



Green Growth Diagnostic:

Bangladesh

November 2016

Contents

Acknowledgements	4
Acronyms & Abbreviations	5
1. Introduction	8
1.1. Theory of Change	9
1.2. Our Approach	11
2. Generating green growth in Bangladesh	13
2.1. Economic Profile of Bangladesh	13
2.2. The Environmental Impact of BAU Economic Strategy in Bangladesh	14
2.3. Encouraging Green Growth: Country Examples India and China	15
2.3.1. Green Growth in India	16
2.3.2. Green Growth in China	18
2.4. Current Status of Green Growth in Bangladesh	19
3. Review of Policies, Laws and Regulations	21
3.2. Incentives and Penalties	26
3.3. Inequality, Environment and Informality	30
3.4. Policy insights for green growth from public sector representatives	32
3.4.1. Inertia	32
3.4.2. Government Failure	32
3.4.3. Low Social Returns	33
3.4.4. Market Failure	33
4. Constraints Analysis for Bangladesh	34
4.1. Survey analysis	35
4.2. Private Sector Insights	43
4.3. Bangladesh Green Growth Diagnostic	44
5. Economic Sector Analysis	49
5.1. Agriculture	49
5.1.1. Overview	49
5.1.2. Role of Private Sector and PPPs in Agricultural Development	50
5.1.3. Policy Mapping of the Agricultural Sector	52
5.1.4. Potential for green growth in agriculture	53
5.2. Transport	54
5.2.1. Overview of the Transport Sector	54
5.2.2. Role of Private Sector and PPPs in in Transport	55
5.2.3. Political economy of the transport sector	57
5.2.4. Policy Mapping of the Transport Sector	58

5.2.5. Potential for green growth in transport	58
5.3. Energy	60
5.3.1. Overview of the Energy Sector	60
5.3.2. Policy Mapping of the Energy Sector	62
5.3.3. Potential for green growth in energy	62
6. Synthesis of Findings	65
7. Recommendations	72
8. Bibliography	74

This report was authored by James MacGregor, Remeen Firoz, Nasir Uddin, Salma Islam and Md. Abdus Sattar Moin and peer-reviewed by Saleemul Huq.

The report was commissioned by UKAID.

Acknowledgements

We would like to express our deepest appreciation to all those whose contributions helped bring this report together. There are six people without whom this study would not be possible who we would like to acknowledge. Shawly Chowdhury, Abdullah Al Mamun, Md. Abdus Sattar Moin, Jeet Roy, Maliha Sarahzin, and Zakia Sultana are the six Research Assistants who helped us conduct the 154 face-to-face interviews using a structure questionnaire from both public and private sector stakeholders for completion of this study.

We would also like to thank all the stakeholders and key informants for the time they devoted to allow us to conduct surveys and interviews which were all crucial to this study.

Acronyms & Abbreviations

ADB	Asian Development Bank
BaGGD	Bangladesh Aggregate Green Growth Diagnostic Assessment
BAU	Business as Usual
BCCRF	Bangladesh Climate Change Resilience Fund
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BCTF	Bangladesh Climate Change Trust Fund
BMUB	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
CDM	Clean Development Mechanism
CETP	Common Effluent Treatment Plant
CHUEE	China Utility-based Energy Efficiency Finance
CNG	Compressed Natural Gas
CO ₂	Carbon Dioxide
COP	Conference of Parties
CPEIR	Bangladesh Climate Public Expenditure and Institutional Review
DG	Director General
DoE	Department of Environment
DRIMO	Disaster Risk Identification and Mitigation Options
DRR	Disaster Risk Reduction
ECC	Environmental Clearance Certificate
EDGG	Economic Dialogue on Green Growth
EMP	Environmental Management Plan
ERD	Economic Relations Division
ETP	Effluent Treatment Plant
FCD	Flood Control Damage
FGP	Flying Geese Paradigm

FYP	Five Year Plan
GAP	Good Agricultural Practices
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GEF	Global Environment Facility
GG	Green Growth
GGD	Green Growth Diagnostic
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOB	Government of Bangladesh
GRIHA	Green Rating for Integrated Habitat Assessment
GW	Giga Watt
HHK	Hybrid Hoffman Kilns
IFC	International Finance Corporation
LaBL	Lighting a Billion Lives
LLRF	Loan Loss Reserve Fund
MG-NREGS	Mahatma Gandhi National Rural Employment Scheme
MoEF	Ministry of Environment and Forests
MoF	Ministry of Finance
mtCO ₂	Metric tonnes of Carbon Dioxide
MW	Mega Watt
NAMAs	Nationally Appropriate Mitigation Options
NAPA	National Adaptation Plan of Action
NGO	Non-government Organisation
NSDS	National Sustainable Development Strategy
NTFPs	Non-timber Forest Products
NTPC	National Thermal Power Cooperation Limited

OECD	Organisation for Economic Cooperation and Development
PES	Payment for Ecosystem Services
PPP	Public Private Partnership
R-APDRP	Restructured Accelerated Power Development and Reforms Programme
RMG	Readymade Garments
SMEs	Small and Medium Enterprises
SREDA	Sustainable and Renewable Energy Development Authority
TERI	The Energy and Resources Institute
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VAT	Value Added Tax

1. Introduction

This report seeks to generate evidence on the binding constraints to shifting Bangladesh’s current economic strategy to one aiming at green growth. Specifically, it is critical that Bangladesh decouples its economy from the negative environmental effects of the economic growth path it is currently pursuing. It is important that green growth is pursued in order to unlock Bangladesh from its unsustainable growth path to a more sustainable and inclusive one.

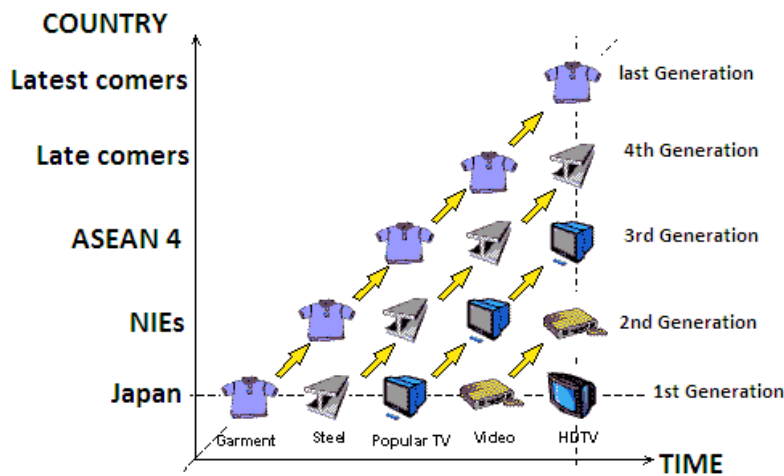
This paper uses a novel approach which has not been trialled elsewhere- the Green Growth Diagnostic. This methodology will help Bangladesh develop its strategy to pursue an economic growth path that takes full account of natural resources and promotes sustainable development. This report will demonstrate and highlight the constraints that need to be addressed in order to do so.

Bangladesh is chosen owing to looming and considerable economic and environmental risks. It is vulnerable to climate change, and has a perceived high potential to benefit from economic growth that is diversified, inclusive and enhances the environment. The economy relies on textiles for economic growth, and yet this is considered risky owing to new countries fulfilling its role. Bangladesh also faces pressures from a large growing population, high levels of poverty, a largely informal economy, and growing inequality. Furthermore, there is a broad political vision and attendant will to accelerate and diversify development.

The pathway of economic growth for Bangladesh is evolving, and this is one reason for the application of our approach. Theory and practice show how reliance on textiles is a pre-cursor to development of other economic sectors, particularly light manufacturing and services. The policy challenge is to ensure that this reliance on one relatively low-value industry can be transformed and leveraged into new higher-value industrial sectors.

This theory is showcased by the flying geese paradigm (FGP) which has relevance for Bangladesh in its simplified illustration of the cascading process of industrialisation of Asian nations along a broadly similar economic development pathway, after the country enters an international economic relationship with more industrially advanced countries by opening trading ports and large-scale trading relations (Akamatsu, 1962). The theory is based on the existence of a sequential order of industrial economic development from import to domestic production to export. Further, that the first exports from “latest comers” will be crude consumer goods and the later exports will be refined capital goods. For Bangladesh, it is not the starting point of making garments but whether, after this starting point, it has moved up the value chain (FGI, 2015), and whether this as an option remains an efficient pathway in a changing world, specifically one redefined by a green growth pathway. Figure 1 provides a depiction of the FGP which is illustrative but also reminds us that technologies change swiftly and economies and their strategies need to also.

Figure 1 Stages of Industrial Development in Flying Geese Paradigm



Source: Tun K., 2012

Transitioning the economy onto a green growth pathway is one way to achieve these goals. Green growth is an environmentally sustainable growth strategy that strives for economic growth whilst recognising the importance of natural capital, biodiversity and maintaining ecosystem integrity. Furthermore, green growth promotes the efficient use of natural resources; it is clean, as it minimises pollution and environmental impacts, and it is resilient, as it accounts for natural hazards and the role of environmental management and natural capital in preventing physical disasters. It is important that green growth is pursued in order to unlock Bangladesh from its unsustainable growth path to a more sustainable and inclusive development one.

Emerging evidence suggests that countries which pursue a Green Growth strategy exhibit higher economic growth, poverty reduction, increased resilience to climate change and natural disasters, greater energy security, and more secure livelihoods for those directly dependent on the use of natural resources. Part of this arises from the recognition of environmental and social factors as assets and flows, and, through quantifying these, integrating the sustainable development agenda into policy making. Indeed, Green Growth has clear and measurable social, economic and environmental benefits. Social benefits for poor and vulnerable communities include: livelihood improvement, capacity building, gender equity, health benefits and job creation. While economic benefits include: output growth, natural resource efficiency, cost effectiveness and improved productive capacity. Finally, measurable environmental benefits include: emissions reduction, energy efficiency measures and ecosystem conservation.

This paper will begin mapping this shift in economic strategy for Bangladesh, detailing constraints and potential solutions in doing so. Our first step in mapping this shift will be to use an internationally recognised, standard methodological framework – Green Growth Diagnostic– to identify such constraints and opportunities. A Green Growth Diagnostic (GGD) is a practical exercise in deriving policy priorities widely used to analyse low-growth economies. In a world where policymakers often develop interventions in an ad hoc manner, a GGD provides a systematic, though not foolproof, methodology for rationally prioritising alternative policies.

In practice, to identify opportunities for elevating sustainable development, the GGD uses a simple framework to map the full list of potential binding constraints that are preventing or holding back Bangladesh's adoption of a Green Growth strategy, and prioritises those investments and policies that will make this happen most efficiently. Typically, addressing these binding constraints is the most cost-effective approach to galvanising green growth. The GGD is grounded on three basic ideas: firstly, that the resources for promoting growth are limited; secondly, constraints can be prioritised; and finally, that the green growth approach requires political ownership and a country-specific policy approach.

1.1. Theory of Change

Theory of Change is increasingly regarded as an essential tool in designing and appreciating the complex network of factors which influence project outcomes. It is a simple project management and reporting methodology which maps the assumptions which inform planned interventions within all stages of an initiative. Our understanding of project needs and our approach are embodied in the Theory of Change below.

GREEN GROWTH DIAGNOSTIC TOOL – part of EDGG

THEORY OF CHANGE

From economic growth-led sustainable development to sustainable development led economic growth

GOALS

- Identify binding constraints to adopting an economic strategy based on green growth in Bangladesh
- Provide fresh quantitative evidence to mainstream a green growth approach
- Enable government and stakeholders to make better decisions and improve the knowledge gap at policy level

STRATEGY

- Interdisciplinary team, led by an economist
- Establish a working "vision" for GG and for future GG in Bangladesh
- Understand underlying drivers for economic growth in Bangladesh
- Identify the environmental costs of current economic growth approach in Bangladesh
- Review all documentation
- Augment with interviews, surveys
- Understand the options (from experience elsewhere) for shifting an economy onto GG
- Identify how these may work in Bangladesh
- Focus on 3 key sectors to learn international lessons on transition to GG and understand how these may be applied in Bangladesh

PROFILE

Target Sectors
 Transport
 Energy
 Infrastructure

STAKEHOLDERS

Government of Bangladesh
 Universities and Academics
 Donors
 Civil Society Organisations
 NGOs
 Industry

ACTIVITIES

Conduct GGDA

Research

- › Policy documents
- › Experience internationally on GG
- › Growth diagnostic analysis

Survey

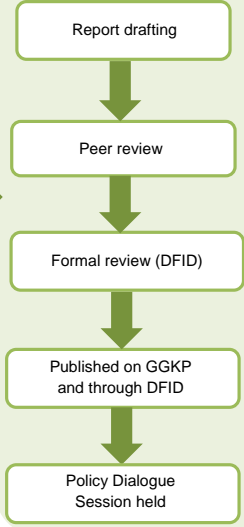
- › Private sector
- › Public sector

Analysis

- › Framework focused on constraints
- › Bangladesh economic data

GGD paper for Bangladesh
 17 key informant interviews
 154 surveys
 40 documents reviewed
 Case studies from 3 sectors
 Policy dialogue session

SYSTEMS



OUTCOMES

- Clear understanding of the constraints to GG and recommendations of how to mitigate these
- Increased willingness of private sector stakeholders towards Green Growth policy reform
- GoB has increased ability to undertake policy reform to mainstream green growth

IMPACT

- Bangladesh pursues a Green Growth strategy exhibit higher economic growth, poverty reduction, increased resilience to climate change and natural disasters, greater energy security, and more secure livelihoods for those directly dependent on the use of natural resources
- Clear and measurable social, environmental and economic benefits from shift to GG

1.2. Our Approach

Our report has three main goals:

- 1) Identify broader macro-economic and strategic binding constraints and opportunities for implementing a Green Growth strategy in Bangladesh, in order to shift Bangladesh's growth pathway from economic growth-led to sustainable development that is economic-growth-led.
- 2) Provide fresh quantitative evidence to mainstream a Green Growth approach and enable the government and relevant public- and private-sector stakeholders to make better decisions and to improve the knowledge gap at the policy level.
- 3) Identify recommendations which would enable this gap to be bridged.

Our approach is to take a sustainable economic approach – bridging environmental and economic goals. It is based on:

- › Using the GGD to identify and prioritise binding constraints to shifting economic strategy to green growth (see Chapter 4)
- › Survey stakeholders to elicit fresh insights and common goals on the proposed shift to green growth (see Chapter 4)
- › Developing recommendations for next steps (see Chapters 6 and 7)

Our approach methodology includes: (a) Key Informant Interviews from policy makers, activists, government officers, and industries; (b) sample survey, and; (c) document reviews. The study team used 17 key informant interviews, 40 document reviews and 154 survey responses to analyse the potential for green growth in Bangladesh.

Our sectoral focus was made by the team following a thorough review of the economic data and literature on Bangladesh's economic sectors to narrow focus for this report. Our decision, made in conjunction with our client, is to focus on three areas at the core of Bangladesh's economic growth and with high potential to have transformational impact from successful integration of green growth approach. These are transportation, energy, and agriculture.

Figure 2 The study approach in practice

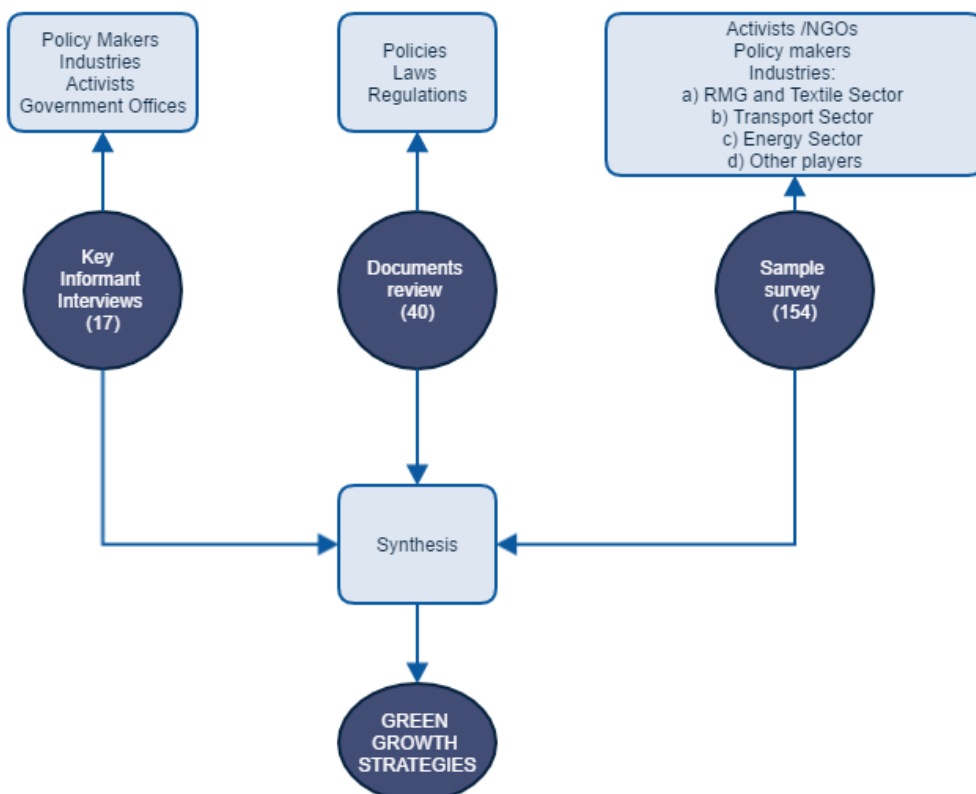


Figure 3 Analytical Framework of the BaGGD

ANALYTICAL FRAMEWORK OF THE BaGGD	
<p>A. Evidence, data, existing:</p> <ul style="list-style-type: none"> • Growth diagnostic: Understand Bangladesh economy, drivers • Identify the environmental sectors' influence within the economy • Identify those policies affecting key environmental sectors • Investments by private sector in both economic activity and environmental aspects • Develop a vision for GG 	
<p>B1: Constraints analysis</p> <ul style="list-style-type: none"> • Private sector views (survey) • Public sector views (survey) • Policy constraints analysis 	<p>B2: Analysis of Constraints</p> <ul style="list-style-type: none"> • Low appropriability of returns • Low economic returns
<p>C1: Sector analysis (Bangladesh): (economic drivers, GG drivers)</p> <ul style="list-style-type: none"> • Transport • Infrastructure • Energy 	<p>C2: Experience analysis (Global): (economic drivers, GG drivers)</p> <ul style="list-style-type: none"> • Transport • Infrastructure • Energy
<p>D: Recommendations: Max 12 recommendations for shifting Bangladesh onto a GG pathway focusing on:</p> <ul style="list-style-type: none"> • Mitigate constraints to GG growth and development • Private sector incentives to invest in GG approach • GOB has capacity, capability, and incentives to mainstream GG 	

2. Generating green growth in Bangladesh

Green growth is the fostering of economic growth and development in an environmentally sustainable and inclusive manner. It promotes the efficient use of natural resources, minimises pollution and environmental impacts, and accounts for natural hazards and the role of environmental management in preventing physical disasters. Green growth provides a strategy for public and private actors to address environmental pressures (whilst simultaneously attaining economic growth) which, if unaddressed, could result in countries locking into unsustainable growth paths causing irreversible, persistent and costly damage to the environment.

Although strategies and policies employed in mainstreaming green growth will differ from country to country, if adopted wholly and integrated effectively, green growth has the potential to promote economic growth through:

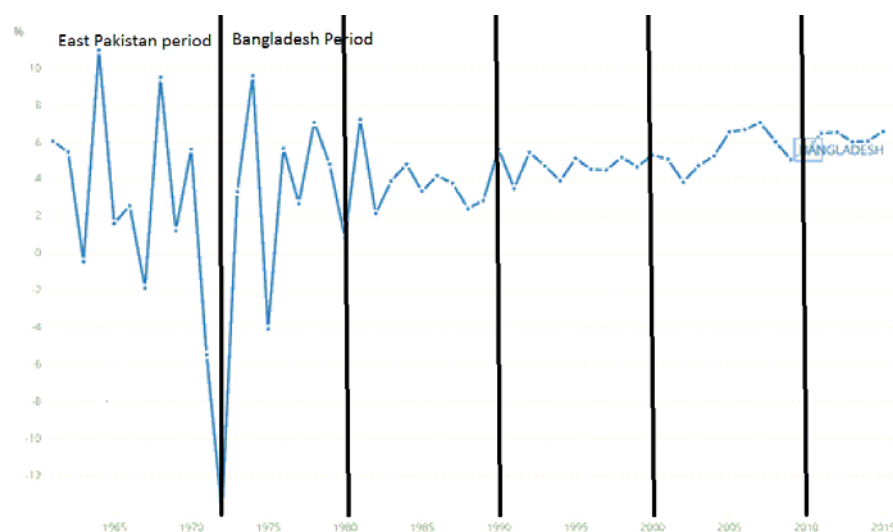
- › **Increasing productivity:** green growth creates incentives for improved efficiency in the use of natural resources. Adoption of green technologies may also promote innovation to increase productivity.
- › **Opening up new markets:** by increasing demand for the consumption of green goods, services and technologies.
- › **Mobilising fiscal revenue:** The introduction of green taxes and reduction of environmentally harmful subsidies can increase government revenue.
- › **Reducing risks of negative shocks:** Green growth can prevent shocks caused by natural resources (e.g. fossil fuels).

In this chapter, we summarise Bangladesh's growth story to date, assess the extent to which green growth policies have been adopted in Bangladesh and also provide experiential learning from green growth mainstreaming in India and China.

