehicles (where fines received due to air pollution emitted by vehicles, related taxes, fees, government grants or funds etc. will be deposited regularly).

F) Renewable Energy Policy 2022 (Draft)

The Renewable Energy Policy 2008 of Bangladesh provided a regulatory guideline for renewable energy in Bangladesh. The policy set the target of 10% of all electricity from renewable sources by 2020. The Energy and Mineral Resources Ministry (MoEMR) fix the tariff that will be decided by Bangladesh Energy Regulatory Commission (BERC). The Renewable Energy Policy 2008 is under revision, and a draft version was submitted by the assigned consultancy firm. The following table outlines observations made regarding the draft:

Table 1: Observations Regarding the Renewable Energy Policy draft 2022

Section of the Draft Report	Observation
1.2 Scope of Policy	Mentions unproven technology such as Geothermal and Hydrogen or Synthetic Gas. This can have unintended consequences like harm to the natural environment if incorporation of them into the policy is not evidence based.
1.2 Scope of Policy	Should mention encouragement of public and private investment into the sector
1.2 Scope of Policy	The role of SREDA is unclear in the approval and revision process in case of discrepancies
1.3 Legislative Framework for Policy	Should focus on how renewable energy should be nature-based and would contribute to energy efficiency e.g. introduce FEV
4.1.6 Solar Charging Stations	Private investment should be mobilized for greater growth
4.1.11 Base Transceiver Station (BTS), Charging Station	Plans should be made for solar and wind-based power charging stations inside Dhaka and throughout the country
8. Allotment of Projects	SREDA should be empowered to regulate the FEV and it's management.
11.10 Investment Facilitations	Should specify multilateral, bilateral and MDB involvement as well as funds like grants, concessional loans, green bond, and philanthropic funding. Investment planning is inadequate.
11.2 Fiscal Incentives	The fiscal incentives e.g. tax rebate, reduced duties for both import of FEVs, and local manufacturers, charging stations installers.

G) Sustainable Renewable Energy Development Authroity (SREDA) Act, 2021

The SREDA Act of 2012 and the Renewable Energy Policy (Draft) 2022 both emphasized cutting back on fossil fuel use to lower the risk of natural disasters (The Sustainable and Renewable Energy Development Authority Act, 2012.). Both documents are prepared to offer the required technical support for creating the Clean Development Mechanism (CDM). Often, the CDM calls for significant financial and technical support. It is applauded that technical support may be offered within the nation rather than relying on foreign aid. Both documents are prepared to develop and put into practice energy-efficient building codes. Inclusion of energy efficiency measures in building regulations is encouraged because it is one of the main elements in the transition to renewable energy. Both will confirm whether the land is

appropriate for renewable energy resources and related technologies. Since land is one of the nation's scarce resources, its suitability and lifespan should be confirmed.

Also, before implementation, the quality assurance of imported technologies must be evaluated. Both the act and the policy mention financial and technical support for renewable energy research, development, training, and demonstration. They will conduct actions to increase public motivation and awareness of renewable energy, as well as to promote its use. Public awareness-building efforts have been gradual but consistent, and thus, far in the nation. Both are willing to offer incentives to draw in and promote private investment in the real estate sector. Because they had both public and private investments, all the successful nations, including the Netherlands and Germany, were able to shift to renewable energy. With incentives, the path to investment for local investors should be profitable and simpler.

The International Climate Agreement targets are taken into consideration when developing the Renewable Energy policy, but this is not the case with the SREDA Act. The SREDA Act requires an 'Energy Audit', which is the assessment of energy efficiency by verification, monitoring, and analysis of machinery and appliances. However, the Renewable Energy Policy is devoid of any audit. In prosperous nations, audits are routinely conducted, and those who don't pass must pay a price. Lack of audits results in a lack of accountability for renewable energy generators and customers. The SREDA Act, in contrast to the Renewable Energy Policy, does not include any tax exemptions related to renewable energy technologies and practices. Why an act that was formulated after the initial policy (Renewable Energy Policy 2008) was created would neglect a financial inducement like tax exemptions defies logic. Discarding such incentives merely undermines the 2008 policy and makes developing the replacement plan more difficult.

H) Bangladesh Road Transport Corporation Bill, 2020

The BRTC has been facing several challenges, including a lack of accountability, inadequate legal support and representatives from concerned ministries, departments, and agencies on the board. The Bangladesh Road Transport Corporation Bill, 2020 was placed in the National Parliament in January 2020 with the aim of replacing the existing Road Transport Corporation Ordinance, 1961. One of the most significant changes is that the government will own 51% of the shares of the BRTC, while the remaining 49% will be sold to the public. The new law includes the creation of a new corporation fund, designed to improve the BRTC's efficiency and effectiveness. However, the BRTC Bill needs to include a meaningful accountability mechanism for reducing the unwanted intervention of the vested interest groups and rent seeking, transparent procurement process and strong oversight role.

I) Bangladesh Environment Conservation Act, 1995

The Bangladesh Environment Conservation Act (BECA) was enacted in 1995 to conserve the environment and improve environmental standards. The government has taken some steps to improve the environment, such as updating bus routes, and passing new Vehicular Emission Standards. However, the act has not been very effective in improving the environment due to lack of enforcement. There is no specific mention of fuel-efficient vehicles in the policy. Section 12 of the Act includes the "Environment Clearance Certificate"; however, it is yet

unclear what will happen if the Department of Environment (DoE) is unable to meet the timetable to approve the Environment Clearance Certificate (ECC). Moreover, the timebound accountability mechanism in approval of the ECC and updating the global standard is also absent.

J) Clean Air Act-2019 (Draft)

According to the latest figures published by the World Health Organization, over 82,000 deaths in Bangladesh can be attributed to diseases caused by both indoor and outdoor air pollution. The country's current five-year plan (2016-2020) commits to reducing air pollution to zero by 2020. The draft "Clean Air Act 2019" proposes that the government announce the names of critical areas regarding the Air Quality Index (AQI), and the head of any government entity be held responsible for violating the law. Section 7 of the law ensures that the government may take required steps to declare critical (non-attainment) area if air quality deteriorates as well as to get rid of the situation. Moreover, the Act doesn't ensure the obligation of global standards of air quality as well as introducing the FEV.

Drafted by the Department of Environment (DoE) and the Bangladesh Environmental Lawyers' Association (BELA), the Clean Air Bill sets a maximum penalty of 10 years imprisonment or fine or both for violating the law governing air pollution, and doesn't spare public sector leaders, making heads of government agencies liable for punishment if their organization commits an offence. The bill also proposes that the DoE prepare a National Air Quality Management Plan within a year of the law coming into effect, however, the plan is optional to implement.

Significant pollution sources in Dhaka, the capital of Bangladesh, include diesel power generators. In winter, meteorological conditions cause pollution concentrations to persistently remain above the Bangladesh National Ambient Air Quality Standard (BNAAQS). Capacity is an issue in the context of implementing the draft bill, particularly its provisions for the government to strengthen scientific and technical research on air pollution prevention and control and promote advance and suitable technologies to prevent and control air pollution.

K) Road Transport Act 2018

The Road Transport Act (RTA) was enacted in 2018 to improve road safety in Bangladesh. The law has been criticized for being too harsh, with fines that are too high and a lack of infrastructure to support compliance. Some experts believe that the law should be implemented gradually, with a focus on education and awareness-raising rather than punishment. The policy includes reforms to licensing and registration, safety measures and vehicle standards, environmental considerations, public transport regulations, and enforcement and accountability. There is no specific mention of fuel-efficient vehicles in the policy. The Act should be revised to include the FEV provision in the practices.

L) Urban Transport Policy, 2015

The Strategic Transport Plan (STP) for Dhaka was developed in 2005 to address the city's growing transport problems, and the Revised Strategic Transport Plan (RSTP) was developed in 2014-2015 to revise the STP. Both STP and RSTP are not compatible with sustainable

transport development in Dhaka. They focus on car-friendly and capital-intensive projects, which benefit the rich more than the poor. Those also ignore the contribution of eco-friendly and sustainable transport modes, such as pedestrians, fuel-free transport, and all short trips. There is no specific mention of fuel-efficient vehicles in the policy. The document recommends that the city adopt a more multimodal approach to transport planning, which includes a greater investment in public transport, cycling, and walking.

M) Sustainable Development Goals, 2015

The seventh sustainable development goal (SDG 7) is that "Ensure access to affordable, reliable, sustainable and modern energy for all." It has been envisioned that the policy to develop affordable and reliable energy and the promotion of modern technology.

- Target 7.1: By 2030, ensure universal access to affordable, reliable, and modern energy services.
- Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix.
- Target 7.3: By 2030, double the global rate of improvement in energy efficiency.
- Target 7.a: By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.
- Target 7.b: By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programs of support.

As per the renewable energy targets of the policy, the targeted total generation of renewable energy is 20% by 2030. By 2030, doubling the global rate of improvement in energy efficiency is another indicator. Though not mentioned, it is assumed that promoting new energy technologies will increase the energy efficiency of the country. As per SDG 39+1, ensuring access to electricity for 100% of the population is one of the indicators. The policy aims to ensure electricity for all and currently, it is 100% electrified. Another indicator is to increase renewable energy share in total final energy consumption to 10% by 2030. The draft policy does not set any ambition of increasing the share of renewables in the total energy mix but currently, only 4.62% of the electricity generation mix is renewable.

N) Bangladesh Climate Change Strategy and Action Plan, 2009

The Bangladesh Climate Change Strategy and Action Plan (BCCSAP) is a comprehensive plan to address the challenges of climate change in Bangladesh. The plan is based on the principles of adaptation, disaster risk reduction, low carbon development, mitigation, technology transfer, and adequate finance. The plan is designed to be implemented over a ten-year period, with the goal of building the capacity and resilience of the country to meet the challenge of climate change over the next 20-25 years. Among the six thematic areas two are focused on a) Research and knowledge management; and b) Mitigation and low carbon development.

One of the key objectives of the BCCSAP is to improve energy efficiency in production and consumption of energy. This will be achieved through several initiatives, including:

- Studying the future energy needs of the country and finding out the least cost energy supply path
- Raising energy efficiency in transport sector

The government of Bangladesh is committed to integrating climate change considerations into all aspects of national, sectoral, and spatial development.

O) Eighth Five Year Plan of Bangladesh, 2020

The 8th Five Year Plan (8FYP) is a development plan for Bangladesh that outlines the country's goals for the period of July 2020 to June 2025. The plan includes allocation targets for the Annual Development Plan (ADP) to achieve a set of development goals. However, the transport infrastructure sector has been consistently getting about 10% higher ADP allocation per fiscal year than the allocation prescribed by the 8FYP. The increased allocation to the transport sector is likely to have several negative consequences e.g. increased congestion and pollution. The government should reconsider its decision and reallocate some of the funds from the transport sector to the health and education sectors.

P) The National Integrity Strategy, 2012

The National Integrity Strategy (NIS) sets out the government's plan to address system weakness in institutions that is affected by the corruption. The NIS claims that "the fight against corruption cannot be won by prosecution alone; an inclusive approach based on values, morals, ethics, and integrity is necessary." Parliament has emerged as a place for fair and rational debate for law-making as well as developing comprehensive strategies for promoting fuel efficiency. Ensure that local government is people-oriented, accountable, transparent, and independent. Moreover, the NIS is to continue to foster an environment where citizens can effectively demand transparency and accountability from public institutions. That creates the provision of promoting fuel efficiency and raise awareness among the public about the economic and environmental benefits of fuel-efficient vehicles and hold government and industry actors accountable for their commitments to promoting fuel efficiency. However, there is no strong oversight in tracking the compliance of the NIS at all levels of executive and judiciary process.

2.1.2 INCENTIVES, FISCAL MEASURES, AND CONSUMER BEHAVIOR

Taxes on fuel and vehicles serve as potent tools to promote the purchase of fuel-efficient vehicles. This includes initial registration taxes and annual circulation taxes, where vehicles with lower CO2 emissions enjoy reduced taxes or even subsidies, especially for zero-emission electric vehicles. Research indicates that countries with efficiency-based incentives and regulations improve on average 60% faster than those without (IEA, 2019). Fiscal measures may also take the form of feebates, combining fees on inefficient technology with rebates on efficient vehicles. Furthermore, fuel taxation can internalize external transport costs, providing additional incentives for efficient vehicle purchases.

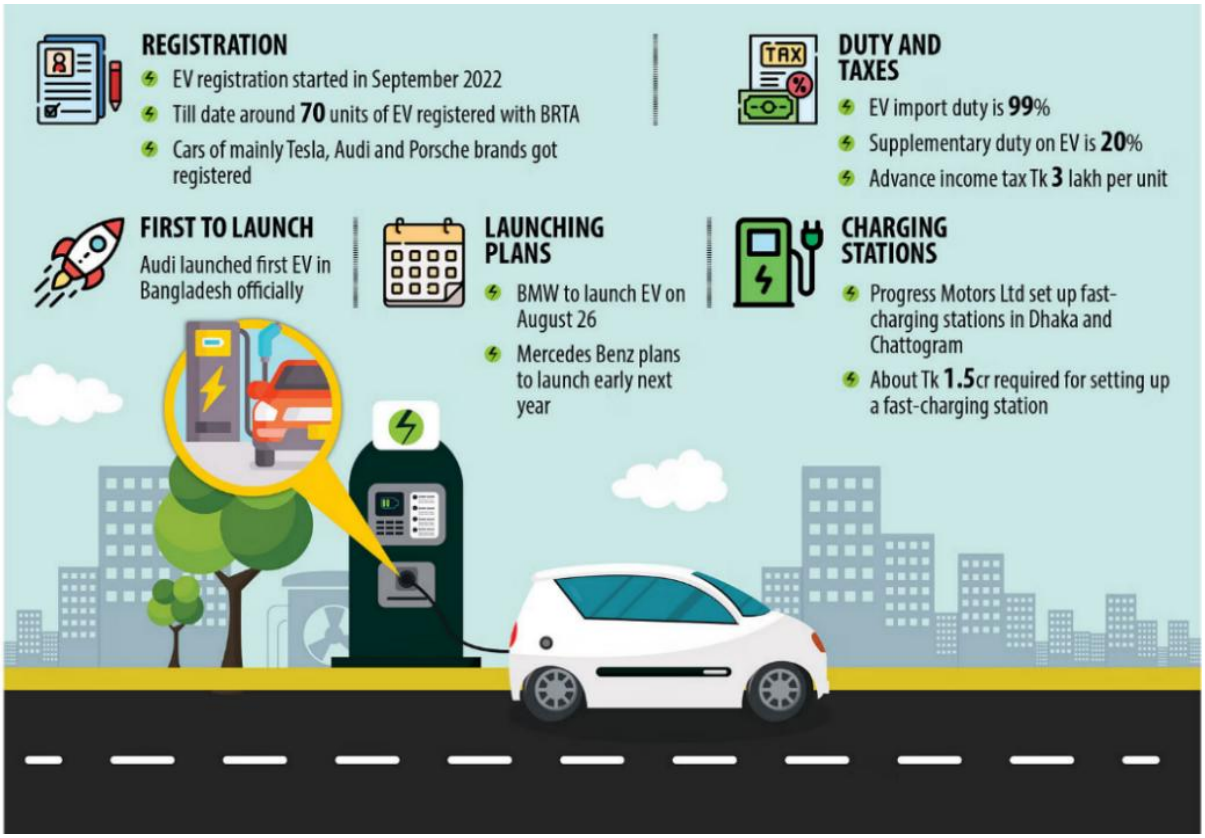


Figure 2.3: Enabling supports of promoting the electric vehicles[10]

Providing information through fuel economy labels for new vehicles and voluntary programs can significantly influence consumer behavior. Voluntary initiatives, such as Green Freight programs, aim to enhance logistics efficiency. Additionally, eco-driving approaches offer direct feedback to drivers, encouraging fuel-efficient driving practices.

