United Nations Development Programme

Annotated Project Document template for nationally implemented projects financed by the GEF/LDCF/SCCF Trust Funds

<table>
<tr><td colspan="3">Project title:
Promoting Energy-Related Low Carbon Urban Development in Bangladesh (LCUD)</td></tr>
<tr><td>Country:
Bangladesh</td><td>Implementing Partner:
SREDA</td><td>Management Arrangement:
NIM (National Implementation Modality)</td></tr>
<tr><td colspan="3">UNSDCF/Country Program Outcome (2022-2026): Strategic Priority 3: Sustainable, Healthy and Resilient Environment Outcome 3: By 2026, ecosystems are healthier, and all people, in particular the most vulnerable and marginalized in both rural and urban settings, benefit from and contribute to a gender-responsive manner to a cleaner and more resilient environment, an enriched natural resource base, low carbon development, and are prosperous and more resilient to climate change, shocks and disasters.</td></tr>
<tr><td colspan="3">UNDP Country Programme Document 2022-2026: Output 2.1: More people in Bangladesh, especially the most vulnerable and marginalized, have increased capacities, knowledge, and skills to adopt sustainable consumption behaviors and lead in climate action.</td></tr>
<tr><td colspan="2">UNDP Social and Environmental Screening Category:
Moderate[1]</td><td>UNDP Gender Marker:
GEN1 (contribute to gender equality)</td></tr>
<tr><td colspan="2">Quantum Project ID: 00115022
(Atlas proposal no. as in DOA: 00117898)</td><td>Quantum Award ID: 00115022.1
(Atlas project no. as in DOA: 00115022)</td></tr>
<tr><td colspan="2">UNDP-GEF PIMS ID number: 5571</td><td>GEF ID number: 9368</td></tr>
<tr><td colspan="3">LPAC meeting date: 1 September 2020</td></tr>
<tr><td colspan="3">Project duration in months: 60 months</td></tr>
<tr><td colspan="2">Planned start date: 1 July 2024</td><td>Planned end date: 30 June 2029</td></tr>
<tr><td colspan="2">Expected date of Mid-Term Review: 31 July 2026</td><td>Expected date of Terminal evaluation: 31 January 2028</td></tr>
<tr><td colspan="3">Brief project description:
The project Promoting Energy-Related Low Carbon Urban Development in Bangladesh (LCUD) addresses the development challenge of increased negative economic and environmental impacts from fossil use and other non-sustainable practices in urban areas by enabling low-carbon interventions and investments in energy-efficiency (EE) and renewable energy (RE) in buildings and built environment and to support urban development in Bangladesh. The LCUD project will support national goals in achieving more sustainable consumption and production of urban energy and thus avoid greenhouse gas (GHG) emissions. The investments in improved energy use in building, renewable energy (such as rooftop solar PV and waste-to-energy initiated during project implementation will lead to cumulative (direct) GHG emission reduction of 1.573 million tons of CO2 per year (over the investment's lifetime). The Project's planned urban planning strengthening, awareness creation and capacity strengthening will catalyze replication in after the project's end.

The Project seeks to achieve this through the following Outcome: 1) Coordinated and integrated low-carbon urban plans and effective implementation of regulations, 2) Increased investments and measures in EE and RE in buildings and built</td></tr>
</table>

[1] During the PPG, the project interventions planned are mainly targeting low risk EE and RE subsectors and waste to energy would mainly be implemented through TA components for the existing plants or sites and will address the need for detailed ESIA assessments and preparation of ESMP, if any new site is planned."

environment, 3) Knowledge increased of practitioners and awareness raised of city dwellers on low-carbon, green, development. During implementation, the project partners with financial institution (IDCOL), city corporations and private sector to leverage financing as well as promote synergies among various stakeholder's activities for maximising impacts.

FINANCING PLAN	
GEF Trust Fund	USD 3,767,810
(1) Total Budget administered by UNDP	**USD 3,767,810**
PARALLEL CO-FINANCING (*all other co-financing that is not cash co-financing administered by UNDP*)	
IDCOL (loan)	USD 65,000,000
SREDA (in kind)	USD 700,000
DoE (in Kind)	USD 43,000
UNDP (grant)	USD 57,000
(2) Total co-financing	**USD 65,800,000**
(3) Grand-Total Project Financing (1)+(2)	**USD 69,567,810**

SIGNATURES		
Signature: Md. Shahriar Kader Siddiky Secretary Economic Relations Division Ministry of Finance Dhaka	**Agreed by Government**	**Date/Month/Year:** 02.11.2025
Signature: Farzana Mamtaz Secretary, Power Division Ministry of Power, Energy and Mineral Resources	**Agreed by Implementing Partner**	**Date/Month/Year:** 02/11/2025
Signature: Stefan Lillar Resident Representative UNDP Bangladesh	**Agreed by UNDP**	**Date/Month/Year:** 2/11/2025

1. TABLE OF CONTENTS

1. TABLE OF CONTENTS 3

LIST OF BOXES 5

LIST OF ACRONYMS AND ABBREVIATIONS 6

2. DEVELOPMENT CHALLENGE 8

2.1 INTRODUCTION 8
2.2 PROBLEM ANALYSIS AND THE PROJECT'S OBJECTIVE 9

3. STRATEGY 16

4. RESULTS AND PARTNERSHIPS 20

4.1 EXPECTED RESULTS 20
4.2 PARTNERSHIPS 31
4.3 RISKS AND RISK MITIGATION 32
4.4 STAKEHOLDER ENGAGEMENT 36
4.5 SOUTH-SOUTH AND TRIANGULAR COOPERATION (SSTrC) 37
4.6 MAINSTREAMING GENDER 37
4.7 SUSTAINABILITY AND SCALING UP 38

5. PROJECT MANAGEMENT 41

5.1 COST EFFICIENCY AND EFFECTIVENESS 41
5.2 PROJECT MANAGEMENT 42

6. PROJECT RESULTS FRAMEWORK 43

7. MONITORING AND EVALUATION (M&E) PLAN 47

8. GOVERNANCE AND MANAGEMENT ARRANGEMENTS 52

9. FINANCIAL PLANNING AND MANAGEMENT 59

10. TOTAL UNDP BUDGET AND WORK PLAN 62

11. LEGAL CONTEXT 66

12. RISK MANAGEMENT 66

ANNEXES 70

ANNEX A. MULTI YEAR WORK PLAN 71

ANNEX B. OVERVIEW OF EXPERTS AND CONTRACTS 73

ANNEX C. TERMS OF REFERENCE OF KEY PROJECT STAFF 76

ANNEX D. GENDER ANALYSIS AND ACTION PLAN 83

D.1 GENDER MAINSTREAMING ANALYSIS 83
D.2 GENDER ACTION PLAN 86

ANNEX E. BASELINE CONDITIONS AND SITUATION, LOW-CARBON URBAN DEVELOPMENT 91

E.1 URBAN AND ENERGY PLANNING 91
E.2 LOW-CARBON URBAN DEVELOPMENT 93
E.3 SOLID WASTE MANAGEMENT AND WASTE-TO-ENERGY 97
E.4 ENERGY EFFICIENCY AND RENEWABLE ENERGY IN BUILDINGS AND THE BUILT ENVIRONMENT 103

ANNEX F. CALCULATIONS OF TARGETED ENERGY SAVINGS AND GREENHOUSE GAS EMISSION REDUCTIONS 112

F.1 DIRECT AND INDIRECT GHG EMISSION REDUCTION ESTIMATES 112

F.2 GEF CORE INDICATORS 117

ANNEX G. STAKEHOLDER ENGAGEMENT AND COMMUNICATION PLAN 118

ANNEX H. ADDITIONAL BUDGET TABLES 121

ANNEX I. UNDP SOCIAL AND ENVIRONMENTAL SOCIAL SCREENING 123

ANNEX J. RESULTS OF THE CAPACITY ASSESSMENT OF THE PROJECT IMPLEMENTING PARTNER AND HACT MICRO ASSESSMENT 135

LIST OF BOXES

Box 1	Barriers and challenges in urban policy and coordination	11
Box 2	Barriers and challenges in energy efficiency and renewable energy integration in buildings	11
Box 3	Barriers and challenges in composting and waste-to-energy	12
Box 4	Linkages of energy with the SDGs	13
Box 5	Greenhouse gas emission from cities in Bangladesh	15
Box 6	Baseline activities undertaken by development partners and other stakeholders and links with Components of the Project	16
Box 7	Theory of change – problem tree (causes and challenges) and solutions (results and impacts)	18
Box 8	Overview of indicative public and private sector low-carbon investments associated with the LCUD Project, with indicative levels of GEF TA and INV support	25
Box 10	Summary of direct greenhouse gas emission reduction (due to LCUD investments)	41
Box 11	Mandatory GEF M&E requirements and M&E budget	50
Box 12	Project governance and management setup	53
Box 13	Gender-related indicators and targets (from the project Results Framework)	86
Box 14	Gender-aspects in Theory of Change	87
Box 15	Gender and social inclusion action plan: a gender mainstreaming measurement tool	88
Box 16	Installed capacity and electricity generation per fuel type	92
Box 17	Urban centres in Bangladesh	93
Box 18	Selected investment areas, issues and options in low-carbon urban development	94
Box 19	Composition of urban solid waste	97
Box 20	Total waste generation in urban areas of Bangladesh in 2005	98
Box 21	Solid waste management and practices in Banagladesh	99
Box 22	Utilisation of organic waste for composting and landfill gas recovery	101
Box 23	EE&C issues proposed to be incorporated in the Revised BNCB	103
Box 24	Role and responsibilities of stakeholders in EE&C in buildings and in BNBC	104
Box 25	Building rating systems and features	106
Box 26	Proposed Bangladesh building energy and environment certification and label	107
Box 27	Potential savings in different types of buildings	108
Box 28	Typical net-metering architecture	110
Box 29	The role of energy service companies in EE and RE in built environment	111
Box 30	Estimates of GHG emission reduction, costs and benefits of waste-to-energy projects	113
Box 31	Energy savings in an average hotel	114
Box 32	Energy savings in larger commercial and public buildings	115
Box 33	Analysis rooftop PV on a smaller building	115
Box 34	Analysis rooftop PV on a larger building	116
Box 35	Summary of direct greenhouse gas emission reduction (due to LCUD investments)	116

LIST OF ACRONYMS AND ABBREVIATIONS

3R, 4R	reduce, re-use, recycle; recover
AC	Advisory Committee
ADB	Asian Development Bank
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BDT	Bangladesh Thika
BGBC	Bangladesh Green Building Council
BIFFL	Bangladesh Infrastructure Finance Fund Ltd
BLCCN	Bangladesh Low-Carbon Cities Network
BNBC	Bangladesh National Building Code
BOD	biochemical oxygen demand
BREEAM	Building Research Establishment Environmental Assessment Method
BUF	Bangladesh Urban Forum
CBO	community-based organization
CDR	Combined Delivery Report
CEO	Chief Executive Officer
CEO ER	CEO Endorsement Request
CfP	Call for Proposals
CO	Country Office
COD	chemical oxygen demand
CPD	Country Programme Document (UNDP)
CSO	civil society organisation
CTA	Chief Technical Advisor
DoE	Department of Environment
DCA	USAID Development Credit Authority (DCA)
DPP	Development Project Proposal
ECBC	Energy Conservation Building Code (India)
E&E	energy and environment
EE	energy efficiency
EE&C	energy efficiency and conservation
ESCO	energy service company
EU	European Union
FPIC	Free Prior and Informed Consent
FSP	financial service provider
FSP	full-sized project
FY	Fiscal Year
GBG	Green Building Guidelines
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	greenhouse gas
GIZ	Gesellschaft für Internationale Zusammenarbeit (German cooperation)
GRIHA	Green Rating for Integrated Habitat Assessment
GWh	Gigawatt-hour (billion watt-hours)
HBRI	Housing and Building Research Institute
ICLEI	Local Governments for Sustainability Network
IGNB	Indian Green Building Council
HVAC	heating, ventilation and air-conditioning
IA	Implementing Agency
IEO	Independent Evaluation Office
IDCOL	Infrastructure Development Company Ltd.
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
IP	Implementing Partner
IRRC	integrated resource recovery centre
JICA/JICS	Japan International Cooperation Agency / System
kW	kilowatt
kWh	kilowatt-hour