2.1. Economic Profile of Bangladesh

Bangladesh has made remarkable progress over the past two decades, lifting millions out of poverty and sustaining expanding levels of economic growth. It has achieved this in spite of major internal and external challenges, global economic downturns, natural disasters, and periods of political uncertainty that have tested the resolve of the Bangladesh economy. Analysis of the economic growth path to date demonstrates a largely stable and healthy growth rate from the country's inception in 1971. The growth rate has risen to six percent in recent years, which is higher than comparable South Asian countries and many sub-Saharan African countries at a similar development stage.

Figure 4 GDP Growth Rate of Bangladesh since 1971



Source: World Bank Data. <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=BD>

Underpinning this growth path are significant structural changes in line with a move from lower-value goods production to higher-value goods. The share of agriculture in GDP is declining fast; from 18% in 2009-10 to 16% in 2013-14, as the industrial sector's share has grown from 27% to 30% over the same period. Currently more than 50% of the country's GDP is derived from services.

Growth and employment generation in Bangladesh have largely been driven by the rapid expansion of the ready-made garments (RMG) sector for export built on relatively low wages, extensive subsidies and sizeable tax exemptions. Other drivers of growth include remittances, largely from workers in GCC, and the agricultural sector.

However, these figures only depict part of the picture, given that they are focussed on the contribution of the formal sector to the overall economy. Like most developing economies, Bangladesh has a large informal economy that is not accounted within GDP statistics. An ADB (2010) report has attempted to quantify the size of Bangladesh's informal economy which is concentrated in agriculture, fishery, trade and industries (e.g. farms, markets, bazaar stalls, etc.). The report finds that the informal economy accounts for 89% of the total number of jobs in the labour market. Given data collection issues with measuring the informal sector's contribution to the overall economy, the gross value added was estimated at 40% of the total gross value added of Bangladesh - 18% from the informal services sector, 15% from agriculture and 10% from informal industry.

Despite economic expansion, Bangladesh remains a developing country with 32% of the population living below the national poverty line¹. This is exacerbated through high levels of economic inequality, which has been rising since the 1980s. The Gini coefficient increased from 0.35 in 1984 to 0.46 in 2010, with a similar trend in both rural and urban areas. In the same period, the share of national income of the poorest 20 percent of population decreased from 3% to 2%, while for the richest 20 percent of population, it grew from 28% to 38%. Analysis into the cause of rising income inequality focuses on government policy, particularly the country's taxation structure, and rising food inflation.

Bangladesh aspires to be a middle-income country by 2021. This will require increasing GDP growth to 7.5-8% per year based on accelerated export and remittance growth, as well as an increase in public and private investment. However, given Bangladesh is a low-lying country and particularly vulnerable to climate change, concerns have been raised about the impact of the pursuit of growth on the environment.

2.2. The Environmental Impact of BAU Economic Strategy in Bangladesh

The current economic strategy for Bangladesh has been heavily reliant on industrialisation which is considered to be environmentally harmful. Growth has not been green. Indeed, the gap between Gross National Income and Adjusted National Income (an indicator that takes into account the consumption of fixed capital and natural resources depletion) has been increasing. There is expectation this trend will continue and imperil economic progress, as environmental degradation continues and risks posed by climate change loom.

Bangladesh is one of the lowest ranked countries in the global Environmental Performance Index 2016 prepared by the Yale Centre for Environmental Law and Policy: ranking 173 out of 180 countries. Fragmented attempts at reform in support of environmental management in a few sectors, including fisheries, wet land management, biodiversity promotion, forestry, and agriculture, have not been sustained and the impact on natural resources generation has been tangible. This is largely due to the enforcement regime being weak.

As can be seen below, environmental degradation, depletion of natural resources and pollution are widely observed in Bangladesh across sectors pursuing growth. In Bangladesh's case, these effects have been exacerbated by over-population, poverty and lack of awareness among the public.

¹ <https://www.adb.org/countries/bangladesh/poverty>

Agriculture

Bangladesh has made progress in agricultural development and productivity through the introduction of green revolution technologies including improved seeds, fertilisers, irrigation and water management. However, the sector has huge environmental costs and is characterised by over-use of inputs. Excessive agro-chemical use, such as fertilisers, insecticides, herbicides and pesticides, has impacted negatively on soil fertility and crop yields, and as an indirect effect causing health concerns for farmers and consumers. Chemical run-off is also polluting natural water bodies and damaging biodiversity. Every year about one percent of agricultural land is lost due to industrialisation, urbanisation and housing.

Industry & Manufacturing

The main driver of the economy has been expansion of the RMG sector, which had generated jobs for nearly 4.5 million people (80% of whom are women). The RMG sector has supported the economy's shift away from a rural agricultural economy to a manufacturing and a service economy. However, the majority of textile and garment factories are highly polluting and are yet to adopt cleaner production paths due to a host of barriers, including lack of finance. Despite legislation mandating the installation of ETPs and CETPs in industries with provisions for punishing those who are not compliant, there is anecdotal evidence that the operation of ETPs is not being complied with. Further, powerful industry elites are capturing the wetland in and around the cities, particularly in Dhaka, and building unplanned industries and physical infrastructure. This further contributes to industrial pollution particularly of rivers (for example, there has been heavy industrial pollution of rivers like the Buriganga, Sitalakka and Turag).

Services

Currently, more than 50% of the country's GDP is derived from services (constituting community and public services, wholesale and retail businesses, transportation, construction, financial, and energy, among others), however many of these areas contribute heavily to environment degradation.

- › **Transportation:** Dhaka is the 11th largest megacity in the world in terms of population. With rapid urbanisation and industrialisation the city has witnessed a huge growth of motor vehicles. Large pre-Euro standard bus and truck fleets contribute to high levels of air pollution, particularly during the dry winter months. Transport is the second largest contributor to urban air pollution after brick kilns.
- › **Energy:** Natural gas is a major source of energy in Bangladesh. Almost 60% of total gas is used for power generation. The contribution of renewable energy to the energy mix is only about 20 MW, which is around 0.5%. In light of rising energy demand in the country, coal is going to be the major energy source for power generation.
- › **Construction:** The construction sector of Bangladesh has grown considerably during the last two decades, growing at 8.63% in the fiscal year of 2014-15. The sector employs more than 3 million people, absorbing a large share of the Bangladesh's labour force. The construction sector plays a strong role in the economy amid continued urbanisation. Rising urbanisation and building of infrastructures, including roads, bridges and flyovers are the main factors behind the growth of this sector, but these are also highly polluting.

2.3. Encouraging Green Growth: Country Examples India and China

It is therefore evident that in order to achieve and sustain accelerated growth, Bangladesh will need to address environmental concerns to prevent lasting damage to the environment and for future generations. It must transition toward a green, inclusive and sustainable growth strategy. A number of countries have integrated formal green growth strategies effectively at the national level. South Korea has adopted a green growth strategy to drive economic competitiveness through development and use of advanced technologies. The Government of South Korea is investing in innovation and deployment programmes for 27 priority technologies guided by a Green Technology Roadmap with

the goal of becoming the world's seventh largest economy by 2020 (Young et al., 2013). Germany has also adopted green growth policies, which have facilitated the development of an internationally competitive environmental goods and services sector particularly focused on renewable energy.

The adoption of green growth has not been limited to developed countries. Rwanda released the Green Growth and Climate Resilience National Strategy for Climate Change and Low Carbon Development in October 2011. It aims to be a developed climate-resilient, low carbon economy by 2050, through the achievement of three key strategic objectives: energy security and a low carbon energy supply; sustainable land use and water resource management; and social protection and disaster risk reduction. Chile has also launched the National Green Growth Strategy in December 2013 outlining a set of actions to promote greener growth, such as implementing environmental management instruments, over the short, medium, and long term.

In this section, we outline the progress made in adopting green growth policies in two comparison countries- China and India. These countries were chosen because they are the two countries from where Bangladesh imports the most. This means its production technology will be largely influenced by the markets for technology available in these two countries. India also has strong cultural ties with Bangladesh and consumption and demand patterns are similar given they share a common border.

2.3.1. Green Growth in India

India is an example of an emerging nation actively pursuing a green growth pathway for its economic strategy.

India has witnessed strong economic growth over the last two decades averaging 7% annually, which has enabled the country to graduate to a middle-income country. Millions of individuals have escaped from poverty as economic growth has generated new employment opportunities. However, this growth has been to the detriment of the environment and has contributed to the depletion of natural resources. India ranks 155 out of 180 countries in the global Environmental Performance Index prepared by the Yale Centre for Environmental Law and Policy (eight places above Bangladesh). Indian cities are recognised as having some of the world's worst air and water pollution, with the national capital, Delhi, registering particulate PM10 at over ten times the standard level. Economically, this environmental degradation is significant, with a World Bank (2014) study finding it costs India \$80 billion per year or 5.7% of its economy.

Against this backdrop, the World Bank conducted the first national-level economic assessment of environmental degradation in India - a 'Diagnostic Assessment of Select Environmental Challenges in India'. This assessed the physical assets and flows coupled with the associated monetary losses from environmental degradation and natural resource depletion. It concluded that a transition to green growth is, necessary for India and moreover that this can be achieved with minimal impact on India's GDP.

India is making progress on incorporating the mainstreaming of green growth components within its national policies, as can be seen in the table below. One such initiative is the Mahatma Gandhi National Rural Employment Scheme (MG-NREGS), which is a labour law guaranteeing the right to work in rural areas and addressing environmental degradation. The act provides at least 100 days of paid employment per year to households in which members volunteer for labour-intensive work, and the act is strengthening rural natural resource management, by financing labour-intensive work that is addressing causes of drought, deforestation and soil erosion (UNEP, 2010). The Scheme is both ambitious and vast, with over 850,000 projects established over 2006-2008.

Box 1 India's Policy Framework for Green Growth

NATIONAL GREEN GROWTH POLICIES

National Action Plan on Climate Change, 2008

National Mission for a Green India, 2011

Integrated Energy Policy, 2008

The National Innovation Act, 2008

National Environmental Policy, 2006

Biological Diversity Act, 2002

Energy Conservation Act, 2001

Environmental Protection Act, 1986

NATIONAL GREEN GROWTH PLANS

Jawahar National Solar Mission: target of 20,000 MW of on-grid solar power by 2022.

Restructured Accelerated Power Development and Reforms Programme (R-APDRP): Aims to reduce transmission and distribution losses in the power sector.

Perform, Achieve and Trade Scheme: Improving energy efficiency in energy intensive industries- aluminium, cement, chlor-alkali, fertiliser, iron and steel, paper, textile and thermal power plants.

Bachat Lamp Yojana: The Bureau of Energy Efficiency launched this project to improve energy efficiency in buildings and domestic appliances through promoting compact fluorescent lighting.

Mahatma Gandhi National Rural Employment Guarantee Scheme: This is explained in greater detail above.

Green Rating for Integrated Habitat Assessment (GRIHA): Developed by TERI, GRIHA has subsequently been adopted by the Government of India in 2007 as the national rating system for green buildings.

The Indian government has also demonstrated commitments to financing green growth initiatives. The Indian Clean Energy Equity Fund was announced by the Government of India in November 2016 at COP 22. The Government is seeking to work with three state-run firms to set up an equity fund of up to US\$2 billion for renewable energy companies to tap into to help India urgently meet its clean energy goals. The fund will invest in both public and private companies and seek to mobilise funds from other investors (including international pension funds). Around US\$600 million of the initial pool will come from the Ministry of Finance's National Investment and Infrastructure Fund, and the remainder from state entities such as NTPC Ltd (India's largest power producer), Rural Electrification Corp. and the Indian Renewable Energy Development Agency.

Partnerships are key, evidenced by three significant green growth initiatives active in India. Led by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), GIZ and UNEP, the Partnership for Action on Green Economy (PAGE) initiative is working across seven countries, including India. The project is working to improve knowledge and implementation capacity regarding approaches and tools to adopt green growth. Another donor funded, green growth programme is funded by GGGI which is supporting the Government of India's 'Indian Water Project'. This project is assessing water resource management systems, assessing ground and surface water challenges and analysing water-centric systems. TERI's 'Lighting a Billion Lives' (LaBL) programme is also supporting the greening of India's economy. LaBL is replacing kerosene-based lighting with cleaner alternatives through the promotion of rural entrepreneurship and the setting up of micro-solar enterprises across 22 states in India.

As of November 2016, India has 16 km² of the world's most widely used green building rating system LEED-certified buildings.²

2.3.2. Green Growth in China

China is committed to transitioning to a green economy, and leads the world in both visionary national policy and private sector manufacturing for renewable energy.

In 1978, China initiated market reforms which resulted in a shift from a centrally-planned to a market-based economy. This was accompanied by extensive economic and social development, with GDP growth averaging 9.79% per year between 1989 and 2016. This has contributed to lifting more than 800 million people out of poverty. Economic growth has been driven by rapid industrialisation, intensified agricultural production and urbanisation which have challenged environmental sustainability. Yet, high demand for energy and raw materials increased pressure on ecosystems and affected health across the population. Given its heavy reliance on coal (accounting for 67% of the country's total primary energy consumption in 2012), China became the world's largest carbon dioxide emitter in 2006, and in 2012 it accounted for 29% of global carbon dioxide emissions.

China has committed to transition to a green economy. The 11th Five-Year Plan (2006-2010) allocated a significant share of investments to "green" sectors, with an emphasis on renewable energy and energy efficiency. This Plan made environmental targets binding for the first time, including a 10% reduction in sulphur dioxide emissions and a 20% reduction in energy intensity. The government also committed itself to producing 16% of its primary energy from renewable sources by 2020. This has seen continued traction in the 12th Five-Year Plan, in which commitments include investing in natural resource management, with the aim of creating one million new forestry jobs and reducing rural poverty (OECD, 2013).

Box 2 China's National Green Growth Policies

UNFCCC COP 21 NDC, 2015

12th Five-Year Plan for the Environmental Health Work of National Environmental Protection, 2011

China's National Report on Sustainable Development

China Emissions Trading Schemes, 2014

China's Renewable Energy Law

China has been recognised in its efforts to promote renewable energy. In terms of wind energy, China has encouraged local wind turbine manufacturing through adopting policies to promote joint-ventures and technology transfers and has also mandated the use of locally made wind turbines. The Government has also subsidised research and development efforts with wind energy. In terms of solar energy, China has targeted an increase in capacity from 1.8 GW to 20 GW by 2020. It is also the world's largest producer of solar water heaters.

China has also introduced innovative financing mechanisms to promote private financing in green growth. This is on top of laws that offer a variety of financial incentives, such as a national fund to foster renewable energy development, and discounted lending and tax preferences for renewable energy projects. The China Utility-based Energy Efficiency Finance (CHUEE) Programme, initiated in 2006, is a successful example of the use of guarantees to support private investment in energy efficiency measures. In cooperation with the Ministry of Finance, CHUEE set up a loan loss reserve fund (LLRF), funded by the IFC and GEF, to share the financial risks Chinese commercial banks face by guaranteeing loans they make to energy management companies who finance upgrades for their

² <http://www.prnewswire.com/news-releases/usgbc-announces-international-ranking-of-top-10-countries-for-leed-300378256.html>

customers. The LLRF refunds 75% of the first 10% of the loan amount in case of default, and 40% of any losses on the remaining 90% of the loan amount. The fund has been set up with US\$50 million contributed by the GEF and IFC, which the programme aims to use to mobilise US\$0.7-1.45 billion for energy efficiency project financing from the private sector. As of December 2010, 142 sub-projects had been financed under CHUEE by US\$573 million of loans, backed by the risk sharing facility. This is estimated to have leveraged an estimated total of US\$1.18 billion, with emission savings of 2.3mtCO₂ per year. The impact was also reflected in the growth and quality of the energy efficiency loan portfolio of the participating banks (IIP 2012).

2.4. Current Status of Green Growth in Bangladesh

Green growth is a term widely used in Bangladesh, but poorly defined in national strategies and planning frameworks. The Government of Bangladesh does not have a separate green growth strategy, but rather a number of initiatives that collectively contribute to framing the government's approach. At the highest level, the Supreme Constitution of the country articulates (under Article 18A) that the state shall endeavour to protect and improve the environment and to preserve and safeguard the natural resources, bio-diversity, wetlands, forests and wildlife for present and future citizens. Furthermore, Bangladesh maintains a firm external commitment to mainstreaming the SDGs and climate issues in policy frameworks.

From an institutional perspective, environmental policy, laws and regulations are managed through the MoEF. The Five-Year Plan, initiated by the Planning Commission, activated the National Environmental Council, which is a cross-sector body headed by the MoEF. In addition, environment committees have been established at Division, District and *Upazila* (sub-units of district) levels. There are a number of frameworks that seek to protect the environment and promote good practice in sustainable economic development.

The National Sustainable Development Strategy (NSDS, 2008) is the first document that brought together many of the green growth concepts. The strategy seeks to 'ensure sustained economic growth, environmental protection and social justice which implies improvement of livelihood options of the people, reduction of poverty; ensuring wise use of natural resources, good governance and people's participation'. The NSDS has four priority areas— sustainable economic development, agriculture and rural development, social security and protection, and environment and natural resource management.

A number of core plans and strategies address various aspects of green growth. Economic growth and development policies as set out in both the Seventh Five-Year Plan (2015–2020) and the Perspective Plan Bangladesh (2010–2021), including explicit "green" elements. The Five Year Plan document articulates promotion of green growth and sustainable development. This Plan recognises the negative externalities of industrialisation and rapid economic growth though visible declines in biodiversity, deforestation, destruction of wetlands and fisheries, soil nutrient depletion, desertification and salinity intrusion. Further, the Plan acknowledges that there is a 'window of opportunity' for halting the process of environmental degradation through pursuing strategic actions that generate green growth and minimise the adverse effects of climate change simultaneously.

The Perspective Plan of Bangladesh (2010–2021), popularly known as Vision 2021, sets out a long-term development strategy and seeks to balance the opportunities for environmental improvement against economic growth and poverty reduction concerns. Vision 2021 seeks to promote the mainstreaming of environment, climate change and disaster management across government policies to explicitly benefit the poor. From a sector perspective, Vision 2021 works to align sector policies with its priorities such as promoting biodiversity through a National Assessment and Action Programme, afforestation in the coastal areas to protect against storm surge, integrated coastal zone management and land desalination.

Bangladesh also made green investments from its own resources through the Bangladesh Bank's reform initiative (2012), sets out a range of support measures to enable green growth. First, developing a green banking cell, and introducing a refinance scheme worth BDT 2 billion (USD \$25 million) to refinance loans for effluent treatment plants, solar panels, biogas plants and Hybrid

Hoffman Kiln (HHK) technology in the brick-making industry at a 5% interest rate. Second, on-lending by banks and other financial institutions is provided at a 9% rate (compared to an average 13% market rate). Third, it also integrates an assessment of green management when awarding ratings under the CAMELS system.

An estimated 7% of public expenditure contributes to green growth activities. From a medium-term budgeting perspective, the Government of Bangladesh has developed a Climate Public Expenditure and Institutional Review (CPEIR) (GoB, 2012) and is currently developing a climate fiscal framework, while UNDP is supporting the government in mainstreaming an environmental and climate change coding methodology into the budget system to allow for the quantifying and tracking of relevant fiscal expenditures. The initial assessment detailed in the CPEIR indicated that approximately seven percent of total public expenditure contributed to activities that have implications for green growth. The introduction of a climate budget code is creating a level of transparency, but there is scarce evidence as to whether this information has improved policy-making or the allocation of finance.

There were early examples of mainstreaming, such as the Coastal Zone Policy and National Water Management Plan, but this process was consolidated through the NAPA (2005) and more recently the Bangladesh Climate Change Strategy and Action Plan (BCCSAP, 2009). The strategy contains 44 programmes formulated around six themes: food security/ social protection/ health, comprehensive disaster management, infrastructure, research/ knowledge management, mitigation/ low carbon development, and capacity building/ institutional strengthening. One area of specific green growth alignment is the commitment to better understand the macroeconomic impacts of climate change on the economy of Bangladesh, although it is not clear what work has been undertaken as a result. There is also a discussion about improving the resilience of agricultural systems to ensure economic development and food security.

This overarching policy framework supports a number of programmatic and financing structures. The BCCSAP saw the operationalisation of a National Climate Change Fund, the BCTF. The Bangladesh Climate Change Resilience Fund (BCCRF) was also established as a multi-donor trust fund with World Bank as its Trustee to finance projects for climate resilience building.

3. Review of Policies, Laws and Regulations

This chapter presents an objective analysis of Bangladesh's key national policies that have implications for green growth. It provides a snapshot review of policies that are pertinent to high growth sectors, as well as cross-cutting sectors such as land, water and environment. Bangladesh is a policy rich country where the laws and rules are already in place in most of the cases. This is primarily due to the colonial legacy of the British rule and also due to its heavy dependence on donor funding for continuation of development activities. Environmental policies formulated in the post-millennium era in Bangladesh not only strive to meet international obligations, but also ensure sustainable and equitable development for the nation and many of them contain green growth components.

While many argue that policies in Bangladesh are some of the best in the world, they are not implemented judiciously. This clearly indicates that some of the policies, laws and regulations are not fully owned by the government. They are made as a part of the general prescription by donors and other pressure groups, but there is lack of political commitment and the country's bureaucracy is unable to implement them. A major setback in Bangladesh is the lack of reliable information and statistics, which are precursors to formulation, implementation and monitoring the impact of policies (PAGE, 2016). The key sectoral policies, such as energy and agriculture have to be systematically reviewed, periodically, in order to incorporate environmental predicaments. Moreover, there has to be opportunities for synergising the policy objectives and ensuring coordination between sectoral, environmental and social dimensions, to ensure fruitful coordination between all actors.