While improving vehicle efficiency is crucial, it alone may not suffice to reduce emissions, especially as the number of vehicles continues to rise. The *'Avoid, Shift, Improve'* framework emphasizes a holistic approach, suggesting policies to incentivize avoiding discretionary journeys, shifting to energy-efficient modes like public transport, and improving vehicle efficiency through technological advancements. The transition to electric vehicles requires complementary interventions related to charging infrastructure and the decarbonization of the electricity grid. The success of these policies relies on a multifaceted and coordinated effort, aligning regulatory, fiscal, and informational measures to foster a sustainable and efficient vehicle fleet.

2.2 MAPPING STAKEHOLDERS

Political economy analysis is an essential technique that policymakers and experts analyze the intricate network of relationships between different stakeholders in a particular political and economic context. Stakeholder mapping enables us to assess the interests, power dynamics, and influence of various actors that impact decision-making processes and policy outcomes. By representing the stakeholders involved, their relationships with one another, and their

[10] The Daily Star, 26th August 2023, Accessed on December 2, 2023

respective roles and positions, stakeholder mapping can provide insight into significant players who may hold considerable sway over policy choices or may be affected by them.

Additionally, this process can help identify potential conflicts of interest, coalitions, or alliances among stakeholders, as well as gaps in representation or marginalized groups whose voices may not be adequately heard in decision-making processes. Stakeholder mapping is, therefore, a crucial tool for effective policymaking that provides a comprehensive understanding of the various factors at play within a political economy landscape. Stakeholder mapping for political economy analysis is a crucial tool used to analyze and understand the complex web of relationships between various stakeholders in each political and economic context. This method allows policymakers, researchers, and analysts to identify and evaluate the interests, power dynamics, and influence of different actors that impact decision-making processes and policy outcomes. By visually representing the stakeholders involved, their relationships with one another, and their respective roles and positions, stakeholder mapping can shed light on key players who may hold significant sway over policy choices or may be affected by them.

Stakeholder Hierarchies, Interrelationships, and Power Dynamics in Dhaka's FEV Governance Centralized Policymaking:

- Bangladesh's policymaking process is highly centralized, with national-level institutions holding significant power over local initiatives.
- This is evident in the listed policies, where national bodies like the Ministry of Environment, Forest and Climate Change (MoEFCC) and the Department of Environment (DoE) play a central role in setting regulations and strategies for FEV adoption.

Key Stakeholders:

A. *National Government:*
   - MoEFCC and DoE: Lead agencies responsible for climate change mitigation and environmental protection, influencing FEV policies and regulations.
   - Ministry of Road Transport and Bridges (MoRTB): Oversees the road transport sector, including public transport policies and infrastructure development relevant to FEVs.
   - Bangladesh Road Transport Corporation (BRTC): State-owned public transport operator, crucial for implementing FEV adoption strategies in Dhaka.

B. *Sub-national Government:*
   - Dhaka Transport Authority (DTA): Responsible for managing public transport within Dhaka, implementing national policies and developing local strategies for FEV adoption.
   - City Corporations: Have some influence over local transport planning and infrastructure, potentially impacting FEV deployment.

C. *Private Sector:*
   - Bus Operators: Key players in Dhaka's public transport system, their investment and operational decisions significantly impact FEV adoption.

- Automobile Manufacturers and Importers: Influence the availability and affordability of FEVs in the market.
- Charging Infrastructure Providers: Play a crucial role in enabling the widespread use of electric buses.

D. *Civil Society:*
   - Environmental NGOs: Advocate for cleaner transportation solutions and can influence policymaking through advocacy and public awareness campaigns.
   - Consumer Groups: Represent the interests of public transport users and can influence policy decisions through advocacy and research.

Hierarchies and Power Dynamics:

- The national government, particularly the MoEFCC and MoRTB, hold the most significant power in shaping FEV policy and regulations.
- The DTA, while having some autonomy, operates within the framework set by national policies and relies on national funding for FEV initiatives.
- Private sector actors like bus operators and manufacturers hold significant economic power and can influence policy decisions through lobbying and partnerships.
- CSOs can influence policy through advocacy and public pressure, but their power is often limited compared to government and private sector actors.

Interrelationships:

- National and sub-national government actors collaborate on policy implementation and infrastructure development for FEVs.
- Private sector actors' partner with government agencies and NGOs on projects and initiatives related to FEV adoption and technology development.
- Civil society organizations work with government and private sector to advocate for policies that promote FEVs and benefit public transport users.

Understanding these hierarchies, interrelationships, and power dynamics is crucial for analyzing the effectiveness and potential challenges of FEV governance in Dhaka. It also helps identify key stakeholders to engage with for successful policy implementation and stakeholder buy-in.

2.2.1 HIGH POWER AND HIGH INTEREST

The Ministry of Power, Energy and Mineral Resources, and the Ministry of Road Transport and Bridges are key governmental agencies with the authority to enact energy and transportation policies, respectively. They hold the regulatory clout to set stringent emissions standards, offer incentives for low-emission vehicles, and create an environment conducive to the adoption of fuel-efficient technologies. However, ministries have been found incapable to regulate or implement the transparent decision due to policy capture by the lawmakers who are controlling the public transport system at Dhaka through some companies. Moreover, "several ministers are owners of the public transport companies of different routes; and they dump the outdated buses by just coloring and make abnormal profit. They are not interested either in investing in new transport or not willing to allow FEV-led new companies to operate" (KII, 2023).

"Power tends to corrupt, and absolute power corrupts absolutely", it has been more evident while the lawmakers are involved in the business despite having vivid conflict of interests, whenever a person has unchallenged power over others, it makes him/her corrupt. Stakeholders in this quadrant possess both significant control over and a vested interest in the successful implementation of FEVs.

The Bangladesh Energy Regulatory Commission (BERC) has the authority to influence energy prices, which can indirectly affect vehicle fuel efficiency choices. Development partners and multilateral institutions like JICA, ADB, and the World Bank provide essential financial and technical support, aligning their international climate goals with local implementation strategies. Similarly, automobile manufacturers such as Walton Hi-Tech Industries Ltd. have a strong interest in responding to these regulations and capturing market share through the production of fuel-efficient vehicles.

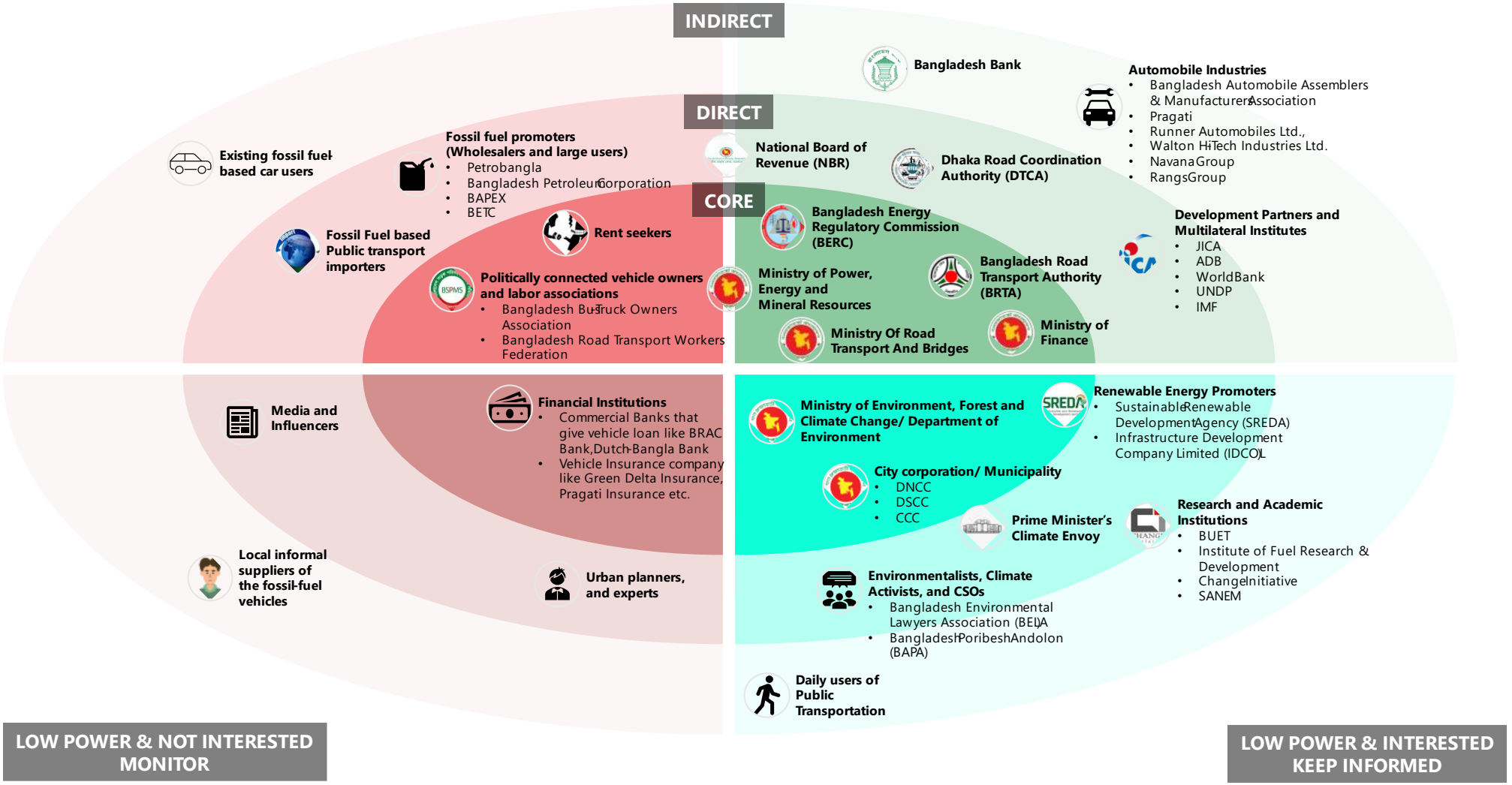
2.2.2 HIGH POWER BUT LOW INTEREST

The National Board of Revenue (NBR) and various Vehicle owners' associations, while they wield significant power that could influence the adoption of fuel-efficient vehicles through fiscal and monetary policies, may not prioritize environmental considerations as part of their core mandates. Their primary responsibilities revolve around economic stability and revenue generation, which may sometimes be at odds with incentivizing fuel-efficient vehicles, especially if it impacts tax revenues from fuel sales. Bangladesh Petroleum Corporation, which manages the fuel supply, holds significant influence over fuel pricing and availability. However, their interest in promoting fuel-efficient vehicles may be limited as it could potentially reduce the overall fuel consumption, impacting their revenue streams.

Though BRTA has endowed with the required authority and power to introduce incentives for promotion of the FEVs e.g. reduced rate of registration fees and annual renewal fees however, they are less willing to ensure that due to policy captures and rampant corruption. However, lack of resources and inadequate workforce and logistics support is causing a significant backlog in the responsibilities BRTA was supposed to perform. A deficient license issuing system and inefficient institutional practices also resulted in a considerable number of fake licenses. In most cases, these fake license owners do not have proper driving training and knowledge of traffic rules and regulations. TIB household survey has identified that "the most corrupt sector in terms of the percentage of households (63.1%) experienced bribery during receiving services is found BRTA."[11] Moreover, a deficient license issuing system and inefficient institutional practices also resulted in a considerable number of fake licenses. Besides, lack of resources and inadequate workforce and logistics support is causing a significant backlog in the responsibilities BRTA was supposed to perform.

[11] NHS_2017_Ex_Sum_EN.pdf (ti-bangladesh.org)

Figure 2.4: Stakeholder mapping for PEA on adopting the FEV system



2.2.3 LOW POWER BUT HIGH INTEREST

Renewable energy promoters, including the Sustainable and Renewable Energy Development Authority (SREDA) and Infrastructure Development Company Limited (IDCOL), advocate for the adoption of electric vehicles and the development of necessary infrastructure, thereby promoting a shift towards a less carbon-intensive transportation sector but they often lack the power when it comes to implementation. However, the SREDA has been undermined in several decision-makings on the energy transition despite having mandates and authority to execute (KII, 2023). Moreover, IDCOL is more focused on accessing funds from the external sources as well as disbursement ratio, moreover, IDCOL, entity of the Ministry of Finance (MoF) has very low capacity to influence the MoEMR as well as BRTA to push energy efficiency.

The Ministry of Environment, Forest and Climate Change and its Department of Environment also may suffer the same type of situation. Research and academic institutions like BUET, MIST and the Institute of Fuel Research & Development contribute valuable insights and innovations in fuel efficiency and vehicle technology, but their direct impact on policy and consumer behavior is typically mediated through advisory roles and partnerships with the government and industry.

Environmentalists, climate activists, and CSOs, including the BELA, Change Initiative (CI) are keen in advocating for and supporting the adoption of fuel-efficient vehicles. However, their influence on policymaking and market dynamics is relatively limited. These stakeholders are crucial for raising public awareness and pushing for change at the grassroots level, yet they often rely on alliances with more powerful entities to see their goals come to fruition. According to our survey, we found that public commuters, while being the end-users of transportation systems, often lack both the influence over policymaking and a vested interest but are willing to try fuel efficient vehicle if it means better air quality.

2.2.4 LOW POWER AND LOW INTEREST

At the periphery are stakeholders with neither the power to significantly affect the market for FEV nor a primary interest in doing so. Local informal suppliers of fossil-fuel vehicles and daily users of public transportation may be aware of the broader environmental issues but are more focused on immediate practical concerns like cost, availability, and convenience. Media and influencers, while capable of shaping public opinion, may not prioritize fuel-efficient vehicles in their content unless it becomes a trending topic or aligns with their personal or professional agendas. Local parts suppliers and vehicle service centers like *Navana* Automotive Ltd. and *Rahimafrooz* fall into this category. Their business operations are more focused on the supply of components and servicing of vehicles rather than on broader policy or market trends. They tend to adapt to changes in the automotive industry rather than driving them.

2.3 STAKEHOLDER ANALYSIS

From our review, we found several institutions at different levels are working in the transportation sector of Dhaka city. We found four ministries and ten organizations that contribute or share activities in this area. We also found a series of policy documents and studies that determine these organizations' responsibilities and determine what development will take place. We grouped these organizations into six categories based on their core responsibilities and involvement in the transportation development of the city. We broadly classified the activities into six categories (Regulation, Coordination, Construction and Management, Law-enforcement, Administrative role, and Legislation), Organizations under this category is shown in the outer orbit and then assigned the institutions to each of these activities. We considered the primary transportation-related activity if any institution has multiple roles.

Most inside bands represent the core activities of the institution in the system. The next band is the agencies and authorities connected to those responsibilities. The third band from the core indicates the policies under which these agencies operate currently. The most outer band indicates the ministry to which these authorities belong. We only reported the agencies and ministries that are connected to the road transportation system.

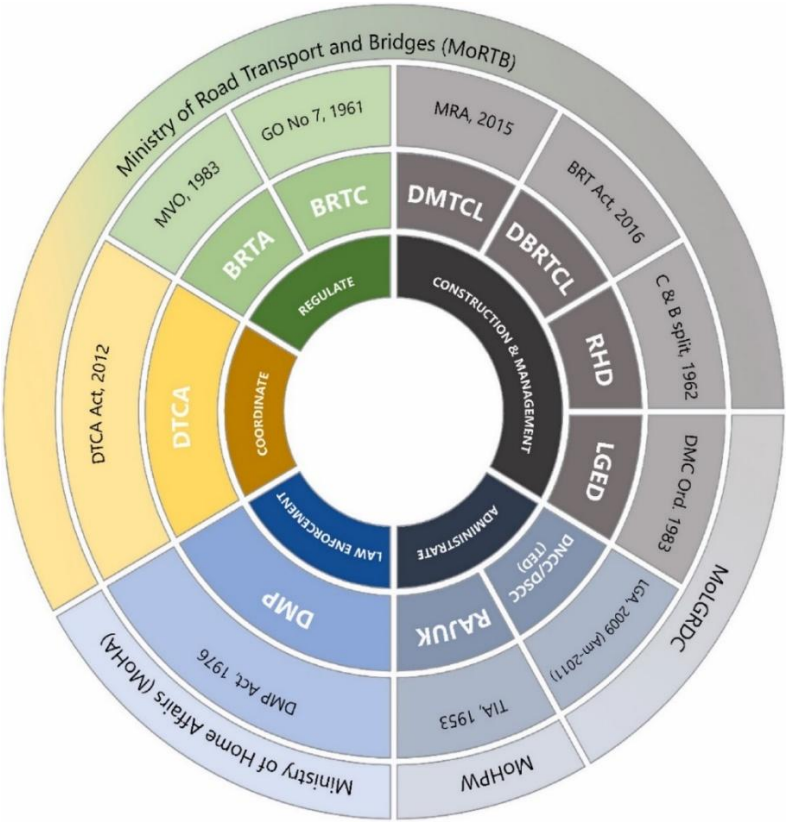


Figure 2.5: Institutions involved with transportation-related activities in Dhaka city.