LCUD	low-carbon urban development
LCUD Project	"Promoting Energy-Related Low Carbon Urban Development in Bangladesh" Project
LEED	Leadership in Energy and Design
LGED	Local Government Engineering Department (of MLGRDC)
LoA	Letter of Agreement
LED	light-emitting diode
LPAC	local Project Appraisal Committee
M&E	monitoring and evaluation
MLGRDC	Ministry of Local Government, Rural Development and Cooperatives
MHPW	Ministry of Housing and Public Works
MoEFCC	Ministry of Environment, Forests and Climate Change
MPEMR	Ministry of Power, Energy, and Mineral Resources
MRV	monitoring, reporting, and verification
NCE-VF	Nature, Climate and Energy – Vertical Fund
NGO	non-governmental organization
NEP	National Energy Policy
NHA	National Housing Authority
NPD	National Project Director
NUPRP	National Urban Poverty Reduction Programme
MTR	Mid-Term review
MW	megawatt (million Watts)
OFP	Operational Focal Point
O&M	operation and maintenance
PAC	Project Appraisal Committee
PIF	Project Identification Form
PIR	GEF Project Implementation Report
POPP	Programme and Operations Policies and Procedures
PPG	Project Preparation Grant
PPP	public-private partnership
PM	Project Manager
PMU	Project Management Unit
ProDoc	project document
PV	photovoltaic
PWD	Public Works Department (of MHPW)
RAJUK	Capital Development Authority
SREDA	Sustainable and Renewable Energy Development Authority
SREPGen	Development of Sustainable Renewable Energy Power Generation
R&D	research and development
RE	renewable energy
RET	renewable energy technology
ROAR	Results-Oriented Annual Reporting
RRMC	Risk Reduction Management Centre
SDG	Sustainable Development Goal
SESP	Social and Environmental Screening Procedure
SHS	solar home system
tCO_2	ton of carbon dioxide
TA	technical assistance
TAC	Technical Advisory Committee
TE	Terminal Evaluation
Toe	tons of oil equivalent
UDD	Urban Development Directorate (of MHPW)
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States dollar
WB	World Bank
WTE	waste to energy

2. DEVELOPMENT CHALLENGE

2.1 Introduction

Context

The cities of South Asia in general and Bangladesh, in particular, are growing at an unprecedented rate, and there is a need to steer this development towards a sustainable and low carbon path. Bangladesh's urban population has been growing at a yearly average rate of 6% since independence in 1971, and its urban population has increased six-fold since then. Approximately 35% of Bangladesh's population 165 million (2017) currently lives in urban areas[2]. Of this urban population, more than 60% lives in the five largest metropolitan areas that include the following main areas: Dhaka (18.9 million), Chittagong (7.4 million), Khulna (2.0 million), Sylhet (1.0 million) and Rajshahi (0.85 million)[3]. The growth of urban GDP is proportionately related to urbanization growth in Bangladesh. The country's GDP was USD 285 million of which the Dhaka metropolitan area contributes USD 100 million[4]. Much of the organized service sector (government, banking, construction, and trade) is concentrated in Dhaka.

The key drivers for urbanization in Bangladesh are: (i) countrywide demographic transition from rural areas to urban centres; (ii) displaced/landless people migration to urban areas; (iii) conversion of rural growth centres into urban areas; (iv) agriculture sector is no longer able to absorb the surplus labour force entering the economy every year, and many from this sector move to cities where the economic opportunities are much better, and (v) lack of educational, health facilities, social and cultural opportunities in rural areas.

It is noted that the burgeoning development of Bangladeshi cities is exerting pressure on land, land use, and housing and results in overloaded urban infrastructures and transport systems that need to be improved and expanded. These are accompanied by some key challenges: (a) poor urban planning and management, and lack of coordination amongst agencies, (c) higher energy consumption and increased greenhouse gas (GHG) emission, (d) inadequate solid waste management leading to environmental issues such as pollution, and (e) expansion of metropolitan cities in an uncoordinated and non-integrated manner, including the rapid growth of slums and squatter settlements. Furthermore, the impacts of climate change will accelerate Bangladesh's ongoing urbanization as well as deepen the scale and severity of urban poverty.

Development challenge

The UNDP/GEF Project aims to address the **development challenges**, posed by *increased negative economic and environmental impacts from fossil use and other non-sustainable practices in urban areas.* The project's contribution, described in the following sections, will contribute towards the promotion of low-carbon urban development, that is instrumental to add value to help cities earn win-win benefits or co-benefits by integrating energy efficient sustainable initiatives and green development principles into city planning.

Solution: low-carbon urban development

Cities and climate change have a causal relationship. Cities, as major emitters of greenhouse gases, contribute to climate change. Again, the changing climate can have severe impacts on cities, all the more important as they house a large, increasing, part of the population and productive assets. The **low-carbon urban development (LCUD) approach** has become an emerging framework to address the challenge of climate change (see Annex E.1 for a short description of the LCUD concept and approach). The effective low-carbon urban planning and development require land-use planning that creates

2 www.worldometer/info

3 Bangladesh Bureau of Statistics, Aug 2014

4 Dhaka Factsheet. Lloyd's City Risk Index 2015–2025.

land-use patterns within cities that can provide services without the loss or degradation of natural habitats and lower GHG emissions. The urban form includes population density, open spaces, the extent of impervious surfaces, road networks, trip distances, civic infrastructure, etc. Together with the structures (buildings and built environment) and natural parameters, the city morphology has a great bearing on energy use and, therefore, on emissions. The density and diversity of the urban form influence a city's energy use.

2.2 Problem analysis and the project's objective

Baseline situation

Urban planning (see also Annex E.2)

The burgeoning development of Bangladeshi cities is accompanied by poor urban planning and management, and lack of coordination amongst agencies. Cities of different size are assigned to different planning authorities for their plan (physical) making. City plans are prepared by development authorities, city corporations, municipalities and by the Urban Development Directorate, which are under the Ministry of Local Government, Rural Development and Cooperatives (LGRDC) and Ministry of Housing and Public Works (MHPW) respectively. Due to lack of coordination and synergy between inter-ministerial objectives and strategy, schemes by one ministry may not properly be reflected by other ministries.

In the five main cities, spatial planning and development are carried out by Urban Development Authorities (under the authority of MHPW). The Development Authorities prepare master plans for their city areas, control development (e.g., building development approval), and develop infrastructure (mainly roads for residential neighbourhoods). MHPW is responsible for the Bangladesh National Building Code (BNBC) and issuing the Green Building Guidelines (GBG). MHPW's Urban Development Directorate (UDD) has prepared some 50 district-level and 392 municipal-level master/ land use plans, but UDD does not have the mandate, neither the capacity nor the financial resources to implement the plans and projects.

MLGRDC is the ministry responsible for the housing and building, regional and rural policy, municipal and cities administration and finances. Under the Ministry, the Local Government Engineering Department (LGED), one of the largest public sector organizations in Bangladesh, is entrusted for planning, development, and maintenance of local-level infrastructure. Urban Bangladesh is divided into 11 City corporations and 329 municipalities that fall under the Ministry of LGRDC. They have the mandate to prepare urban plans and to provide municipal services to its residents. However, in general, smaller municipalities have little capacity to prepare master plans and lack financial and human resources to carry these out.

Waste management and waste-to-energy (see also Annex E.3)

It is estimated that approximately over 16,380 tons of waste were produced per day in the urban areas of Bangladesh (with an urban population of 32.7 million in 2004, at 0.41 kg per capita per day), which is over 4.86 million tons annually, of which about 4,200 tons a day in Dhaka[5]. Currently, 45% of the urban solid waste remains uncollected and is dumped somewhere in roadside bins or anywhere in unsanitary ways; about 55% is collected by municipalities and brought to the crude disposal site. Even the collected wastes are not managed at a satisfactory level. Dumping areas and landfills are overburdened. There is a severe lack of source-separation practices in Bangladesh. Land for waste disposal is also scarce. This cause the sector a top priority for introducing better management practices. However, many Corporations and municipalities are overwhelmed by the size of the problem and their lack of manpower, finance and transport problems.

The solid waste has a substantial organic content which is left unutilised, while the escaping methane gas resulting from its decomposition leaves bad odours and contributes to global warming. The organic content in the waste can be a source for composting, while the landfill gas that is produced by bio-methanation of the organic content, can be captured, burnt (which

[5] *National 3R Strategy for Waste Management*, Department of Environment (DoE), MoEFCC (December 2010); SREDA website

converts methane into carbon dioxide which has a lower global warming potential), or better, be put to use for electricity generation or converted into a fuel.

However, so far, the actual implementation in Bangladesh has been limited to pilot activities in research centres, and there is no commercial WTE facility operating, although several proposals have been made in the past. Government support in terms of incentives (e.g. feed-in tariff for supply of landfill-generated electricity to the grid) to make WTE economically attractive to the private sector is not available. Another reason is that the proper waste collection and sorting is often absent, while in densely populated Bangladesh, land availability and getting the official approval for land acquisition form a major barrier in establishing landfill in the first place.

Energy efficiency and renewable energy in buildings (see Annex E.4, and E.5)
The Bangladesh National Building Code (BNBC) is the mandatory program which provides regulation and/or minimum requirements of certain types and sizes of buildings. The Ministry of Housing and Public Works (MoHPW) has been updating the existing Bangladesh National Building Code (BNBC-Revised), promoting green buildings and incorporating energy efficiency and conservation (EE&C) elements. The BNBC-Revised has been approved but is currently awaiting the formal confirmation by publication in the Gazette of the Government. Application of EE&C requirement issues in BNBC [Revised] will be implemented and extended in a phased manner (under study by MHPW). Going beyond the BNBC-Revised, the Green Building Guideline (GBG) is a voluntary program and is being developed as a guideline for the design and construction of upper-grade EE&C and low environment-impact buildings. A Green Building Assessment System will be developed by MHPW. Unfortunately, new commercial apartment and other buildings rarely fulfil the green building criteria. The first challenge is to make the low-carbon and green building concepts known amongst buildings designers, developers, constructors, and owners, and a second challenge will be implementation and enforcement.

Brick making is an energy-inefficient industry based on small-scale kilns with limited financial capacity and dominated by a single raw material (clay) and product (solid clay brick). Over the past decades, technology has been improved towards more energy efficiency, but of the most efficient types, only a few are in use. The Green Building concept promotes the use of sustainable building materials (i.e. the use of fired clay bricks that are used in the most energy-efficient way possible and use of alternative non-fire bricks).

The Power Division moved in 2018 to execute 'net metering system' to buy solar power from consumers for the national grid as the required policy guideline have been finalised. This will make setting up rooftop PV an interesting option for larger private, commercial and industrial, buildings and sell their additional or unconsumed electricity to the national grid. Again, there is much uncertainty or ignorance about rooftop PV, and the challenge is to make the low-carbon and green building concepts known amongst buildings designers, developers, constructors, and owners.

Project objective and core problem addressed
The ***core problem*** underlying the above-mentioned development challenge and that the Project seeks to address is formed by *limited low-carbon (EE, RE) investments and measures in buildings and built environment*. Thus, the **project's objective** addressing the core problem is *"enabling investments in renewable energy and energy-efficiency to support urban development in Bangladesh"*.

The description of the project concept in the Project Identification Form (PIF), updated with the stakeholder's inputs during the logframe analysis and stakeholder workshop (May, September and December 2018) and project preparation mission by the PPG team of consultants in 2018, facilitated the further discussion on the *main causes of the problems* (posed by barriers and gaps). These are described in the section below and summarized in its Boxes 2,3 and 4.