The assessment of the policies in this section compliments the overall objectives of the GGD, through identification of opportunities and gaps in pertinent development policies and prioritising suggestions for shifting towards a greener economy. It is based on a review of existing literature, especially the relevant policies, legislation and strategies of the Government. A total of 40 key policy and planning documents were reviewed for this study. Along with that, 17 Key Informant Interviews (KII) were conducted for obtaining first-hand information from policy makers, practitioners, researchers, development partners and representatives of the civil society active in Bangladesh. It was crucial for the BaGGD to review the current policies to understand the trends in development and whether or not the policies are conducive for green growth.

3.1. Principles and Indicators for Policy Design in Bangladesh

The following matrix presents a summary, in particular the principles, messages, options and statements laid down by key national policies and their relationship with green growth and indicators for evaluating the successful implementation of policies. The policies have been mapped to obtain a better understanding of the sectors that significantly contribute to environmental degradation, under the current regulatory and institutional regime in Bangladesh. The principles and indicators for policy design in Bangladesh (presented in the following matrix) are indicative of the Government's commitments towards pursuing a green growth pathway and mainstreaming it into key national plans and policies. The indicators for evaluation (extracted from policies) illustrate the implementation of policies, i.e. what has been achieved so far and how our national planning documents have incorporated green growth elements. Follow-up activities and to track the implementation of policies using the indicators for evaluation need to be perpetuated, in order to ensure continuity of the initiatives.

Policy	Principles/Objectives (related to Green Growth)	Indicators for Evaluation (quantitative and qualitative)
National Water Policy, 1999	Manage all sources of water in a sustainable and equitable manner; decentralise the management of water resources and enhance the role of women as managers; implement a regulatory framework that considers social and environmental dimensions; and improve private sector investment in water resource development.	<ul style="list-style-type: none"> • 100% of the population have access to safe water, including coastal and disaster prone areas • Water is priced efficiently and use of tools such as PES are in use • Private sector is investing in water resource development • Women's burden as water managers/carriers is reduced • Environmental considerations for biodiversity and water quality are prioritised, especially for FCD projects
Coastal Zone Policy, 2005	Economic growth through development of small and medium enterprises; reduction of vulnerabilities through structural measures; sustainable management of natural resources such as land, water, fisheries and conservation of critical ecosystems; pollution control and adaptation to climate change; implementing renewable energy technologies in remote, off shore islands community empowerment, gender equity and awareness creation at all levels by partnering with NGOs and private sector.	<ul style="list-style-type: none"> • Integration through harmonisation and coordination of national policies done • Decentralisation and development of the private sector • Co-management and participatory decision making with coastal communities, including women • Conservation of natural resources and sustainable management for livelihood sustenance • Use of renewable energy and investment in clean technologies for power generation
National Agricultural Extension Policy, 2015	Production of primary food crops; increased crop diversification; access to technologies; agro-ecological zoning for safeguarding biodiversity and ecosystem integrity; information and markets; delineate disaster prone and environmentally critical areas; mitigation of climate change induced vulnerabilities and poverty alleviation; balanced use of micronutrients and promotion of organic fertiliser application; address the key challenges of the current agricultural production systems such as natural disasters, population pressures, degrading soil health, food safety, scarcity of water, etc.	<ul style="list-style-type: none"> • Implementation of a 'pluralistic and decentralised' approach by enhancing outreach to farmers • Collaborative efforts of public, non-government and private sector is in place • Trained and capacitated extension personnel, able to cope with climatic issues • Good Agricultural Practices (GAP) guide in use • Improved technology for hotspot areas and use of ICT for linking marketing and production systems in place • Strengthened PPPs in commercial production, processing and marketing, agro-technology extension services and so on

Policy	Principles/Objectives (related to Green Growth)	Indicators for Evaluation (quantitative and qualitative)
		<ul style="list-style-type: none"> • Specialist Extension Service Providers deployed for specific climate resilient cropping patterns like the floating gardens. • Urban gardening (horticulture) and organic farming using IPM and other environmentally friendly bio-control agents are practiced
Draft National Forestry Policy, 2016	Stabilise forest cover to at least 20% of the country's geographical area and enhance resilience to climate change; create income generating opportunities for forest communities; promote innovative co-management and participatory forestry; strengthen biodiversity conservation by reducing forest degradation and deforestation (in situ conservation); and creation of protected areas (ex situ conservation).	<ul style="list-style-type: none"> • Increased number of conservation partnerships involving local communities and the private sector • Suitable incentives to motivate forestry officials and involve local communities in decision-making are provided • Approaches like 'Payment for Ecosystem Services' (PES) for evaluation of forestry resources are used • Changed mindsets of policy makers, not just viewing forests as a source of timber revenue but a reservoir of biodiversity, providing environmental services • The role of forests in climate stabilisation (adaptation and mitigation) recognised
Integrated Small Irrigation Policy 2014	Develop wetlands, canals, rivulets, stream, burrow pits for irrigation; introduce ground water zoning, reduce dependency on ground water for irrigation, adopt alternate drying and wetting for irrigation practice, introduce rubber dam to ensure water availability in both downstream and upstream for irrigation; safeguard aquatic biodiversity and maintain ecosystem integrity while surface water is used for irrigation.	<ul style="list-style-type: none"> • Ground water abstraction for irrigation reduced • Increased investment for infrastructure building for preservation of surface water • Wetlands and natural water bodies are not dried up because of crop irrigation • Biodiversity increased in natural water bodies • Rubber dams are constructed instead of gravity flow structure
Renewable Energy Policy of Bangladesh, 2008	Bridge the gap between urban and rural areas; facilitate private sector investment; promote environment friendly use; enable institutions and build capacity in the power sector on innovative mechanisms such as CDM.	<ul style="list-style-type: none"> • An institution named Sustainable and Renewable Energy Development Authority (SREDA) has been established to promote awareness and capacity building • Demonstration of new technologies and business models, market opportunities, financing mechanisms are established • Renewable energy projects in both public and private sector will are exempt from corporate tax for up to 5 years • SREDA provides subsidies to utilise solar, wind or biomass energy projects and encourage private sector participation through joint ventures
Integrated Multi-Modal Transport Policy, 2008	Reduce environmental effects, achieve equity and social security and improve fuel efficiency; land use planning, making transport fairer and accessible for all sections of the society, including women.	<ul style="list-style-type: none"> • Government investment in rail and inland water transport is boosted • Private sector participation is enhanced, especially in investment and operations for all modes including land, air and water • Environment, social and resettlement impact analyses are mandatory and carried out for all significant transport and road construction projects • Use of CNG and solar technologies are in operation in the transportation sector • Safety and security of pedestrians and urban commuters ensured through awareness initiatives

Policy	Principles/Objectives (related to Green Growth)	Indicators for Evaluation (quantitative and qualitative)
National Industry Policy, 2016	Environmentally benign industrialisation, risk reduction and reducing dependency on imports; increase productivity and skills, promote export-oriented industries; use technological innovation for cleaner production processes; and encourage the participation of women in this sector.	<ul style="list-style-type: none"> • Tax exemptions provided to priority industries and cash incentives to high priority sectors such as RMG • For industries manufacturing alternatives to fuel, the import of solar panels is duty free • Incentives given to industries that use renewable energy in their manufacturing processes as well as environmentally friendly technologies and equipment • Special incentives for infrastructural projects such as transport and production of electricity, using cleaner production technologies • Minimum 15% involvement of women in industries, with special provisions and incentives for engaging women entrepreneurs in SMEs • Installation of ETPs and CETPs for industries and punishment for offenders as per the legal and institutional arrangements • Promoting R&D and stimulating innovation through CDM, for reducing risks from disasters and adapting to climate change
Bangladesh Environment Conservation Act, 1995 and Amendments, 2010	Overriding effect, rules and directions issued can supersede any other law; power to declare Ecologically Critical Areas, impose restrictions on vehicles emitting injurious smoke and discharge of environmental pollutants; issuance of clearance certificates and imposition of penalties in the form of fines and imprisonment for violation of environmental laws.	<ul style="list-style-type: none"> • For all projects and industrial activities, the DoE is mandated to provide Environmental Clearance Certificates (ECC) • Water reservoirs are conserved, with the application of all other existing legal provisions when it comes to encroachment of wetlands • The DoE exercises its rights to issue punishment, fines and imprisonment for offenders • Due diligence and public opinion/endorsement of projects are a mandatory part of the EMPs and information is shared in the public domain • DG of DoE uses the authority to lodge PIL (Public Interest Litigation) cases on behalf of affected communities or individuals • Formalisation of the declaration of Ecologically Critical Areas through legal recognition
Intended Nationally Determined Contribution (INDC), 2015	Includes both conditional and unconditional mitigation actions in three sectors, namely power, transport and industry; 'synergies and co-benefits' of mitigation actions, such as the economic benefits from developing green jobs.	<ul style="list-style-type: none"> • Unconditional contribution in terms of reduction of GHG emissions by 5% from Business As Usual (BAU) levels by 2030 • Conditional reduction of GHG emissions by 15%, subject to appropriate international support in the form of finance, investment, technology development and transfer and capacity building • Conditional mitigation actions such as use of super-critical technology in coal fired power plants; modal shift from road to rail and energy audits to incentivise energy efficiency are in place • Conditional action based contributions like landfill gas capture and power generation, promotion of energy efficiency policies and reforestation and

Policy	Principles/Objectives (related to Green Growth)	Indicators for Evaluation (quantitative and qualitative)
		<ul style="list-style-type: none"> • afforestation are implemented • Combination of the country's own funds such as the ADP, along with international climate funds are being used
National Disaster Management Policy, 2008	Mainstreaming DRR activities within the Government, NGOs and private sector by making it an integral part of national and sectoral policy; reduce people's vulnerability due to natural, environmental and human induced hazards, especially the poor and disadvantaged.	<ul style="list-style-type: none"> • Strengthened disaster management system and paradigm shift from 'response and relief' to 'disaster risk reduction' (DRR) through capacity building, skill and knowledge development • The Standing Order on Disasters implemented to create a well-defined institutional mechanism for disaster management across all agencies and at both national and sub-national levels • 'Disaster Risk Identification and Mitigation Options' (DRIMO) used as a mandatory tool/element for all public and private sector investments
Monetary Policy Statement, July – December 2016	To continue to support inclusive, environmentally sustainable growth, addressing its developmental role in the longer term risks to micro-financial stability, through its monetary and financial policies	<ul style="list-style-type: none"> • Electricity, gas and infrastructure facilities are provided to all businesses • New financing opportunities in diverse areas of SME and agricultural clientele segments are under exploration • For 'greening' initiatives in the textiles and leather industries, Bangladesh Bank has provided loans from its own funds to private sector entities
Perspective Plan of Bangladesh: Vision 2021	Balance the opportunities for environmental improvement against economic growth and poverty reduction concerns; mainstreaming environment, climate change and disaster management across government policies to benefit the poor; promote biodiversity through a National Assessment and Action Programme; afforestation in the coastal areas to protect against storm surge; integrated coastal zone management and land desalinisation.	<ul style="list-style-type: none"> • The negative externalities of industrialisation and growth are reduced through the use of renewable energy and efficient technologies • The biodiversity, forestry, wetlands and fisheries are conserved through community based, participatory programmes • Soil nutrient depletion, desertification and salinity intrusion are countered through appropriate measures • Broad-based growth and food security ensured through generation of employment in the primary sector • Skill intensive, export-oriented dynamic industrial sector is in place • Disparities between regions (urban and rural) is bridged through intensive development programming • All or most of the population have secure and affordable access to energy • Sound infrastructures such as efficiently operated and maintained buildings, transportation systems, supplies of water, electricity and power, telecommunications, postal and waste management services • Environmental and climate change concerns (adaptation/mitigation) are adequately addressed by government and non-government actors
7th Five Year Plan (FYP) 2016-2020	Attain good governance in environmental sustainability; eradicate extreme poverty and achieve national food security; ensure cities are sustainable and more efficient, with	<ul style="list-style-type: none"> • Ecologically healthy native forests are restored and protected in all public forest lands (about 16% of land)

Policy	Principles/Objectives (related to Green Growth)	Indicators for Evaluation (quantitative and qualitative)
	development following appropriately structured plans; preserve agricultural land and to ensure food security with minimum environmental degradation; hold water of wetlands and rivers in dry season; meet national air and water quality standards; achieve tree cover over 20% of the land surface (with density >70%).	<ul style="list-style-type: none"> • No new extinctions of globally and nationally threatened species have happened • A 'low carbon strategy' is formulated and implemented, to meet energy demands of development • Potential economic losses due to climate change (particularly from floods, droughts and salinity) are reduced through proper planning, adaptation and mitigation measures in practice • Sustainable industrialisation is accelerated through policy reforms and developing green industries • Enhanced understanding, knowledge, capacity and coordination of the implementing authorities • Gender sensitivity integrated in all project designs • Capacity development across all the sectors, especially on energy efficient technologies (green bricks, 4R, NAMAs) • Implementation of relevant strategies from other on-going development initiatives such as the Bangladesh Delta Plan 2100

3.2. Incentives and Penalties

The following table summarises the policy options, incentives and penalties stated in the national policies of Bangladesh, which are applicable for green growth sectors. Both incentives and penalties should ideally be there to promote green growth. Penalties are good for control, but this should not be a target. In order to motivate the private sector, there needs to be strong regulatory mechanism as well as incentives in the form of financial subsidies and tax breaks. The Government can provide incentives such as start-up funds, tax rebates, duty free import of cleaner technology and changes in economic policies like introducing feed in tariff. "Green Investments" can be promoted by applying the 'carrot and stick' approach and the government needs to demonstrate and create positive examples for the private sector to follow.

Policy	Incentives	Penalties
National Water Policy, 1999		<ul style="list-style-type: none"> • Zoning regulations • Effluent disposal • Industrial polluters pay for the clean-up of the water bodies enforcement of the 'Polluter Pays Principle' • Fair pricing of this commodity
Water Law of Bangladesh, 2013		<ul style="list-style-type: none"> • Fines and punishment of the non-compliant users

National Agricultural Extension Policy, 2015	<ul style="list-style-type: none"> Improved technology for hotspot areas Use of ICT for linking marketing and production systems Specialist Extension Service Providers for climate resilient cropping patterns Fostering forward linkages like processing, packaging and marketing of agricultural products 	
National Agriculture Policy, 1999	<ul style="list-style-type: none"> 'Soil Health Card' currently for monitoring the health of the agricultural lands Farmer Field Schools in underdeveloped areas 	
National Forestry Policy, 2016	<ul style="list-style-type: none"> Protect forest ecosystems by providing suitable incentives to motivate forestry officials Involve local communities in decision-making Targets small and medium forest based enterprises to be financed by public and private institutions Create linkages with the private sector for development of NTFPs 	<ul style="list-style-type: none"> The wildlife Crime Control Unit - forest based crimes through issuing fine and punishments
National Fisheries Policy, 1998		<ul style="list-style-type: none"> Prohibits the discharge of harmful municipal and industrial wastes Reserves the right to cancel licenses for commercial operators
Renewable Energy Policy of Bangladesh, 2008	<ul style="list-style-type: none"> Renewable energy projects in both public and private sector will be exempt from corporate tax for up to 5 years Equipment will also be exempt from VAT SREDA will provide subsidies to utilise solar, wind or biomass energy projects Encourage private sector participation through joint ventures 	
Bangladesh Power Sector Roadmap: An Update, 2011	<ul style="list-style-type: none"> Providing incentives for setting up solar panel producing industry, developing skilled personnel trained in renewable energy Determining rational pricing for sustainable development of energy sector 	
Integrated Multi-Modal Transport Policy, 2008	<ul style="list-style-type: none"> The use of CNG and solar technologies in the transportation sector 	
National	<ul style="list-style-type: none"> Investment incentives for national investors, foreigners and 	<ul style="list-style-type: none"> It has legalised the installation of ETPs and CETPs for industries and offenders

Industry Policy, 2016	<p>non-resident Bangladeshis</p> <ul style="list-style-type: none"> • Tax exemptions to priority industries and cash incentives to high priority sectors such as RMG • Industries manufacturing alternatives to fuel, the import of solar panels will become duty free • Infrastructural projects such as transport and production of electricity, special incentives will be given • Incentives for engaging 15% women as entrepreneurs in SMEs 	will be punished as per the legal and institutional arrangements.
Municipality Law of Bangladesh, 2000		<ul style="list-style-type: none"> • Open spaces and water bodies cannot be leased; any development on these areas is a punishable offense • For company or commercial enterprise, encroachment of open spaces will be recognised as a cognisable offence and penalised
Ecologically Critical Areas (ECA) Rules, 2016		<ul style="list-style-type: none"> • Evaluating environmental and development projects • Taking legal action against perpetrators who inflict harm upon nature and natural resources
Bangladesh Environment Conservation Act, 1995 and Amendments, 2010		<ul style="list-style-type: none"> • Government authorities can declare Ecologically Critical Areas • Impose restrictions on vehicles emitting injurious smoke and discharge of environmental pollutants • Issuance of clearance certificates and imposition of penalties in the form of fines and imprisonment • Exhaustive list of the punishment, fines and imprisonment details is provided by the Amendment • Due diligence and public opinion/endorsement of projects a mandatory part of the EMPs • DG of DoE can lodge PIL (Public Interest Litigation) cases on behalf of affected communities or individuals.
Bangladesh Environment Conservation Rules, 1997		<ul style="list-style-type: none"> • DG of DoE can take measures related to vehicles emitting smoke that is injurious to health and the environment • The four categories of industries: Green, Orange – A, Orange – B and Red.
Brick Making and Kiln Construction	<ul style="list-style-type: none"> • Kilns and bricks that use cleaner technologies and are less harmful for the environment, recommending the production of hollow bricks for at least 50% of the bricks manufactured. 	<ul style="list-style-type: none"> • Location of the brick kilns is restricted; kilns cannot be built near residential areas, within boundaries of the City Corporations or sanctuaries, rivers and agricultural plots.

Act, 2013		<ul style="list-style-type: none"> • Use of fuelwood or coal is forbidden • The investigative committee formed by the local administration has the right to temporarily halt or cancel the license of the manufacturers or offenders
Environment Court Act, 2000		<ul style="list-style-type: none"> • The Environment Court Act is a powerful tool to punish environmental offence and crime, as notwithstanding anything contained to the contrary to any other existing law, the provision of this Act will prevail.
National Disaster Management Policy, 2008	<ul style="list-style-type: none"> • One of the priority activities mentioned in the policy is to develop 'Disaster Risk Identification and Mitigation Options' (DRIMO) and include that as a mandatory element for all public and private sector investments 	
Disaster Management Act of Bangladesh, 2012		<ul style="list-style-type: none"> • Authority to relay disaster warnings and/or awareness message through mass media such as print, radio, telecoms and satellite networks • Non-compliance can be penalised as an illegal activity. • Price hikes for essential items during the post-disaster period is also a punishable criminal offence.
Monetary Policy Statement, July – December 2016	<ul style="list-style-type: none"> • In order to ensure sustained economic growth, providing electricity, gas and infrastructure to businesses is a priority area for BB • For 'greening' initiatives in the textiles and leather industries, BB provides loans from its own funds to private sector entities. 	
7th Five Year Plan (FYP) 2016-2020, 2015	<ul style="list-style-type: none"> • To reduce greenhouse gases from the manufacturing sector and prepare NAMAs for specific sectors such as cement. • Promotion of green bricks known as Hybrid Hoffman Kilns has been recommended to improve the air quality • Managing E-wastes - preparation of an 'action plan' for the nation. • Both solid and liquid waste, the 4R policy (Reduce, Reuse, Recycle and Reclaim) has been re-introduced. 	<ul style="list-style-type: none"> • Innovative mechanisms such as CDM, REDD and PES are pricing policies that are endorsed for future adoption

Since the new millennium there has been a paradigm shift in terms of policy formulation and amendments in Bangladesh. All policies and plans were geared towards meeting the MDGs and more recently the SDGs from 2015. On one hand, punitive measures are suggested for non-compliant polluting industries in Bangladesh and on the other, incentives are provided for industries that are doing cleaner production methods or renewable energy (solar). However, there are still gaps in understanding and knowledge and there is a need for capacity building on green growth issues across all sectors. Fruitful engagement of the private sector and provision of fiscal incentives can be instrumental in ensuring green growth and sustainability.

3.3. Inequality, Environment and Informality

The design of policies has to be inclusive, so that growth addresses the issues of poverty and inequality and the benefits of growth are reaped by all sections of the society. This is especially important for a country like Bangladesh, where poverty and inequality are omnipresent and environmental issues are not always prioritised. It must be kept in mind that policies have to be complemented with capacity of institutions and individuals implementing them, a conducive environment with stable funding, as well as a good governance regime that fosters positive change and transition towards green growth. In addition, there has to be fruitful engagement of the private sector as the engine of growth, to generate employment and bring social changes.

The following table depicts the coverage of three key issues (Inequality, Environment and Informality) in the policies of Bangladesh. The tick marks (√) indicate that the issues of inequality, environment and informality are adequately addressed by the policies and cross marks (x) mean that they are not deliberated by the policies. Environment refers to nature and natural resources in the policies, inequality refers to poverty, gender, remote access area coverage and informality means private sector involvement.