DTCA- Dhaka Transport Coordination Authority
MVO- Motor Vehicle Ordinance
GO- Government Order
MRA- Metro Rail Act;
BRT- Bus Rapid Transit
DMC- Dhaka Metropolitan Corporation
LGA- Local Government Act
DMP- Dhaka Metropolitan Police
TED- Traffic Engineering Department
RAJUK- Rajdhani Unnayan Kartripakkho
MoHPW- Ministry of Housing and Public Works
MoLGRDC- Ministry of Local Government Rural Development Cooperation

A) Regulatory Authorities

From the review, we found two organizations that actively contribute to the regulatory functions of the transportation sector in Dhaka city- BRTC and BRTA. A critical similarity among these three organizations is that their jurisdiction is not limited to Dhaka city. Instead, they are responsible for performing the same task all over the country. BRTC operates under the Ministry of Road Transportation and Bridges (MoRTB). BRTC primarily focuses on providing a quality passenger service through the bus service it operates on intra-city and inter-city routes. However, it also helps the government with bus services for the public service employees, school bus services, bus services for women inside Dhaka city.

Over the years, BRTC shared some of its initial responsibilities with BRTA, which has been operating under the same ministry since 1988 to control, streamline, and enforce discipline in road transport to ensure the safe and smooth operations of the same. BRTA has a vital role in Dhaka city's transportation development and operation despite its nationwide jurisdiction and operations. It authorizes and oversees the route permit provision, vehicular registration, driver's license issuance and determines a rationale fare for both the operators and passengers. BRTA is also responsible for monitoring the city's bus service (The Motor Vehicle Ordinance, 1983, (Ordinance no. LV of 1983), section 54).

B) Coordinating Authority

Dhaka Transport Coordination Authority (DTCA) is the designated entity responsible for coordinating all the activities in the transport sector in Dhaka city. The vision behind DTCB's establishment was to enable efficient mobility of the people and freight through the planning of an integrated multimodal, safe, and environment-friendly strategies. DTCA, earlier known as the DTCB, was established after the Dhaka Integrated Transport Study (DITS)[12] described the transportation environment in Dhaka as “Chaotic with chronic traffic congestion, lack of traffic management, conflicts of jurisdiction, and poor coordination among agencies". The main recommendation of the DITS was to establish an organization that will not only coordinate among different organizations but will also focus on implementing mass transit options for the public. DTCB was responsible for developing the first Strategic Transport Plan (STP) for Dhaka; as well as were responsible for advising and coordinating different agencies for implementing the recommendations in STP in the following years.

It was envisioned to take an advisory role to develop an integrated and safe transportation system for Dhaka city and make necessary arrangements to achieve that purpose by developing a strategic plan. Although DTCB has developed the said Strategic plan (STP, 2005, revised in 2015 (RSTP 2015)), even after 15 years of the establishment, the DTCB has not yet been able to perform the functions properly-mainly the absence of appropriate legal coverage and institutional capacity. That is why, the government has approved reorganizing and

[12] Based on that recommendation, the Greater Dhaka Transport Planning and Coordination Board (GDTPCB) was established in 1997 to carry out transport planning and coordination activities within the Greater Dhaka area (Dhaka Metropolitan Area (DMA), Gazipur, Savar, Narayanganj). The GDTPCB was renamed as Dhaka Transport Coordination Board (DTCB) in 2001.

strengthening the DTCB and renamed it to DTCA with more legal authority. DTCA is now working with the same vision and mission to ensure a better transportation situation in Dhaka city. The ongoing Bus Rapid Transit (BRT), Mass Rapid Transit (MRT), and Elevated Expressway (EE) projects are some of the recent examples of DTCA's emphasis on mass transit development in Dhaka city.

C) Construction And Management Authorities

The RHD has jurisdiction all over the country, responsible for the construction and maintenance of the major road and bridge network. As these infrastructures are significantly important for national economic growth, this places a great responsibility on RHD. However, inside Dhaka, RHD does not perform any other activity other than maintaining the national highways crossing through the city.

In contrast, the Local Government Engineering Department (LGED) is another national organization function within Dhaka city. LGED is responsible for developing transportation infrastructures in rural areas and provides technical support for transportation development where necessary, regardless of urban-rural classification. However, in recent years, LGED is carrying out multiple large-scale transportation infrastructure development projects inside Dhaka city. At the same time, they are responsible for developing bus terminals and construction and maintenance of minor roads within the city. However, even though they build the terminals, it is beyond their jurisdiction to maintain and oversee the terminal after the construction. Although the mission and vision are different, two new agencies are also working in the construction and management of transportation infrastructure in Dhaka city. The Dhaka Mass Transit Company Limited (DMTCL) is responsible for implementing the ongoing metro rail projects in Dhaka city. As the government emphasizes providing more reliable, fast, and environment-friendly public transit modes to the residents, DMTCL is working to construct these mass transit projects. With a similar motivation, Dhaka Bus Rapid Transit Company Limited (Dhaka BRT) is working to construct the Bus Rapid Transit (BRT) routes, which are designed to complement the vision of the metro rail system.

D) Administrative Authorities

Dhaka city is divided into two city corporations (North and South), who are responsible for all the administrative works for their respective jurisdiction. The Transportation and Engineering Department (TED) in both the city corporations are operational and related to administration. They are associated with the infrastructure maintenance, planning, and monitoring of supporting transport infrastructure to make services available. Functions of the city corporations are manifold-maintain and develop city streets, traffic signals and streetlights, construction and improvement of bridges/culvert and footpath and foot over-bridges, setting up, and maintenance of traffic signals at all critical intersections, non-motorized vehicle (rickshaw) licenses issuance, rickshaw driver's licenses, construction and maintenance of bus terminals and parking spaces. Traffic Engineering is the mandated responsibility of TED. But due to institutional incapacity and lack of resources and logistics, they can hardly do anything and thus become ineffective. The city corporation is performing traffic engineering duties without having proper knowledge and any supporting technical studies. As a result, the actions are not always appropriate and sustainable and create unwanted consequences for the people.

On the other hand, Rajdhani Unnayan Kartripakkha (RAJUK) works with a vision very similar to the city corporations to bring welfare to the residents. Founded in 1987, RAJUK plays a similar role in the transportation sector as the city corporations except that they are entitled to prepare structure plan, strategic plan, master plan, and detailed area plans, which eventually guides the city's development. The structure plan (the current one from 2015 to 2035) has a separate transportation development strategy with a vision to establish a sustainable road network for the metropolitan area. The expectation is that it would provide access for the growing urban concentrations to the urban center itself and connect the center with potential growth areas. However, RAJUK cannot enforce its development proposals in these plans with inadequate institutional capacity and support. Additionally, they are more focused on ensuring proper development regulations and accommodations for the rapidly growing urban population, which keeps the transportation focus on the backseat.

E) Law Enforcement Authorities

None of the organizations mentioned above are empowered and have legal provisions to enforce the rules and regulations in the transportation sector. Dhaka Metropolitan Police (DMP) is authorized to control traffic movement and enforce traffic rules and regulations in the city. The DMP divided the entire metropolitan area into four traffic divisions, headed by a Deputy Commissioner (DC)- East, West, North, and South. Each division is further divided into zones based on the geographical area. Assistant Police Commissioner (APC) is the head of each zone. The DMP (traffic) is responsible for-ensuring smooth traffic flow every day; taking actions against traffic violations; enhancing the comfort of the pedestrians and passengers; taking measures to reduce road accidents; providing safe and uninterrupted movement to nationally significant personnel, and collecting fines imposed for a traffic violation and deposit the same to the treasury. The Police Commissioner, DMP, is Chairman of the Dhaka Metropolitan Regional Transport Committee (DMRTC), and the four DC (Traffic) are the essential members. The DMP plays a dominant role in regulating the public transport system in the city and strongly influences the formulation of public transport policy, planning, and other development activities.

F) Legislative Authorities

All the organizations reported in the prior five categories work under a ministry that determines the scope of these organizations' work and jurisdiction. The MoRTB is the center of all the transportation-related activities all over the country, including Dhaka city. DTCA, BRTA, RHD, all belong directly under this ministry. However, even with an entire ministry for transportation, other ministries are also working in this sector. The Ministry of Railway, for example, is responsible for overseeing and maintaining any rail-related activities. In contrast, there are two separate ministries for water-transportation-related issues-the Ministry of Water Transport and the Ministry of Shipping. However, these are not involved in Dhaka city's transportation geography. The Ministry of Home Affairs (MoHA) oversees the DMP. Despite the similar nature of their works, RAJUK and the city corporation do not work under the same ministry. RAJUK works under the Ministry of Housing and Public Works (MoHPW), whereas the city corporations belong to the MoLGRDC. Due to this multi-ministry involvement in

similar works, transportation development, and related works often face a bureaucratic delay and result in a lengthy legal process from plan preparation to adoption to implementation.

The organizations working in Dhaka city's transportation sector can be further classified based on their scale and level of activities. Some of these institutions are working beyond the city area at a more national scale transportation planning and management (i.e., BRTA, RHD, BRTC, LGED etc.). These national-level organizations are more focused on the regulations and policies, and interconnectedness of different cities and growth centers. On the contrary, regional, and local level institutions emphasize infrastructure development and regular maintenance works. For example, RHD is responsible for constructing and maintaining the highway system and major roads in the country. In contrast, LGED focuses on developing transportation infrastructure in rural Bangladesh and building bus terminals within the city. The issuance of driving licenses and route permits and fare determination is the responsibility of BRTA, whereas planning and maintaining the public transport system is the duty of BRTC.

All these organizations are responsible for the same activities at the national level and at the city level. All these above-stated institutions work under different ministries, which also serve the whole nation. Although RHD and DTCA belong to the same ministry as BRTA and BRTC, they perform a different role than those two. RHD focuses more on construction and structural improvement. DTCA, on the other hand, is the authority entitled to coordinate and look after everything related to urban transportation in Dhaka city. The presence of multiple organizations performing similar activities is creating mismanagement of resources and, at times, reducing the system's performance.

G) Energy Adaptation Authorities

The Bangladesh Energy Regulatory Commission (BERC) and the Sustainable Renewable Development Agency (SREDA) can play crucial roles in promoting the adoption of fuel-efficient vehicles (FEVs) in Dhaka, Bangladesh. By leveraging their respective mandates and expertise, these agencies can collectively drive the transition towards a more sustainable transportation system in the city.

BERC:

1. Electricity Pricing for EV Charging Infrastructure**:** BERC can set favorable electricity tariffs for EV charging stations, making it more affordable to operate and charge EVs. This would encourage the establishment of a robust charging network in Dhaka, addressing one of the primary barriers to FEV adoption.
2. Promoting Smart Charging Practices**:** BERC can incentivize smart charging practices, such as off-peak charging, to manage the load on the electricity grid and prevent potential disruptions. This would ensure a reliable and sustainable electricity supply for EV charging.
3. Supporting Research and Development**:** BERC can allocate funding for research and development in EV technology, fostering innovation and advancements in charging infrastructure and battery efficiency. This would contribute to the long-term sustainability and cost-effectiveness of FEVs in Dhaka.

SREDA:

1. Financial Incentives for FEV Adoption: SREDA can provide financial incentives, such as subsidies or tax breaks, to encourage consumers and businesses to switch to FEVs. This would reduce the upfront cost barrier and make FEVs more attractive to a wider range of users.
2. Promoting Public Awareness and Education: SREDA can launch public awareness campaigns and educational programs to inform the public about the benefits of FEVs and dispel any misconceptions. This would raise awareness and encourage acceptance of FEVs among Dhaka's residents.
3. Collaboration with Automobile Manufacturers: SREDA can collaborate with automobile manufacturers to encourage the production and sale of affordable FEVs tailored to the needs of the Bangladeshi market. This would increase the availability of suitable FEV options for consumers.
4. Supporting Infrastructure Development: SREDA can support the development of EV charging infrastructure, working in collaboration with relevant stakeholders such as city authorities and utility companies. This would address the critical need for a comprehensive charging network throughout Dhaka.

By working in tandem, BERC and SREDA can play a pivotal role in accelerating the adoption of FEVs in Dhaka, contributing to improved air quality, reduced fuel consumption, and a more environmentally sustainable transportation system for the city.

2.4 INFORMAL RULES OF THE GAME

2.4.1 STRUCTURE AND INFLUENCING FACTORS

In the context of the Political Economic Analysis of Fuel-Efficient Vehicles (FEVs), the "Rules of the Game" encompass both formal and informal structures that shape the dynamics of the automotive industry and influence the adoption of FEVs. Formally, these rules are manifested through government regulations, policies, and legal frameworks that dictate the standards, incentives, and restrictions within the automotive sector. This includes, but is not limited to, emission standards, taxation policies, and import regulations. These formal rules provide the structural foundation upon which the industry operates.

The structural dynamics of Bangladesh's transportation sector are shaped by a complex interplay of formal and informal rules, influencing factors, and stakeholder dynamics. The regulatory framework, encompassing policies, laws, and institutional structures, forms the foundational rules. These regulations dictate vehicle standards, emissions norms, and operational protocols. Simultaneously, informal dynamics, including cultural norms, historical practices, and societal expectations, contribute significantly to the rules that influence decision-making.

Analyzing the rules of the game and influencing factors provides a comprehensive view of the ecosystem within which fuel-efficient vehicles (FEVs) must navigate and thrive. It sets the stage for a targeted and effective intervention strategy to promote sustainable and efficient transportation solutions in Bangladesh. A key informant highlighted the need for a clear import policy and reduced tax for FEVs. They also raised the issue of importing reconditioned fossil

fuel-based vehicles and called for public-friendly EV registration policies linked to demolishing fitness-less vehicles.

Another key informant expressed concerns about the current state of fuel-efficient vehicles in Bangladesh. They suggested a tax policy that differentiates between new and old vehicles to incentivize the purchase of newer, more efficient models. They also advocated for a 0% tax rate for EVs until the phase-out of existing fossil fuel-based vehicles.

The transition to a fuel-efficient transportation system in Dhaka requires a comprehensive approach that addresses vehicle age, efficiency, and emissions standards, promotes EV adoption, streamlines registration processes, and invests in cost-effective public transport options. Empowering the Department of Environment, learning from ASEAN countries, implementing a carbon tax, and rethinking NBR's revenue strategy are crucial steps in this process. Addressing standardization challenges, power dynamics, and phasing out older vehicles would further accelerate progress. However, the existing curtail or unholy nexus in the public transport system should be broken down with the mix of multiple horizontal and vertical checks with the formulation of the proper incentive mechanism.

A) Power Game, Policy Capture and Domination of Oligarchs

The public transport sector in Bangladesh is riddled with conflict-of-interest, as powerful private interests closely aligned with ruling groups exert undue influence on policymaking. This has led to the adoption of policies that favor these private interests at the expense of the public good. For instance, the allocation of route permits for public transport services is often dominated by transport owners' oligopolies, who prioritize their own profits over the needs of commuters. Additionally, the government has been reluctant to invest in fuel-efficient public transport options due to pressure from vested interests in the fossil fuel industry.