Barriers, causes and gap analysis
The baseline situation and core problem will continue, due to the *persistence of barriers band challenges in a) policy, instruments and planning, b) implementation of planned actions and related investments, and c) awareness, knowledge and capacity*. The barriers are summarised per thematic area, 1) policy and coordination), 2) implementation of policy action and investments, and 3) awareness and capacity, in the Boxes 1 to 3. As barriers and challenges continue, Bangladesh's sustainable urban development targets regarding carbon emissions, as laid down in the INDC, and energy efficiency and renewable energy, as guided by the SDG Goal 7, will not be met. Under the project's theory of change, addressing the

underlying issues and barriers of the core problem, the underdeveloped rural energy infrastructure, and energy services, will lead to the transitioning of Bangladesh towards a more low-carbon and greener urban development path.

Box 1 Barriers and challenges in urban policy and coordination

Policy and planning	Implementation	Awareness and capacity
Lack of appropriate policies and regulatory frameworks for supporting sustainable and LCUD of cities • Cities in Bangladesh have to periodically prepare Development, Structure plan and Urban area plans. These are prepared by the City Corporations and Urban Development Authorities respectively. The current city plans have been formulated based on the traditional urban development planning process principles. The existing plans are often made in parallel and overlap of leave gaps and do not make incorporate green planning or LCUD elements *Multiplicity of organisations and agencies involved in urban governance and management and lack of coordination* • Urban governance involves multiple agencies at the national, sectoral and local level often generate overlapping of functions due to lack of coordination among the concerned agencies. The pluralism in the planning results in uncoordinated efforts which often creates more problems than bringing solutions[6].	*Poor implementation of planned actions and lack of scaling up and replication* • In general, less than 10% of the planned actions are implemented. Even though some successful pilots on the application of energy efficiency technologies and practices, as well as environment-friendly urban waste management schemes have been implemented, these are not replicated nor scaled-up. This is caused by the return of inter-related issues: a) lack of technical know-how in integrated urban development planning, b) inadequate financing of these schemes due to the lack of support from local government officials, and c) the low level of confidence by the private sector (that is capable of bringing additional financing) in venturing into public-private partnerships with city governments.	*Absence of a common platform for mutual exchange of ideas, best practices and policy discussion on urbanization and urban development* • There is no common forum or network to share experience and promote good practices among urban sector stakeholders and to contribute to the formulation and implementation of LCUD and green planning and policies *No efforts to sensitise city dwellers and raise awareness on greening city development* • There are no real concerted efforts by cities towards sustainable urban development. This stems from the rather inadequately informed views and decisions of city authorities in the planning and operation of their cities, the lack of cooperation and coordination among cities, and most likely, the lack of understanding and appreciation among the city authorities of the need to, and the benefits of, planning and implementing more environment-friendly, sustainable and low carbon development of cities

Box 2 Barriers and challenges in energy efficiency and renewable energy integration in buildings

Policy and planning	Implementation	Awareness and capacity
Poor coordination between the agencies in charge of the implementation of the Bangladesh National Building Code (BNBC) and city corporation bylaws for promoting energy efficiency in buildings, and public lighting	*Poor implementation of planned actions and lack of scaling up and replication* • City corporation officials do not have adequate technical understanding of the code and responsibilities for enforcement of guidelines and codes • There is limited knowledge among designers and architects to analyze designs based on mandatory (BNBC) and	*Lack of awareness among developers, designers, and building users and a general lack of awareness on EE in buildings* • There is limited knowledge among designers and architects to analyze designs based on code requirements.

[6] *Coordination of urban planning organizations as a process of achieving effective and socially just planning: A case of Dhaka city, Bangladesh*, by Md. Ashiq Rahman, in: "International Journal of Sustainable Built Environment" (2015), 4, 330-440

• Based on experiences in the past, although codes/guides like the BNBC can emphasize new specific objects (in this case energy efficiency), when it comes to implementation and enforcement, this may be very lax. • The same is true with the city corporation bylaws. For example, Dhaka the city corporation bylaws were revised recently but there was no emphasis on energy efficiency in the city building code or integration of RE. This problem is mainly due to the lack of coordination between the relevant authorities and monitoring of code compliance	voluntary (BEEER) requirements. Energy simulation exercises to quantify savings based on EE parameters and RE integration has been very limited to a few pilot buildings only • The building construction industry (contractors, services providers) do not apply EE&C measures or RE integration (rooftop PV) in buildings on a commercial basis; • Asymmetry in sharing of costs and benefits in the building sector between building developers, owner, and users; • Uncertainty on payback times of the additional upfront investment involved in the development of efficient buildings	• The audit methods and accompanying recommendations currently practiced to study buildings needs improvement • The building construction industry (contractors, services providers) are not geared to apply EE&C measures or integrate rooftop PV in buildings; • Building managers and/or users do not know how to get the intended performance improvement associated with various aspects of the EE&C and RE integration including whole building performance associated with compliance to BNBC 2020and voluntary guidelines and green building rating schemes.

Box 3 Barriers and challenges in composting and waste-to-energy

Policy and planning	Implementation	Awareness and capacity
• The country does not have an official waste management strategy. As a result, waste management is viewed solely as an engineering option under municipal responsibility for collection and disposal, not something that could be part of public-private partnerships. The absence of cost recovery in waste collection makes raising finance for waste management difficult. • The lack of proper enforcement of the already inadequate environmental regulations stemming from the absence of proper coordination between regulatory authority, city corporations, and city development authorities, makes local waste management difficult • Waste is seen by authorities (at national and city level) not as a potential resource that can generate income (material recycling, compost, electricity)	• Due to high population density in a highly urbanized region, finding large extents of land away from the main habitations is difficult. A large part of the country consists of low-lying areas which are generally active floodplains. As a result, suitable landfill sites for WTE are not easily available within the city. • WTE systems have been studied. However, these have not been implemented as a commercial project • There is a lack of technical expertise in the city corporations to ensure the sustainable implementation and monitoring of waste management, composting and WTE schemes.	• Private sector and the public at large alike do not see re-use and proper disposal of waste as their responsibility, let alone that waste could be a source of income generation (recycling, composting, WTE) • Moreover, the private sector (developers, and financial sector) is also wary about investing in this kind of initiatives, which are often perceived to be risky investments • The average resident, as well as industrialist views, waste management as a City Corporation's or municipality's responsibility. The public carries a negative perception of the role played by the local body mainly because of the conspicuous quantities of waste lying uncollected on city roads for days[7]. However, there is little awareness about the role the citizens themselves can play; for example, there is widespread 'resistance' to calls for separation of waste and recycling at the household level.

[7] About 86% of residents manifest dissatisfaction with the waste management system in Dhaka; 57% of resident think that many footpaths are covered with waste, and that waste dumping is a main reason for Dhaka's notorious traffic jams. Report in Daily Prothom Alo, 04-05-2016, Dhaha, by S.S. Partho

Alignment with national priorities

The proposed project is consistent with national priorities and plans, *8th Five Year Plan (2020-2025),* and the *National Perspective Plan*, and with plans and strategies that help Bangladesh to address GHG emissions by investing in low carbon development. The climate-resilient development trajectory in the *Bangladesh Climate Change Strategy and Action Plan (BCCSAP)* is built on six pillars where mitigation/low-carbon development is one of the pillars. This seeks to link policy, plan, programme, and capacity development objectives in the context of national development. The proposed project is consistent with Bangladesh *2nd National Communications* to the UNFCCC that identified cities need to play a key role while addressing the issue of climate change as they are most vulnerable.

The proposed project aligns to three of the mitigation programs on interventions included in Bangladesh's *Intended Nationally Determined Contributions (INDC)* report (that was submitted to the UNFCCC in September 2015), applicable to cities, i.e., "Improved energy efficiency in production and consumption of energy", "Renewable energy development", and "Management of urban waste". The proposed project will take accelerate their implementation through its scale-up activities at the city level.

Relevance to the SDGs

The 17 Sustainable Development Goals (SDGs) were adopted in 2015 by the international community, including Bangladesh as part of the UN 2030 Agenda for Sustainable Development. Goal 7 specifically deals with sustainable energy and energy efficiency, while there are various indirect linkages of sustainable energy with some of the other SDGs (number 8, 9, 11, 12 and 13).
Box **4** shows the relevant SDGs and how these are linked with energy-relevant low-carbon development.

Sustainable Development Goals	Linkage with low-carbon development
Sustainable energy	
7.2 Increase substantially the share of renewable energy in the global energy mix 7.3 Double the global rate of improvement in energy efficiency	7a. Enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies 7b. Expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, particularly LDCs and SIDS
Other SDGs:	
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	The energy intensity and carbon content of economic growth
9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Resilient infrastructure and public-private partnerships are required to ensure access to energy for all and to maximise energy efficiency
11. Make cities and human settlements inclusive, safe, resilient and sustainable	Cities require careful energy and low-carbon development planning
12. Ensure sustainable consumption and production patterns	Renewable energies are a key part of a future in which there is sustainable consumption and
13. Take urgent action to combat climate change and its impacts	The carbon-intensive energy sector (based on fossil fuels) is a key driver of climate change.

Compiled from *Transforming our World: the 2030 Agenda for Sustainable Development* (UN, 2015), *Indicators and a Monitoring Framework for the Sustainable Development* Goals, Sustainable Development Solutions Network (SDSN)

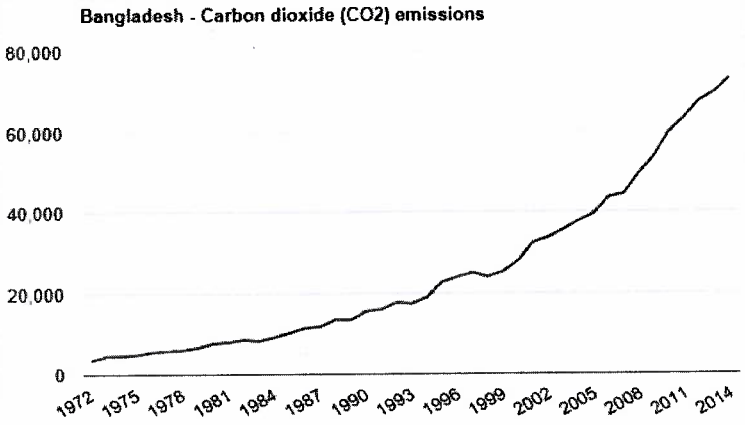
Box 4 Linkages of energy with the SDGs

Relevance to GEF priorities

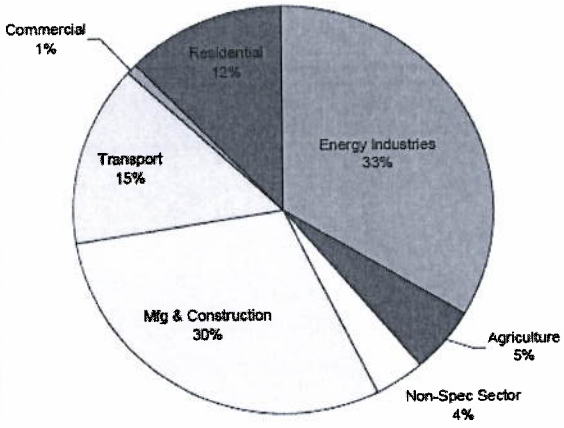
The project falls within the GEF-6 programme area "Promote integrated low-emission urban systems" of the Climate Change focal area's Objective #2, "Demonstrate systemic impacts of mitigation options". Box 5 shows the GHG emission from cities in Bangladesh.

Box 5 Greenhouse gas emission from cities in Bangladesh

Bangladeshi's greenhouse gas emissions have been growing rapidly; emissions were 39.48 million tCO_2 and 0.275 tons of CO_2 per capita in in 2005, which had increased to 73.19 million tCO_2 and 0.459 ton per capita by 2014 (source: Index Mundi).