Key Growth Sector/s	Relevant Policies/Strategies	Inequality	Environment	Informality
Land and Water	National Water Policy, 1999	√	√	√
	Water Law of Bangladesh, 2013	√	√	x
	Haor and Wetland Law of Bangladesh, 2013	√	√	x
	Coastal Zone Policy, 2005	√	√	√
Agriculture, Forestry and Fisheries	National Agricultural Extension Policy, 2015	√	√	√
	National Agriculture Policy, 1999	√	√	√
	Draft National Forestry Policy, 2016	√	√	√
	Social Forestry Rules, 2010	√		x
	National Shrimp Policy, 2014	√	√	x
	National Fisheries Policy, 1998	√	√	√
Energy	National Energy Policy, 2005	√	√	√
	Renewable Energy Policy of Bangladesh, 2008	√	√	√
	Bangladesh Power Sector Roadmap: An Update, 2011	√	√	x

Key Growth Sector/s	Relevant Policies/Strategies	Inequality	Environment	Informality
Transport and Tourism	National Land Transport Policy, 2004	√	√	√
	Integrated Multi-Modal Transport Policy, 2008	√	√	×
	Motor Vehicles Ordinance 1983	×	√	×
	National Tourism Policy, 2010	√	√	√
Industry and Infrastructure	National Industry Policy, 2016	√	√	√
	Hazardous Waste and Ship Breaking Waste Management Regulations, 2011	×	√	×
	National Building Code of Bangladesh, 1996	×	√	×
	Municipality Law of Bangladesh, 2000	×	√	×
Environment and Climate Change	Ecologically Critical Areas (ECA) Rules, 2016	√	√	√
	Bangladesh Environment Conservation Act, 1995 and Amendments, 2015	×	√	×
	Bangladesh Environment Conservation Rules (ECR), 1997	√	√	√
	National Disaster Management Policy, 2008	√	√	√
	Disaster Management Act of Bangladesh, 2012	√	×	√
Overarching Policy Documents	Monetary Policy Statement, July – December 2016	√	√	√
	Perspective Plan of Bangladesh: Vision 2021	√	√	√
	7 th Five Year Plan (FYP) 2016-2020, 2015	√	√	√
	National Sustainable Development Strategy (NSDS)	√	√	√

3.4. Policy insights for green growth from public sector representatives

The following insights and pointers for greening the economy of Bangladesh have been collated from interviews with experts, policy makers, representatives of government and non-government organisations, researchers, planners, academics, etc. We use the four branches of the BaGGD to group these insights:

- > Inertia
- > Government Failure
- > Low Social Returns
- > Market Failure

3.4.1. Inertia

Business as usual must change, policies must be implemented and great policy should not simply sit on statute books. Respondents suggested that involvement of the private sector is necessary for green growth and there needs to be a 'Master Plan' that identifies the role of the government agencies and private institutions, and to bring these bodies together to discuss, agree, design the necessary transformation of policy and action. The involvement of regulatory bodies such as environmental institutions, SREDA, Bangladesh Bank, Insurance Development and Regulatory Authority (IDRA) are essential since they can catalyse the involvement of the private sector.

Likewise, the revised Strategic Transport Plan 2016 which prioritises investments in mass public transport such as the metro rail could reduce air pollution. Yet, the institutional structure for transport is acknowledged to be complex, and many respondents fear that for this reason the progressive Transport Plan will not be fully implemented.

On green infrastructure, respondents felt that there is considerable policy but little implementation. They agreed that strict implementation of the building codes must be ensured by the authorities. At the moment these design options do not exist, and a transformation is needed to ensure delivery of new buildings with "greener" designs, where use of sunlight, wind flow, doors and windows, façade, are optimised and there is resource efficiency in terms of use of energy consumption, use of hollow bricks, and optimal natural air flow and sunlight. Respondents suggested making visible policy impact by both increasing government investment in new green infrastructure and providing tangible incentives to nudge private sector investment in green infrastructures – such as relaxing property planning legislation to allow higher vertical expansion for compliant builders which it is hoped will reduce encroachment of khas (government owned) lands and water bodies. Another crucial step is encouraging retrofitting of older establishments to make them greener and more energy and materially efficient.

GoB finances are not considered to be transparent, and this needs to change. For instance, the MoF/ERD should set up a transparent monitoring mechanism for climate finance.

3.4.2. Government Failure

To catalyse green growth, respondents felt the GoB needs to provide incentives, and increase awareness-raising campaigns to include small entrepreneurs. For instance, small entrepreneurs can take loans from Bangladesh Bank and other sources such as SME foundation and PPP (under the Ministry of Industries) for switching to greener technologies.

A detailed public sector capacity assessment is needed to analyse suitability of current structure for the adoption of suitable technologies, enforcement of new environmental laws, technological innovation and human resource capacity building.

The Government has to take a stronger stance, enforcing new laws and shifting polluting industries such as leather to other locations or banning such industrial activities altogether or moving to new private sector Special Economic Zones. Policy options may include providing incentives to the factories that retrofit and penalising the factories that practice wasteful production methods.

Government needs to lead on green growth, own key issues, and coordinate strategic implementation across its system. Respondents felt there is lack of coordination between different government agencies and ministries. Institutional weaknesses and inter-agency coordination is an important missing element within GoB. Ministries have different plans and projects and they do not consult with one another. In addition, there is no mechanism for retaining 'institutional memory' as there are frequent changes in personnel and there is a tendency to "unfollow the predecessor".

3.4.3. Low Social Returns

Currently, growth and technology dispersion outside of large cities is weak according to respondents. Growth and technology needs to trickle-down to rural areas to really establish green growth, in the form of appropriate technologies such as solar home systems and solar irrigation. Creating demonstration projects with energy efficient technology and a conducive political environment for investment are necessary for green growth to take place.

Public Information campaigns need to be expanded and the message amplified. A lack of information to poorer people, rural populations and SMEs are the cause of much of the low uptake of green investment opportunities by these groups. This includes many simple low-technology solutions, that have strong green credentials. For instance, rainwater harvesting for ensuring water supply during dry season can lead to reduced extraction of groundwater resources.

3.4.4. Market Failure

Bangladesh is a great example of a country where there are many good policies, but a lack of implementation or regulation. This leads to unsustainable practices, for instance, solid waste, E-waste from computers, laptops and accessories remain unregulated in Bangladesh. Respondents felt this is a market failure, with a race-to-the-bottom resulting owing to the poor implementation of policies. A combination of more centralised policy – for instance, a 'Waste utilisation and management policy for Bangladesh' – backed with conspicuous incentives for private sector to act in accordance with green growth strategy is needed. This can ensure that different aspects of waste management, recovery and utilisation are in practice and followed by everyone. Examples of this could be the 3R model (Reduce, Reuse and Recycle) which should be adopted at large, especially for cities. Using recycled materials for building apartments and other construction is an example of waste recovery and can be prescribed for the construction sector.

Market information is lacking, and environmental data are needed to support decision-making by the private sector and support better strategy development by the public sector. The DoE has begun collating such data, however there is room for expanding this.

Energy efficient green technologies have the potential to curb the effects of climate change and facilitate adaptation in Bangladesh. In order to meet the challenges of a resource poor and densely populated country, green growth can provide realistic solutions through resource efficiency. Sustainable development of industries and infrastructures and reducing carbon emissions through clean technologies is an example of green growth that also helps the country adapt to the effects of climate change.

4. Constraints Analysis for Bangladesh

Conceptually bringing together economic growth and environmental protection is not new. It is rather a natural result of several threads of academic discourse and applied practice globally. Porter (1990)³ in his seminal paper on the Theory of Competitive Advantage suggested that there is scope for creating a national advantage by developing both market structure and related supporting institutions. Following this, it is argued that development strategies can also be focused to identify opportunities for investment and innovation in order to promote green growth. Environmental economics has been used to inform national policy and strategy globally since the late 1980s (see Pearce et al., 1989).

This project takes a novel approach to green growth by examining the current economic situation in Bangladesh using a methodology developed to identify the key constraints holding back economic growth from its full potential. Hausmann, Velasco and Rodrik (2005) developed a growth diagnostics methodology to satisfy demands from policymakers tasked with solving challenges with multiple interconnected causes, but limited financial and executive capacity. Their methodology concentrates on identifying binding constraints, through public and private policy analysis and implementation. They see low levels of private investments as the key issue⁴. Green Growth Diagnostics expand on this approach to provide an initial rapid prioritisation approach for policy makers considering green growth investments, innovation and integration, in advance of adopting a more comprehensive and analytical review of the constraints for each economic sector.

There are a range of constraints which can prevent the emergence of greener growth. These will vary from country to country and depend on environmental issues at stake. Figure 5 develops a diagnostic framework for identifying key constraints to greening growth. It characterises constraints to green growth as factors which limit returns to “green” investment and innovation i.e. those activities which can foster economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies.

One constraint which is likely to be common to all countries, regardless of its development stage, is regulatory certainty i.e. the extent to which governments articulate and ideally legislate a clear plan for closing the gap between private and social returns so that people can plan and act without too much risk that governments will change the rules of the game.

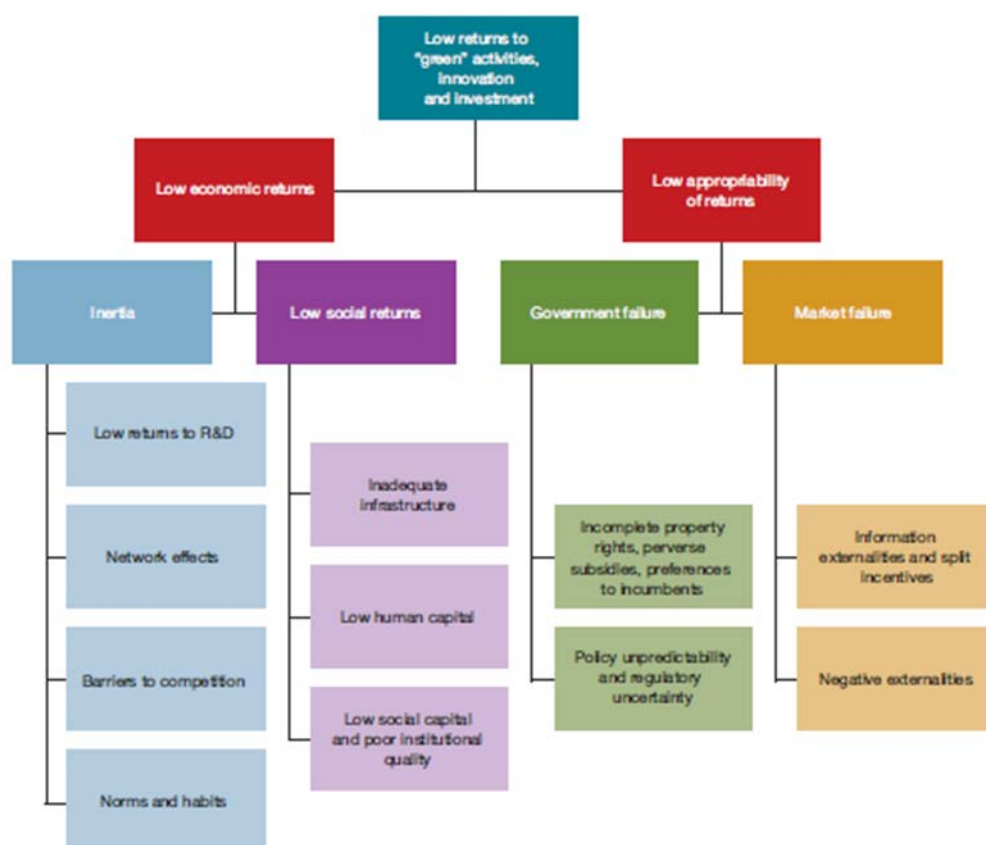
For green growth, this methodology has been adopted by many researchers and international organisations to drive understanding of the complexity of green growth and the needs to focus investment and resources. Primary is the OECD approach – see Figure 5.

³ Michael E Porter, (1990), The Competitive Advantage of Nations, Harvard Business Review, March-April.

⁴ Hausmann, R., Rodrik, D., and Velasco, A. (2005), Growth Diagnostics, The John F. Kennedy School of Government, Harvard University, Massachusetts.

Figure 5

Green growth diagnostic conceptualised by the OECD (2011)



This Green Growth Assessment of Bangladesh is one of the first steps to identify possibilities, constraints and strategies for pursuing green growth in Bangladesh for the private sector given the commitment of the Government of Bangladesh towards the global community without compromising on the economic growth agenda of the government. As part of our analysis, we have adapted the green growth diagnostic developed by the OECD to the Bangladesh context.

4.1. Survey analysis

In order to get a unique perspective and strengthen the base of this study, primary data was collected. A questionnaire was designed targeting a wide range of stakeholders from industrialists to government officials/policy makers as well as civil society. Six enumerators collected a total of 154 surveys from these groups. Within industries, high polluting sectors were chosen like RMG, plastic, battery, brick, textiles, leather, etc. to be covered by the survey.

Table 1 Summary of respondents by main sector of employment (n=154)

	Respondents	% of sample
Agriculture experts	8	5%
Architects	14	9%
Battery manufacturer	3	2%
Brick manufacturer	5	3%
Construction Sector	12	8%
CSO	31	20%
Electrical and Electronics	5	3%
Government Officer/Policy Makers	24	16%
Leather	8	5%
Others	7	5%
Plastic and rubber	4	3%
Poultry and Livestock Sector	4	3%
RMG Manufacturer	20	13%
Textile & Dyeing	9	6%
Grand Total	154	100%

We have split the private sector into garments and non-garments owing to both the importance of the garment sector to the economy of Bangladesh and its high potential to make investments in green technology.

Table 2 Summary of respondents by main employment (n=154)

	Total	% of sample
Garment sector	37	24%
Other Private Sector	40	26%
CSO	31	20%
Government Officer/Policy Makers	24	16%
Policy enablers	22	14%
Grand Total	154	100%

The questionnaire was tailored to ask different questions to different groups. Industrialists were asked about the size of their industry, what sort of energy efficient technologies they use in their factories, if any, how they dispose of their solid and liquid waste, if there is any ETP in the factory and other related environment questions. This was to understand what sort of green growth measures are already in place. Other questions for industrialists were related to their perceptions of green growth and what they felt the government should do to further the green technology within the industrial sector.

Government officials, policy makers, civil society (including NGOs and academics), architects and agricultural experts were all interviewed as experts in their field. Questions asked of these groups were geared more towards their understanding and awareness of green growth in their relevant fields. This included questions on the sort of progress has been made to date and what sort of changes needed to be made. They were also asked about the government's role and responsibility in aiding these changes. Analysis from the survey data is presented below.

Using the criteria for business size from the Industrial Policy of Bangladesh (GoB, 2016⁵), we split the private sector between large (asset value over 1 billion taka/ £10 million), medium (asset value 15-999 million taka/ £0.1-10 million) and small (asset value less than 15 million taka/ £0.1 million).⁶ Our survey has over-represented large and medium firms, but it is these that we anticipate are either considering investments in green technology or could be persuaded to consider in the near future if the enabling environment were improved.

Table 3 Firm size in the private sector

	Large (investment between 100 crore taka +)	Medium (investment between 1.5 crore and 100 crore taka)	Small (investment less than 1.5 crore Taka)	Total
Garments	13	21	3	37
Other Private Sector	21	14	5	40

The primary destination of products from our sample vividly contrasts the export-focused garment sector with the domestic focus of the rest of the private sector respondents.

Table 4 Geographical markets served by private sector respondents (n=78) from GGD survey (%)

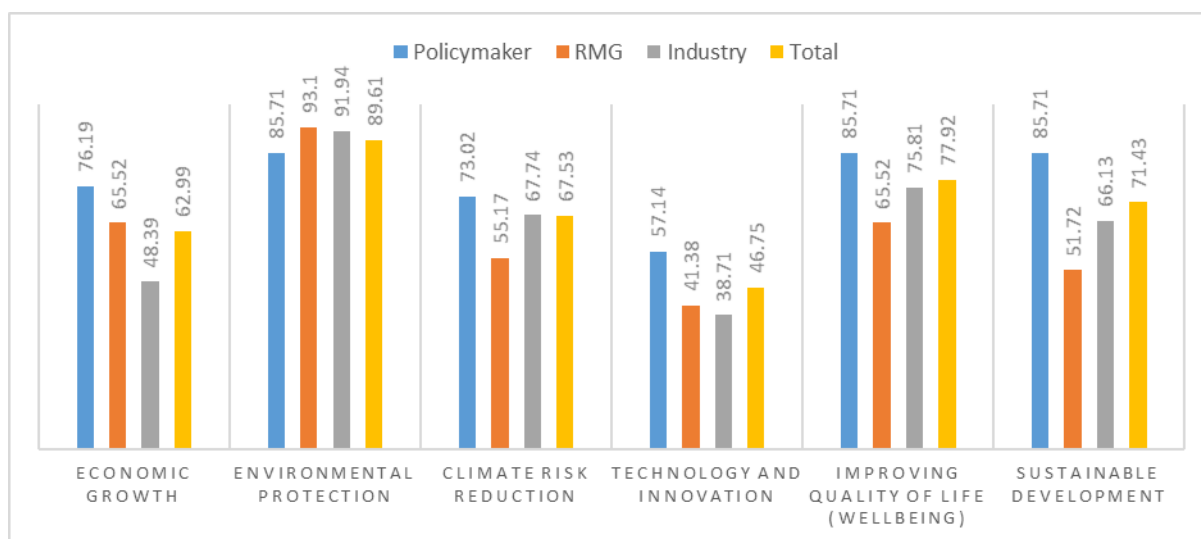
Market Destinations	RMG	Construction	Plastic & Electronics	Others	TOTAL (78)
Bangladesh	21	100	100	79	65
Asian Countries	10	-	25	32	16
Europe	90	6	17	47	49
India	14	12	17	16	14
USA	41	-	17	11	21
Africa	3	6	8	5	5
China	10	-	8	32	13
Australia and New Zealand	17	-	-	5	8
Canada	45	-	-	32	25
Russia	17	-	-	-	6
South America	28	-	-	-	10

On green growth, there are a range of perceptions, but it is clear that policy-makers are more aware, informed and keen to act than other respondents:

⁵ GoB, 2016. Industrial Policy of Bangladesh. Government of Bangladesh, Dhaka.

⁶ Asset value is defined in GoB (2016) as “value/replacement cost of durable resources other than land and factory buildings”.

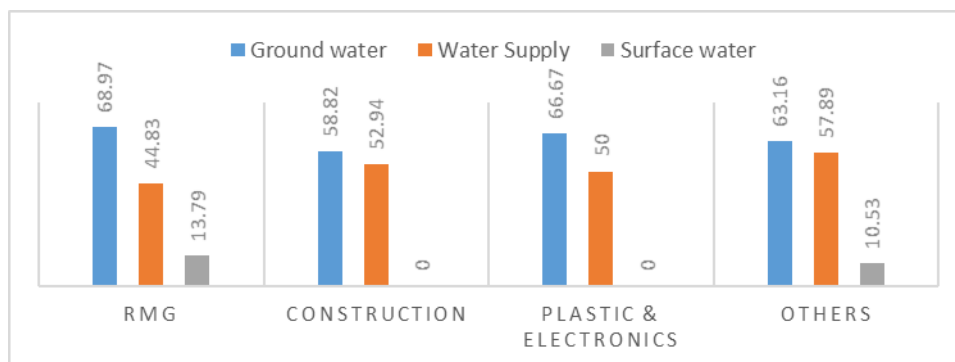
Figure 6 Perception of Pursuing Green Growth Strategy



We aimed to understand views on current reliance on the environment and investments made. Specifically, to understand a) pattern of resource use and adoption of green technologies in the factories, b) pattern of waste disposal practices used in the factories, c) level of awareness on clean technologies, d) bottlenecks in adoption of green technologies, and e) changes required to incentivise adoption of energy saving technologies in the industry.

Water use for the private sector is primarily from bulk mains water supply, urban water supply authorities and groundwater, with 11% of our respondents using surface water for some of their water supply needs. Water usage varies across industrial sectors.

Figure 7 Water Usage across the Private Sector



In terms of energy usage of private sector industries, it was found that LED bulbs are almost used by all. Solar light is also in use in nearly 46% of the industries but bio-gas plant is absent in most of them except some poultry industries. Nearly 58% of the industries in our survey use natural lights in their premises but use of efficient motors is still below 25%, use of biogas is below 6%, use of heat recovery technology only exists in 24% in the RMG sector and 11% in the construction sector. None of the plastic and electronic industries use this technology. Therefore, there exists an opportunity to improve energy efficiency in these industries.

Table 5 Investments made in energy efficient technology (% of sample, n=90)

	Solar light	Energy efficient motors	Access natural lights	Heat recovery boiler	Recycling system	Solar heating	Biogas plant	Wind power	LED bulb
Garments	46%	22%	56%	20%	32%	10%	12%	5%	95%
Other Private Sector	57%	29%	55%	8%	49%	16%	10%	4%	88%

Notably, investment appears similar across economic sectors (Figure 8) and sizes (Figure 9) hinting that common drivers may be at play at a macroeconomic scale.