The transport sector in Bangladesh is characterized by the economics of injustice, where the benefits of the sector are disproportionately distributed towards a small number of favored groups while most of the population faces limited access to affordable and efficient public transport services. This inequity is exacerbated by the lack of political voice for workers, farmers, small entrepreneurs, and the middle classes, who are often left to bear the brunt of rising transport costs, poor service quality, and a lack of safety measures.

Primacy of narrow politically connected private interests have become a structural barrier not only to road governance, but also to the economics of transportation impacting travel time, onerous formal and informal costs of travel, and rampant failures in road safety. The BRTC has been rendered a perennially sick state-owned enterprise, route permit allocation is dominated by a transport owners' oligopoly standing in the way of both road safety and sector efficiency, and the BRTA is nowhere near rising to its stewardship role. Rule-flouting private interests are effectively being given the immunity to continue the misgovernance stalemate.

Political actors with vested interests in the existing transportation system may infiltrate regulatory bodies like BRTA, SREDA, and IDCOL, influencing decision-making processes to favor their interests. This is leading to biased policies, lax enforcement, and a reluctance to adopt sustainable transportation solutions. Political interference can influence the appointment and promotion of officials within these organizations, ensuring that individuals aligned with

their interests are placed in positions of power. This control over personnel allows the political mafia to steer decisions in their favor. They may even lobby for legislation or policies that favor their interests, while opposing regulations that promote sustainable transportation. This political maneuvering can create a regulatory environment that stifles innovation and hinders the adoption of cleaner technologies. They are obstructing the enforcement of regulations that could harm their interests, such as those related to emission standards, safety standards, or labor practices in the transportation sector. This lack of enforcement can create an uneven playing field and disadvantage sustainable transportation providers.

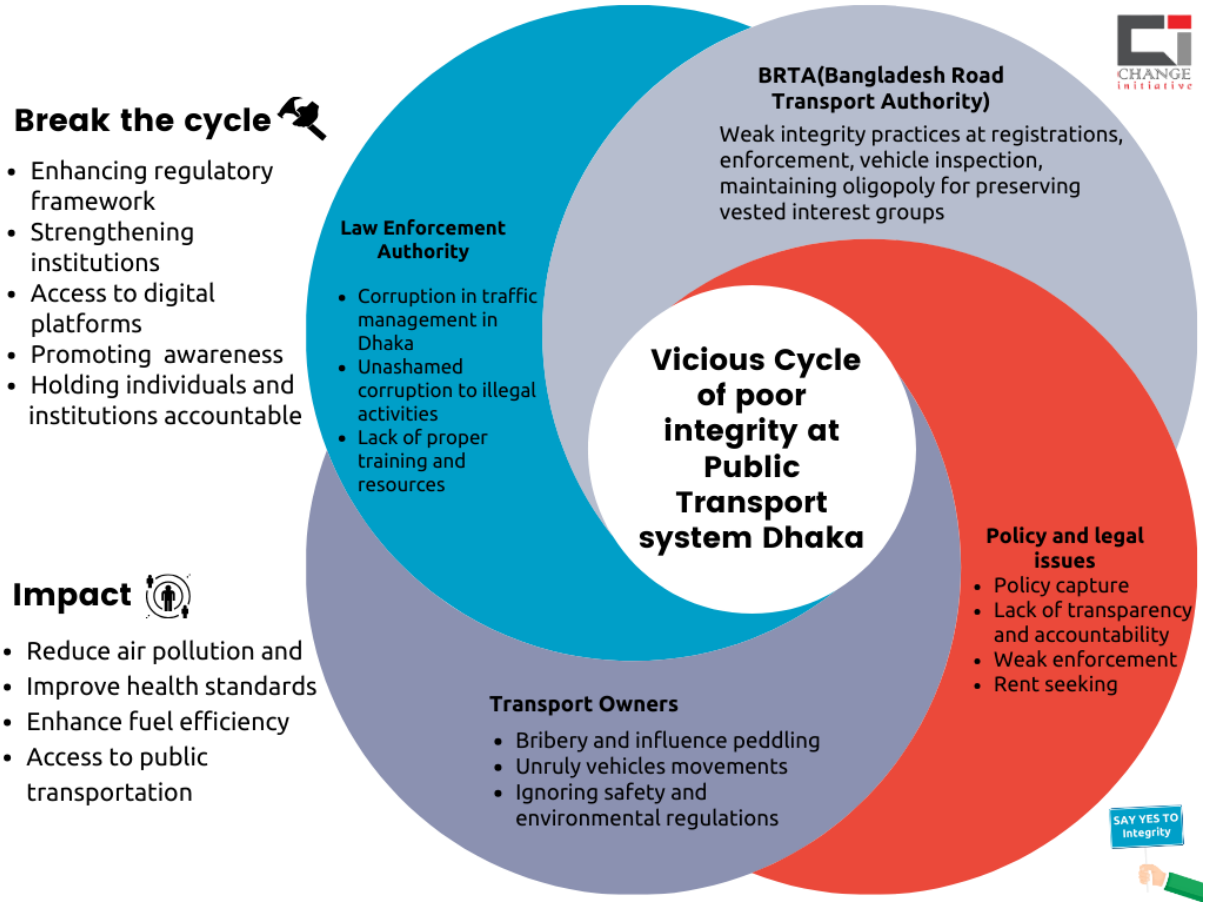


Figure 2.6: Vicious cycle of poor integrity in the public transport system

Source: Developed by author, 2023

This group of *High Power-Govt. Officials* may seek to control the flow of information within these organizations, limiting transparency and accountability. This can obstruct the identification and prosecution of corrupt practices, allowing the mafia to operate with impunity. They may exploit weaknesses in governance systems, such as a lack of transparency, accountability, or oversight, to manipulate decision-making processes and advance their interests. This can lead to a culture of impunity and hinder the implementation of reforms.

A) The Case of Japanese Second-Hand Automobile Importers

Used Japanese vehicles, primarily Toyotas, have dominated Bangladesh's auto industry since the 1980s. Toyota is the brand with the most automobiles on the road, and consumers believe it to be the most reliable. The strong performance and readily available replacement

components of Japanese automobiles were major factors in their rise to popularity. Toyota auto repairs are also simpler for nearby mechanics to complete. Since many of these auto technicians and garage owners have acquired the necessary skills to fix these vehicles e.g. Toyota is also essential to their livelihood. Reliance on outdated Japanese cars was brought about by government policy, nothing else. The policy was made by the government to allow us to import these cars.

The government probably thought that if we import reconditioned cars, we will have to spend less foreign currency and so, people will get a vehicle at a low price. The continent of Africa, Bangladesh, and Russia are the primary markets for used Japanese automobiles. In the past, Bangladesh permitted low-cost importers to bring automobiles that had been used for no more than eight years. Old cars that have been driven for more than five years are no longer permitted to be imported by the government. As a result, the price of old cars has gone up in Japan and this is why Bangladesh has to import these at a higher price. Bangladesh is falling behind the rest of the automotive sector because of its reliance on outdated Japanese cars. Introducing Fuel-Efficient Vehicle might make them discomfortable, and the government may face a challenge from the Japanese Automobile Importers who currently hold a powerful position in our economy (Ariful Islam Mithu, 2023). [13]

The focused group discussion with six experienced drivers and two car owners shed light on critical aspects of the Political Economy Analysis (PEA) of Fuel-Efficient Vehicles (FEVs) in Dhaka. One key finding highlighted the pervasive lack of awareness among both drivers and car owners about FEVs, underscoring the necessity for robust public awareness campaigns. Economic considerations emerged as a significant hurdle, with participants expressing concerns about high initial costs and the inadequacy of charging infrastructure. Policy support, particularly in the form of incentives such as tax reductions and subsidies, was strongly advocated by attendees to facilitate the transition to FEVs. The participants, especially car owners, voiced apprehensions about the city's deteriorating air quality and emphasized the urgent need for cleaner transportation options to address public health concerns. Additionally, the discussion brought attention to the crucial role of infrastructure development, emphasizing the necessity for substantial investments in charging networks. Notably, the lack of availability of parts hampering car servicing, especially in hybrid cars, emerged as a prominent challenge requiring targeted interventions within the broader framework of FEV adoption. (Sources: FGD, 2023)

A) Key Insights of Drivers and Car Owners on FEV Promotion

Conversely, the informal rules represent the unwritten norms, practices, and relationships that influence decision-making within the industry. This could involve industry customs, lobbying efforts, and the influence of key stakeholders. Informal rules may also include the existing

power dynamics among industry players, creating an environment that either facilitates or hinders the transition to FEVs.

Delving into the informal dynamics of FEV adoption in Dhaka unveils a nuanced layer that significantly influences the trajectory of this transition. Community norms and informal economies play a pivotal role in shaping perceptions on the ground. A local driver shared, "In our neighborhood, there's a preference for traditional vehicles; people are skeptical about the new technology." This skepticism stems from longstanding norms within the community, reflecting the challenges FEVs face in overcoming ingrained preferences. Another quote from a car owner highlights the role of the informal economy, "Repairing hybrid cars can be tricky; many local mechanics are not familiar with the technology." This sheds light on the disconnect between the informal automotive sector and the evolving technology of FEVs, creating barriers to efficient servicing. The influence of informal networks in disseminating information is evident, with a respondent noting, "We usually rely on recommendations from friends and neighbors when buying a car." This underscores the importance of community opinions and informal channels in shaping purchasing decisions. Uncovering these informal nuances provides valuable insights into the barriers and opportunities for FEV adoption, emphasizing the need for targeted interventions that consider both formal policies and grassroots-level dynamics.

The focus group discussions did reveal divergent perceptions among drivers, reflecting a spectrum of ideologies influencing their views on Fuel-Efficient Vehicles (FEVs). One driver expressed, "I prioritize cost efficiency and see FEVs as a practical choice for fuel savings, especially considering the rising fuel prices." This pragmatic perspective aligns with an economic ideology, emphasizing personal financial considerations. In contrast, another driver voiced, "I am concerned about the environment, and FEVs seem like a step towards reducing carbon emissions." Here, an environmental ideology takes precedence, indicating a commitment to sustainable practices. The ideological variance is not only rooted in economic and environmental factors but also in traditional beliefs. A driver remarked, "I've always driven conventional vehicles; it's what I'm comfortable with." This sentiment underscores the influence of familiarity and resistance to change, reflecting an ideology shaped by longstanding norms. These divergent ideologies among drivers highlight the need for a nuanced approach in promoting FEVs, considering the interplay of economic, environmental, and cultural factors.

While there is a discernible push for the domestic production of Fuel-Efficient Vehicles (FEVs) and Electric Vehicles (EVs) in Bangladesh, several challenges, primarily a lack of widespread awareness, hinder these efforts from becoming a top priority. Despite the advocacy of some non-governmental organizations (NGOs) and civil society organizations (CSOs), the momentum has not reached critical mass. The limited awareness among the public and key stakeholders impedes the transformation of FEVs into a focal point of the automotive industry. NGOs and CSOs play a crucial role in advocating for sustainable and eco-friendly transportation solutions, yet their influence has not reached a tipping point where FEVs become the unequivocal choice. Bridging the awareness gap and garnering broader support from stakeholders through targeted awareness campaigns and education initiatives will be pivotal in

elevating the status of FEVs and positioning them as a central component of the country's transportation future.

The favored groups in the context of FEV policies often encompass those with economic and political influence, particularly individuals or entities associated with the fossil fuel-based vehicle industry. The policies tend to favor existing structures and businesses involved in traditional vehicle manufacturing and distribution. This preference can be observed in tax structures, subsidies, and regulatory frameworks that may unintentionally or indirectly support the fossil fuel sector. Conversely, marginalized communities, including lower-income groups and those dependent on public transportation, face challenges due to the lack of support to afford the increased rents for transitioning to FEVs. The marginalization patterns are evident in the disproportionate burden of air pollution and health hazards on these communities, exacerbated by the prevalence of older, polluting vehicles in their localities. For instance, neighborhoods with inadequate public transport options may be more reliant on personal vehicles, often older models with higher emissions. Addressing these disparities requires not only redirecting policies to benefit marginalized communities but also actively involving them in decision-making processes to ensure their unique challenges are considered and mitigated.

Understanding both the formal and informal rules is essential for a comprehensive Political Economic Analysis, as they collectively shape the strategies of manufacturers, investors, and other actors within the automotive sector. Analyzing these rules provides insights into the potential challenges and opportunities for promoting FEVs, highlighting areas where interventions and reforms may be necessary to foster a supportive environment for sustainable and fuel-efficient transportation.

B) Game Plan for Sustainable Urban Transportation in Dhaka

A senior researcher of a CSO discussed various aspects of urban transportation in Dhaka, Bangladesh. highlighted the importance of promoting fuel-efficient vehicles (FEVs) and the need for a gradual phase-out of older vehicles. Addressing the failure of the Bangladesh Road Transport Corporation (BRTC), they attributed it to a lack of interest in the public transport sector due to the absence of personal benefits for government officials.

Promoting FEV needs a multifaceted approach, including promoting fuel-efficient vehicles through policy and incentives, phasing out older vehicles, improving public transport accessibility and affordability, implementing carbon pricing and government funding for research, and addressing vested interests through collaboration. CSOs should advocate for policies, develop business models, and conduct research. Initiatives like TARA's work on LNG are acknowledged, but clearer government requirements, incentives, and regulations for FEVs are needed. Exploring PPPs and harmonizing policies are also crucial. Regarding fiscal deficit, there is scope for a combined approach that includes carbon pricing, carbon tax, and government funding for research on carbon pricing.

Fair pricing of electric vehicle charging and support for local manufacturing are essential for a sustainable and inclusive transition. We cannot disregard the huge influence of Petrol Pump owners, so they should be brought into the mix by giving them priority for installing Charging

Stations. Implementing these recommendations will result in a more sustainable and equitable transportation system for Dhaka.

C) Game Changing Strategy: Government Adaptation

Due to the energy crisis and global climate change, there has been a noticeable increase in the priority placed on environmental protection and fuel saving in recent years. As a result, the field of alternative energy research and development has also accelerated. In Bangladesh, the transportation industry is one of the main consumers of fossil fuels. Considering that the harmful emissions of greenhouse gases caused by the burning of fossil fuels have now increased to a concerning degree. Bangladesh must make investments in and promote fuel-efficient and gasoline-alternative automobiles as the primary means of transportation.

Robert Anderson first invented the concept of electric vehicles (EV) between 1832-1839, which has been further restructured gradually. Unlike internal combustion engine (ICE) cars, which are powered by fossil fuels like gasoline to heat their internal combustion engines, EVs are powered entirely or in part by electricity, for instance, three-wheeler easy bikes in the context of Bangladesh. The most popular vehicle is the hybrid one that uses both gasoline and electricity as a form of propulsion for four-wheeler private transportation.

The Bangladeshi government created an automobile strategy in 2020 to speed up the country's transition to electric and hybrid vehicles. A section of the suggested strategy would lower import duties and indirect taxes, such as income taxes and value-added taxes, while also offering tax breaks to encourage local assembly and production of electric cars.

The Bangladeshi government's Automobile Industry Development Policy 2021 calls for policy support—such as tax breaks and financial incentives—for the local production of electric vehicles as well as the advancement of infrastructure and technology for fuel-efficient automobiles. But for the industry to benefit, the policy needs to be put into effect right away.

D) Take a Pass from Good Practices of Neighboring Countries

The National Electric Mobility Mission Plan (NEMMP), created in 2013 by India, aims to facilitate the swift uptake of electric vehicles in that nation. Supply-side incentives, the encouragement of research and development in fields such as battery technology, power electronics, motors, systems integration, battery management systems, testing infrastructure, and charging infrastructure are some of the policy options available to the NEMMP. Hybrid and electric car purchases are additionally promoted by demand-side incentives.

The Indian government appears to have done all possible measures to persuade individuals to switch to electric cars that are better for the environment. With effect from the Assessment Year 2020–2021, a new section, 80 EEB, has been added that permits a deduction for interest paid on loans obtained for the purchase of electric cars. If an electric vehicle is purchased with the help of an auto loan, the buyer may be entitled to yearly deductions of up to Rs 1.5 lakh (USD 1,798.50) from the interest paid on the loan throughout the fiscal year.