The sectoral composition, 2005 data, is given in the figure (taken from the Second National Communications). Of these, many are related to urban settings, e.g. residential, transport, industries, but the statistics do no show what are emissions from cities as such.



However, the share of cities in Bangladeshi's emissions must be substantial. approximately 35% of Bangladesh's population 165 million (2017) currently lives in urban areas. Approximately 36% of Bangladesh's population 165 million (2017) currently lives in urban areas. Of this urban population, more than 60% lives in the five largest metropolitan areas that include the following main areas: Dhaka, Chittagong, Khulna, Sylhet, and Rajshahi. The Dhaka metropolitan area alone provides 35% of the country's GDP (see Section 2.1 in the main text). The share of urban population is also increasing from 24% in 2000 to 36% in 2017. The population is expected to increase to 202 million in 2050 (with a 56% urban share; source: worldometer.info)

The Local Governments for Sustainability network ICLEI has made some estimates of greenhouse emissions, waste production and electricity consumption for some of Bangladeshi's cities:

Sector	National	Chittagong	Dhaka	Khulna	Rajshahi
Electricity-residential (million kWh)	8,900.2	59.6	2,753.8	41.8	11.8
Electricity-commercial (million kWh)	1,644.2	15.2	536.5	9.5	2.2
Electricity-industrial (million kWh)	7,848.6	101.6	1,502,3	10.0	0.1
Electricity-other (million kWh)	2,205.8	35.4	1,660.3	13.0	44.7
Waste production (tons per day)	13,333	1,550	4,634	321	173
CO_2 emissions (million tons)	37.95	0.38	4.27	0.77	0.05
- share of City Corp services in CO_2		10%		8%	1%

City electricity figures (2007-08): *ICLEI Energy and Carbon Emissions Profiles of 54 South Asian Cities* (2009); waste production (2005): *National 3R Strategy for Waste Management*, Department of Environment (DoE), MEFCC (December 2010). National CO_2 emissions (2005) and electricity consumption (average over 2005-2008): *Second National Communications*.

Increasing urban sprawl and growth in incomes continue to put additional pressure on city authorities and emissions are set to increase. The bulk of city emissions are energy-related and Bangladeshi's economy, buildings and transportation sector are relatively energy intensive. Waste management is increasingly a major concern for cities as space for landfills and treatment systems in densely populated Bangladesh is very constrained. Underlying this sprawl is the continuing development of new areas of mostly rural land for new, low density housing and industrial estates. Local land-use planning and development has a key role in reducing GHG emission from cities. However, low-carbon city planning is not easily implemented in a complex institutional web of several tiers of government (national ministries and agencies, city corporation, and city development authorities). Sustainable economic development is closely tied to the ability of the country to move to a low carbon climate resilient development pathway, and that, given their important role in the economy, cities will be essential partners to chart a low carbon growth path. The LCUD Project aspires to transform the way cities plan and develop so as to promote the application of green low carbon technologies, mobilise cities' management, and engage city dwellers.

3. STRATEGY

In the context of the above linkages between the development challenge (and core problem) and its causes (persistence of barriers and challenges), the **objective** of the project is "To reduce GHG emissions by enabling investments in renewable energy and energy-efficiency to support urban development in Bangladesh". The project seeks to achieve this by achieving the following **outcomes** that are grouped in three project components:

Component 1 City level integration of energy-relevant low carbon urban development plans and programmes
- Coordinated and integrated low-carbon urban plans and effective implementation of regulations

Component 2 Implementation of selected low carbon interventions in cities
- Increased investments and measures in EE and RE in buildings and built environment

Component 3 Sensitizing city dwellers and capacity strengthening for low-carbon initiatives
- Knowledge increased of practitioners and awareness raised of city dwellers on low-carbon, green, development

As the project will not function in isolation and will avoid duplication with existing or planned activities undertaken by the government and other development partners or seek active cooperation in specific activities where possible, the *baseline activities are identified* (see Box 6). The project will seek collaboration with the selected group stakeholders during project implementation in addition to a wide range of stakeholders, as is detailed further in Section 3.4 on partnerships.

Box 6 Baseline activities undertaken by development partners and other stakeholders and links with Components of the Project

Baseline activities	**Component 1 Policy, planning, regulations**	**Component 2 Investments**	**Component 3 Info, capacity and awareness**
Government: *EE&C Master Plan up to 2030.* Main elements (proposed): o EE Building Program: 1. Revised BNBC with EE&C, 2. EE&C manual for BNBC; 3. Green building guidelines (GBG) o Other related programmes under implementation (labelling appliances; energy management in large consumers and industry)	X	X	X
Existing and pipeline projects of Local Government, City corporations, Municipalities, NGOs and donors along with budget allocation that fall within the scope of the proposed project	X	X	
UNDP *National Urban Poverty Reduction Programme* (2016–2021), in particular activities on strengthened municipal pro-poor urban management and planning, and strengthened municipal financial management and performance)	X		
IDCOL (development bank) can providing financing (also managing funding of other MFIs or donors, including loan schemes) for applicable for EE interventions in buildings and built environment		X	
World Bank project *Rural Electrification and RE Development II* (USD 245 million budget). Relevant components is Component 2: Renewable Energy Financing Facility, REFF (rooftop PV)		X	
The proposed Asian Development Bank (ADB) *Second Region City Development Project* focusses on urban water and infrastructure services, including waste management in Dhaka and Kulna with a USD 150 million loan			
UNDP/GEF Development of Sustainable Renewable Energy Power Generation (SREPGen), links with renewable energy applications in built environment and waste-to-energy activities		X	X

The LCUD Project seeks to complement these projects to address gaps observed in the three components elaborated in Section 2.2 by designing and implementing *additional interventions and activities*. GEF support is needed to be able to implement these additional interventions (referred to as *incremental reasoning).* In the case of continuation of the current status quo and persistence of challenges and barriers, Bangladesh's sustainable and environmental goals as outlined in its development, urban development and environmental policies and plans (see Section 2) will not likely be met; this is referred to as the *baseline scenario).* Addressing the underlying issues and barriers of the core problem (the underdeveloped rural energy infrastructure, and services) will help the transitioning of Bangladesh towards a pathway of more environmentally sustainable, low-carbon, urban development (referred to as the *alternative scenario)* with a dedicated focus through the proposed project interventions.

The Project's theory of Change explains the process of change by outlining the linkages of its interventions, i.e., its outputs, direct outcomes, and impacts, with the before-mentioned main barriers to change. Box 7 on the next page shows how the project's results (impacts, outcomes, and outputs) address the identified issues (development challenge, core problem, and causes).

Project boundary

In the LCUD approach, strategic investment can be grouped in a number of multi-sectoral **investment areas**. These include 1) low-carbon transport, 2) low-carbon industries, 3) greener water and wastewater management (water supply, wastewater and sanitation, water management and drainage), 4) carbon-relevant solid waste management, 5) energy efficiency (EE), renewable energy (RE) and low-carbon materials in buildings and the built environment. This is a very broad range of subjects, and given the GEF funding resources made available for the project and cofinancing commitments, the project concept (as formulated in the GEF-approved Project Implementation Form, PIF) focusses on *solid waste management and waste-to-energy (WTE)* and energy efficiency and *renewable energy in buildings and the built environment*. During the PPG (project preparation) phase a further refinement through consultation with the envisaged project partners and other stakeholders was made, and described below.

Regarding **'solid waste management and energy'**, it has been noted that it consists of two main parts: 1) processing of waste for energy purposes (electricity or fuel), and 2) management of the waste system itself (collection, re-use, and recycling, proper disposal of waste). In assessing and supporting *waste-to-energy* projects. the sites being proposed would assume a certain level of waste management already taking place, i.e. land has been allocated and cleared for the landfill, waste is collected and disposed in the landfill, so that the proposed project activity can focus on the energy generation and composting aspects at the landfill. Hence, greenfield landfill projects may not be targeted given the project timeframe and few private investors forthcoming to venture into an already risky investment.

Since *waste management* is a huge issue in Bangladesh with currently, 45% of the urban solid waste remains uncollected and is dumped somewhere in roadside bins or anywhere in unsanitary ways; even the collected wastes are not managed at a satisfactory level; dumping areas are overburdened, as there is a severe lack of source-separation practices in Bangladesh, and land for waste disposal is very scarce, the PIF conceptualised waste management and waste-to-energy but lumped these together for potential project interventions. During PPG preparation, it was ascertained that waste management itself (including waste reduction and recycling) is such a big issue (and contentious in view of land scarcity and other factors) in urban Bangladesh that it would merit its own project. Other donors have been working on urban waste management. For example, JICA has been providing support for solid waste management in Dhaka City[8]. The LCUD initiative will thus focus first on establishing waste-to-energy and composting facilities on waste sites as an add-on to existing or proposed waste sites, where, project proponents will need to show that these are managed in a social and environmentally sound way or adopt recommended practices. Before Project support can be considered, a social and environmental screening will be carried out for specific sites identified, and if considered 'high risk', the proposal will be accompanied by a social and environmental management plan.

[8] During 2003-2006, a Master Plan for Solid Waste Management was formulated, followed by participatory solid waste management (working with wards in community organization (forming and training of ward waste committees), capacity building of collection/transportation and disposal site improvement.

Box 7 Theory of change – problem tree (causes and challenges) and solutions (results and impacts)

DEVELOPMENT CHALLENGE:

Increased negative economic and environment impact from fossil use and other non-sustainable practices in urban areas

CORE PROBLEM:

Limited low-carbon (EE, RE) investments and measures in buildings and built environment

CAUSES (main and underlying barriers and challenges):

Policy, planning and regulations:

- Absence of appropriate policies and regulatory frameworks for supporting sustainable and LCUD of cities
- Multiplicity of organisations and agencies involve in urban governance and management and lack of coordination
- There is no official waste management strategy. As a result, waste management is viewed solely as an engineering responsibility for collection and disposal
- Ineffective enforcement of the already inadequate regulations (waste, EE building codes, city building bylaws)
- Lack of technical expertise in the city corporations to ensure the implementation of these regulation and the planning and assessment of low-carbon investments and measures
- Poor coordination between the agencies in-charge of the implementation of the Bangladesh National Building Code (BNBC) and city corporation bylaws for promoting energy efficiency
- There is no explicit strategy for mobilizing the necessary funding for low-carbon investments

Implementation and investment

- Poor implementation of planned actions and lack of scaling up and replication at municipal level
- Insufficient public and private funding for LCUD-relevant measures and investments (EE buildings, waste to energy, RE in buildings)
- Lack of confidence on techno-economic feasibility of LCUD-relevant measures and investments (uncertainty on payback times of the additional upfront investment)
- Asymmetry in sharing of costs and benefits in the building sector between building developers, owner and user
- Despite successful pilots in EE in buildings technologies and practices and environment-friendly urban waste management schemes have been implemented, these are not replicated nor scaled-up

Awareness and capacity

- There are no real efforts to systematically sensitise city dwellers and raise awareness on greening city development
- Absence of a common platform for mutual exchange of ideas, best practices and policy discussion on urbanization and urban development
- People are not fully aware of the need to, and benefits of, implementing sustainable waste management schemes And performance improvement (and end-user cost reduction) associated with various aspects of the EE&C, including whole building
- lack of knowledge among designers and architects to analyze designs and perform audits based on EE BNBC, GBC and other considerations
- The building construction industry (contractors, services providers) is not geared to apply EE&C measures

IMPACT

Market transformation to low-carbon interventions and reduced GHG emissions

OBJECTIVE:

Enabling investments in R and EE applications to support urban development in Bangladesh

RESULTS (OUTCOMES and OUTPUTS):

Outcome 1
City level integration of energy-relevant low carbon urban development plans and programmes

- LCUD concepts integrated in regulatory measures and policy instruments
- Capacity strengthened in national and local government entities on LCUD
- City corporations (partner cities) supported in the incorporation of LCUD elements in city planning and investment in cost-effective LCUD options

Outcome 2
Increased investments in EE (energy efficiency) and RE (renewable energy) in buildings and the built environment

- Identified low-carbon investments in public and private buildings and built environment
- Implemented Low-carbon investments in public and private buildings and Built environment

Outcome 3
Knowledge increased of practitioners and awareness raised of city dwellers on low-carbon, green, development

- Capacity strengthened of practitioners and institutionalised capacity building on LCUD
- Knowledge management, info dissemination and sensitisation on LCUD
- Monitoring and evaluation

Similarly, in the investment area of **'EE and RE in buildings and the built environment'** some re-focus has taken place during the PPG phase. The PIF mentions the "application energy efficient *public lighting* (with LED lamps replacing the conventional high-pressure sodium or other lamps). However, discussions with stakeholders found that using LED in new street lighting has now considered more as a baseline activity (as LED technology has advanced rapidly and cost has come down since the time of conceptualisation of the PIF). In the discussion with SREDA and other stakeholders, it was noted further that the government is making funds available for municipalities to modernise their lighting systems based on LED. Hence, the present scope of the project limits to awareness campaigning and information dissemination with regard to LED issues, but excludes for now the larger technical assistance and capacity building as envisaged at the time of PIF preparation.