Figure 8 Investments in selected energy efficient technology by private sector respondents(n=90)

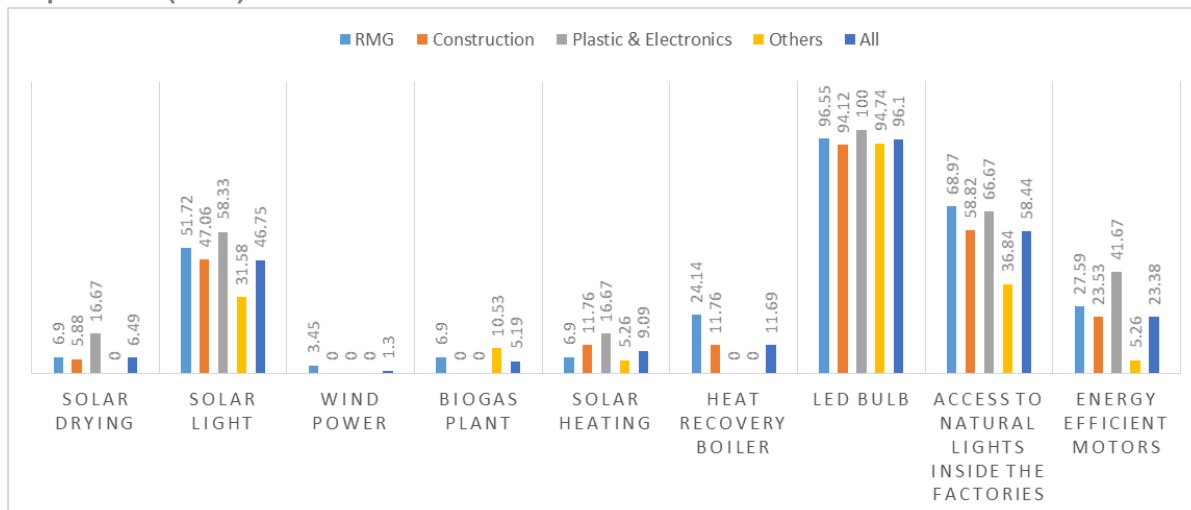
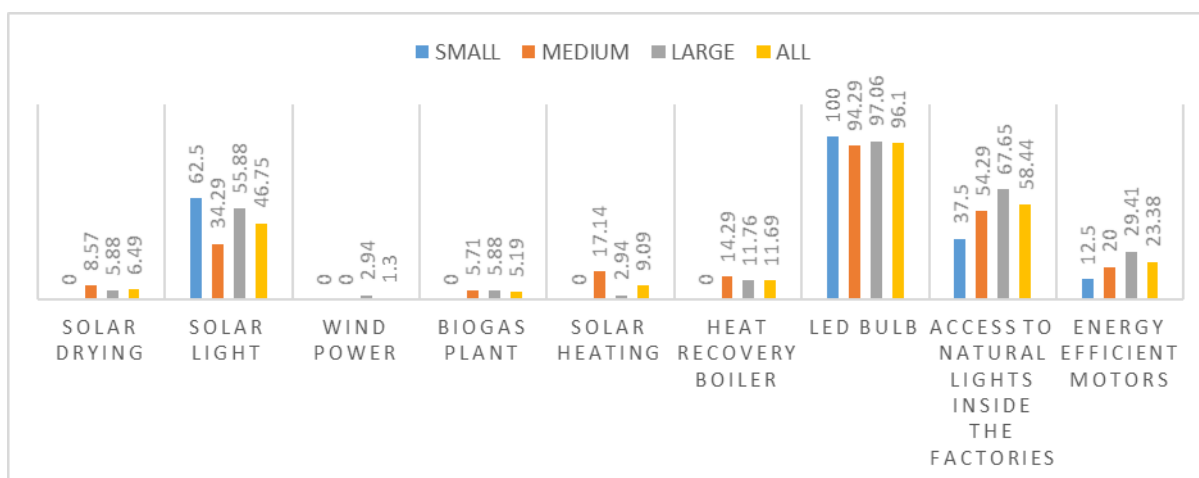


Figure 9 Use of Energy and Energy Saving Technology by Size of Industries



Reasons for not investing are telling, with over half of all those respondents who did not invest stating financial reasons. This alerts us to necessary changes in market conditions that are required to enable energy efficient technology investments.

Table 6 Reasons from respondents for not investing in energy efficient technologies (n=90)

	Tax Break	Loan at reduced interest rate	Financial Support	Technical Support
Garments	46%	61%	63%	29%
Other Private Sector	49%	33%	51%	59%

The perceptions of all stakeholders over the size of potential savings from investing in energy efficient technology are that overall benefits are considered between 19-34% reduction in energy bills from investments in green technologies. This is considerable, and helps to contextualise the lack of uptake of green investments as being not simply about finance, since these returns appear too good to avoid.

Table 7 Estimated financial savings as a % of total energy bills, from investments in energy efficient technologies:

	Solar Panel	Biogas plant	Water coolers	Waste to Energy	Water recycling	Sun-drying	LED lights	Solar Pump
CSO	30%	20%	21%	28%	25%	30%	31%	29%
Garments	30%	15%	22%	31%	25%	24%	32%	24%
Government Officer/Policy Makers	34%	15%	16%	25%	30%	12%	47%	23%
Other Private Sector	28%	13%	18%	23%	23%	19%	34%	17%
Policy enablers	36%	27%	20%	28%	28%	32%	32%	30%
Total	31%	17%	19%	27%	25%	23%	34%	23%

The importance of environmental plans to companies is illustrated below, with similar proportion of all private companies having an environmental plan, but the garment sector lags on more stringent standards of ISO14000:

Table 8 Adoption of Environmental Plan and ISO14000

	Env. Plan	ISO 14000
Garments	49%	27%
Other Private Sector	51%	45%

For those firms with ISO accreditation, the following table explores the reasons for making this investment, with image being a key reason. Interestingly limited incentives or reassures are being applied through supply chains. This requires more research to ascertain if this is owing to a lack of general coordination along supply chains or whether these can be co-opted to promote green growth outcomes:

Table 9 Reasons for obtaining ISO accreditation, Bangladesh private sector (n=29)

Sub-sector	Number	Govt. rule	Image building	Maintain market share	Keep up with competitors	Supplier's requirement
Garments	10	20%	50%	30%	30%	0%
Other Private Sector	19	26%	74%	26%	42%	16%
Total	29	24%	66%	28%	38%	10%

Of those not currently investing, 57% see no value in making the investment itself.

We find that the majority of our respondents (77%) were in favour of pollution taxes, but with the private sector less favourable (65%), see Table 10.

Table 10 Respondents view on levy of pollution taxes (n=154)

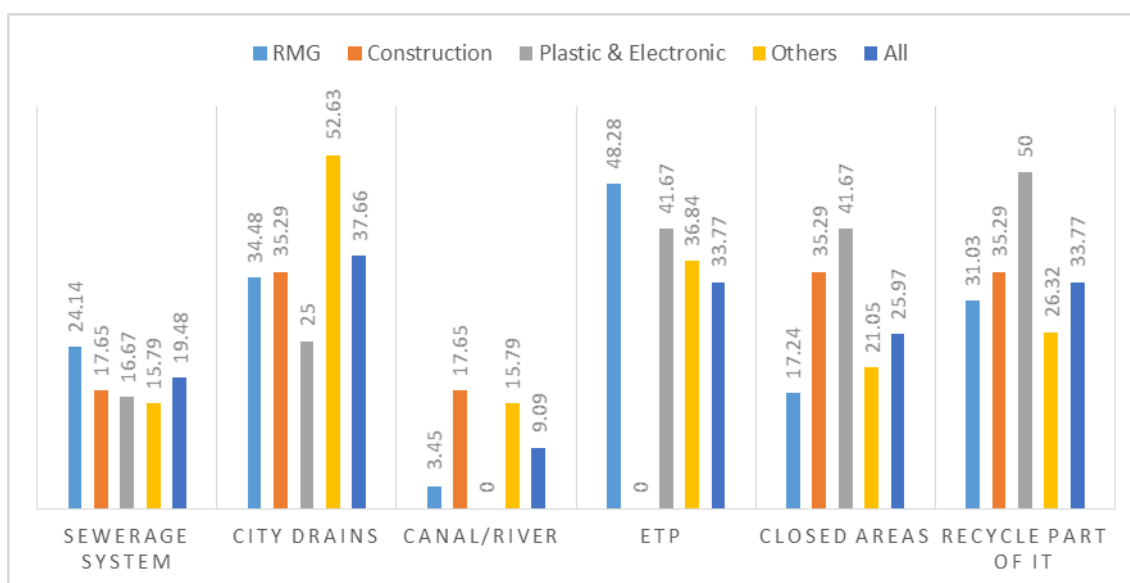
	No	Yes	Grand Total	No	Yes
CSO	3	28	31	10%	90%
Garments	15	22	37	41%	59%
Government Officer/Policy Makers	4	20	24	17%	83%
Other Private Sector	12	28	40	30%	70%
Policy enablers	2	20	22	9%	91%
Total	36	118	154	23%	77%

Support for developing Feed-In-Tariffs was almost unanimous (98%).

Waste disposal is another activity that might be a concern in terms of green growth strategies. Indiscriminate disposal of solid waste could lead to pollution of air, water and soil and hence a major constraint to green growth.

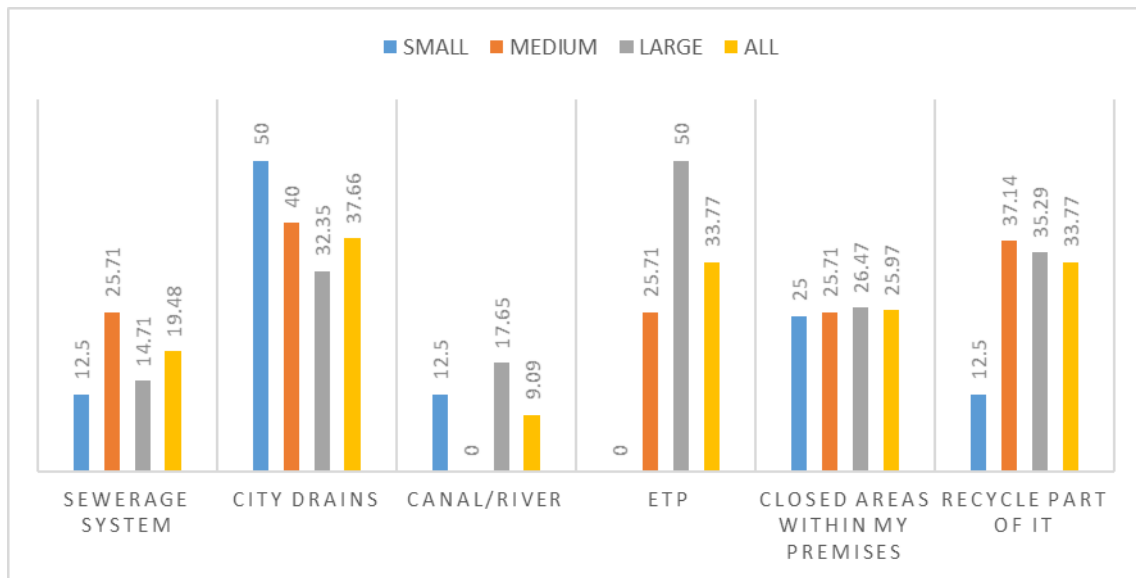
Figure 10 illustrates the current pattern of liquid waste disposal by factories. It shows that 20% of the factories pump it in the sewerage system, 37% pump in to city drains, only 33% use ETPs to process liquid wastes.

Figure 10 Pattern of disposal of liquid wastes by industries



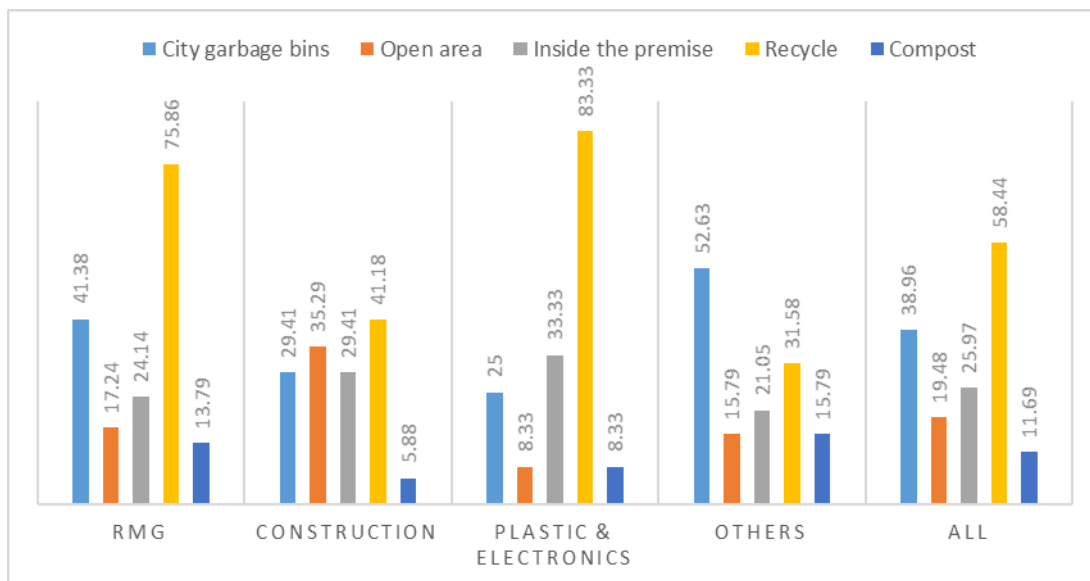
There is a scale issue here (see Figure 11) which alerts us to the potentially high investment required by firms in more environmentally responsible treatment of waste. Indeed, Figure 11 shows that nearly 50% of the small industries throw their liquid wastes into city drains, 12% into canals/river, 25% within their premise, and a very few (12%) recycle it.

Figure 111 Disposal of Liquid Waste by Size of Industries



Indiscriminate disposal of solid wastes is a cause of concern for the health of both human and animal life. Analysis of the current state of solid waste disposal suggests that both RMG and Plastic and Electronic industries recycle/reuse part of their solid wastes either within or outside their premises. However, nearly 40% of the industries dump their wastes into the city garbage bins, 25% keep them in their premises, and a very few (only 11%) compost their wastes.

Figure 122 Disposal of Solid Wastes by Industries



4.2. Private Sector Insights

To understand what the barriers private sector firms face in making green investments we conducted interviews with the owner of a knitwear company and the owner of a leather factory in Dhaka. The case studies below highlight the challenges and opportunities facing businesses making investment decisions which have a green growth component.

Box 3 Case Study of a Knitwear Factory

This factory is typical of the sector – a small firm operating from a rented building. The factory specialises in CTP (cut-trim-pack) for export supplying to international brands. It began with an investment of BDT 5 crore, BDT 3 crore of which was loaned from the bank at 12% annual interest. The factory currently has 200 staff, 180 sewing machines and produces approximately 2000 t-shirts a day. Over the last 3 years it has had an annual turnover of BDT 2-2.5 crore.

The owner admits that while the factory is profitable, it is not a green factory. He believes that a green factory operating at the same size and capacity as his would have higher productivity and profitability. Owing to higher prices from buyers, better business image, stronger ties to buyers.

The barriers faced highlighted by the owner included:

Scale: a green factory would require a large area of land which is too large for a small investor to acquire, especially with escalating land prices. The owner estimates a small green factory alone would cost 50-60 crore Taka.

Profitability: The factory is profitable, but knitwear is a competitive sector and margins are low, making long-term investments in any green technology hard to justify commercially.

Incentives: The government is active in the sector promoting green growth through both providing land facilities in the EPZ for those setting up green factories and providing funds for those building new eco-friendly factories, but this doesn't extend to upgrading older factories. The owner felt strongly that the government should create incentives for existing factories to make green investments, through for instance lower interest rates. There are some banks which provide loans to install green technology, but the interest rates are high, ranging from 10-16% and not sufficiently different from existing rates of borrowing.

Supply chain: There are limited signals in the supply chain from buyers to invest in green technology. Buyers willing to pay more for environmental and social traceability tend to give their work orders to large factories..

The primary obstacles are a huge initial investment, incentives stacked in favour of larger companies, inadequate access to finance for green investment, and limited commercial incentives from the supply chain.

Source: Interview with a Knitwear Garments Owner in Narayanganj.

Box 4 Case Study of a Leather Factory

Leather production exerts considerable environmental stress in Bangladesh owing to use of groundwater for tanning, contamination issues as polluted discharge into surface and groundwater, and the use of heavy metallic chemicals in the tanning process which carry a range of environmental and social risks. The conditions for workers are considered hazardous owing to exposure to chemicals and a sector-wide poor safety record.

We studied a family-owned leather tanning business operating for over forty years in Hazaribag, a cluster of 200 tanneries. Annual leather production of 1.5 million ft mean its larger than the typical leather factory in Bangladesh. In common with all factories in Hazaribag, this factory has neither environmental safety measures, nor an effluent treatment plant (ETP).

At the same time all the tannery owners are well aware of the environmental impacts caused by the vast untreated chemical waste disposal from the tanning process.

The owner explained that environmental protection matters to the leather industry, they understand that a product produced using clean technology and without hurting the environment, will attract foreign buyers. The key constraints to investing in green technology include:

Government assistance: The leather industry receives no direct support from the government despite earning over \$1 billion in export revenue in 2015.

Government plans: The GOB is committed to improving the environmental and safety of the Hazaribag cluster, and is relocating all tanneries to Savar where a modern and controlled industrial estate is established. UNIDO claim it “offers a once-in-a-lifetime opportunity to place the entire export-oriented leather industry in Bangladesh firmly on the world map”. There are a range of challenges, including low acquisition of land in Savar, employee inertia owing to poor service provision in Savar – particularly schools and medical.

Policy not implemented: There are strict national laws pertaining to the disposal of wastes. Unfortunately these laws are not implemented.

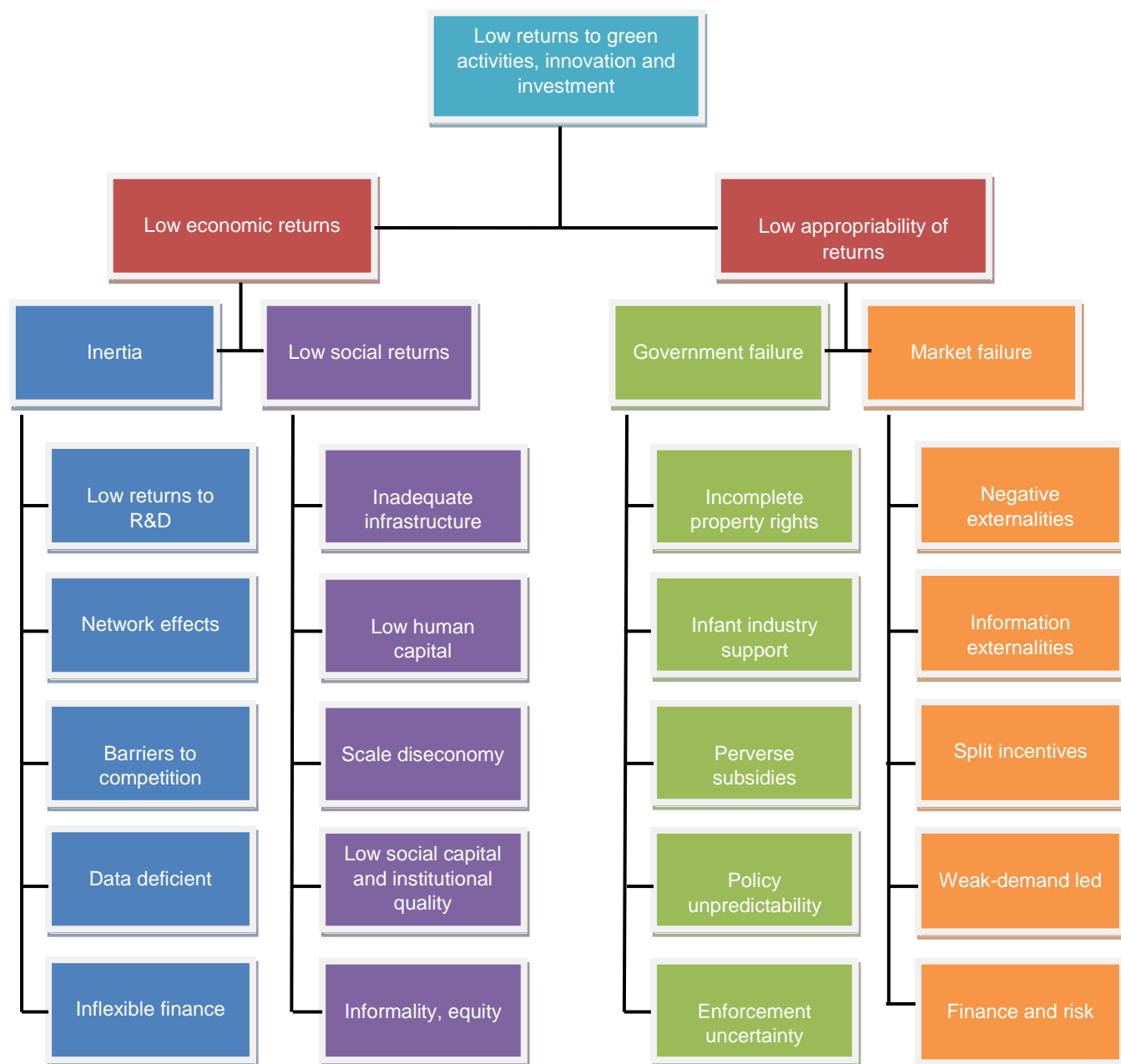
Signals in the supply chain are small: Eco-friendly leather remains a niche product, and buyers are not demanding environmental or social compliance. One company – RMM is doing this (<http://www.thedailystar.net/eco-friendly-leather-a-niche-to-be-exploited-35815>)

Source: Interview with a Leather Manufacturer in Hazaribag.

4.3. Bangladesh Green Growth Diagnostic

Based on the survey data analysis and assessment of national level policies a green growth diagnostic has been developed for Bangladesh. Figure 13 is adapted from OECD (2011a and 2011b) and Hausmann and Rodrik (2008) but with slight modifications to make this relevant for Bangladesh. For instance, the inclusion of critical enablers and challenges like informal sector (employing an estimated 75% of the national population) and infant industry support (including SMEs for which there is limited traction or structured policy focus).