This provision applies to both 2-wheelers and 4-wheelers. Nothing of the type is relevant when buying a traditional ICE (internal combustion engine) car, making the entire EV purchasing

process an even more profitable bargain. The government had previously reduced the goods and services tax (GST) portion on electric cars to 5%.

Four-wheel EVs can obtain subsidies of up to Rs 1.5 lakh (USD 1,798.50) under the Faster Adoption and Manufacturing of Electric Vehicles -II (FAME-II) plan, whereas two-wheelers can only earn subsidies of up to 40% of the purchase price. In Bangladesh, these kinds of efforts are still nonexistent.

The Indian government is aware that establishing the necessary infrastructure for electric vehicle charging is a critical first step towards achieving a significant revolution. More than 1,640 public EV charging stations are currently available to the public in India. Since many charging stations in Bangladesh are privately held, charging EVs at these locations is expensive.

The world's largest auto market, China, is aggressively pushing electric vehicles (EVs) with ambitious manufacturing targets and incentives. Domestic EV makers like BYD and NIO are rapidly growing, challenging established players. While challenges remain in battery range and charging infrastructure, China's commitment to EVs is shaping the global landscape.

A pioneer in hybrid technology, Japan boasts some of the most fuel-efficient cars on the road. Hybrids like the Toyota Prius have become household names, and government incentives further encourage their adoption. However, the market for pure EVs is still developing, facing challenges like charging infrastructure limitations. Japan sees FCVs (hydrogen Fuel Cell Vehicles) as a long-term solution, investing heavily in research and development. Toyota Mirai is a leading FCV model.

E) Infrastructural Roadblocks in Transitional Phase

Restrictions such as exorbitant levies and a dearth of charging stations impede the country's shift to an electric-powered public transportation network. The main instrument utilized to greatly affect Bangladesh's automobile market is government taxation. EVs that have a power output of more than 175 kW will be considered cars with a displacement of more than 3,500 cc. Thus, Tk 200,000 (USD 1,814) will be the tax to be paid if the motor capacity surpasses 175 kW. Bangladesh currently lacks subsidies to produce electric vehicles in addition to hefty tariffs. Due to high import duties and customs, four-wheeled electric vehicles are pricey for the Bangladeshi market.

The adoption of electric vehicles in Bangladesh is hindered by the country's inadequate infrastructure. There are currently only 14 solar-powered EV charging stations, with a total capacity of 282 kW. These solar-powered stations require more time to fully charge, making them impractical for high-load commercial applications. Bangladesh should have a big number of charging stations to promote the adoption of EVs.

Two important issues that affect the adoption of EVs are the cost and charging time. In Bangladesh, an electric auto rickshaw or basic bike requires 120 to 150 BDT (USD 1.09-1.36) a day to be fully charged. There are also a number of EV charging rates that are increasing annually.[1]

Moreover, this charge requires six to eight hours every day. In Bangladesh, encouraging the adoption of more economical and environmentally friendly EVs requires a readily available and dependable infrastructure for charging them. Bangladesh's efforts to entice EV manufacturers to the country are hampered by its infrastructure. There must be a sizable local EV market in Bangladesh for manufacturers to be encouraged to invest there.

Bangladesh focuses on three-wheeler electric vehicles (EVs), mostly used in rural and suburban settings. However, we think that because of the gig economy's rise in big cities, the focus should instead be on two-wheeled bikes and four-wheeled cars. This should be considered when balancing the supply and demand sides for a more favorable, cost-effective, and ecologically secure result.

F) Higher cost of FEV vehicles and Web of Bureaucratic Complexity in Tax Incentives

An energy expert for key informant interview for this study stretched that there should exist cost rationale. Moreover, the fuel intensive vehicle challenges should be regulated through inclusion peoples' participation ensuring government accountability. Problems also persist in terms of gas power plants that run with below 40 percent efficiency; this scenario is 80-85% for government private sectors.

Meanwhile, the bottom-up plan for regulating the transportation sector was phased out. The speakers praise the government for eradicating baby taxis completely. According to them, a competitive market for importers should be created which secures people's interest. This can be beneficial according to the speakers. BSTI is influenced by certain powerhouses or mafia and is no longer functioning properly. To break oligopoly, BRTA compliance should be ensured. They also said it is important to ensure energy justice by promoting renewable energy, which is not doing well competing with fossil fuels. Low quality appliances are consuming the market which BSTI should protect. It is time to apply state power, build technician contractually and prepare modules. Absence of manpower is an excuse for overcoming the challenges of transport sector.

A former energy related bureaucrat of Bangladesh Govt. outlines the public transport system of the country in two broad categories as government owned and private owned. The BRTA lacks major impact on the transport sector of the country. Moreover, it has zero impact on transportation of goods. On the contrary, the private sector is either monopolized or oligopoly.

G) Link up play for Renewable Energy Integration

The bult tariff of the RE generation is from 7-17 cents (Change Initiative, 2023). However, Tariff supposed to be determined by the BERC, in reality, an arbitrarily tariff is determined by the external consultants who are associated to the IDCOL even though it does not possess enough rights (KII, November 2023); the CSOs claimed that some consultants and middlemen have nexus with the chief executives or policymakers of the MoPEMR and in collusion with the RE generators PPA or the tariff rate is determined.

Fuel efficiency should be ensured by the BERC. In Bangladesh different policies exist but they are not enforceable. Therefore, the best solution is enforcing law through court. In this way if

legal force is strengthened, the social force will be strengthened as well. In terms of machinery, phase wise replacement should be ensured – machines should be replaced as soon as they hit lifetime expiration. A Key Informant suggested that "making charging stations is no big deal and the BERC should provide a license for it." He also exampled out the water sector for comparison. The price of water was increased to 40% without any rules and regulations.

The concept of fuel-efficient vehicles is replacing fuel with electricity, but the major question is how long it will take for the replacement. Serious problems persist in terms of implementation. For example, in 2015 it was determined that not installing gas meters is a punishable offence but then left due implementation. Under the policies of the DPs, BERC changed the law, and it was halted therein. In actuality, the sector is run by the private owners – administrative and regulatory authority.

H) Replace the Oligopoly

The priority is to break the oligopoly in the transport market and replace it with another oligopoly. There is certainly an oligopoly in transport sector in Bangladesh. In a bid to contain the growing disorder of the public transport system in Dhaka, limiting the number of bus operators is seen as a critical step. While experts have been arguing for long to take a comprehensive measure in this regard, policymakers have, of late, acknowledged it as a solution.

More than two years back, the former late mayor of Dhaka North City Corporation (DNCC) and an eminent business leader, gave a proposal to revamp the public transport system in Dhaka. The proposal called for reduction of more than 200 overlapping bus routes to six main routes, replacement of ramshackle buses and minibuses with 4,000 new buses and transformation of 150-plus small bus operating companies into five to six broader holding companies with color codes.

The proposal got shelved soon after the demise of the immediate past Mayor of the DNCC. Later, early this year, Dhaka Transport Coordination Authority (DTCA) took an initiative to launch a transport network management company to operate all the bus companies. It outlined a plan to reduce the bus routes to 90 with 10 bus operating companies and started trial-run on two routes with 105 articulated buses. But nothing emerged in the form of a concrete decision in the last eight months.

2.4.2 INCENTIVES AND INFLUENCES:

The adoption of fuel-efficient vehicles (FEVs) is influenced by a complex interplay of incentives and factors, including:

- Government Policies: Government policies, such as tax breaks, subsidies, and charging station infrastructure investments, can significantly influence the affordability and accessibility of FEVs.
- Technology Advancements: Technological advancements in battery technology, energy efficiency, and charging infrastructure are making FEVs increasingly attractive to consumers.

- Consumer Preferences: Consumer preferences play a crucial role in driving the demand for FEVs. Consumers consider factors such as fuel economy, performance, range, and environmental impact when making purchasing decisions.
- Industry Trends: Automobile manufacturers are increasingly investing in FEV development to meet growing consumer demand and comply with stricter emissions regulations.
- Social Norms and Perceptions: Social norms and perceptions of FEVs can influence consumer adoption. Positive perceptions of FEVs as environmentally friendly and stylish can encourage adoption, while negative perceptions of range anxiety or high upfront costs can hinder adoption.

Strategic planning and policy changes are integral to the development of sustainable transportation. Mega projects, like flyovers and metro-rails, need to be in coherence with each other and undergo development at all stages. The influence of political changes on policy reversals should be carefully considered, and the role of city corporations in policy design must be emphasized.

In an insightful interview, a key informant delves into the complexities of Dhaka's transportation landscape, recommended for a comprehensive approach that embraces fuel-efficient vehicles, advanced technologies, and transparent governance to pave the way for a sustainable urban future. Dhaka, with its burgeoning population, demands a distinctive approach to address the transportation gap. FEVs present a viable solution, yet the true potential of fuel efficiency remains largely untapped. Examining global examples, such as London's intelligent lane expansion, reveals a need for Dhaka to embrace innovative approaches in its pursuit of sustainable transportation.

Non-motorized vehicles have been a historical mode of transportation, and their significance should not be overlooked. However, the implementation of fuel efficiency in transportation infrastructure is still underdeveloped, requiring a paradigm shift. Metrorail, often considered a solution, may not be as useful as anticipated due to high subsidies, as highlighted in global studies. Governance issues, lack of proper planning in various sectors like industry and education, corruption, and the business acumen of political leaders contribute to the challenges faced by the public transport system in Dhaka.

The integration of digital technology in the transportation system, as seen in San Francisco's digitally operated trams, is a step towards a more efficient and transparent system. However, challenges such as confusion intentionally carried in the system and breakdowns due to incorrect positioning must be addressed.

Public awareness and accountability are key components in ensuring the effectiveness of these institutions. It is imperative to address outdated vehicle issues, enforce laws against health hazards, and eliminate data suppression for sustainable urban development.

The government and various stakeholders play a crucial role in facilitating the adoption of Fuel-Efficient Vehicles (FEVs) through the mobilization of information, data modeling, and research. In this context, research and academia act as pivotal contributors to the knowledge base that informs policy decisions and goal setting. Research institutions, universities, and

think tanks generate valuable insights into the environmental, economic, and social aspects of FEV adoption. They conduct studies on factors such as air quality, energy consumption, and the overall feasibility of FEVs in the local context.

NGOs also play a significant role by conducting on-the-ground assessments, advocating for sustainable transportation policies, and raising awareness among the public. The government, utilizing information from these diverse sources, formulates policies, sets goals, and establishes accountability mechanisms. Sub-national governments contribute by aligning local policies with broader national objectives and tailoring strategies to the specific needs of their regions.

The collaborative efforts of these stakeholders contribute to a holistic understanding of the challenges and opportunities associated with FEV adoption. By fostering a symbiotic relationship between researchers, government bodies, NGOs, and other agencies, the collective knowledge generated serves as a foundation for evidence-based policymaking and effective implementation strategies.

In conclusion, the transformation of Dhaka's transportation system requires a comprehensive, sustainable approach. By embracing fuel efficiency, implementing advanced technologies, and fostering transparent governance, the city can pave the way for a greener, more efficient future. The responsibility lies not only with policymakers but with the citizens who should actively participate in building a sustainable urban environment.

3 DEMAND-SIDE EXPERIENCES AND PERCEPTION OF FEV PROMOTION

To address challenges in transport sector sustainability the government has been exploring the promotion of fuel-efficient vehicles (FEVs). This survey was conducted to assess the public's perception of FEVs and their willingness to adopt them. The survey was conducted on a sample of 429 public transports users from different locations of Dhaka South and North City Corporations, representing a diverse range of age groups, education levels, and occupations. The opinion of commuters regarding the influencing factors considered or prioritized for choosing mode of transport at Dhaka has been illustrated below.

3.1 FINDINGS FROM COMMUTERS SURVEY

Overall, the public transport users surveyed (N=429) have opined more than two factors determine their choices for choosing mode of transport. Cost-efficiency, timesaving, and availability were identified as the primary factors influencing transportation choices. Around one-third of respondents (32%) value cost efficiency as the main factor in their choice of public transportation. However, they have identified the following issues are also important to

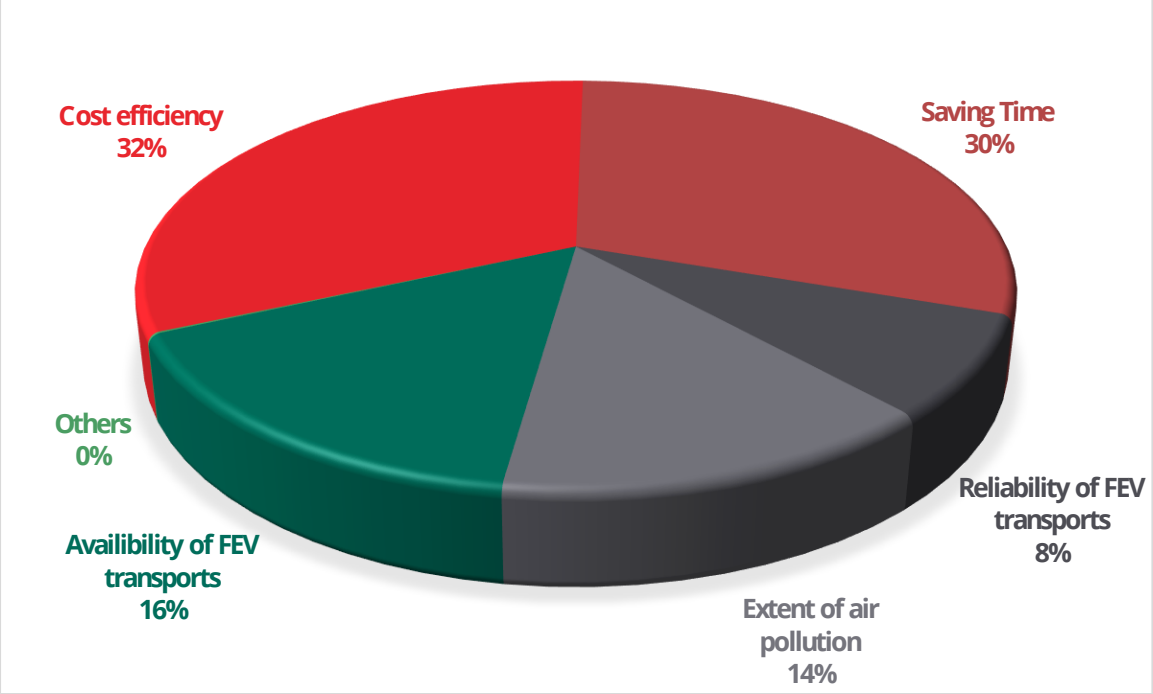


Figure 3.1: Factors influencing choice of Public Transportation

Transportation Habits: Many respondents (61.92%) use public transportation daily, with buses being the most popular mode of transportation (83.18%).

Awareness of FEVs: While a significant portion of respondents (42.52%) feel moderately informed about FEVs, only 18.93% consider themselves very well informed. Knowledge of specific FEV technologies, such as electric vehicles and hybrid engines, remains limited.

Expectations about the public transport system in Dhaka: Overall, on average all surveyed commuters have reported considering around three outcomes of the public transport system. Among the respondents identified improvement in traffic congestions (66%) and conversion of existing transport to renewable energy-based transports (63%) are the most critical areas for enhancing fuel-efficiency in the public transportation system. Around 40% of the commuters thought that the public transport system should adopt the electric vehicle.