Further, within the 'EE and RE in buildings' investment area, the option of *integration of renewable energy (RE) in buildings* (in particular rooftop photovoltaics, PV) has been introduced, also in the light of recent changes in legislation regarding net-metering. Regarding *energy efficiency (EE) in buildings*, although the PIF is not specific, the LCUD seeks to promote EE investments in new buildings (or as retrofit) by improving building design (passive solar innovations), improvements in lighting, cooling, ventilation) in larger buildings (e.g. schools, hospital, office buildings, hotels), and more efficient energy use by the building dwellers in a holistic way to achieve a better Energy Performance Index (EPI). This also includes the use of more eco-friendly building materials, such as energy-efficient bricks. The PIF mainly focuses on public buildings with city energy efficiency bylaws and procurement schemes. While public buildings remain an important element in the Project Document, equal importance is given to EE and RE investments in private sector buildings. *Financing* remain critical for the achievement of LCUD goals and hence, and hence, envisages cooperation with the development banks, such as IDCOL and technical support in identifying and financing investment opportunities in all the three sub sectors.

Low-carbon urban (green) planning involves the integration of the various investment categories to achieve an integrated low-carbon (green) city development, by means of: a) policy and regulations, b) coordination and planning of development interventions and c) availability of financing and incentives for green investments. The LCUD Project will support the implementation of *regulations*, such as the newly-added EE elements in the Revised Bangladesh National Building Code (BNBC) and voluntary Green Building Guidelines (GBG).

A multitude of agencies and government entities are involved in urban planning. In the LCUD ProDoc, supporting *mainstreaming of low-carbon development in urban planning* and, especially, *coordination between entities*, remains as important as described in the PIF. However, rather than only focussing on the city-level coordination urban policy and planning, it is equally important to have coordination at national level (horizontal) and between the various levels of government (vertical). The Project Document also adds activities on city-level greenhouse data collection, inventory, and reporting.

The capacity building capacity component 3 goes beyond awareness creation and lessons learnt workshop by adding professional training on low-carbon planning, and technical training on low-carbon investment areas (designing, techno-economic assessment, and implementing EE in buildings, rooftop PV and of waste-to-energy). A second new element in the ProDoc (in comparison with the PIF) is institutionalisation of capacity building and training in a Centre of Expertise to be hosted by a Bangladeshi institute) and institutionalisation of awareness creation and info dissemination in setting up a Bangladesh Low-Carbon City Network. This will ensure continuation of capacity building and awareness creation and knowledge dissemination after the Project ends. The LCUD Project will help the Centre of Expertise in formulating a sound business plan that will the basis for its financially sustainable operation and monitoring of impacts after the Project ends.

4. RESULTS AND PARTNERSHIPS

4.1 Expected results

This Section describes in detail the activities under each output of the three components of the LCUD Project

Component 1 *City level integration of energy-relevant low carbon urban development plans and programmes*

Outcome	Project outputs and activities
1: Coordinated and integrated low-carbon urban plans and effective implementation of regulations	1.1. LCUD concepts integrated in regulatory measures and policy instruments
	1.1.1 Review and study of status, issues and options of low-carbon policy instruments and incentives 1.1.2 Inter-institutional Coordination Mechanism and regular meetings on LCUD thematic areas 1.1.3 Studies on energy savings potential, costs, and benefits of selected low-carbon interventions and available policy instruments 1.1.4 Review of SREDA Building Energy and Environment rating system and recommendations 1.1.5 Institutionalization of LCUD intervention and related GHG MRV at the Department of Environment (of MoEFCC)
	Main partners: SREDA; MLGRDC, MHPW, MEFCC (DoE) Other partners: departments of the above-mentioned ministries - LGED, UDD, NHA; city corporations, city development authorities; research institutes (e.g. NHRI) and universities;
	1.2. Capacity strengthened in national and local government entities on LCUD
	1.2.1 Training on mainstreaming LCUD (low-carbon urban development) and selected low-carbon measures and for urban planners and city officials
	Partners: SREDA, MLGRDC, MHPW and departments; city corporations, city development authorities; institutes (e.g. HBRI, Institute of Planners) and universities
	1.3. City corporations (partner cities) supported in the incorporation of LCUD elements in city planning and investment in cost-effective LCUD options
	1.3.1 Establishment of a low-carbon coordination Working Group in the selected partner city corporations 1.3.2 Tailor-made support on LCUD issues, key concepts and LCUD investment options provided to the partner city corporations
	Main partner(s): City corporation(s) Other partners: City development authorities and relevant ministerial departments; SREDA; NHRI; Institute of Planners

The proposed project activities are aligned to the national policy context that mainly consists of the Energy Efficiency and Conservation Master Plan up to 2030 (2015, and Power Division/MoPEMR). The important elements in the Plan regarding the urban environment (and regarding the focus areas of the LCUD Project in particular) are setting up an energy management and data reporting programme for large consumers (including large buildings, i.e. consuming over 3,000 toe annually), and a standards and labelling programme for selected appliances (air conditioning, refrigerators/freezers, TV, motors, lighting). It further includes an EE building programme, in which MPEMR/ and MHPW/HBRI work together in the

revision of the BNBC to include EE elements (building envelope, HVAC, hot water, lighting, escalators, renewable energy) and the elaboration of BNBC 2020 Manual for local governments, building owners and users, designers and constructors. In addition, the Building Energy Efficiency and Environment Rating (BEEER) System form a voluntary program targeting the design and construction of upper-grade EE and low-environment impact buildings, going beyond the BNBC 2020 requirements. The objects of BEEER are offices, rental & mercantile (shopping malls), residential, hospitals, schools and hotels in new large-scale projects by both the public and private sectors.

While the above plan and basic framework exist, their practical implementation are hindered by a number of barriers, discussed in the previous Sections. The involvement of a multitude of ministries, agencies and local government entities in urban planning requires a that these plans establish an operational mechanism for coordination. In the baseline situation, there is also an Energy Efficiency and Conservation Master Plan of which its policy instruments (such as BNBC 2020) are being designed. However, initiatives are likely to be implemented by national and local authorities as stand-alone initiatives.

The LCUD Project with GEF support will facilitate dialogue among the various ministries involved (MPEMR, MHPW, MLGRD), departments and agencies (, HBRI, UDD, LGED) and local government (city corporations, urban development authorities), will provide training of national and local government staff and advisory services to harmonise national plans and local urbanisation plans (and introduce elements such as clear national policy regarding solid waste management and consequently, the option of waste-to-energy that are missing in current plans) that the various entities produce into a more integrated planning system that factors in low-carbon development considerations. GEF support will be used to strengthen coordination both vertically between national and local levels, and horizontally across stakeholders at each level.

As the Local government entities play an important role in implementing regulations, such as BNBC 2020 by issuing building and construction permits and perform monitoring and the formulation of urban physical and infrastructure plans, while often lacking the necessary skilled human resources to carry the tasks; GEF support will be provided for the training of council officers (planners, engineering staff) in the promotion and appraisal of development proposals with regards to existing regulations, development of local by-laws and local regulations. Further, the LCUD Project with GEF support will help partner cities in the review of current plans and move towards low-carbon integrated development planning as also highlighted above. Setting up of city-level GHG inventory and baseline and emission reduction targets and based on sectoral assessments, identification of priority areas in a local low-carbon development framework and the identification of specific low-carbon or green investment options will be promoted. *(The most promising options can be developed further into specific (public) sector projects to be supported as part of Output 2.1).*

The proposed project aims specifically at supporting at least two cities corporations. During the PPG phase, a number of cities and authorities expressed interest, such as Narayanganj City Corp[9]. At project inception, a final selection will be made, based on confirmation of undertaking low-carbon planning within their area and making available funding with their budget to support low-carbon interventions (a condition for proving the GEF support in Output 3.1). This will be coordinated and confirmed with the ministry responsible for local government, MGLRD. Efforts will be made to leverage interventions through the ongoing UNDP's *National Urban Poverty Reduction Programme* (2016–2021) which is focusing on strengthened municipal pro-poor urban management and planning, and strengthened municipal financial management and performance. GEF - LUCD project will coordinate activities as needed with UNDP's project to complement efforts on the urban governance issues.

Output 1.1 LCUD concepts integrated in regulatory measures and policy instruments

[9] See cooperation letter in Annex J. The PPG Team also approached Dhaka North City Corp, Dhaka South City Corp, RAJUK, Chattogram City Corp, Gazipur City Corp, Khulna City Corp, Khulna Development Authority and representatives expressed interest in the Project.

Activity 1.1.1 Review and study of status, issues, and options of low-carbon policy instruments and incentives

The review will look at status, issues and options of low-carbon policy instruments, e.g. the BNBC 2020, Draft BEEER; public procurement schemes; inclusion of benchmarking, such as energy performance index (EPI) for buildings, bylaws, etc.,) and of the national and sub-national institutional setup. This will include an assessment of public and private financing, incentives (fiscal and non-fiscal) and available loan schemes to promote energy-efficient (green) buildings (and other selected low-carbon investments) and of the role of various government and city-level entities in urban and infrastructure planning. Apart from knowledge and info capturing, the studies will be carried out after project inception and towards the end of the project as a means to validate baselines and 'measure' the impact of the LCUD Project.

Activity 1.1.2 Inter-institutional Coordination Mechanism and regular meetings on LCUD thematic areas

Lack of inter-institutional coordination is one of the main issues hindering low-carbon urban planning, as mentioned in Section 3. This can be remedied by the formation of a Coordination Mechanism with LCUD project support. This could be a Working Group or Committee with participants (at mid-level decision-making) from the many national and local government entities involved (vertically and horizontally).