Figure 13 Bangladesh Green Growth Diagnostic



Specific steps for developing institutional capacity will depend on whether green growth strategies need to be incorporated into an existing and regular national development planning process or whether such a process will need to be initiated (Clapp, Briner and Karousakis, 2010). In all cases, the goal should be to integrate green growth into policy processes, rather than create stand-alone policy documents or agencies (OECD, 2011a). In Bangladesh, much policy already exists, and the job of both integrating GG into these policies and secondly seeking to establish both the implementation of these policies and the enabling architecture of interventions for the private sector. The specific profile of the Bangladesh political-economy and private sector, coupled with experience from how policy gearing gains traction in the private sector have dictated how we have moulded the GGD into a Bangladesh-specific version for this report. The table below explores the relevance of the specific constraints in the BaGGD.

CONSTRAINT	POLICY CHALLENGE
Low economic returns	<ul style="list-style-type: none"> Perceived low economic returns from change are endemic to many economic systems. This constraint includes including factors which create inertia in economic systems (i.e. fundamental barriers to change and innovation) and capacity constraints, or “low social returns
Inertia	<ul style="list-style-type: none"> Bias towards BAU options in decision-making owing to lack of innovation across production techniques, enabling technologies, and patterns of end-consumption Typically, a mixture of market failure and market imperfection
Low returns to R&D	<ul style="list-style-type: none"> Research and investment bias to incumbent Technology Technological roadblocks and lack of radical innovation Knowledge spillovers mean firms are unable to capture the full benefits of investment in technology and skills
Network effects	<ul style="list-style-type: none"> Lock in old technologies, because co-ordination is needed to develop better systems for example for public transport, communications, logistics, or consumer acceptance (Jaffe and Stavins, 1994) Overcoming or avoiding lock-in on network technologies that are no longer optimal. The nature of economic growth is subject to a great deal of inertia or path dependency. E.g. centuries of fossil fuel use have created an energy system that is now locked-in to their use, with significant sunk costs (Foxen, 2002). More broadly, such lock-ins include changes in established societal behaviours, such as eating habits, housing arrangements, and mobility norms. Preventing lock-in of investment, skills, and infrastructure into assets that risk becoming ‘stranded’ Due to technological obsolescence or high and potentially un-insurable physical risk exposure can set a more robust long-term basis for growth Barriers to entry that arise from increasing returns to scale in networks and the bias in the market towards existing technologies are examples of market imperfection
Barriers to competition	<ul style="list-style-type: none"> Lack of finance Regulatory barriers to new firms Closed shop sectors
Data deficient	<ul style="list-style-type: none"> Prices do not highlight full market costs Integrate environmental factors into decisions Collection of data and its analysis is often a private endeavour
Inflexible finance	<ul style="list-style-type: none"> Finance is immature market PPP system is nascent or missing
Low social returns	
Inadequate infrastructure	<ul style="list-style-type: none"> No enabling conditions for increasing returns to low environmental impact activities, meaning consumers and producers fail to pursue “green” activities. E.g. inadequate electricity or water sanitation infrastructure may lead to water pollution or the use of high emission fuels or inefficient production of electricity
Low human capital	<ul style="list-style-type: none"> They can also include insufficient human capital such that people are not aware of alternative sources of energy or there is insufficient technical know-how to

	<p>deploy them. In addition, at low levels of development, a mixture of poor infrastructure with low human capital and institutional quality can mean heavy reliance on natural resource extraction and little incentive for improved natural resource use like sustainable forest</p>
Scale diseconomy	<ul style="list-style-type: none"> • Lack of capabilities in SME to adopt green innovation • Financial incentives
Low social capital and institutional quality	<ul style="list-style-type: none"> • Lack of innovation capability
Informality, equity	<ul style="list-style-type: none"> • Lack of informality or social equity considerations in policies render them incomplete, likely to fail • SMEs overrepresented in both innovation and informal sector • Amplifies risks of enhanced market failure in practice
Low appropriability of returns	<ul style="list-style-type: none"> • This is where market and government failures prevent people from capturing the full value of improved environmental outcomes and efficiency of resource use. Examples include fossil fuel subsidies (government failure) or a lack of incentives for constructing energy efficient buildings (split incentives) or reducing air pollution (negative externalities).
Government failure	<ul style="list-style-type: none"> • To integrate and prioritise environmental concerns, to establish and define and enforce boundaries around environmental assets, to coordinate
Incomplete property rights	<ul style="list-style-type: none"> • Customary, historical, collective and informal ownership rights present issues for policy enforcement • Poverty means that contracts can be verbal, rights unclear • Responsibility for outcomes (safety environment) require clarity
Infant industry support	<ul style="list-style-type: none"> • Support to new, innovative industries is unavailable either from government or financial sector
Perverse subsidies	<ul style="list-style-type: none"> • Subsidies that produce opposite outcomes to those intended
Policy unpredictable	<ul style="list-style-type: none"> • Policy needs to be part of a process to have credibility with those affected and to ensure any perverse outcomes are highlighted beforehand and minimised
Enforcement uncertainty	<ul style="list-style-type: none"> • Clarity over who enforces and how • Ensuring the financial incentives associated with environmental malpractice are well publicised and appropriate • Research to understand the efficiency of all environmental taxes
Market failure	
Negative externalities	<ul style="list-style-type: none"> • Economic growth occurs at the expense of environmental assets and flows – this can be direct from policy (deforestation for alternative purposes, over-exploitation of natural resources, polluted streams) and indirect from policy (e.g. rising inequality leads to over-exploitation of peri-urban forests)
Information asymmetry	<ul style="list-style-type: none"> • International technology transfer

Split incentives/ principal-agent	<ul style="list-style-type: none"> • How contracts (financial incentive structure) among buyers-sellers, owners-leasers are structured impacts the behaviour of consumers • When consumers are facing low costs or zero costs owing to contract structure, investors are less likely to invest in environ • Mentally beneficial options • Often these options are existing technologies and operational measures
Weak-Demand led	<ul style="list-style-type: none"> • Insufficient demand for green innovation
Finance and risk	<ul style="list-style-type: none"> • Imperfection in risk/capital markets caused by the operational policies of financial institutions prevent capital flowing to where it could best be used

5. Economic Sector Analysis

This chapter analyses the political-economy of three high growth sectors across Bangladesh in detail: agriculture, transport and energy. It provides a brief overview of the investment patterns in the sector, analyses relevant policies and identifies policy gaps and discusses the applicability of a green growth approach to the sector.

5.1. Agriculture

5.1.1. Overview

Why Agriculture Sector?

Employs more than 50% of the labour force and is the third largest sector in terms of contribution to GDP

- Food security is a key concern in the backdrop of climate change vulnerability. Current policies do not coherently address the issue of efficient resource conserving technologies which are already available. Overconsumption of shallow aquifer water resulting in arsenic contamination; inefficient use of pesticides and chemicals to levels which are threatening to public health; and the loss of total arable land to competing sectors, are potentially going to be huge challenges in the short and long run.

Key Policy Issues

A number of policies are there; NSDS, NAP, 7th FYP, Perspective Plan, NLUP, BCCSAP etc.

- While the NAP is the core policy emphasising some of the issues mentioned above, other policies do cursorily address these. The private sector has had laudable growth in recent years despite ecological and environmental concerns. Identified climate resilient and resource efficient technologies are yet to be scaled up as DAE, NGOs, and CGIARs involved in the sector are dealing with these issues on a project by project basis. Consequently, robust opportunities exist for green growth in this sector.

Potential for Green Growth

Government buy-in is likely demonstrated by strong political and budgetary commitment by current govt.

- Resource conserving agriculture is likely to reduce costs substantially for poor farmers, whilst increasing their yield. Regulatory decisions have to be made to increase the opportunity of value addition and certifications for promoting exports.

Following independence in 1971, agriculture (comprising crops, livestock, and fisheries) was considered the backbone of the national economy contributing more than half of GDP. Owing to structural changes in the intervening years, coupled with the rise of the service and industrial sectors, agriculture is now ranked a distant third based on its contribution to the economy. In 2015, agriculture contributed 16% to national GDP. Yet, agriculture remains critical owing to its employment generation and poverty reduction; it is the country's largest employer accounting for 47% of the labour force in 2016. Agriculture supports the livelihoods of over half of all Bangladeshi citizens through small-scale farming and agri-food supply chains, and indirectly underpins the economy and food security for the other half of the population. Indeed, 70% of Bangladesh's population and 77% of its workforce lives in rural areas.

Nearly half of all of Bangladesh's workers and two-thirds in rural areas are directly employed by agriculture, and about 87% of rural households rely on agriculture for at least part of their income (World Bank, 2016)⁷.

Public sector investment plans and policies for the agriculture sector are managed by two related ministries and implemented through their respective implementing agencies. The Ministry of Agriculture is responsible for the crop sector through the Department of Agricultural Extension (DAE). The Ministry of Fisheries and Livestock is responsible for fisheries and livestock, respectively through its Department of Fisheries (DoF) and Department of Livestock (DoL).

Agriculture is relevant to the green growth agenda across and within the different pillars of sustainability: economic, environmental, and social. Since 1971, food production has increased three-fold, but net cultivable area has been declining fast at 28,200 square hectares annually owing to conversion of agricultural land to alternative use demanded by the growing population. This increased demand for food on smaller cultivable land has resulted in rising cropping intensity, higher usage of chemical fertiliser and pesticides, and rising demand of groundwater for irrigation.

Available statistics suggests up to 15% of crops are destroyed in the field each year due to insect pests. 14,340 m tons of pesticides are used annually but are questioned as solutions owing to their efficacy, their economic risks owing to being imported with prices pegged to international prices and impact on local ecosystems and human health.

There is emerging evidence that other environmental reasons, not just pests, are to blame for the loss of crops in situ. Environmental stress including the impact of unseasonal and extreme variations in climate, reduced water availability: drought, flooding, soil erosion and salinity is a major cause of crop losses during production. Plus, post-harvest losses owing to technologies, particularly cold chain infrastructure, and an overall lack of coordination and communication across supply chains. Policy options, therefore, need to be assessed from the perspectives of effectiveness and efficiency, as well as their distributional implications.

'Good Agricultural Practices' in Bangladesh are limited. There is legitimate concern that human, fish and animal health are impacted by intensification of agriculture. Inefficient use of water and pumping of groundwater for irrigation have accelerated the depletion of underground water which causes drawdown, salinity intrusion, and lower availability of potable water. Compounding this are poor practices by agricultural producers that result in siltation of rivers and water bodies. Furthermore, poor fertiliser and water management, recurring floods, and droughts have led to a depletion of soil nutrients, declining soil organic matter contents, and overall soil degradation. Pesticide run-off from agricultural land also impairs drinking-water quality and harms water-based wildlife.

Given the significance of agriculture on the national economy and food security, adoption of a green growth strategy in this context is relevant and crucial. This is because of (i) documented evidence of land-use changes caused by the intensification of farming practices (reduced crop rotations and increased fertiliser and pesticide application) (ii) marked intensification of agriculture (more output per unit of land or labour) and farming on environmentally sensitive land, which is likely to result in environmental harm (iii) increasing cropping intensity which has significant but so far undocumented impact on the local ecological conditions.

5.1.2. Role of Private Sector and PPPs in Agricultural Development

The National Agricultural Extension Policy (2012) reflects the government's intent to facilitate private sector involvement; however, to further the growth of this sub-sector and its positive contribution to the agriculture, infrastructural development with regard to irrigation and value chain development including transportation, and marketing is needed. The government also needs to incentivise the private sector to build forward market linkages so that the potential contributions of the private sectors are wholly explored. Constraints in developing farm enterprises and agribusiness also need to be identified and removed.

⁷ <http://www.worldbank.org/en/results/2016/10/07/bangladesh-growing-economy-through-advances-in-agriculture>

Since the early 1970s, development partners and NGOs have been highly involved in the agricultural development of Bangladesh and have worked alongside the DAE, DoF, and DoL to provide extension services. The private sector has also been increasingly getting involved in the marketing of agricultural product using modern processing techniques. This has brought forth a vibrant agro-industry sub-sector establishing backward linkages across the agriculture sector.

Despite the private sector being highly involved in the agriculture sector, the promotion of PPPs has been given very low priority in the sector. Although the 7th Five Year Plan has emphasised urgency of ensuring sufficient budgetary provisions and coordination among different public-private research entities in promoting agricultural research.

Indeed, to date none of the PPP projects operating in Bangladesh are in the agriculture sector. Yet, it is indirectly affected owing to the large number of physical infrastructure projects, which are expected to promote trade opportunities. Globally, the agricultural sector is not a forerunner in PPP development in developing countries.⁸

⁸ Thorpe, J. and Maestre, M. 2015. Brokering Development: Enabling Factors for Public-Private-Producer Partnerships in Agricultural Value Chains. IDS-IFAD, 39pp, <http://www.ids.ac.uk/publication/brokering-development-enabling-factors-for-public-private-producer-partnerships-in-agricultural-value-chains>.

5.1.3. Policy Mapping of the Agricultural Sector

The following table summarises key policy issues emerging from analysis of policies related to the agricultural sector.

Subsector	Policy Issues / Gaps⁹	Key Issues regarding GG	Current status	Potential buy-in	Entry point¹⁰
<i>Agriculture</i>	1. Resource efficiency is mentioned in the policy in a non-coordinated manner ¹¹	<ol style="list-style-type: none"> Efficient and effective irrigation practices. Efficient fertiliser management Conservation agriculture to reduce depletion of fertility and erosion Reduction of pesticide and other chemicals Resource conserving agriculture mechanisation 	<ol style="list-style-type: none"> Some initiatives are already in the field but those are on a project basis and require scaling-up. CGIAR organisations are involved with national and international NGOs. Integrated pest management is already under promotion by DAE. Coherent countrywide analysis linking resource efficiency, impact on food security and reduction of carbon footprint is absent. 	<ol style="list-style-type: none"> Government focus on food security indicates strong appetite for buy-in. Strong political support. 	<p>A committee representing the following bodies;</p> <ol style="list-style-type: none"> Bangladesh Agricultural Research Council is the apex body in the national agricultural research system. CGIAR institutions¹² Multilateral Banks Bilateral organisations Private sector NGOs Ministry of Agriculture
	2. Lack of Policy Coordination	<ol style="list-style-type: none"> Lack of promotion of green energy in agriculture 	<ol style="list-style-type: none"> Some initiatives to use solar power but limited to only a few off-grid areas¹³. Power subsidy is actually a disincentive against the promotion of green growth. 	<ol style="list-style-type: none"> DO. 	DO
	3. Inter sectoral coordination and land use planning	<ol style="list-style-type: none"> Reduction of loss of agricultural land to other sectors Lack of effective land use planning cascading the effect Very weak linkages with forestry sector policy resulting in inefficient use of unclassified state forests 	<ol style="list-style-type: none"> Steady annual reduction of agricultural land to housing and industry The Brick kiln industry is one of the largest factors contributing to the loss of agricultural land Special economic zones are also occupying agricultural land. Severe degradation on ecological situation on the Hill tracts resulting from forest clearing is used for 	<ol style="list-style-type: none"> Less intense on the protection of agricultural land. Moderately challenging in shifting focus for eco-friendly land-use planning. Strong public support is likely. 	<p>A committee representing the following bodies</p> <ol style="list-style-type: none"> Bangladesh Economic Zone Authority Ministry of Agriculture Ministry of Land FBCCI Ministry of

⁹ Issues which are directly relevant for green growth in terms of efficient resource use, eco-friendly production, labour intensive, reduced carbon foot-print, climate resilience.

¹⁰ Potential formation of a steering committee consisting of the interest groups mentioned.

¹¹ For example resource efficiency has been mentioned in 7th FYP, NSDS, Perspective Plan, NLUP, BCCSAP, and Agricultural Policy but very little has been done to promote these issues at field.

¹² CIMMYT, IRRI have ongoing projects.

¹³ By 2014, out of 308,193 irrigation connections only 193 were based on solar power.

Subsector	Policy Issues / Gaps ⁹	Key Issues regarding GG	Current status	Potential buy-in	Entry point ¹⁰
			shifting cultivation instead of horticulture.		Environment and Forest 6. CEGIS 7. BIDS 8. Institute of Forestry, Chittagong University
	4. Resilience to climate change is identified in policies	1. R&D on varieties in the backdrop of climate change 2. Potential collaboration with private sector	1. Some work is in progress but there are severe shortages in funding. 2. Newly developed varieties often remain at laboratory level and the commercialisation issue is mostly missing.	1. Strong political support 2. Keen private sector	1. BRRI 2. IRRI 3. BARC 4. DAE 5. Private sector 6. NGOs 7. BIDS
	5. Lack of unified policy on value addition and export processing	1. Post-harvest loss management 2. Sanitary and phytosanitary conditions 3. Sourcing and certification of organic products	1. Only sporadic initiatives 2. There is a ban on the import of Bangladesh vegetables to EU due to lack of sanitary standard. 3. No certification system exists for organic production	1. Strong political support in export promotion. 2. Ready investors. 3. Growing movement against unsafe food and public support.	1. Hortex Foundation 2. EPB 3. BARC 4. NGOs ¹⁴ 5. EU 6. Private Sector.

5.1.4. Potential for green growth in agriculture

Agriculture, globally, faces considerable challenges in implementing a green growth strategy. Anticipated growth in the demand for food and agricultural raw materials due to higher populations and incomes will place considerable demands upon scarce natural resources, particularly land and water. Agricultural producers already have to persistently raise productivity, economise on the use of increasingly scarce resources, adapt to environmentally friendly practices, and combat climate change.

The GoB has committed to make a transition towards green growth in its national plans and strategies; however, the extent to which the commitment focused on the agriculture sector lacks clarification.

¹⁴ Winrock International has ongoing project.

5.2. Transport

5.2.1. Overview of the Transport Sector

Why this sector?	Experiencing faster urbanisation than the average rate for South Asia.
	<ul style="list-style-type: none">• Dhaka has been ranked as the least liveable city in the world several times. Continuous increase in population density, lack of investment in public infrastructure (especially roads, public transport systems, drainage, water supply and sanitation), and lack of green space in urban areas have been compounding the already complex situation. Dhaka alone has a population of more than 12 million and green policy, investment, and planning are near enough absent. Although, a Spatial Plan was established to save flood flow zone, a combination of weak policy and lack of strong political commitment meant that it did not make a difference.
Key Policy Issues	No coherent policy.
	<ul style="list-style-type: none">• Key policy is centred on investment in: public transport, water supply and sanitation, housing, waste management, traffic management (to reduce pollution), energy efficiency, and greening the city. To date, nothing or very little has been done on these issues. Spatial planning has been subject to debate due to governance failure at city management level. Overall enabling environment for private sector investment in infrastructure is missing.
Potential for Green Growth	Government and industrial buy-in is likely due to current levels of pollution and liveability of the cities.
	<ul style="list-style-type: none">• Scope is very high given that there are already some public projects ongoing signalling that government is on-board. On the other hand, there has been a substantial spike in private investment, particularly within the housing sector and also a rise in public-private investments.

The transport conditions in Dhaka are characterised by chronic traffic congestion, low quality and reliability of public transport, lack of safety for pedestrians, and worsening air pollution. Annually, Dhaka traffic congestion costs BDT 19,555 crores (£2 billion)¹⁵ in financial loss, with the environmental cost component estimated at of BDT 2,200 crores (£220 million). Mortality and respiratory diseases caused by air pollution are believed to be endemic in major cities of Bangladesh. Poor air quality in Dhaka causes an estimated 15,000 premature deaths. Given the exponential increase in vehicular population in major cities in Bangladesh, emission from vehicles is expected to remain a major contributor to air pollution, especially in major cities like Dhaka and Chittagong.

¹⁵ <http://www.thedailystar.net/news-detail-147756>

The subsector investment plans and policies are managed by four transport related ministries through their respective implementing agencies.

- › Ministry of Road Transport and Bridges is responsible for major highways through the Roads and Highways Department (RHD).
- › Ministry of Local Government, Rural Development and Cooperatives is responsible for rural roads through its Local Government and Engineering Department (LGED). City Corporations are responsible for urban roads.
- › The Ministry of Railways is responsible for railways through Bangladesh Railway.
- › Ministry of Shipping is responsible for inland waterways, ports, and shipping, including: two major seaports managed by the Chittagong and Mongla port authorities; inland waterway ports are managed by the Bangladesh Inland Waters Transport Authority; and land ports are managed by the Land Port Authority.

A study undertaken by the Department of Environment (DoE), under the Ministry of Environment and Forests (MoEF), with assistance from the World Bank, provides detailed accounts of vehicular emission in Bangladesh¹⁶. Primary data collected for the purpose of the study shows that 72% of petrol/ CNG 4-wheeled vehicles had idle carbon monoxide emissions below the current standard and 93% of the vehicles comply with the HC emission standards (1200 ppm max) and approximately 66% of the vehicles comply with the both standards simultaneously. The low emission of cars, bus, minibus, autorickshaws can be attributed to the high number of CNG operated vehicles in Bangladesh. However, there is a rising number of diesel vehicles in Bangladesh and these are less clean. The study found that 73% of the diesel vehicles failed to comply with emission standards (65 HSU max). The non-compliance of a high number of diesel vehicles to emission standards is attributed to low levels of engine technology and lack of robust vehicle emission inspection and maintenance and overall ineffective implementation of vehicle emission standards.