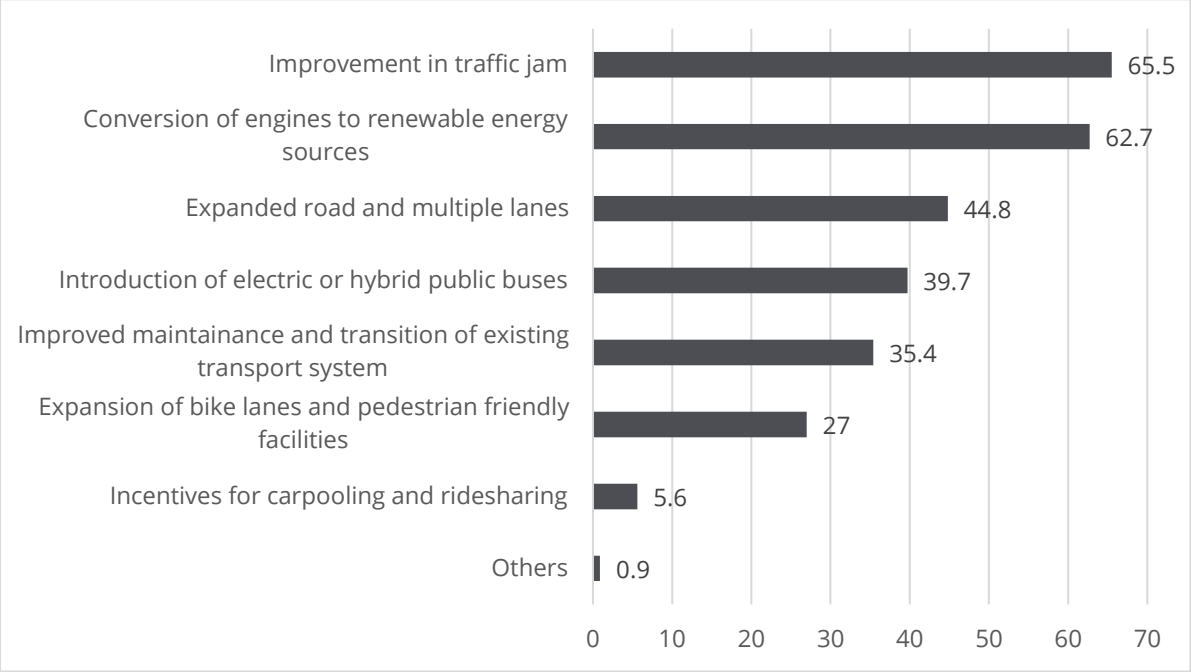


Figure 3.2: Expected contribution of the public transport system at Dhaka (In Percentage)

Environmental concerns or air pollution-caused health hazard: Around one-quarter of the respondents have opined that environmental hazards influence their choices for transportation. However, around 60 percent of the commuters have claimed that somewhat the quality of environment People in Dhaka city face many health hazards while and post travelling in the metropolitan. The post-travelling health issue is also not very good. 42.76% are at risk of Chronic obstructive pulmonary disease (Lung infection). Though 34.35% hasn't yet gone through this severity, but rest have experienced long time health hazards like Developed allergies The average household level health costs was around US$36.3 (4000 BDT) they had to spend in the last 3 months for treatment purposes, which is almost 20% of their average monthly income. Promoting FEV in Dhaka will passively solve this problem and improve this situation.

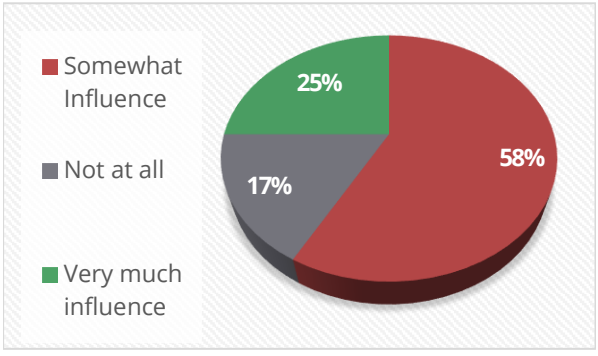


Figure 3.3: Influence of environmental hazard in choices for transportation

Due to the adverse impacts of air pollution on public health, commuters or around 40% believe that fuel efficiency is extremely important for them to choose the FEVs that can reduce the air pollution. Only 13% of commuters felt that fuel efficiency doesn't matter to their choices for the FEV vehicles.

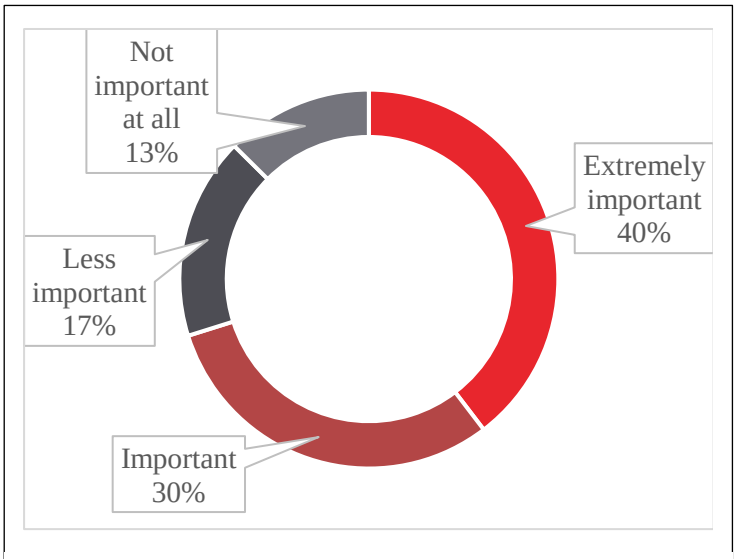


Figure 3.4: How important is fuel efficiency to you when choosing public transportation options?

Preferred mode of FEV-based transports at Dhaka: Most respondents (49%) think that FEVs should be promoted in all types of vehicles at Dhaka, while only 42% think that FEV promoted in the public transport like local buses and train. Only 9% of commuters think that FEV should be introduced for private vehicles e.g. cars and bikes etc.

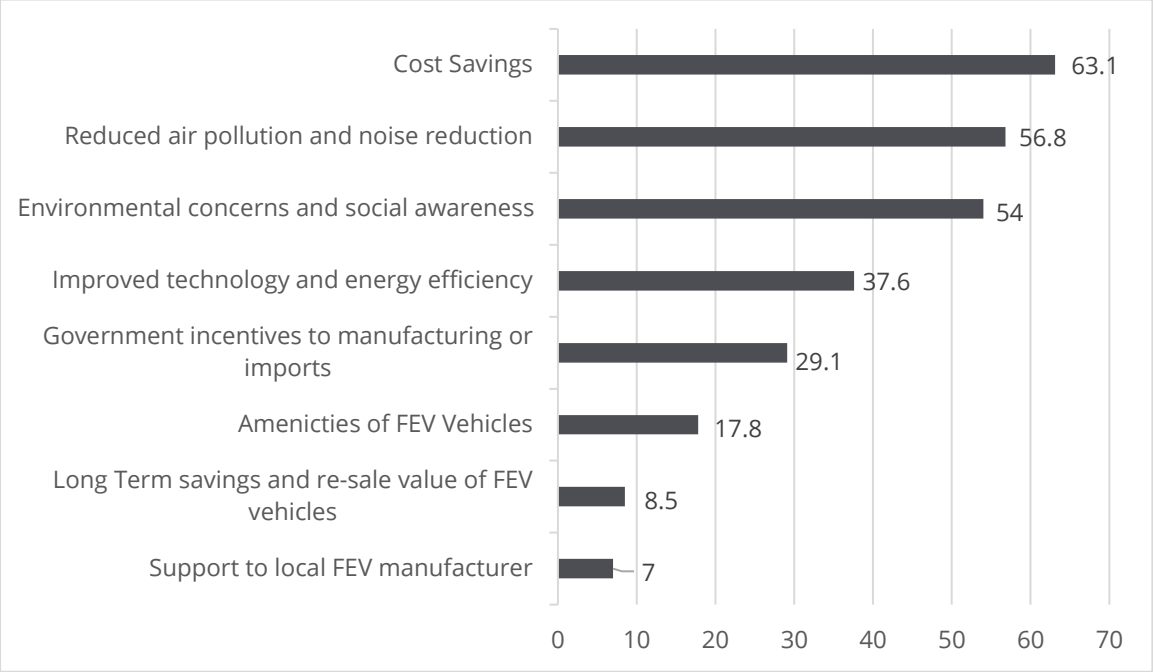


Figure 3.5: Factors effecting to adopt FEV (Demand Side Perception)- In Percentage

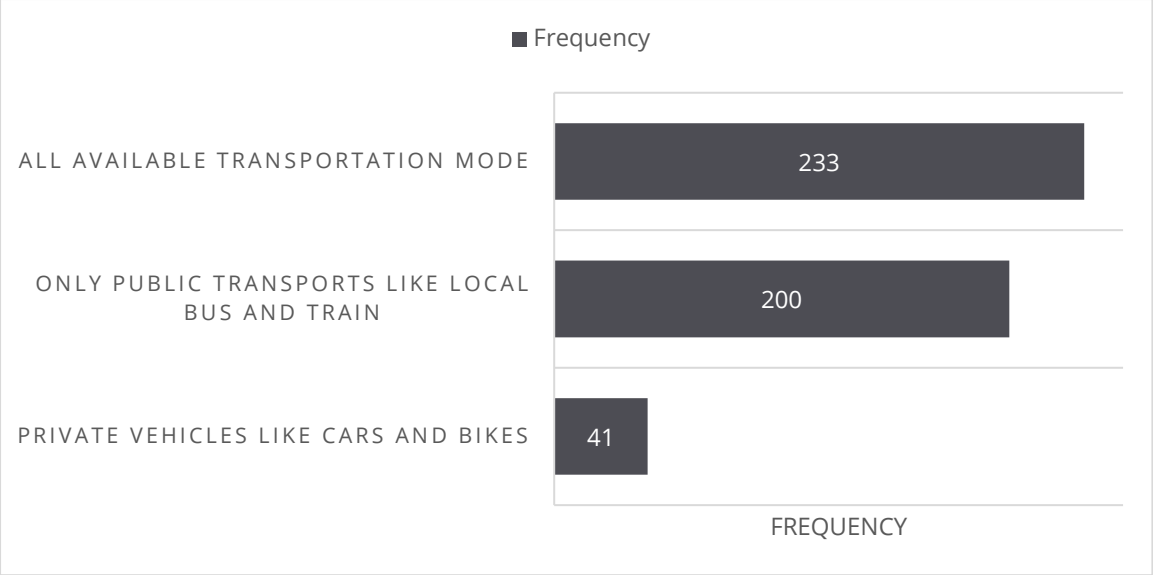


Figure 3.6: Which vehicles should be given priority to FEV promotion.

Many of the respondents (82.71%) believe that adopting FEVs can help to address air pollution. 25.23% are very willing to pay slightly higher fares to support the implementation of more fuel-efficient public transportation.

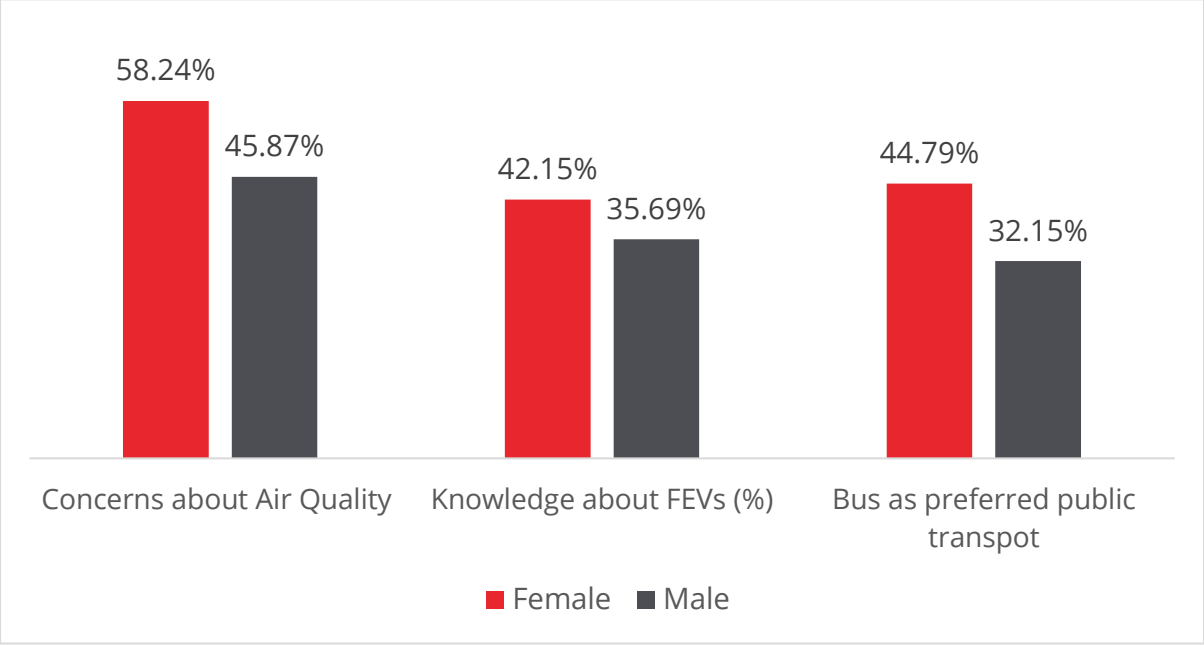


Figure 3.7 Gender Dynamics of the Survey

Based on the survey results, 44.79% of women respondents in Dhaka expressed a preference for public transport, citing safety and convenience as key factors. In contrast, 32.15% of male respondents leaned towards public transport. This data suggests a significant gender disparity in transportation choices, emphasizing safety considerations as a critical factor influencing women's preferences. Additionally, when examining the interest in adopting Fuel-Efficient Vehicles (FEVs), around 30.82% of women showed openness to environmentally friendly modes of transport, slightly surpassing the 28.15% of men expressing similar interest. These

specific statistics underscore the importance of understanding gender dynamics in transportation and highlight the potential for targeted interventions to address safety concerns and promote sustainable options, aligning with the specific needs and preferences of women in the city.

3.2 EVALUATING THE ROAD AHEAD

The public transport commuters survey reveals a strong public interest in FEVs to address transportation challenges and improve air quality. The government can capitalize on this demand by implementing policies that promote the adoption of FEVs. However, several factors could hinder the widespread adoption of FEVs, including:

- **High Cost of FEVs:** The initial cost of FEVs is often higher than that of conventional vehicles, which may discourage some consumers from purchasing them.
- **Limited Awareness:** The lack of awareness about the benefits and availability of FEVs could hinder their adoption.
- **Infrastructure Constraints:** The availability of charging stations and other infrastructure for FEVs is still limited in Dhaka.
- **Technological Concerns:** The survey identified potential concerns related to the technology of FEVs, such as uncertainties about the reliability, durability, and performance of electric or hybrid vehicles compared to traditional vehicles.
- **Resale Value Apprehensions:** Concerns about the resale value of FEVs emerged as a potential hindrance. If individuals perceive a lower resale value for these vehicles compared to traditional ones, it may impact their decision-making.

While there is normative interest in embracing FEVs for environmental and economic reasons, the feasibility aspect emerges as a critical determinant influencing choices. The government stakeholders, as indicated by the survey, prioritize policy incentives, tax reductions, and infrastructure development to enhance the feasibility of FEV adoption. Public respondents, on the other hand, express concerns about economic barriers, charging infrastructure, and limited awareness. The divergence here lies in the emphasis on immediate economic considerations by the public, contrasting with the government's focus on long-term policy interventions.

Operators and industry stakeholders, as gleaned from both surveys and KIIs, converge on the need for supportive policies, financial incentives, and collaboration between public and private sectors. However, divergences arise in the perceived pace of implementation, with industry stakeholders often pushing for quicker policy changes to drive FEV adoption.

These convergences and divergences highlight the complexity of stakeholder dynamics, emphasizing the importance of aligning interests, addressing concerns, and fostering collaboration to create a conducive environment for the widespread adoption of FEVs.