The studies of Activity 1.1.1 and 1.1.3 will provide basic information for discussion of LCUD issues and options and to formulate recommendations for the promotion of low-carbon interventions. The PSC and its Technical Committees(s) that are part of the LCUD Project could form a discussion forum for setting up such a Mechanism. However, the Mechanism would not only look at the LCUD Project focus areas (energy efficiency, renewable energy, and WTE in built environment and buildings) but should, in the end, extends its work to other low-carbon urban planning areas. The Mechanism could be institutionalised as a government coordinating body for low-carbon and urban planning and policy. Examples of possible activities of such a Coordination Mechanism are:

- The mainstreaming of LCUD within the national planning and policy-making system
- Identification of gaps and overlapping mandates among key municipalities, national agencies, and ministries to facilitate discussion and agreement to streamline structures
- Definition and delineation of the roles and responsibilities and reporting arrangements within municipalities and with national and regional authorities, and between sectors to support low carbon planning and investment in cities.
- Promotion of public-private partnerships for low-carbon infrastructure and services
- Implementation of a low carbon guidelines and city benchmarking system for development
- Formulation and adaptation of integrated fiscal-regulatory incentives, net metering and other (non-fiscal) policy instruments on EE and RE application in buildings
- Formulation of national urban waste management and use of waste resources (WTE, composting) expanding the existing 3R Strategy (reduce, recycle, re-use) to 4R, adding 'recovery' (and use of waste for WTE and composting to sell and generate income)[10]

Activity 1.1.3 Studies on energy savings potential, costs, and benefits of selected low-carbon interventions and available policy instruments

This activity on energy savings potential, socio-economic costs and benefits of selected low-carbon interventions with benchmarking and impact analysis, includes A) energy efficiency improvements in technology (in air conditioning, lighting, fans, pumps and motors), better design, and improve practices (maintenance, rational use of energy) in selected larger buildings (e.g. office buildings, schools, and institutions, hospitals, hotels, shopping malls), B) integration of renewable energy (e.g. rooftop PV) in such larger buildings. A study will be undertaken to build on a recent SREPGen study[11] by carrying out a further assessment of using waste disposal facilities for income-generation through composting and waste-to-energy (capturing and utilisation of the landfill gas not only for power generation but also for processing as fuel to substitute for fossil fuels). This will be linked with Activity 1.1.1 with a review of the current electricity tariff system and the recently

[10] This can be expanded into a '5R" approach, in which 're-think' is added to the other 4R, that is, 're-thinking' of the current situation and move towards a more integrated approach of actions involving national and local authorities, mobilizing communities, forming community-public-private partnerships, create awareness among citizens, provided education and training, as well as effecting monitoring and enforcement.

[11] *Conducting a Feasibility Study on Waste-to-Energy Conversion in Six Municipalities in Bangladesh*, SREPGen Project, UNDP/SREDA/Power Division (2017)

introduced net-metering policy and the role of other policy (fiscal and non-fiscal) instruments to improve the viability of these low-carbon investment categories. The studies will include an assessment of the role of ESCOs (energy service companies; see Annex E.4, Box 24)

Activity 1.1.4 Review of SREDA Building Energy and Environment rating system and recommendations

SREDA is contemplating the introduction of an 'Building Energy Efficiency and Environment Rating' system for buildings, of which energy management will be one aspect. The activity will support in the further design, needed background assessments (the study of Activity 1.1.3. will provide the necessary info for quantitative analysis to define the different categories of the labels), and by expanding the rating system with renewable energy aspects (power generation, e.g., with building-integrated PV).

Activity 1.1.5 Institutionalization of LCUD intervention and related GHG MRV at the Department of Environment (of MoEFCC)

In the current greenhouse gas assessment and monitoring, reporting, and verification (MRV) systems, there is no reporting for 'urban' or individual cities, yet, actions take place in certain cities or municipalities. Without a city-level reporting, it is difficult to see which urban area performs better or worse than other areas in terms of CO_2 emissions and GHG emission mitigation. Tools, protocols, and software exist to help cities report their carbon status and action[12]. The activity seeks to support individual cities (linked with Output 2.1) with carbon data collection and registry. The Department of Environment in expanding its current carbon reporting system to include city-wide GHG accounting. Capacity building (Output 1.2) will support the training of staff and the linking of databases.

Output 1.2 Capacity strengthened in national and local government entities on LCUD

Activity 1.2.1 Training on mainstreaming LCUD (low-carbon urban development) and selected low-carbon measures for urban planners and city/municipal officials

Based on the capacity needs analysis (activity 3.1.1), the activity will provide demand-driven training and on-the-job technical support for national government and city officers on preparation of GHG inventories, low-carbon planning principles, priority setting and development of low carbon scenario, and integration of LCUD within the framework of existing plans and strategies, using the tools of Activity 1.1.5. The training will discuss the benefits of various LCUD investment options as well as financing schemes, public-private partnerships and incentives mechanisms to promote low-carbon technology investments.

Output 1.3 City corporations (partner cities) supported in the incorporation of LCUD elements in city planning and investment in cost-effective LCUD options

Activity 1.3.1 Establishment of a low-carbon coordination Working Group in the selected partner city corporations

The activity will include stakeholder consultation and setting up a Working Group as a local Cooperation Mechanism with representatives from ministries, development authorities, city corporations and other stakeholders to ensure partnership and coordination with an integrated planning process. The WG will define confirmation of boundaries and scope and prepare partnerships for low carbon local planning in the participating partner city/cities.

Activity 1.3.2 Tailor-made support on LCUD issues, key concepts and LCUD investment options provided to the partner city corporations

The activity consists of demand-driven and on-the-job training and advisory services by longer-term experts (including secondments) and short-term consultants on[13]:

---

[12] For example, the Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC) prepared by ICLEI

[13] The LCUD Project will work closely with the ongoing UNDP National Urban Poverty Reduction Programme (NUPRP), implemented by MLGRDC, in particular in the areas of urban governance, pro-poor climate-resilient urban planning, and community level organisations

- Integration in city planning of key LCUD elements, including data gathering for the city GHG inventory system (see Activity 1.1.5), setting carbon reduction and energy use targets, and performing sectoral assessments, and balancing the green and low-carbon agenda with local development priorities;
- Implementation of national guidelines and regulations (BNBC 2020; Draft BEEER; building rating schemes) and green policy instruments (see 1.1.4) at the municipal level, including creating awareness amongst local stakeholders (e.g. developers) and tools for community engagement (e.g. forums, consultation initiatives);
- Create awareness amongst citizens on waste separation, recycling, and reducing waste, and engage local stakeholders, e.g. by setting up waste management committee in city wards with local waste action plans or working with existing community organisations[14] and raise awareness at ward level), accompanied by education and training of corporation staff on waste management and planning;
- Preparation and approval of low carbon development and investment plans, including the identification and feasibility analysis of appropriate and cost-effective LCUD investments (EE and RE in public/municipal buildings and built environment; waste-to-energy and composting facilities) and implementation modalities (energy service companies and energy performance contracting; public-private partnerships) and identification of possible funding sources.

Component 2 *Implementation of selected low-carbon energy efficiency, renewable energy and waste to energy interventions in cities*

Outcome	Project outputs and activities
2: Increased investments in EE (energy efficiency), WTE (waste to energy) and RE (renewable energy) in buildings and the built environment	2.1 Identified low-carbon energy efficiency, renewable energy and waste to energy investments in public and private buildings and built environment (TA)
	2.1.1 Selection of public buildings (retrofit or new) and other low-carbon interventions (waste) in the partner City Corporation; this activity also links to 1.3.2 2.1.2 Organisation of Call for Proposals (project concept) for non-governmental, private sector, entities to submit low-carbon 2.1.3 Energy audits, feasibility analysis including ESIA/ESMP, and business/finance plan for selected low-carbon investments in buildings and built environment (EE, RE, WTE); support to IDCOL and other financial institutions in the techno-economic evaluation of the submitted business/finance plans and a selection criteria including ESMF
	Main partner: SREDA; City Corporations; IDCOL (private); MHPW and MLGRDC (public) Other partners: NHA, PWD; HBRI, building developers, project developers, NGOs, building and housing owners; waste management companies; local government (permits)
	2.2 Implemented low-carbon investments in public and private buildings and built environment (INV)
	2.2.1 Secure funding for specific EE and low-carbon investments (public and private) and support implementation of site-specific environmental and social management plan as applicable. 2.2.2 Monitoring and evaluation of the Project-supported investments, compliance with regulations, voluntary guidelines, and green building rating systems
	Main partner: SREDA; City Corporations; IDCOL (private); MHPW and MLGRDC (public) Other partners: NHA, PWD; HBRI, building developers, project developers, NGOs, building and housing owners; waste management companies; local government (permits)

As financing constitutes a significant barrier to implementation of low carbon interventions, mainly, EE, RE, and waste to energy as highlighted in Box 1 - 3, the PPG phase carried out consultations with several stakeholders and in particular IDCOL which is currently facing challenges with its existing Facility to fund projects in solar PV and EE. At the level of Municipalities, there is a lack of specialised human resources, and therefore, outsources assessments, audits and feasibility studies to consultants, but without the capacity to do a quality check on the consultants' work. Municipalities' budget are set on a

[14] For example, 'integrated resource recovery centres' (IRRC; see Annex E.3)

periodic basis and the ceilings therein may force municipalities to go for lowest initial investment of a particular proposal. Even if having a lower cost over the investment's lifetime, these constraints limit the City initial investment. Under IDCOL's financing facility of BDT 5.4 billion (USD 65 million) for RE and EE (in urban environment), only for about 20 solar rooftop PV and EE projects have been processed[15]. IDCOL receives many proposals that often are not bankable and do not have the necessary quality and are further constrained by the availability of the specialized experts to be able to assess the technical performance of each of the possible EE or RE technologies. Many of these projects further lack detailed environment and social impact assessments and risk analysis and mitigation measures. Box 8 highlights indicative investment types for 45 projects as proposed by various stakeholders for considering under LCUD project.

Box 8 Overview of indicative public and private sector low-carbon investments associated with the LCUD Project, with indicative levels of GEF TA and INV support

SUMMARY TABLE DEMO/INVESTMENT PROJECTS

	1	2	3		4		5	6			7
Type	Average investment per project (USD)	Number of RE and EE EE projcts	Targeted Capacity and and savings		GHG emission reduction Annual tCO_2-eq/yr	Cumulative tCO_2-eq	Total Investment (USD)	GEF indicative support INV (USD)	TA (USD)	Total (USD)	IDCOL and other finance (USD)
			Avoided methane emissions (tCO_2-eq/yr)		77,341						
Waste to energy	3,514,335	2	Installed Capacity (MW)	0.8	5,025	1,356,616	7,028,670	667,017	175,717	842,734	3,514,335
			Energy savings (MJ)	1,118,370	9,432						
			Composting (ton/yr)	31310	43,863						
Rooftop PV - public	634,801	3	Installed Capacity (MW)	2	1,861	22,338	1,904,404	257,264	47,610	304,874	1,142,643
Rooftop PV - private	1,081,496	10	Installed Capacity (MW)	10	10,666	127,990	10,814,963		270,374	270,374	7,570,474
EE in public buildings	154,930	6	Energy savings (kWh/yr)	2,363,668	1,584	19,004	929,582	99,982	23,240	123,222	557,749
EE in private buildings	114,751	24	Energy savings (kWh/yr)	5,845,990	3,917	47,002	2,754,029		68,851	68,851	1,927,820
Total					153,689	1,572,949	23,431,649	1,024,263	585,791	1,610,054	14,713,022

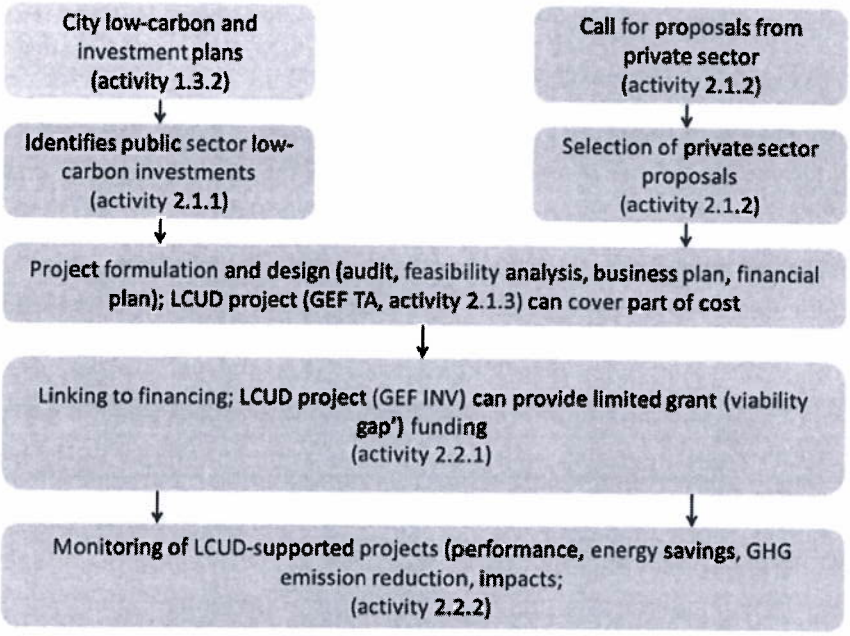
Note: IDCOL has financing available up to USD 65 million for RE and EE funding in general. This is maximum LCUD-linked projects can apply for. However, we have applied a conservative approach and included approx. USD 14.71 million assuming that realistically only part will be applied for by the project proponents. GEF funding (TA) can be made available for project design and formulation (indicative USD 585,791) for the above project types. GEF funding (INV) can be made as viability gap funding (indicative USD 1.02 million; activity 2.2.1; based on see budget line 72100, Component 2, in Section 10, UNDP Budget)). It is difficult to estimate at this stage as it will depend on each investment project's financing need. The figures mentioned in this paragraph are thus indicative and will depend on the actual submission of investment proposals (but remain with the proposed total). For calculation details, the reader is referred to Annex F.