The large and growing number of vehicles in the major cities in Bangladesh is also contributing to high level of noise pollution. According to World Health Organisation (WHO), noise above 60db is regarded as harmful. In this context it is of great concern that the vehicular noise in Dhaka streets is measured at 95db. Unregulated use of high pitch horns and frequent use of horns are reported to be the major contributors to vehicular noise pollution in Bangladesh.

Compounding these pollutions are supply chain contributions to hazardous waste like tires, engine oil and scraps. Furthermore, transportation infrastructure are globally recognised as involving considerable environmental risk in construction and operation – particularly on local ecology, local water bodies, alteration of local habitat, air pollution and noise.

In summary, transportation is relevant to Bangladesh's green growth agenda because of (i) documented evidence of negative impacts of the GHG emitted by the rising number of vehicles (ii) high economic loss due to congestion (iii) documented evidence of noise pollution and its harmful effect on city dwellers (iii) growth in construction of roads and highways and bridges which has significant but so far undocumented impact on the local ecological conditions.

5.2.2. Role of Private Sector and PPPs in in Transport

The capital cost of transportation infrastructure is daunting for all governments, and for this reason, there are many PPP projects delivering and operating transportation infrastructure across Asia and developing countries. There are 13 PPP ongoing projects for transport in Bangladesh, see Table 11.

¹⁶ http://case.doe.gov.bd/file_zone/reports_publications/WB%20BOOKLET%20FINAL%20CORRECTION.pdf

Table 11 Transport-related PPP, as of 30 November 2016, Bangladesh

	Project Name	Status
1.	Dhaka-Elevated Expressway.	Construction Stage
2.	2 Jetties at Mongla Port through PPP.	Award Stage - Contract Signed
3.	Upgrading of Dhaka Bypass to 4 Lane (Madanpur-Debogam-Bhulta-Joydebpur).	Procurement Stage - RFQ
4.	Supply, Installation and Commissioning of a Multi Mode Surveillance System (Radar,etc. at Hazrat Shahjalal International Airport, Dhaka).	Procurement Stage - RFP
5.	Flyover from Santinagar to Mawa Road via 4th (New) Bridge over Buriganga River.	Project Development Stage - Feasibility Study
6.	Hemayetpur-Singair-Manikganj PPP Road.	Project Development Stage - Feasibility Study
7.	Dhaka-Chittagong Access Controlled Highway.	Project Development Stage - Feasibility Study
8.	Construction of Laldia Bulk Terminal.	Project Development Stage - Feasibility Study
9.	Construction & Operation of Inland Container Terminal (ICT) at Khanpur.	Project Development Stage - Feasibility Study
10.	Construction of a New Inland Container Depot (ICD) near Dhirasram Railway Station.	Project Development Stage - Feasibility Study
11.	Improvement of Hatirjheel (Rampura Bridge)-Shekherjaiga-Amulia-Demra Road.	Project Development Stage - Advisor Appointment
12.	2nd Padma Multipurpose Bridge at Paturia-Goalundo.	CCEA Approved
13.	3rd Sea Port.	CCEA Approved

The public sector provides most rail and port services. The private sector is increasingly becoming a dominant force in the domestic air transport and passenger rail markets, as well as the transport logistics market. Private sector participation in the transport sector in Bangladesh is defined as moderate compared to neighbouring countries. This is attributed to lack of clear regulatory framework and proactive actions from the government for the facilitation of public private partnerships. However, the National Land Transport Policy (2004) manifests the government's intent to encourage private sector participation in the transport sector. The Private Sector Infrastructure guidelines (2004) also outlined the government's policy for facilitating private sector participation in infrastructure including in the transport sector. A national Private Sector Infrastructure Committee (PICOM) was established in 2005 under the Prime Minister's Office for implementing these guidelines. The Draft Inland Water Transport Sector Policy also envisaged that initiatives will be given for private sector participation in the operation of Inland Container Depots (ICS).

The Perspective Plan of Bangladesh 2010-2021 clearly articulates GoB's aim to deepen private sector investment and engagement in transportation services, particularly air transport, ports and shipping. The private sector has been approached to lease unused airports, such as Shamsnagar and Thakurgaon, for operation and maintenance. GoB intends to promote PPP in port management and port development infrastructure through a BOO/BOT model using a clear, transparent policy guideline. The Perspective Plan however does not provide any timeframe or precise directives for the private sector's engagement in railways and rail transport.

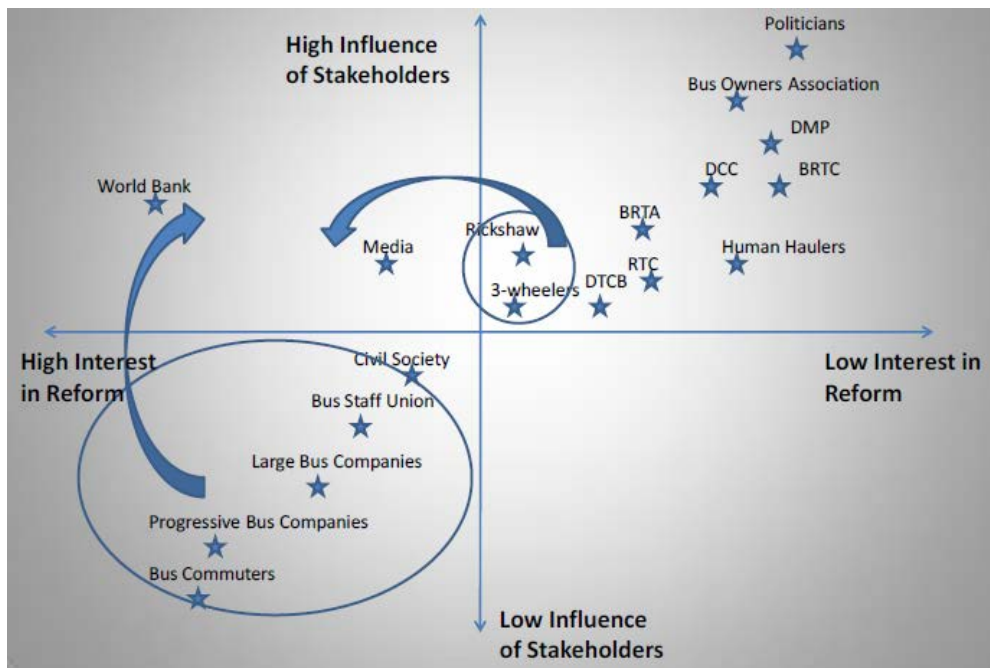
However, the need and context of PPP and increased investment from the private sector is pursued as an active agenda by the private sector and multilateral development agencies that are investing in Bangladesh. This is well articulated in the proceedings of Bangladesh Investment and Policy Summit 2016. Further to that there are several ongoing and planned PPP projects in the transportation sector in Bangladesh that show that PPPs will be a growing determinant of investment in transportation in Bangladesh. Of the PPP projects that are ongoing, the 23 km Dhaka Elevated Expressway (budgeted at USD 1.062 billion dollars) is the major one. Projects in the procurement stage include the upgradation of Dhaka bypass to four lanes. Projects in conceptual stage include the flyover from Shantinagar to Mawa Road in Dhaka, and the Dhaka-Chittagong access controlled highway.

It is concluded in the Bangladesh Transport Policy Note (2009) by the World Bank that financing requirements for transport infrastructure are likely to exceed public financing capacity. In this context, the transport policy note underscored the need to develop a financing strategy that calls on both public and private participation. The policy note further stipulates that private participation should cover both provision of capital financing by domestic or foreign investors as well as contribution from users. This potential contribution needs to be better explored in the road sector through the creation of road tolls, but also in the inland water transport sector through the participation of road ferry users.

5.2.3. Political economy of the transport sector

One of the challenges is multiple strong stakeholders, many with commercial vested interest in BAU. This has been extensively researched by World Bank¹⁷ and Figure 13 shows there are many high influence stakeholders with low interest in reform.

Figure 13 Reform Influence-Interest Matrix, Transportation sector, Dhaka, Bangladesh



¹⁷ <http://documents.worldbank.org/curated/pt/797631467998806501/pdf/693780BRIOP1080Bus0Operations0final.pdf>

5.2.4. Policy Mapping of the Transport Sector

The table below shows the key policy gap when assessing policies relevant to the transport sector.

Subsector	Policy Issues / Gaps ¹⁸	Key Issues regarding GG	Current status	Potential buy-in	Entry point ¹⁹
Transport	1. National Integrated Multimodal Transport Policy 2013 exists, but weak institutional framework is the key obstacle.	1. Efficient public transport system a. Air quality b. Integration c. Accessibility d. Inclusiveness	1. Major investments ongoing on key highways. 2. Metrorail project is rolling out. 3. Private collaboration is on the rise. 4. Urban public transport is in a dire state. 5. Coordination remains in flux.	1. Some political commitment likely due to heavy public pressure through CSOs.	1. MoRT&B 2. RHD 3. BD 4. BRTC 5. World Bank 6. ADB 7. JICA 8. BUET 9. CSOs 10. Transport Owners Associations

5.2.5. Potential for green growth in transport

The Government of Bangladesh is the key investor in transportation infrastructure in Bangladesh and receives co-funding from multilateral development agencies which include ADB, the World Bank and JICA. The private sector however is taken as a key stakeholder for transportation service provision in Bangladesh.

The government's current strategy is focused on reducing congestion, and improving road networks. Environmental and noise pollution is not well represented in the policy discourse and direction. Such direction also appears to be weak in the policy of the major multilateral agencies like ADB, JICA and the World Bank, which are key financiers of transportation projects in Bangladesh. The GoB commitment to green growth in transportation is to certain degree reliant on the degree to which these agencies adopt green growth as the underlying agenda for investing in transportation sector in Bangladesh. The low engagement of the private sector means that the private sector is yet to emerge as a champion for green growth in transportation. However, given the expressed intent of the government to engage private sector in the transportation sector, the prospect for green growth would depend on the degree to which the private sector is incentivised and regulated to ensure adoption of green growth in transportation projects. The major opportunity lies on the fact that Bangladesh has entered the rapid expansion stage of transportation and thus it is the right time to steer the future investment in transportation towards green growth.

¹⁸ Issues which are directly relevant for green growth in terms of efficient resource use, eco-friendly production, socially just growth, reduced carbon foot-print, climate resilience.

¹⁹ Potential formation of steering committee from the interest group mentioned.

Given the investment patterns in transportation which is currently heavily dictated by government, a green growth agenda for the transportation sector needs to be anchored with the government agencies which include Ministry of Planning (Bangladesh Planning Commission), Ministry of Finance, Ministry of Roads, Transports and Bridges, Ministry of Railway, Ministry of Shipping, Ministry of Civil Aviation and Tourism, Ministry of Local Government and Rural Development and Cooperative. Given the plurality of agencies involved, the green growth agenda needs to be anchored centrally, preferably with the Prime Minister's Office (PMO). A national transportation green growth agency and a national green growth coordination committee would be essential to pursue green growth agenda.

Subsequently, the green growth strategy needs to be pushed in GoB's development policies. It should be mentioned herein that the 7th Five-Year plan for (2016-2021) is already in progress. Nevertheless, establishment of a national green growth policy and an anchor agency for green growth implementation and monitoring could facilitate gradual uptake of green growth agenda in transportation projects that are to be undertaken within this period. Most importantly, it would facilitate deeper integration of green growth in GoB vision for the 8th Five-Year plan.

5.3. Energy

5.3.1. Overview of the Energy Sector

Why energy subsector?	Electricity generation capacity doubled through international and private sector collaboration
	<ul style="list-style-type: none">•The energy sector is one of the most emphasised sectors by the government- they aim to bring an additional 30 million homes under national grid electricity supply. Consequently, more than 76 contracts have been signed, along with initiatives on mega projects like nuclear power generation. Coal-based projects are on-going with a vision to generate 50% of power from coal. Surge in environmental footprint is likely. Renewable energy subsector has been emphasised by the current government.
Key Policy Issues	No policy (still in the draft phase) with some regulatory mechanism.
	<ul style="list-style-type: none">•Current growth is taking place under a emergency plan (quick rentals with some impunity against accountability) by government and the regulatory commission is complementing government intentions through increased pricing. Power Sector Master Plan (PSMP) envisions sourcing 5% of the power from renewables. Coal policy is in limbo, while coal based large scale power plan projects are ongoing. This is raising concerns due to their proximity to the largest mangrove forest in the world.
Potential for Green Growth	Government and industrial buy-in is less likely due to global demand and local readiness.
	<ul style="list-style-type: none">•Greening the sector is a non-priority right now despite emphasis on renewables. Renewables occupy less than 1% of current power generation, but there is huge opportunity especially in solar energy for growth.

The energy sector poses a particular challenge for green growth given the scale of change required and the extent to which many countries are locked into polluting greenhouse gas emitting energy sources . At the global level, new sources of alternative energy must be deployed at pace, scale and cost to prevent energy related emissions of CO2 doubling by 2050.

In regards to its population and need, Bangladesh's energy infrastructure is insufficient, with demand outstripping supply over the past decade. Electricity is the main source of power for the country's economic activities, in January 2014 Bangladesh's installed electric generation was 10,289MW only about 3 quarters of which is considered to be actually available. The government estimates that 70% of Bangladeshi households have access to electricity. At the end of 2015 the total number of consumers connected to the grid was 21.8 million, which was roughly 50% of all the 30-40 million Bangladeshi households. Another 15% of households had access to off grid electricity such as the solar home systems. The government has plans to connect 98% of households in Bangladesh to some form of electricity, mainly through a planned grid expansion programme by 2021. The mismatch in demand and supply has also resulted in frequent load shedding over the years, and although this has gone down significantly it is still a fundamental issue today.

With regards to power production supply, natural gas makes up (56.06%) followed by biofuels and waste (24.65%), oil (16.39%), coal (2.81%) and lastly renewables (0.1%). There is a reliance on natural gas, and that does not look like it will likely change in the near future, although there is plans in place for a

nuclear plant to be commissioned by 2020 and the recent developments of coal based power plants in Rampal and Chittagong. These are the immediate projects taking place today, and will bring a much needed diversification away from natural gas use, although there are other implications to consider.

Box 3 Rampal Power Plant Case Study

The Rampal Power Plant is a revealing case study for Bangladesh's power supply issues. It is a proposed coal powered thermal power plant that will cost \$1.6 billion, produce 1320MW of power at capacity making it the joint largest power plant in the country. It is a joint venture between India's state owned National Thermal Power Corporation (NTPC) and the Bangladesh Power Development Board, which is proposed to be completed in 2021.

The Rampal Power Plant is a coal fuelled power station with the most recent carbon capture technology. However, it is its proposed location that has drawn the most criticism. The project reportedly violates the environmental impact assessment guidelines for coal based thermal power plants, namely that the site must be at least 25km from an ecologically sensitive area. The Power Plant is to be built only 14Km north of the Sundarbans, which is the largest mangrove forest in the world, and a UNESCO World Heritage Site.

Environment and ecology experts have warned that the Plant will release toxic gases such as carbon monoxide, oxides of nitrogen and sulphur dioxide, thereby putting the surrounding areas and, most importantly the Sundarbans at grave risk.

The Rampal Plant will need to import 4.72 million tonnes of coal per year via the port on the bank of the Poshur River. The path from the port to the coal plant will cut through 40kms of the Sundarbans. Environmentalists claim these coal-carrying vehicles scatter large amounts of fly ash, coal dust and sulphur. This will have a direct effect on the local inhabitants many of whom have already been relocated due to preliminary construction work. The movement of the vessels delivering coal through the water ways may contaminate the water, endangering heath and local livestock.

5.3.2. Policy Mapping of the Energy Sector

Subsector	Policy Issues / Gaps ²⁰	Key Issues regarding GG	Current status	Potential buy-in	Entry point ²¹
Power	1. PSMP is almost completely focused on fossil fuel and coal	<ol style="list-style-type: none"> Emissions Demand and distribution management Subsidies, incentives and pricing 	<ol style="list-style-type: none"> Large-scale coal based projects are ongoing Distribution issue persists²² Subsidising private investments. 	<ol style="list-style-type: none"> Challenging for fossil fuel and coal based power plants Highly politically sensitive issue 	<ol style="list-style-type: none"> MoPEMR SREDA Power Div. Power Cell Rural Electrification Board World Bank ADB IDCOL
	3. Availability and accessibility of power for poorer households.	<ol style="list-style-type: none"> Poverty alleviation Just growth Price regime not pro-poor. 	<ol style="list-style-type: none"> Around 50% of the population is out of electricity coverage. Regulatory commission hiking price without effective participatory consultations. 	<ol style="list-style-type: none"> Challenging due to short term fuel based projects resulting in higher production cost 	DO
	4. Thrust in renewables is missing.	<ol style="list-style-type: none"> Emission Increased cost of generation and distribution Base-load option does not yet recognise renewables. 	<ol style="list-style-type: none"> Rhetorical emphasis but quantitatively not translated in the PSMP. Solar Home System 	<ol style="list-style-type: none"> Serious reforms needed for medium and longer term projects. 	DO

5.3.3. Potential for green growth in energy

Bangladesh has experienced rapidly rising energy consumption over the past two decades. This trend will intensify further in the coming years as economic growth and development efforts accelerate. Bangladesh is striving to become a middle-income country by 2021. Development experience in other countries shows that energy consumption tends to rise quickly when per capita income reaches between US\$1,000 and US\$10,000, a range that Bangladesh is currently entering. Energy supply must thus increase rapidly in order to sustain the country's growth momentum. Some estimates predict that the country's energy needs will triple in the next five years. It is clear that this demand will have to be met in an environmentally sustainable way to prevent costly, long-run damage to the country.

²⁰ Issues which are directly relevant for green growth in terms of efficient resource use, eco-friendly production, socially just growth, reduced carbon foot-print, climate resilience.

²¹ Potential formation of steering committee from the interest group mentioned.

²² More than 14% of overall power is lost due to 'system losses'.

Analysis of previous transitions show that the shift to cleaner and greener energy sources involves the following four aspects:

Innovation: Without technological change the old polluting processes can never be left behind. Policy should where possible encourage innovation, focussing on the nuances of each sector's local needs and establishing new and inventive approaches to providing energy services.

Integration: While the foundations of change are innovation, building these into the existing network in many cases may be the best or only option. Often with renewable energy solutions having multiple sources working together creates a much more stable supply. The need for market confidence in all new technologies creates a need for policy to bring reassurance and support in the early stages.

Implementation: Due to inertia and inherent subsidies in early stages that are reduced then removed, clean technologies are often placed at a market disadvantage relative to conventional technologies. This is often true even when they are cheaper with or without incentives. Once again this is where policy needs to help guide the market in the right direction, for example regulation, labelling, carbon pricing amongst other factors can bring the new technologies into widespread use.

Transformations: The goal of green growth for energy is the fundamental reworking of energy economies over time, while realising positive benefits on the local economy. Studies of past energy transition show that consistency in policy is one of the primary factors underpinning success.

Firstly, in innovation Bangladesh has been a pioneer in promoting and developing certain forms of renewable energy. This is best demonstrated through the hugely successful Solar Homes System programme implemented by IDCOL (see box 4), which highlights the complementarities between an established micro finance set-up, a huge off grid population and a visionary government department.

In integration, Bangladesh can be credited with plans to create a network with a diverse mix of energy sources, some better for the environment than others. The support for the SHS systems with subsidies has created a confidence in solar in the country although the short term direction the government appears to have taken, with the move towards coal powered power stations, is worrying in other regards.

In implementation, since 2010 Bangladesh has been reportedly examining the possibility of a carbon tax. While the so-called 'green tax' for pollution was enacted as part of the 2014/15 budget, carbon pricing is not yet a reality²³.

Finally, transformation is a long term aspiration for Bangladesh. The case study on IDCOL demonstrates that some incredible positive steps have been taken in laying the foundation for a green energy industry and these will need to be further built upon.

²³ <http://www.lse.ac.uk/GranthamInstitute/legislation/countries/bangladesh/>

Box 4 **IDCOL Solar Home Systems**

The Infrastructure Development Company Limited (IDCOL) was established in 1997 to further infrastructure development in Bangladesh through a public-private partnership. IDCOL is governed by a board of government officials and private sector individuals. In 1998 it was licensed by Bangladesh Bank as a Non-Banking Financial Institution (NBFI). It has played a major role in financing large and medium scale infrastructure and renewable energy projects in Bangladesh.

IDCOL envisioned economic development for the country by improving lives through sustainable and environment friendly investments. Its goal to accomplish this included private sector participation in the development of infrastructure and renewable energy. IDCOL provide long-term and soft loans for private sector infrastructure, renewable energy and energy efficiency projects. It also provides grants to reduce costs of renewable energy projects and provides technical, logistical and training support.

IDCOL's pioneering programme has been the Solar Home System (SHS). In Bangladesh, it is estimated that 27 percent of households do not have access to grid electricity. As a viable alternative, IDCOL developed a solar home system to expand energy access in off-grid areas and to the poorest households.

The solar home system initiative applied an innovative financing mechanism which saw private sector (from Monetary Financial Institutions and partner organisations) and donor funds being channelled into a public sector institution, IDCOL. The programme began in January 2003 with financial support from the World Bank and the Global Environment Facility (GEF). Later GIZ, KfW, ADB, IDB, GPOBA, JICA, USAID and DFID provided additional financial support.

To date a total of 4.1 million SHS have been installed in remote areas with a target to finance 6 million by 2021. IDCOL currently has 56 partner organisations implementing the programme. IDCOL's total investment in the program is over BDT 50 billion (UK£500 million) of which loans are UK£470 million and grants are UK£30 million.