4 DISCUSSION

The transition to a more sustainable and efficient transportation system in Dhaka requires a comprehensive approach that addresses the various factors influencing FEV adoption. By implementing the recommended strategies and fostering collaboration among stakeholders, the government can effectively promote FEVs, improve air quality, and enhance the overall transportation system in Dhaka. While the state-run transport company BRTC has planned to procure 50 battery-electric buses for its fleet, at least two private automobile companies are in the process of manufacturing or assembling EVs at home in partnership with global automakers. The United Nations Development Programme Bangladesh has also offered support for infrastructure such as charging stations for an increased penetration of 4-wheeled EVs in Dhaka's public transport. Based on these crucial entry points we think the following steps will be most relevant in introducing FEV in current political-economic context of Dhaka.

4.1 POTENTIAL ENTRY POINTS FOR SETTING THE FIELD- HIGH PRIORITY

a) Legal and Policy Reform (Short Term):

i. **Feasibility:** Immediate policy revision is feasible with political will and stakeholder consensus. It addresses immediate barriers hindering the growth of fuel-efficient public transportation. Though as we discussed earlier, the ever-present bureaucratic complexity can hinder the progress of the revision and it may take 1-2 years from drafting to finalizing. To effectively promote the adoption of FEVs and address air pollution in Dhaka, the government should consider the following recommendations:

ii. **Plausible Change Pathway:** Immediate policy revisions are crucial to address existing barriers. Reevaluate and amend tax policies to incentivize electric vehicle (EV) adoption. Introduce and enforce carbon taxes to discourage fossil fuel usage. Currently the standard of fuel-efficiency is not given in any of the Government Policy. It should be immediately standardized. Again, in some cases, the policies are not coherent- like the conflict between clean and renewable energy in MCCP and SREDA Act regarding 40% contribution until 2041. Again, the taxes for new and used vehicles are the same, in some cases, the less emitting vehicles have to pay more tax. This should be identified and solved.

iii. **Actions Proposed:** Immediate review and modification of tax policies to reduce levies on EVs. Introduce carbon taxes at varying rates to encourage fuel efficiency and reduce emissions.

b) Imposing Carbon Tax:

a. Realism of Change Process: Implementing a carbon tax is realistic given the global emphasis on environmental conservation. It requires strong advocacy, collaboration with environmental organizations, and a transparent mechanism for tax collection. CSOs and NGOs working in the relevant sector can help the DoE/BERC should prepare a policy on carbon taxation based on Carbon Emission rate of the vehicles.

b. Feasibility: This is the most feasible way, as to break the oligopoly, we must handicap them in every possible way. The current policy is not discriminating taxes based on

carbon emissions which is discouraging the promotion of fuel-efficient vehicles. We think imposing carbon tax on the emitting vehicles and use that incentive to promote fuel-efficient vehicles will be a good way to promote fuel-efficient vehicles. And the government has recently passed the Carbon Tax Policy- so this can be a fantastic entry point.

c. **Assessment of Viability:** The introduction of a carbon tax aligns with international practices and can be effectively implemented in Dhaka. Collaboration with international bodies can offer insights and support**.**

c) Leverage on Import of Parts:

i. **Realism of Change Process:** Leveraging the import of EV components involves negotiations with suppliers, revisiting trade agreements, and potentially providing incentives for local manufacturing. In case of the three-wheeler electric autorickshaw we have seen how a local informal industry is being built with the popularity and spread of these vehicles14. If the parts of EV are legally imported with a strong guidelines we can see the adaptation rate of fuel efficiency vehicle increase in much higher rate. These processes can be rigorous, but this can be feasible in mid-term timespan. From our KII and FGD, we understand that it needs support and awareness along with infrastructure building, but it can be feasible as with the case of CNG autorickshaws in Dhaka City a few years back.

ii. **Assessment of Viability:** Realistic, especially with targeted negotiations and incentives for local manufacturing. This approach aligns with the goal of reducing dependency on fossil fuels.

d) Customized Incentive Options:

i. **Plausible Change Pathway**: Tailored incentives are required to suit the unique context of Dhaka. Introduce custom incentives such as reduced taxes on EV components and localized manufacturing to boost the EV market.

ii. **Actions Proposed**: Explore and implement customized incentives, including reduced taxes on EV components, fostering a conducive environment for localized manufacturing.

e) Strengthen Coordination Between Government Agencies:

i. **Realism of Change Process:** Enhancing coordination requires administrative commitment, policy alignment, and streamlined communication channels between agencies like BERC, BRTA, DoE, and BSTI.

ii. **Assessment of Viability:** Realistic but challenging due to bureaucratic hurdles. An integrated approach with clear mandates and responsibilities can enhance coordination.

4.2 RANGES OF OTHER VIABLE ENTRY POINTS: MODERATE PRIORITY

a) Implementation of Existing Plans:

[14] https://www.tbsnews.net/features/panorama/vicious-toxic-lead-cycle-illegal-lead-battery-factories-pollution-and-unauthorised

i. **Plausible Change Pathway**: Immediate implementation of previously outlined plans is essential for tangible progress. Execute the Automobile Industry Development Policy 2021 to encourage local production and reduce import barriers.

ii. **Actions Proposed**: Definitive execution of the Automobile Industry Development Policy 2021, providing tax breaks and financial incentives for local assembly and production of EVs.

b) International Influence:

i. **Realism of Change Process:** Seeking international influence involves collaboration with organizations promoting sustainable transportation, engaging in knowledge-sharing forums, and leveraging global best practices. As we discussed earlier, many of our neighboring countries are promoting FEVs, so we can certainly learn and collaborate with them, but the election is in the backdrop, it depends on the upcoming Governments revised foreign policy. But as Bnagladesh Government has good relationships with India, China & Japan- the MoU can be signed.

ii. **Assessment of Viability:** Highly viable, as international collaborations can provide funding, expertise, and valuable insights into successful transitions to fuel-efficient public transportation.

c) Embracing Petrol Pumps as EV Charging Hubs:

- **Plausible Change Pathway**: The transition to FEVs inevitably poses challenges for existing petrol pumps, which rely on the sale of fossil fuels for their revenue. However, by leveraging their established infrastructure and customer base, petrol pumps can transform themselves into EV charging hubs, diversifying their business models and adapting to the changing energy landscape.
- **Actions Proposed**: Provide financial incentives and support to petrol pumps willing to invest in EV charging infrastructure. These incentives could include tax breaks, subsidies, or low-interest loans to facilitate the installation of charging stations. Offer training and retraining programs for petrol pump employees to equip them with the necessary skills and knowledge to operate and maintain EV charging stations. This proactive approach will ensure a smooth transition for the workforce.

d) Leverage Private Sector (Long Term):

- **Feasibility:** Long-term engagement with the private sector requires strategic partnerships, incentives for investment, and a conducive regulatory environment.

e) Leverage Local Innovation (Long Term):

- **Feasibility:** Long-term focus on local innovation necessitates investments in research and development, collaboration with academic institutions, and creating platforms for innovation incubation.

4.3 ADDRESSING THE POLITICAL ECONOMY VIA ADVOCACY TO GOVERNMENT STAKEHOLDERS

A. Bangladesh Energy Regulatory Commission (BERC)

- **Tariff Setting and Monitoring:** BERC should play a central role in setting and monitoring tariffs for EV charging stations to ensure fair pricing and accessibility for consumers. This includes establishing transparent and predictable tariff structures, considering the costs of operation and maintenance, and implementing measures to prevent price gouging.
- **Regulatory Oversight:** BERC should strengthen its regulatory oversight of the EV charging infrastructure sector to ensure compliance with safety standards, quality of service, and consumer protection measures. This includes conducting regular inspections, addressing consumer complaints promptly, and enforcing penalties for non-compliance.

B. Bangladesh Road Transport Authority (BRTA)

- **Vehicle Registration and Licensing:** BRTA should streamline the registration and licensing process for FEVs to make it more efficient and user-friendly. This includes simplifying documentation requirements, reducing processing times, and providing dedicated lanes or counters for EV registration.
- **Promoting Public Awareness:** BRTA should engage in public awareness campaigns to educate citizens about the benefits of FEVs, including environmental advantages, cost savings, and government incentives. This could involve distributing informational materials, organizing workshops, and collaborating with media outlets.
- **Enforcing Traffic Regulations:** BRTA should strictly enforce traffic regulations to ensure the smooth and efficient movement of FEVs. This includes prioritizing designated EV lanes, enforcing speed limits, and addressing congestion issues.
- **Vehicle Scrappage Programs:** Implement vehicle scrappage programs to remove older, less fuel-efficient vehicles from the public transport fleet and replace them with environmentally friendly alternatives.

C. Department of Environment (DoE)

- **Emission Standards and Monitoring:** The DoE should establish stringent emission standards for all vehicles, including FEVs, to ensure that they meet environmental regulations and contribute to air quality improvement. This includes conducting regular emissions testing and enforcing penalties for non-compliant vehicles.
- **Promoting Research and Development:** DoE should support research and development initiatives focused on improving the efficiency and environmental performance of FEVs. This could involve funding research projects, collaborating with universities and research institutions, and providing incentives for innovation.
- **Environmental Impact Assessment:** DoE should conduct thorough environmental impact assessments for large-scale EV charging infrastructure projects to ensure that they minimize environmental harm and promote sustainable practices.

D. Bangladesh Standards and Testing Institution (BSTI)

- **Quality Assurance and Certification:** BSTI should establish rigorous quality assurance standards for EV components, charging stations, and related infrastructure to ensure the safety, reliability, and performance of these technologies. This includes conducting comprehensive testing, issuing certifications, and enforcing compliance with standards.

- **Technical Support and Training:** BSTI should provide technical support and training to EV manufacturers, installers, and service providers to ensure that they adhere to quality standards and best practices. This could involve workshops, seminars, and the development of training manuals.
- **Consumer Protection and Advocacy:** BSTI should act as a consumer advocate, protecting the interests of EV users and ensuring that they receive safe, reliable, and high-quality products and services. This includes investigating consumer complaints, addressing safety concerns, and educating consumers about their rights.

The prescription for a plausible pathway of change involves a mix of immediate policy revisions, effective implementation of existing plans, and long-term strategies focusing on coordination, private sector engagement, and local innovation. The proposed actions align with the unique challenges and opportunities present in Dhaka's political economy, offering a comprehensive approach for fostering fuel-efficient public transportation.

5 RECOMMENDATIONS AT A GLANCE

Government Incentives:

- Provide financial incentives and subsidies for the introduction of fuel-efficient public transport vehicles to encourage operators to invest in environmentally friendly options.
- The government can provide tax incentives, subsidies, or other financial assistance to reduce the cost of FEVs for consumers to implement cost-reduction strategies.

Policy Framework:

- Develop a comprehensive FEV policy framework that supports the transition to fuel-efficient public transport, outlining standards, regulations, and incentives for operators.

Tax Benefits:

- Implement tax benefits or reduced taxes for operators adopting fuel-efficient technologies, making it financially attractive to invest in cleaner transport options.

Research and Development Funds

- Allocate funds for research and development in the field of fuel-efficient technologies for public transport, encouraging innovation in the sector

Public-Private Partnerships

- Foster partnerships between the government and private entities to jointly invest in and operate fuel-efficient public transport systems

Infrastructure Support:

- Develop the necessary infrastructure, such as charging stations for electric buses or refueling stations for alternative fuels, to support the new fleet of vehicles.
- The government can invest in expanding the network of charging stations and other infrastructure for FEVs.

Emission Standards and Awareness

- Enforce strict emission standards for public transport vehicles, gradually phasing out older, more polluting vehicles and ensuring compliance with environmental regulations.
- The government can launch public awareness campaigns to educate the public about the benefits of FEVs and available options.

Green Financing Options

- Collaborate with financial institutions to provide green financing options with favorable terms for operators adopting fuel-efficient public transport.

Collaborate with Stakeholders:

- The government can work with businesses, industry associations, and environmental organizations to develop effective policies and promote FEV adoption.

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ANNEX

METHODS OF STUDY

The proposed methodology for conducting a political economy analysis (PEA) of the public transportation sector in Bangladesh was a comprehensive and multifaceted approach that encompassed literature review, stakeholder engagement, and a thorough examination of policies, laws, and plans.

Literature Review: To gain a comprehensive understanding of PEA and its various components in the context of the public transportation sector, a thorough literature review was conducted. This review involved analyzing academic research, case studies, and existing practices from various contexts to identify best practices and determine suitable approaches for this study.

Stakeholder Engagement: Integrating learnings from experts and stakeholders was crucial for ensuring that the PEA framework was grounded in robust theoretical foundations. Engaging with experts in the field of PEA, public transportation, and Bangladesh's political economy provided valuable insights into political economy dynamics, theoretical frameworks, and analytical tools that could enhance the effectiveness of the analysis.

Policy, Law, and Plan Review: A thorough review of policies, laws, and plans related to the public transportation sector in Bangladesh was essential for understanding the country's economic landscape. This review included examining the effectiveness and efficiency of governance structures, identifying gaps or inconsistencies with national goals or international standards, and proposing adjustments for optimal outcomes.

Public Survey: A public survey was conducted to collect data on the perceptions and experiences of public transportation users in Bangladesh. The survey was designed to gather information on a variety of topics, including satisfaction with current services, willingness to pay for improvements, and suggestions for future development.

Focused Group Discussion with Drivers: Focused group discussions were conducted with drivers of public transportation vehicles in Bangladesh. The discussions were designed to gather information on the challenges and opportunities faced by drivers, as well as their insights into the public transportation sector.

Key Informants Interview: Key informant interviews were conducted with experts and government officials in the field of public transportation, economy and environment in Bangladesh. The interviews were designed to gather in-depth information on the political economy dynamics that influence the development and implementation of public transportation policies in Bangladesh.

By employing these methodological steps, the PEA provided a comprehensive and nuanced understanding of the political economy dynamics that influenced the development and implementation of public transportation policies in Bangladesh. This understanding informed

the formulation of effective policy recommendations to improve the efficiency, accessibility, and sustainability of the public transportation sector in Bangladesh.

DATA COLLECTION

Data collection has been completed through the Computer-Assisted Personal Interviews (CAPI) method. A link to access the data but not edit it has been shared with Asia Foundation personnel to inspect data quality. Data has been uploaded after data collection each day, considering possible network disruption and internet connection availability. A data dictionary or codebook has been prepared. Categorical variables have clear, concise labels for each category. Each variable has a type (string or number), a label, and a set of valid values. Responses like "Do not know" or "Refused to answer" have well-defined values.

Development of the Data Collection Instrument

Data collection software has been used to streamline the collection and analysis process. An open-source tool for android data collection in Kobo Toolbox has been chosen, critically acclaimed for its range of features and ease of use. The survey instruments have been developed in consideration of objectives and questions. Data collection instruments have been finalized through several pretests, consultation with the concerned officials of Asia Foundation, and feedback incorporation. The research team has translated the questionnaire in Bangla for a better response from the participants. The different tools are discussed below:

- Structured questionnaire for the public transport users' survey.
- Semi-structured checklist for KII and IDI.

After finalization of the tools, an expert of the research team has prepared it for android-based data collection system (online and offline) in KoBo Toolbox. After computerization, the research team has driven a field test of the tools and contents for in the comparable area (not included in sample area) for constancy and integrity checking.

Data Management and Triangulation

Comparing qualitative content analysis with its familiar quantitative counterpart has enhanced understanding of the study. Content analysis has been performed for making replicable and valid inferences from data to their context, with the purpose of providing knowledge, new insights, a representation of facts, and a practical guide for action. The qualitative and quantitative data analysis has been done separately, and their findings have been synthesized.

Data Analysis

Data management involves the systematic organization, storage, and upkeep of data in a structured and controlled manner to guarantee its precision, accessibility, protection, and usefulness. It encompasses a variety of tasks designed to efficiently handle data from its inception or acquisition to its eventual disposal or archiving. Quantitative data analysis techniques will mostly include uni-variate analysis, bi-variate analysis. The measurement levels of the variables will be considered while analyzing the data, as special statistical techniques are available for each level. The measurement levels of the variables will be considered while analyzing the data, as special statistical techniques will be used for each level:

- Frequency distributions and graphical representations (numbers, proportions, percentages)
- Statistics (mean, median, mode, standard deviation, variance, etc.)