Based on a preliminary assessment of opportunities listed above, LCUD project proposes to extend support to planned investments through activities under 2.1: Technical assistance towards identifying low-carbon energy efficiency, renewable energy and waste to energy investments in public and private buildings and built environment; A call for proposals will be issued for ascertaining the investment neds and prioritisation for supporting formulation of technically and financially sound proposals and activities under 2.2: by linking the well prepared proposals for the identified investments to its potential sources of funding with participation of private sector, in particular IDCOL for its implementation. As IDCOL does not have dedicated funding to support proponent's business plan (incl. audits, cost-benefit analysis, social-environment assessments), nor do private proponents want to spend money (possibly external consultants) without knowing their proposal will receive IDCOL support, and the enhanced awareness around the Call for Proposal may also incite companies that have not previously considered RE or EE investments in their buildings (either new of retrofit) to re-assess the pros and cons and think about putting together and embarking on a low-carbon improvement project (with IDCOL support as needed).

LCUD Project will provide assistance to (private or non-government) proponents to formulate technically and financially sound proposals on which IDCOL financing support (soft loans) can be based. LUCD project would recommend and support with appropriate funding options up to 5% of total investment based on the investment criteria to be assessed for different investment types based on levelized cost analysis, internal rate of return hurdle, risk analysis, etc. GEF resources would be prioritised for riskier investment types and especially if finance is needed where proponents can apply for IDCOL support. This modality of cooperation has IDCOL commitment but will be pursued with other development banks and institutions, such as Bangladesh Infrastructure Finance Fund Limited (BIFFL) who have verbally expressed interest in working with the LCUD Project. Other banks can be included during the course of the Project, if cooperation can be

[15] See co-financing Letter, Annex J

agreed by means of a cooperation (co-financing) agreement, similar to IDCOL's. Overall, the activity flow for Outputs 2.1 and 2.2 are presented below for Component 2 that are further elaborated for outputs in subsequent sections.



Output 2.1 Identified low-carbon investments in public and private buildings and built environment

Activity 2.1.1 Selection of selection of public buildings (retrofit or new) and other low-carbon interventions (waste) in the partner City Corporation

From the investment plans of partner City Corporations (Activity 1.3.2) and in discussion with the partner City Corps, selected investments in EE (retrofit or new) and integration of RE (e.g., rooftop PV) in larger public buildings (office buildings, hospitals, school, institutions) and other low-carbon interventions will be identified and assessed for environment and social impacts.

Regarding waste-to-energy, Narayanganj City Corp has already expressed interest in pursuing such a project. The City Corp has formulated the DPP (development project proposal) for submission to the relevant authorities with a proposed budget of BDT 1.9 billion (about USD 22 million) for the effective solid waste collection, disposal, and management[16]. The City Corp will acquire the land to construct a sanitary landfill, at which the WTE could be established. Such a waste-to-energy facility would be an 'add-on' to the current DPP. A feasibility study will determine the size and nature of the facility and end-products (e.g. compost, landfill gas for power or fuel substitution) and the implementation modality (e.g. public-private partnership) and financing arrangement. LUCD will assess for funding support after the feasibility report is prepared and technical support could be extended for the preparation of ESMP and financial closure.

Activity 2.1.2 Organisation of Call for Proposals (project concept) for non-governmental, private sector, entities to submit low-carbon

The LCUD Project will organize for private sector entities (project developers, constructors, building owners, ESCOs) a Call for Proposals on EE improvements in larger buildings (e.g. hospitals, schools, shopping malls, office and commercial buildings, hotels), integration of RE (e.g. rooftop PV) in these types of buildings and waste-to-energy projects. In return for receiving Project support, proponents should be willing to provide non-confidential info of the proposals and subsequent

[16] See Annex G for a short description of the Narayanganj plans. A 'cooperation letter' confirming Narayanganj City Corp's interest to work with the LCUD Project is attached in Annex J.

project implementation for the knowledge sharing and info dissemination activities of Component 3. In the Call, proponents can present their project concept. These will be screened, including for environmental and social risks, and selected proponents will be asked to submit a business plan, feasibility analysis and any relevant environmental and social management plans. These will be evaluated by a Call for Proposals Committee, after which a final selection will be made.

Activity 2.1.3 Energy audits, feasibility analysis, and business/finance plan for selected low-carbon investments in buildings and built environment (EE, RE, WTE)

GEF financial support can be provided for technical assistance by energy experts to carry the needed feasibility analysis, business (and finance) plan formulation, and environmental and social screening and management plans for the project concepts accepted in the Call for Proposals (Activity 2.1.3). IDCOL has expressed its willingness to provide financing (if requested by the proponents) from their facility for RE and EE projects. The Project will work with IDCOL (and other financial institutions that want to cooperate in the Call for Proposals) in the techno-economic evaluation of the submitted business plans, the technical design of the proposed projects, and the financial plans. A small study will be carried out on the implementation modalities. The budget available for feasibility assessments (incl. social and environmental assessments, as needed[17]) is USD 585,791 (**Error! Reference source not found.**, based on see budget line 71400, Component 2, in Section 10, UNDP Budget)

Output 2.2 Implemented low-carbon investments in public and private buildings and built environment

Activity 2.2.1 Specific EE and low-carbon investments (public and private) linked to IDCOL and other sources of financing

The (approved) proposals elaborated as part of Activities 2.1.1-2.2.3 will result in investment and realization of the intervention. In buildings these may consists of one or more of the following: energy-efficient and green design and of the building envelope and windows, energy-efficient ventilation, cooling and air-conditioning, efficient (hot) water use, use of eco-friendly building materials, as well as other green building aspects, such as green spacing in the building complex, waste management; construction health and safety; and indoor environment aspects, as well as integration of renewable energy, such as rooftop PV or solar water heating. Proposals on waste management and energy are also expected by private entities that have established a public-private partnership with landfill owners (composting and/or waste-to-energy).

It is expected that the investment (by public and private entities) amounts at least to USD 23.4 million for two waste-to-energy projects (one with public and one with the private sector), rooftop PV and energy efficiency in buildings (private and public entities (see **Box 8**). These are expected to result in energy savings and/or substitution of 63.7 GWh per year and emission reduction/avoidance of 153.7 kilotonnes of CO_2 per annum, i.e. 1.572 million tonnes of CO_2 over the investment's lifetime. The reader is referred to Error! Reference source not found. in Section for a summary, and Annex F for more details on these estimates). Project proponents may be the owners of the facility (building, landfills), investors, or energy service companies (ESCOs, see Box 24 in Annex E.4).

This activity will establish a viability gap mechanism to support first-of-a-kind public and private EE, RE and/or WTE investments which are not financially viable with baseline financial terms and structuring. Criteria will be established on which investments will be selected to participate in the mechanism (technologies; actor profile; credit-worthiness; business plan/feasibility study). The mechanism will determine the level of financial support needed for each investment based on independent detailed due diligence and financial analyses, including suitable approaches such as calculating the investment's IRR versus internal targeted returns, and comparing levelized costs versus baseline activities. UNDP will establish the viability gap mechanism in line with its POPP and FRR, using competitive processes where UNDP works with third party technology providers to channel financial support. Funding totalling USD 1,024,263 will be made available for this activity.

[17] Waste-to-energy interventions will be considered 'high risk' given the possible negative social and environmental implications. Any proposal (whether EE, RE or WTE) will be screened on social and environmental risk. If deemed 'high risk', the project proposal may need to be accompanied by a more detailed social and environmental impact assessment (ESIA) and management plan (SEMP). See Annex G

Activity 2.2.2 *Monitoring and evaluation of the Project-supported investments, compliance with regulations, voluntary guidelines green building rating systems*

The delivery of Output 2.2 will be closely monitored on results and compliance with Revised BNBC and local regulations. It is expected that the EE and RE projects will follow the voluntary Green Building Guidelines (as much as possible) and may want to go for certification, for example SREDA's Building Energy and Environment Rating, or one of the international rating systems, such as LEED (Green Building Council, USA), Green Star (Australia/New Zealand), BREEAM (UK), or Indian rating systems (e.g., IGBC, GRIHA; see Annex E.4). The most outstanding EE and RE innovations will be provided an award scheme (activity 3.1.5). This will be accompanied by the development of an appropriate appraisal framework through online tools for assessing energy savings and GHG impacts. On such tool is the IFC-sponsored EDGE (see description in of EDGE and other rating and certification schemes in Box 25 Building rating systems and features in Annex E).

Component 3 *Sensitizing city dwellers and capacity strengthening for low-carbon urban initiatives*

Outcome	Project outputs and activities
3: Knowledge increased of practitioners and awareness raised of city dwellers on low-carbon, green, development	3.1 Capacity strengthened of practitioners and institutionalised capacity building on LCUD
	3.1.1 General capacity needs assessment regarding low-carbon development(SREDA) 3.1.2 Support the establishment of a multi-disciplinary LCUD centre of expertise and mainstreaming of LCUD in existing training curricula(SREDA) 3.1.3 Training and skills development on selected low-carbon interventions for professionals(SREDA) 3.1.4 Energy and low-carbon data gathering and database(DoE)
	Main partner: Department of Environment(DoE); SREDA Other partners: training institutes and universities
	3.2 Knowledge management, info dissemination and sensitisation on LCUD
	3.2.1 Establishment of Bangladesh Low-Carbon Cities Network with a regularly updated website (SREDA) 3.2.2 Elaboration of knowledge products, case studies, best practices and lessons learnt (DoE) 3.2.3 LCUD project and BLCCN communication plan and awareness-raising activities (DoE) 3.2.4 Sensitisation of city dwellers, including youth (DoE) 3.2.5 Promotion of South-South city-to-city exchange and facilitation of linkages with regional and global networks (DoE) 3.2.6 Annual award ceremonies on best LCUD practices and greenest building (DoE)
	Main partner: SREDA; Department of Environment Other partners: institutes and universities; private sector organisations; NGOS and CBOs;
	3.3 Monitoring and evaluation (SREDA)
	Main partner(s): SREDA; Department of Environment Other partners: national and local government entities, private sector organisations

This component will address the lack of awareness and technical capacity. GEF support is required to enhance the capacity and knowledge of the private sector, practitioners, and government entities' staff on planning and implementation of low-carbon technology applications and to enhance awareness of city dwellers on sustainable consumption and production. This component together with the experiences and information generated in the other Components will reduce the pertinent information and knowledge access barriers, as well as the capacity shortfalls in implementing and designing low-carbon and energy-efficient technologies. It is expected that the outputs will benefit policymakers at the national and sub-national

levels, private sectors and the public as a whole. This Component will be implemented by DoE (Department of Environment) as the responsible partner for outputs and activities (see more on the implementation arrangement in Section 8).