Through the use of off-grid solar, the programme has extended energy access to more than four million of the poorest households in Bangladesh, equivalent to 16-20 million individuals. The use of off-grid solar has also disproportionality benefitted women- given that basic household chores can potentially be improved through increased access to modern energy. IDCOL also hired female solar technicians. The programme has saved the consumption of 1.14 million tons of kerosene.

6. Synthesis of Findings

This chapter will bring together the findings from our framework (BaGGD) from survey data, face-to-face key informant interviews, policy analysis and the literature on Bangladesh. We develop our outline BaGGD to include policy options in the final column.

CONSTRAINT	POLICY CHALLENGE	POLICY ACTION FOR GREEN GROWTH
Low economic returns	<ul style="list-style-type: none"> Perceived low economic returns from change are endemic to many economic systems. This constraint includes factors which create inertia in economic systems (i.e. fundamental barriers to change and innovation) and capacity constraints, or “low social returns 	
Inertia	<ul style="list-style-type: none"> Bias towards BAU options in decision-making owing to lack of innovation across production techniques, enabling technologies, and patterns of end-consumption Typically, a mixture of market failure and market imperfection 	<ul style="list-style-type: none"> New institutional arrangements to guide the development of green growth strategies and to overcome the institutional inertia and silos that exist around economic and environmental policy making Significant capacity building for integrating environmental issues into national development planning processes
Low returns to R&D	<ul style="list-style-type: none"> Research and investment bias to incumbent Technology Technological roadblocks and lack of radical innovation Knowledge spillovers mean firms are unable to capture the full benefits of investment in technology and skills 	<ul style="list-style-type: none"> Investment in relevant R&D, including thematic and mission-oriented research International cooperation R&D support, tax incentives Adoption incentives/subsidies Technology prizes R&D subsidies and tax incentives Focus on general-purpose technologies
Network effects	<ul style="list-style-type: none"> Lock in old technologies, because co-ordination is needed to develop better systems for example for public transport, communications, logistics, or consumer acceptance (Jaffe and Stavins, 1994). 	<ul style="list-style-type: none"> Strengthen competition in network industries Subsidies or loan guarantees for new network projects Development of networks to exchange information and

	<ul style="list-style-type: none"> Overcoming or avoiding lock-in on network technologies that are no longer optimal. The nature of economic growth is subject to a great deal of inertia or path dependency. E.g. centuries of fossil fuel use have created an energy system that is now locked-in to their use, with significant sunk costs (Foxen, 2002). More broadly, such lock-ins include changes in established societal behaviours. Preventing lock-in of investment, skills, and infrastructure into assets that risk becoming 'stranded' Due to technological obsolescence or high and potentially un-insurable physical risk exposure can set a more robust long-term basis for growth E.g. barriers to entry that arise from increasing returns to scale in networks and the bias in the market towards existing technologies are examples of market imperfection 	<p>knowledge, based on open innovation systems; and promotion of high speed Information and Communication Technology (ICT) access at a household level as a means of fast-tracking innovation</p>
Barriers to competition	<ul style="list-style-type: none"> Lack of finance Regulatory barriers to new firms Closed shop sectors 	<ul style="list-style-type: none"> Co-investment funds Market development Reform regulation Reduce government monopoly Regulatory reform Competition policy Front-runner approaches
Data deficient	<ul style="list-style-type: none"> Prices do not highlight full market costs Integrate environmental factors into decisions Collection of data and its analysis is primarily a private endeavour 	<ul style="list-style-type: none"> Strengthen PPP coordinating body Natural resource accounting Enhance statistical service
Inflexible finance	<ul style="list-style-type: none"> Finance is immature market PPP system is nascent or missing 	<ul style="list-style-type: none"> Invest in PPP development

Low social returns		<ul style="list-style-type: none"> Some form of expanded public-private collaboration building on the 44 existing public-private partnerships
Inadequate infrastructure	<ul style="list-style-type: none"> No enabling conditions for increasing returns to low environmental impact activities, meaning consumers and producers fail to pursue “green” activities. E.g. inadequate electricity or water sanitation infrastructure may lead to water pollution or the use of high emission fuels or inefficient production of electricity 	<ul style="list-style-type: none"> Taxes Tariffs Transfers Investment in infrastructure to support access to markets Public-private partnerships
Low human capital	<ul style="list-style-type: none"> They can also include insufficient human capital such that people are not aware of alternative sources of energy or there is insufficient technical know-how to deploy them. In addition, at low levels of development, a mixture of poor infrastructure with low human capital and institutional quality can mean heavy reliance on natural resource extraction and little incentive for improved natural resource use like sustainable forests 	<ul style="list-style-type: none"> Taxes Subsidy reform/removal
Scale diseconomy	<ul style="list-style-type: none"> Lack of capabilities in SME to adopt green innovation Financial incentives 	<ul style="list-style-type: none"> Access to finance Skills development Linking SMEs to knowledge networks Improving information supply Reducing regulatory burdens
Low social capital and institutional quality	<ul style="list-style-type: none"> Lack of innovation capability 	<ul style="list-style-type: none"> Broad-based policies to strengthen innovation
Informality, equity	<ul style="list-style-type: none"> Lack of informality or social equity considerations in policies render them incomplete, likely to fail SMEs overrepresented in both innovation and informal sector Amplifies risks of enhanced market failure in practice 	<ul style="list-style-type: none"> Establish Ministry for Inclusiveness Review policy for gaps Develop principles for inclusive policy Ensure all new policy complies with these principles

Low appropriability of returns	<ul style="list-style-type: none"> This is where market and government failures prevent people from capturing the full value of improved environmental outcomes and efficiency of resource use. Examples include fossil fuel subsidies (government failure) or a lack of incentives for constructing energy efficient buildings (split incentives) or reducing air pollution (negative externalities). 	
Government failure	<ul style="list-style-type: none"> To integrate and prioritise environmental concerns, to establish, define and enforce boundaries around environmental assets 	<ul style="list-style-type: none"> Coordination across ministries establishing governance structures at the highest levels of government Capacity building for integrating environmental issues into national development planning processes Environmental risk assessment of national policy, plans and programmes
Incomplete property rights	<ul style="list-style-type: none"> Customary, historical, collective and informal ownership rights present issues for policy enforcement Poverty means that contracts can be verbal, and therefore rights unclear Responsibility for outcomes (safety environment) require clarity 	<ul style="list-style-type: none"> Property right focus in policy Subsidy for poor Responsibility spelt out in contracts
Infant industry support	<ul style="list-style-type: none"> Support to new, innovative industries is unavailable either from government or financial sector 	<ul style="list-style-type: none"> Subsidy, access to Special Economic Zones, high-profile committees and facilitating organisations
Perverse subsidies	<ul style="list-style-type: none"> Subsidies that produce opposite outcomes to those intended 	<ul style="list-style-type: none"> Subsidy diagnostic cross-government
Policy unpredictability	<ul style="list-style-type: none"> Policy needs to be part of a process to have credibility with those affected and to ensure any perverse outcomes are highlighted beforehand and minimised 	<ul style="list-style-type: none"> Set targets Create independent governance systems
Enforcement uncertainty	<ul style="list-style-type: none"> Clarity over who enforces and how Ensuring the financial incentives associated with environmental malpractice are well publicised and appropriate Research to understand the efficiency of all environmental taxes 	<ul style="list-style-type: none"> Create a revenue division in the Treasury on environmental taxes Statistics or economic analysis department to be given role of collating, publishing, commissioning academic research into fundamental issues and ensure implementation

Market failure		
Negative externalities	<ul style="list-style-type: none"> Economic growth occurs at the expense of environmental assets and flows – this can be direct from policy (deforestation for alternative purposes, over-exploitation of natural resources, polluted streams) and indirect from policy (e.g. rising inequality leads to over-exploitation of peri-urban forests) 	<ul style="list-style-type: none"> Taxes Tradable permits Subsidies
Information asymmetry	<ul style="list-style-type: none"> International technology transfer 	<ul style="list-style-type: none"> Development of capabilities Trade and investment policies IPR protection and enforcement Voluntary patent pools and collaborative mechanisms
Split incentives/ principal-agent	<ul style="list-style-type: none"> How contracts (financial incentive structure) among buyers-sellers, owners-leasers are structured impacts the behaviour of consumers When consumers are facing low or zero costs owing to contract structure, investors are less likely to invest in environment Often these options are existing technologies and operational measures 	<ul style="list-style-type: none"> Align the financial incentives of all parties in a way that enables appreciation of the full costs of consumption Labelling Voluntary approaches Subsidies Technology and performance standards GG-aligned contracting principles
Weak-Demand led	<ul style="list-style-type: none"> Insufficient demand for green innovation 	<ul style="list-style-type: none"> Taxes and market-based instruments to price externalities and enhance incentives Demand-side policies, such as public procurement, standards and regulations, in specific Markets and circumstances
Finance and risk	<ul style="list-style-type: none"> Imperfection in risk/capital markets caused by the operational policies of financial institutions prevent capital flowing to where it could best be used 	

Our synthesis of the BaGGD produces summarised priorities for the transition to green growth in Bangladesh.

Table 12 Priorities ranked from the BaGGD

Priority 1	Priority 2	Priority 3
<i>Policy should focus on countering these constraints immediately, by being collaborative, discussions, and conducting research</i>	<i>Policy should consider these constraints key enabling elements for the Bangladesh government to leverage. We suggest much can be developed here with the private sector as delivery agent</i>	<i>These constraints are not currently crucial for Bangladesh to focus its scarce resources on, and should be put on the back-burner for revisiting in 18 months.</i>
Inertia	Low returns to R&D	Barriers to competition
Network effects	Inadequate infrastructure	Low social capital & institutional
Data inadequate	Low human capital	Infant industry support
Inflexible finance	Scale diseconomy	Perverse subsidies
Negative externalities	Incomplete property rights	Policy unpredictable
Finance and risk	Enforcement uncertainty	Split incentives/ principal-agent
Weak-Demand led	Information externalities	

It is clear from Table 12 that there are challenges across the GGD for Bangladesh to consider. Below we present a range of suggested priority policy actions from the BaGGD that are appropriate and build on these in Chapter 7 as part of our recommendations.

Priority 1:

- > New Institutions
- > Coordination across government structure
- > Environmental risk assessment of policy, plans and programmes
- > Policy implementation review
- > Demonstration of benefits of GG in key sectors
- > Political devolution to the local government level
- > Collaboration with private sector in development of all policy and investments
- > PPP acceleration through working with private sector and financial sector
- > Green data development to underpin policy development
- > Financial mechanism liberalisation and development

Priority 2:

- > Financial incentives: taxes on pollution and other negative externalities, subsidies for innovation, R&D, skills development green technology investments, cooperation
- > Political devolution to the local government level
- > Increase governance structures in water, waste, and other environmental ministries
- > Training, capacity building, knowledge building
- > Reduce regulatory barriers for SMEs to innovate, invest and develop
- > Invest in green data
- > Subsidy diagnostic
- > Accelerate PPP development in new sectors learning from the experience of neighbours

7. Recommendations

Below we present recommendations based on the BaGGD.

1. **Leadership:** Ensure strong, high-level leadership and accountability that links long-term national goals with environmental risks and opportunities and builds broad coalitions.
2. **Clarity of GG vision for Bangladesh:** Unpicking its links with Sustainable Development, social development agenda, economic sectors. Currently, The Government of Bangladesh does not have a separate green growth strategy, but rather several initiatives that collectively contribute to framing the government's approach.
3. **Implementation:** Design a robust and adequately resourced planning and co-ordination process focused on green growth objectives, with clear 'rules of the road' and which builds a compelling evidence base. There can be an Apex Body or authority to oversee the co-ordination processes.
4. **Responsibility and mandate:** Establish a mandate for the process with clear economic, environmental, and social objectives, supported by strong institutional governance, for example through the Planning Commission.
5. **Data infrastructure:** Establish green data as a core enabler – collection of data on environmental assets and flows and the use by economic sectors – to ensure it can be integrated into public and private investment decisions and priorities. This is critical to begin transparently making trade-offs and to inform GG-led decision-making. Integrating key elements of green growth and sustainability into major project investments is critical. This will require data (e.g. on environmental assets and flows, as in Natural Resource Accounts or a Green Content Index), capacity building (on how key policy decisions are made, on how to work as a cross-disciplinary team, and on how to use evidence in new ways to make trade-offs that impact GG, such as between jobs and cleaner rivers), and decision-making support (necessary time and structure changes to how policy is enacted, developed and approved including new ministries and multiple voices).
6. **Integrate green criteria seamlessly into public and private decisions:** Macro-level prioritisation of investments and green investments using data (from [5]) to transparently decide on priorities and make investment choices.
7. **Flexible financing:** Macro financing solutions for green growth must be investigated, prioritised and amplified – such as PPPs which are growing in Bangladesh (44 as of October 2016) and demonstrating value globally for large complex infrastructure projects.
8. **Increase availability of green technology:** Incentives for commercial supply of green technology need to be investigated, prioritised and implemented. Policy requirements will include regulation on financing, trade, intellectual property, and will be backed with commercial/ private incentives such as taxes, subsidies, preferential access to markets, access to softer investment, lower bureaucracy.
9. **Increase availability and promote affordability of green technology to consumers:** Incentives to end-users for green technology need to be investigated, prioritised and targeted. Policy requirements will include government incentives, information campaigns, combined with assurances, guarantees.
10. **Environmental risk assessment of national policy, plans and programmes:** The challenge remains to develop a strategy for ensuring better coordination across ministries and line agencies of the government in order to remove or realign policies, laws and regulations that are in conflict with green growth and sustainable development.
11. **Identifying a green growth champion:** To ensure ownership and that recommendations such as those presented in this report are enacted upon, a major player should take charge of

pushing the green growth agenda forward in the long run. There could be both a public sector and private sector champion who work together to mainstream green growth in Bangladesh.

12. **Focus on start-ups:** Experience elsewhere is that local innovation is often from large international corporations and much smaller local SMEs. Our research has shown that SME innovation and investment generally are hindered by poor access to upgrading – through capacity-building, finance, information, and government policy. To ensure these firms can contribute meaningfully to GG in Bangladesh, incentives and support need to be made available.
13. **Green sector focus:** Deeper Sectoral study to understand the bottlenecks for low adoption of green technology in key sectors. For sectors, a full understanding of the current supply chain wide impact – not just visible or end uses. For instance, vehicles contribute to hazardous waste supply chains through engine oils, lubricants, tyres. Yet, these are largely unrecognised in existing analyses of the sector, and to make decisions that will generate green growth, greater evidence and transparency is needed.
14. Once businesses initiate discussion, commercial review around environmental matters, they typically find some worthwhile green investments. We recommend that whatever is needed to get them talking, provide information, provide the commercial benefits to green investments – which our survey shows exist – and a way to realise these.
15. Implementation capacity needs to be raised.
16. The initial assessment detailed in the CPEIR indicated that approximately **seven percent of total public expenditure contributed to green growth type** activities. These data from CPEIR are interesting, but GoB needs to find ways to ensure this scarce evidence is integrated into, and can improve, policy-making and the allocation of finance.
17. Political economy and commercial vested interests with a focus on BAU need to be transformed within sectors and sub-sectors if green growth pathway is to be realised. Suggest mapping exercises are undertaken in the key high-growth sectors with GG potential.

8. Bibliography

- Akamatsu, Kaname (1962), "Historical pattern of economic growth in developing countries." *The Developing Economies* 1: 3-25
- Asian Development Bank (2010), "The Informal Sector and Informal Employment in Bangladesh"
- Bangladesh Forest Department, Ministry of Environment and Forest (2016), "National Forestry Policy", Government of the People's Republic of Bangladesh
- Bangladesh National Parliament (2000), "Environment Court Law", Government of the People's Republic of Bangladesh
- Bangladesh National Parliament (2000), "Municipality Law of Bangladesh", Government of the People's Republic of Bangladesh
- Bangladesh National Parliament (2010), "Climate Change Trust Act of Bangladesh", Government of the People's Republic of Bangladesh
- Bangladesh National Parliament (2012), "Disaster Management Act of Bangladesh", Government of the People's Republic of Bangladesh
- Bangladesh National Parliament (2013), "Brick Making and Kiln Construction Act", Government of the People's Republic of Bangladesh
- Bangladesh National Parliament (2013), "Haor and Wetland Law of Bangladesh", Government of the People's Republic of Bangladesh
- Bangladesh National Parliament (2013), "Water Law of Bangladesh", Government of the People's Republic of Bangladesh
- de Serres, A., F. Murtin and G. Nicoletti (2010), "A Framework for Assessing Green Growth Policies", OECD Economics Department Working Papers, No. 774, OECD Publishing
- Disaster Management Bureau, Ministry of Food and Disaster Management (2008), "National Disaster Management Policy, Government of the People's Republic of Bangladesh
- FGI (2015), "In Conversation with FGI's Experts: On The Flying Geese Model"
- Finance Division, Ministry of Finance (2011), "Bangladesh Power Sector Roadmap: An Update", Government of the People's Republic of Bangladesh
- General Economic Division, Bangladesh Planning Commission (2015), "The 7th Five Year Plan FY 2016-FY2020: Accelerating Growth, Empowering Citizens", Government of the People's Republic of Bangladesh
- General Economics Division, Planning Commission (2012), *Perspective Plan of Bangladesh 2010 – 2021: Making Vision 2021 a Reality*, Government of the People's Republic of Bangladesh
- General Economics Division, Planning Commission (2013), *National Sustainable Development Strategy (NSDS)*, Government of the People's Republic of Bangladesh
- Haque, A.K. Enamul, and Estiaque Bari (2015), *Garments Workers in Bangladesh – Social Impact of the Garment Industry*, A survey report published by the Asian Center for Development, 2015.
- Hausmann, R., Rodrik, D., and Velasco, A. (2005), *Growth Diagnostics*, The John F. Kennedy School of Government, Harvard University, Massachusetts.
- Ministry of Agriculture (1999), "National Agriculture Policy", Government of the People's Republic of Bangladesh
- Ministry of Agriculture (2015), "National Agricultural Extension Policy", Government of the People's Republic of Bangladesh

Ministry of Civil Aviation and Tourism (2010), "National Tourism Policy", Government of the People's Republic of Bangladesh

Ministry of Communications (1983), "Motor Vehicles Ordinance", Government of the People's Republic of Bangladesh

Ministry of Communications (2004), National Land Transport Policy, Government of the People's Republic of Bangladesh

Ministry of Communications (2008), "Integrated Multi-Modal Transport Policy", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (1995 and 2010), "Bangladesh Environment Conservation Act and Amendments", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (1997), "Bangladesh Environment Conservation Rules", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2005), "National Adaptation Programme of Action, (NAPA)", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2006), "National Biodiversity Strategy and Action Plan (NBSAP)", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2009), "Bangladesh Climate Change Strategy and Action Plan (BCCSAP)", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2010), "Social Forestry Rules", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2011), "Hazardous Waste and Ship Breaking Waste Management Regulations", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2012), "Bangladesh Biodiversity Act", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2012), "Second National Communication of Bangladesh to the United Nations Framework Convention on Climate Change", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2014), "Ozone Depleting Substances Rules", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2015), "Intended Nationally Determined Contribution (INDC)", Government of the People's Republic of Bangladesh

Ministry of Environment and Forest (2016), "Ecologically Critical Areas (ECA) Rules", Government of the People's Republic of Bangladesh

Ministry of Fisheries and Livestock (1998), "National Fisheries Policy", Government of the People's Republic of Bangladesh

Ministry of Fisheries and Livestock (2014), National Shrimp Policy, Government of the People's Republic of Bangladesh

Ministry of Housing and Public Works (1996), "Building Construction Act of Bangladesh", Government of the People's Republic of Bangladesh

Ministry of Industries (2016), "National Industry Policy", Government of the People's Republic of Bangladesh

Ministry of Power, Energy and Mineral Resources (2005), "National Energy Policy", Government of the People's Republic of Bangladesh

Ministry of Power, Energy and Mineral Resources (2008), "Renewable Energy Policy of Bangladesh", Government of the People's Republic of Bangladesh

Ministry of Water Resources (1999), "National Water Policy", Government of the People's Republic of Bangladesh

Ministry of Water Resources (2005), "Coastal Zone Policy", Government of the People's Republic of Bangladesh

MOEF (2015), Intended Nationally Determined Contributions, Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, Dhaka.

Monetary Policy Department and Chief Economist's Unit, Bangladesh Bank (2016), "Monetary Policy Statement: July – December 2016", Government of the People's Republic of Bangladesh

OECD (2011), Tools for Delivering Green Growth, Prepared for the OECD Meeting of the Council at Ministerial Level, 25-26 May, 2011, Paris.

OECD (2012), *Green Growth and Developing Countries: A Summary for Policy Makers*, June 2012, OECD, Paris

Partnership for Action on Green Economy (2016), *Integrated Planning and Sustainable Development: Challenges and Opportunities*, UNEP, ILO, UNDP, UNIDO and UNITAR

Sander, H. (2011), The Use and Usefulness of OECD's "Green Growth Diagnostics", Globus Work Paper No. 2011-3, Institute of Global Business & Society, Cologne University of Applied Sciences, Cologne.

Stern, N., et al. (2007), *The Economics of Climate Change: The Stern Review*, Cambridge, Cambridge University Press

The World Bank (2016), *Bangladesh Development Update: Sustained Development Progress*, The World Bank, Dhaka.

UN (2015), Resolution adopted by the General Assembly on 25 September 2015, Seventieth session Agenda items 15 and 116, Distr.: General 21 October 2015, A/RES/70/1

United Nations (1987), *Our Common Future - Brundtland Report*, World Commission on Environment and Development, Oxford, Oxford University Press