- Cross tabulations
- Computation of new variables using existing variables
- Comparative analysis

Qualitative data analysis: Outline of approaches to qualitative data analysis:

- Documentation of the data and the process of data collection
- Organization/categorization of the data into concepts
- Connection of the data to show how one concept may influence another.
- Corroboration/legitimization, by evaluating alternative explanations, disconfirming evidence, and searching for negative cases.
- Representing the account (reporting the findings)

ETHICS OF STUDY AND LIMITATIONS

The Political Economy Analysis (PEA) study on Fuel Efficient Vehicle (FEV) promotion in Bangladesh was conducted ethically, adhering to the Declaration of Helsinki and institutional review board guidelines. Participants' rights, well-being, and confidentiality were prioritized. Informed consent was obtained. The survey team maintained transparency in communicating the study's objectives, methods, and implications. Identifiable information was kept confidential, and data was securely stored. Cultural and contextual nuances were respected. Limitations include sampling constraints, data collection challenges, contextual dynamics, external factors, interpretation variability, and generalizability. The dynamic nature of political and economic contexts introduces a level of uncertainty. The findings are based on the context at the time of the study and may evolve over time. These limitations are acknowledged to provide a transparent understanding of the study's scope and potential constraints, ensuring a nuanced interpretation of the results.

PUBLIC TRANSPORT COMMUTERS SURVEY

With the aim of involving Dhaka public transportation users, this survey intends to explore and assessing public knowledge of fuel efficiency vehicles (FEV), suitability of the fuel-efficient public transportation system at Dhaka and air-pollution caused economic cost and their willingness to pay as rent of FEV vehicles uses. We have found that there are 9 attributes that contribute to making a vehicle fuel efficient. These include aerodynamic designs and lightweight materials, an efficient engine, hybrid technology, electric vehicles (EVs), start-stop technology, efficient transmission systems, tire design, and emission control systems. It is important for individuals to understand these attributes to make informed decisions when purchasing a vehicle.

Sl. No.	Question/ Query	Answer options	Remark
1.	Cell number		
2.	Age Group	1. 0-14 2. 14-47 3. 47-63 4. 63- Above	
3.	Gender	1. Male 2. Female 3. Other 4. Not prefer to say	Single option.
4.	Education	1. Primary (3rd standard to 5th standard) 2. Secondary School (6th standard 10th) 3. High Secondary. 4. Undergraduate 5. Postgraduate 6. Uneducated	Single option.
5.	Occupation	1. Employed (full time) 2. Employed (part time) 3. Not employed 4. Retired 5. Student (full time) 6. Student (part time)	Single option/ Multiple
6.	Monthly average income	---------- (BDT)	
7.	Which part of Dhaka do you live in?	1. Dhaka South 2. Dhaka North	Single option.
8.	Which route of Dhaka city you do usually use for office/work purposes?		
9.	How often do you use public transportation for your daily commuting needs?	1. Daily 2. A few times a week 3. Occasionally 4. Rarely	Single option.

Sl. No.	Question/ Query	Answer options	Remark
10.	Which mode of public transportation do you use most frequently?	1. Bus 2. Train 3. Metro rail 4. Water Bus 5. Rikshaw 6. Ride sharing 7. Other	Multiple options.
11.	What factors influence your choice of public transportation? (Select all that apply)	1. Cost 2. Time saving 3. Extent of air pollution 4. Reliability 5. Availability 5. Other (please specify):	Select all that apply
12.	If introduced, in what extent the FEV should be promoted?	1. Only Public Transports like local bus and train 2. Private Vehicles like cars and bikes 3. All available transportation mode	Multiple options.
13.	On a scale of 1 to 4, how important is fuel efficiency to you when choosing public transportation options (1 - Not important, 4 - Extremely important)	1 2 3 4	Likert scale
14.	Are you satisfied with the current fuel efficiency of the public transportation system you use	1. Yes, very satisfied. 2. Somewhat satisfied. 3. Somewhat dissatisfied. 4. No, very dissatisfied. 5. No comments.	Single option
15.	To what extent do environmental hazards concerns influence your transportation choices?	1. Not at all 2. Somewhat 3. Very much	Single Option
16.	In your opinion, which specific areas of the public transportation system should be improved to enhance fuel efficiency?	1. Introduction of electric/hybrid buses. 2. Conversion to renewable energy sources. 3. Road expansion and multiple lanes. 4. Improved maintenance and upgrades to existing vehicles. 5. Expansion of bike lanes and pedestrian-friendly facilities.	Multiple options

Sl. No.	Question/ Query	Answer options	Remark
		6. Congestion improvement. 7. Incentives for carpooling and ridesharing. 8. Other (Pl. specify)	
17.	How well-informed do you feel about the benefits and advantages of fuel-efficient public transportation?	1. Very well informed 2. Moderately Informed 3. Neutral 4. Slightly informed 5. No informed at all	Single option
18.	How would you rate your perceived interest in Fuel-Efficient Vehicles (FEVs) compared to your actual engagement with FEVs, including your likelihood to purchase or use one in the near future?	1. I am highly interested in FEVs and actively considering purchasing or using one soon. 2. I am somewhat interested in FEVs, but I have not yet made concrete plans to purchase or use one. 3. I have a neutral interest in FEVs and have not actively thought about purchasing or using one. 4. I have no interest in FEVs and do not plan to purchase or use one in the future.	Single Option
19.	What factors, if any, would encourage you to consider switching to an FEV for your daily transportation needs?	1. Cost Savings 2. Environmental Concerns & Social Awareness 3. Government Incentives 4. Improved Technology & Energy Efficiency 5. Reduced Air Pollution & Noise Reduction 6. Supporting Local Industry 7. Charging Infrastructure 8. Performance 9. Long-Term Savings & Resale Value	Multiple/Single Options

Sl. No.	Question/ Query	Answer options	Remark
20.	What sort of health hazard do you endure while travelling?	1. Difficulties in breathing 2. Coughing 3. Sore throat 4. Wheezing 5. Chest pain 6. Dry throat 7. Headache 8. Nausea 9. Difficulties in Hearing 10. No Health Hazard Experienced 11. Others (please specify)	Multiple options.
21.	What sort of health hazard do you endure post travelling?	1. Stroke 2. Ischaemic heart disease 3. Chronic obstructive pulmonary disease #Lung infection 4. Developed allergies 5. Pneumonia 6. Cataract 7. No Health Hazard 8. Others (please specify)	Multiple options.
22.	What are the average household level health costs you had to spend in last 3 months for above mentioned diseases? (In BDT)	----------(BDT)	
23.	Did you or any family member lose any work days?	1. Yes 2. No	Single option.
24.	If yes, how many work days you have lost?	----------Total days	Single option.
25.	Did you lose any work days due to air pollution related diseases in last 3 months?	----	
26.	Would you be more likely to use FEV-based public transportation system would be promoted?	3. Yes, definitely. 4. Yes, probably. 5. Not sure. 6. No, probably not. 7. No, definitely not.	Single option.
27.	How willing would you be to pay slightly higher fares to support the implementation of more fuel-efficient public transportation?	1. Very willing 2. Moderately willing 3. Moderately unwilling 4. Not willing at all	Single option.

Sl. No.	Question/ Query	Answer options	Remark
28.	How much would you willing to pay extra rent for fuel efficient public transportation for each trip?	1. 1-5 Tk 2. 5-10 Tk 3. 10-20 Tk 4. Other (Please specify)	Single option
29.	What are the key causes of air pollution at Dhaka? (Do rank from the key (‘1’) to less contributor (‘6) to air pollution	Lack of awareness of the policymakers	
		Absence of legal and policy options	
		Gap in the enforcement by the DOE	
		Poor urban planning	
		Lack of incentives for energy transition	
		Lack of incentives to introduce FEV	
		Others (please specify)	
30.	Do you have any additional comments or suggestions related to fuel-efficient public transportation?		(Open-ended response)

QUESTIONNAIRE FOR KEY INFORMANT INTERVIEW

(This checklist was adjusted for individual key informants according to their expertise)

Section 1: Overview *GENERAL*

1.1. Please provide a brief overview of your experience and expertise in the field of environmental sustainability and transportation.
1.2. What are the existing and upcoming environmental and climate change vulnerability at Dhaka?
1.3. Are you think the public and private response to air pollution at Dhaka are adequate? If not, what are the reasons?

Section 2: Current State of Public Transportation in Dhaka *GENERAL*

How would you characterize the current state of public transportation in Dhaka in terms of fuel efficiency and environmental impact?

Section 3: Promoting Fuel-Efficient Public Transportation *GENERAL*

3.1 What are the key factors (formal and informal rule or norms) that contribute to the lack of fuel efficiency in Dhaka's public transportation system?
3.2 In your opinion, what strategies or technologies hold the most promising for promoting fuel efficiency in public transportation in Dhaka?
3.3 Who are the key influencing stakeholders to promote the FEV at Dhaka? How could they help?
3.4 Do you think that the policymakers, transport owners and financing entities have found the investment in FEV are economically viable or positive incentive? If not, why?
3.5 Are there any successful case studies or examples from other cities or countries that Dhaka could learn from in terms of promoting fuel-efficient public transportation?
3.6 In your experience, what policy frameworks or regulatory measures have proven effective in promoting fuel efficiency in public transportation systems in other urban areas? Why?
3.7 Do you think that the existing decision-making process of energy, environment and BRTA are transparent?
3.8 How can policy processes be streamlined and enhanced in Dhaka to accelerate the adoption of fuel-efficient technologies and practices within the public transportation sector? power relations, interests/motivation, decision making process and other aspects of PEA?

Section 4: Challenges and Barriers *GENERAL*

4.1 What are the main challenges and barriers to implementing fuel-efficient initiatives in Dhaka's public transportation system?
4.2 How can these challenges be effectively addressed, considering the local context and constraints?

Section 5: Stakeholders and Collaboration *ECONOMIST, TRANSPORTATION*

5.1.Who are the key stakeholders (government agencies, transportation companies, NGOs, etc.) that should be involved in promoting fuel-efficient public transportation in Dhaka?

5.2. Do you think that existing tax structure is conducive to promote FEV at Dhaka? If now what are your proposal in providing the efficient tax structure especially corporate income tax and import duties?

5.3. How can effective collaboration and partnerships be established among these stakeholders to drive sustainable change?

Section 6: Policy and Regulation *GENERAL*

7.1 How do existing policy measures in Dhaka's public transportation align with climate action policies? What new measures can be implemented to promote fuel-efficient technologies and practices?

7.2 Are there any potential unintended consequences of these policies that need to be considered?

Section 7: Public awareness and engagement *ENVIRONMENTAL, ECONOMIST*

7.1 How important is public awareness and education in encouraging the use of fuel-efficient public transportation?

7.2 What strategies can be employed to raise public awareness?

Section 8: Infrastructure and investment *TRANSPORT*

What kind of infrastructure improvements are essential for promoting fuel-efficient public transportation, and how can the necessary investments be secured?

Section 9: Current Vehicle Ownership and Usage *ENVIRONMENTAL*

9.1 Current Vehicle Ownership:

- Among the community of environmental experts, how common is vehicle ownership?
- Are they more inclined towards environmentally friendly options, such as electric or hybrid vehicles, or do other modes of transport dominate?

9.2 Types of Owned Vehicles:

- For those who own vehicles, what types are more prevalent within the environmental expert community?
- Are there particular reasons why they choose a specific type, like electric or hybrid models?

9.3 Usage Patterns:

- Considering their environmental expertise, how often do these experts use personal vehicles for commuting?
- Is there a conscious effort to minimize vehicle use due to environmental concerns?

9.4 Barriers to FEV Adoption

9.4.1 Factors Influencing Non-Adoption:

- For those environmental experts who do not own an FEV, what are the primary reasons identified by them for not adopting this technology?
- Are their reasons predominantly related to the environmental impact, or are there other considerations, such as infrastructure concerns or public awareness issues?

9.4.2 Specific Barriers:

- Considering the options listed (high purchase price, limited charging infrastructure, range anxiety, lack of knowledge, concerns about battery life), could you provide insights into which of these factors are particularly pertinent within the environmental expert community?
- Are there additional barriers specific to their expertise?

9.5 Alternative Perspectives:

- Are there any unique viewpoints or innovative solutions proposed by these experts regarding overcoming the barriers to FEV adoption?
- How do they think these obstacles can be effectively addressed on a broader scale?

Section 10: Monitoring and evaluation *ENVIRONMENTAL, TRANSPORT*

How can the effectiveness of fuel-efficient initiatives in Dhaka's public transportation system be measured and evaluated over time?

Section 11: Future outlook *ENERGY, ENVIRONMENTAL*

In your vision, what would an ideal fuel-efficient public transportation system in Dhaka look like? what steps are needed to achieve this vision?

Section 12: Air Pollution and Environmental Concerns *ENVIRONMENTAL*

12.1. Air Pollution Concerns:

- How do policymakers perceive the level of concern among citizens in the region regarding air pollution?
- What are the prevalent sentiments – from indifference to significant worry?

12.2. Health Impact and Community Priorities:

- According to policymakers, how do health issues linked to poor air quality, especially respiratory problems, affect the community?
- Are there noticeable trends or areas of particular concern?

12.3. Priority for Community:

- From a policymaker's perspective, is there alignment in the community's belief that reducing air pollution is a critical priority?
- How does this align with other community concerns or interests?

12.4. Identifying Pollution Sources:

In interviews with the policymaker, explore their insights into the primary sources of air pollution in the area. What understanding do they have about the key contributors to the pollution problem?

Section 13: Fuel Scarcity and Energy Security *ENERGY, TRANSPORT*

13.1. Experience with Fuel Scarcity:

- Have policymakers observed or received reports about fuel scarcity or energy shortages in their jurisdiction in the past year?
- How did these shortages impact local communities?

13.2. Impact on Daily Life:

- How, in their observation, do fuel scarcity or energy shortages disrupt daily life and routines for residents?
- Are there specific sectors or demographics more affected?

13.3. Fossil Fuel Dependence and Energy Security:

- From a policymaker's perspective, do they believe that reducing dependence on fossil fuels can enhance energy security and mitigate the impact of fuel scarcity?
- What strategies do they consider viable?

Section 14: Alternative Energy Sources *ENERGY*

14.1. Awareness of Alternative Energy:

- How much are policymakers familiar with alternative energy sources like solar power, wind energy, or biofuels?

- How much awareness and understanding do they have regarding the feasibility and impact of these sources in the local context?

14.2. Effectiveness of Alternative Energy:

- In your view, how investing in alternative energy sources is a viable solution to address both air pollution and fuel scarcity?
- What factors contribute to your perception of viability or challenges?

14.3. Interest in Adoption:

- Are policymakers open to considering the integration of alternative energy sources for transportation needs?
- What factors influence their willingness or reluctance regarding initiatives like solar-powered vehicles or electric vehicles charged with renewable energy?

Section 15: Government Actions *GENERAL*

15.1. Awareness of Government Initiatives:

- Are policymakers aware of existing government initiatives or policies aimed at reducing air pollution and promoting energy security in their area?
- What do they think are the strengths and weaknesses of these initiatives?

15.2. Effectiveness of Government Actions:

- From their perspective, how effective do policymakers believe government actions have been in addressing air pollution and fuel scarcity?
- What indicators or outcomes do they consider when evaluating effectiveness?

15.3. Policy Recommendations:

- What specific policy measures or initiatives do policymakers believe the government should implement to effectively address air pollution and fuel scarcity in the region? Are there innovative or unconventional ideas they suggest?

Section 16: Additional Comments *GENERAL*

Is there anything else you would like to share regarding the promotion of fuel-efficient public transportation in Dhaka?

Conclusion: Thank you for your valuable insights and time in participating in this interview. Your expertise will contribute to shaping strategies for a more sustainable and environmentally friendly public transportation system in Dhaka. Your responses will be instrumental in informing future initiatives and decisions. If you have any further comments or suggestions, please feel free to share them.