Output 3.1 Capacity strengthened of practitioners and awareness raised of beneficiaries

Activity 3.1.1 General capacity needs assessment regarding low-carbon development

The activity maps the gaps in technical, planning and managerial capacity of government entities at the national level and in selected partner cities (officials/planners; technical and engineering staff) with recommendations for capacity strengthening to be delivered in Activity 1.2.2, 1.3.1 and 3.2.1 and will be led by DoE and SREDA

Activity 3.1.2 Support the establishment of a multi-disciplinary LCUD centre of expertise and mainstreaming of LCUD in existing training curricula and preparation of know

The Project will support an existing institute to function as a Centre of Expertise on low-carbon urban planning and technologies and facilitating the design and delivery of training courses. The Project will also support other technical and academic institutions in mainstreaming low-carbon urban development subjects to train future building professionals. This will require training of staff and faculty members (training of trainers) along with preparation of relevant course and training materials. Thus, the capacity of local experts will be built to deliver trainings to local stakeholders/building professionals. A database of trainers will be made (subject-wise).

The Centre will also be a resource centre for tools, handbooks, and software for energy efficiency building design, solar PV design, and landfill gas modelling. These will be made available at the Centre's website and linked with the BLCCN's web pages (see Activity 3.2.1).

Activity 3.1.3 Training and skills development on selected low-carbon interventions for professionals

The activity will involve a technical capacity needs assessment, followed by specific training workshops or larger courses conducted for various building professionals (architects/design professionals, building material suppliers, builders/contractors/developers, energy auditors & managers), RE project developers and professionals, as well as experts on waste-to-energy. The project will facilitate various training programs to improve their skills and know-how regarding the design, construction and auditing of energy efficient and integration in buildings, use of alternative bricks and resource-efficient clay bricks; certification of eco-friendly building materials[18] as well as the capturing and utilisation of methane gas for power generation or further fuel processing from landfills.

Special training will be for auditors for Revised BNBC, GBG, and building rating schemes (LEED, SREDA Building E&E rating). The activity includes setting up registration scheme for certification of building energy auditors. Lists will be prepared of energy managers and auditors, energy audit firms and energy service companies (ESCOs) with buildings specialization.

Activity 3.1.4 Energy and low-carbon data gathering and database

The monitoring activity 2.2.2 will yield interesting data on the energy performance of buildings. These will be combined together with survey and audits done by entities, and jointly with SREDA[19], Bureau of Statistics, the Centre will set up a database on energy performance data of buildings. This will allow the definition of benchmarks, e.g. for energy performance index (EPI) of buildings in selected sectors. This will be supplemented with market surveys, studies of the Project (e.g. Activity 1.1.3) and other entities to have a reliable baseline for buildings energy use as well as city-level energy consumption and related greenhouse gas emissions.

Output 3.2 Knowledge management, info dissemination and sensitisation on LCUD

Activity 3.2.1 Establishment of Bangladesh Low-Carbon Cities Network with a regularly updated website

---

[18] Alternative non-fired non-clay bricks and energy-efficient clay bricks (i.e. produced in energy-efficient brick kilns, such as VSBK, HKK and tunnel kilns (see Annex E.4 for information on brick production in Bangladesh)

[19] Cooperation will be sought with the Bangladesh Bureau of Statistics on urban data, including poverty and gender-relevant data

The LCUD will work with entities and organisations to set up a Bangladesh Low-Carbon Cities Network (BLCCN) that will organise annual events[20], other promotional events (see activity 3.2.3) and a web portal (jointly with the Centre of Expertise, Activity 3.1.1) to make available knowledge products, case studies and access to databases and resources. The annual forum may be co-organised with existing events[21]. The Network will bring together government entities (MPEMR, MHPW, MLGRD, DoE, SREDA, HBRI, other), other organisations, academia and institutes and practitioners (planners, academics, architects and private sector). At project inception, it will be decided which entity will physically host the BLCCN secretariat.

The website will also be a resource centre for low- carbon cities information and knowledge products (such as manuals and handbooks, and software for cities on low-carbon and GHG emission reporting; see Activity 1.1.5). The BLCCN will be a key channel for communications and partnership building for the Project and a channel to disseminate knowledge products and info produced under the Project that will remain after the end of the LCUD Project. In cooperation with SREDA, it will maintain database and info exchange system between national and local government entities and private sector organisations on low-carbon projects and programmes undertaken by government and the private sector.

Activity 3.2.2 Elaboration of knowledge products, case studies, best practices, and lessons learnt

This activity will identify and collect and document key learning and instruments derived from the project, including case studies and dissemination of lessons and best practices for development of integrated urban systems for low carbon cities. Case studies will be prepared in partnership with existing institutes (e.g. HBRI, Institute of Planners, universities, and practitioners). Products will be prepared to target key audiences from the general public, planners and decision makers, and practitioners. In all cases, products will be targeted for publication appropriately, either as formal technical reports, general media articles, or in peer-reviewed publications.

Activity 3.2.3 LCUD project and BLCCN communication plan and awareness-raising activities

This plan will be prepared in collaboration with the BLCCN and its partners and provide a concrete set of actions for promoting the Project, disseminating knowledge products, raising general public awareness on low-carbon technology and practices in cities, and promote uptake of low carbon development by cities. This will include regular preparation of media releases, articles for newspapers, radio reports, and video pieces for web and TV. This will be maintained and regular surveys of decision-makers and practitioners undertaken to assess the impact of communications and knowledge products.

Activity 3.2.4 Sensitisation of city dwellers, including youth

As part of the Communication plans the Project will organise promotional campaigns and awareness-raising events and on green and low-carbon development get the buy-in of the citizenry (through mass media campaigns: radio, social media, press releases) and what city dwellers can do achieve eco-friendlier consumption and production patterns, and contribute to cleaner (urban) environment, including waste separation, reduction and recycling. This will include community understanding through youth-targeted and school education programmes, including training of teachers, and the inclusion of LCUD topics in upper-grade curricula, and elaboration of appropriate materials (e.g. teacher's guide; educational brochures).

Activity 3.2.5 Promotion of South-South city-to-city exchange and facilitation of linkages with regional and global networks

The Project will facilitate the promotion of South-South city-to-city exchange agreements and a study tour to selected cities in developing and developed countries. The LCUD Project will promote linkages with other regional and global networks such as C40, Green Climate Cities Network, World Mayors Council on Climate Change, ICLEI.

Activity 3.2.6 Annual award ceremonies on best LCUD practices and greenest building

As part of the Annual Forum (Activity 3.2.1) or linked with another major event, an annual 'best green or best energy-efficiency investment' award ceremony can be held, in coordination with SREDA's E&E Rating scheme or other green building schemes.

---

[20] In cooperation with existing networks, such as the Bangladesh Urban Forum (BUF)

[21] For example, Bangladesh Urban Forum, or environmental, ecological or sustainable energy exhibitions and forums

Output 3.3 Monitoring and evaluation (M&E)

UNDP will carry out a full slate of monitoring and evaluation of the project including continued tracking of the results framework and its progress against the indicators and conducting annual reviews and organizing the mandatory midterm review and terminal evaluation. UNDP and the project will also compile lessons learned and share these at seminars, including the end-of-project workshop/seminar. More information on M&E is given in Section 7, M&E Plan). To help the mid-term review and evaluation, the following activities of the project will provide useful quantitative and qualitative information:

1.1.1 Review and study of status, issues, and options of low-carbon policy instruments and incentives
1.1.3 Studies on energy savings potential, costs, and benefits of selected low-carbon interventions and available policy instruments
2.1.3 Energy audits, feasibility analysis, and business/finance plan for selected low-carbon investments in buildings and built environment (EE, RE, WTE)
2.2.2 Monitoring and evaluation of the Project-supported investments, compliance with regulations, voluntary guidelines, and green building rating systems
3.1.3 Energy and low-carbon data gathering and database
3.2.2 Elaboration of knowledge products, case studies, best practices and lessons learnt.

4.2 Partnerships

The project forms an integral part of the broader efforts to reduce fossil fuel use and greenhouse gas emissions in the Bangladesh urban sector in line with the objectives of the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), Seventh Five Year Plan (2015-2019), and the National Perspective Plan, and the Energy Efficiency and Conservation Master Plan up to 2030.

Project partner	How the project will work with the Partner
• Ministry of Power, Energy, and Mineral Resources (MPEMR); SREDA	SREDA, under MPEMR, will be the Implementing Partner (IP) and work closely with the Project's full-time staff and short-term experts. SREDA also will take a leadership role in the PSC in providing direction to the Project. The project will work with MPEMR in issues like power tariffs and net metering.
• Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) *Departments*: Local Government Engineering Department (LGED)	MLGRDC is the ministry responsible for the housing and building, regional and rural policy, municipal and cities administration and finances. Municipality and city corporations report to MLGRDC. Its LGED is entrusted for the planning of development and maintenance of local level rural and urban infrastructure. The LCUD Project will work in particular in Outputs 1.2, 1.3 and 2.1 with MLGRDC and the ongoing UNDP National Urban Poverty Reduction Programme (NUPRP), implemented by MLGRDC, in particular in the areas of urban governance, pro-poor climate-resilient urban planning, and community level organisations
• Ministry of Housing and Public Works (MHPW) *Departments:* Public Works Department (PWD); Urban Development Department (UDD); National Housing Authority (NHA); relevant City and Urban Development Authorities	MHPW is responsible for the Bangladesh National Building Code (BNBC). Its PWD covers design and construction and maintenance of public buildings, national monuments, public parks, and the UDD. The NHA implements building and housing projects on behalf of the government. MHPW and Department will work in Outputs 1.1, 1.2, 2.1, and training activities of component 3. Selected cities will partner with the project in Outputs 1.2, 1.3, and 2.1, as well as in training and info dissemination activities of Outcome 3
• Ministry of Environment, Forests, and Climate Change (MEFCC) Department of Environment (DoE)	DoE s the GEF Operational Focal Point and therefore is involved in general oversight in the PSC. In particular, the Project will work in city-level greenhouse gas inventories and reporting and in the coordination of activities (Outputs 1.3, 1.2 and 1.1) as well as in the implementation of Component 3, in particular, info dissemination and environmental awareness creation

• Infrastructure Development Bank Ltd. (IDCOL)	IDCOL has made a credit line available for financing for the low-carbon investments the LUCD Project will focus (EE in buildings, RE in buildings and waste-to-energy), as indicated in its co-financing letter (Annex J) and will work the Project in particular in Component 2.
• Narayanganj City Corporation	Narayanganj CC will with the LCUD Project on urban policy to reduce emissions, sensitising citizenry on urban sustainability and on waste management and waste-to-energy (see cooperation agreement, Annex J)

The role and importance of these stakeholders is described as well in Annex E. Each stakeholder has an important role to play in the market transformation process promoted by the project and therefore dedicated efforts will be made by the project team to establish collaboration and meaningful engagement in the project work.

4.3 Risks and risk mitigation

This describes risks and risk mitigation. The reader is also referred to the description of social and environmental screening in Annex I.

Box 9 Risks and risk mitigation

Description	Type	Mitigation Measures
1: The improper management of installation, operation and maintenance of the proposed low carbon technical interventions in the project such as waste processing and management practices, energy efficiency and renewable energy installations and use can potentially pose risks for the health and safety of the inhabitants in communities and labor	Social & Environmental	During the PPG stage, the key project interventions were assessed for potential impacts. As these interventions would largely confine to demand-side measures in buildings/built environment and will promote best practices in waste management processes. Measures; the project will support: - Effective due diligence by the rooftop system installer that the roof is in good condition with no leak/cracks and satisfactory drainage. - Compliance to local laws ensured or permissions sought for any changes to the roof and carry out rectifications to ensure roof has proper and adequate drainage shall be obtained from the building owner/approval authority if required. - Social and environmental screening will be part of the feasibility and impact assessments of investment proposals (Activity 2.1.1 and 2.1.2). If the screening results in 'high risk' categorization (and this may well apply to WTE), An Environment Social Impact Assessment and Management Plan for Waste to Energy plant will be required before the proposal can by accepted for financial support by the LCUD Project - Buy Back arrangements with the solar panel manufacturers and guidelines for the recycling of all e-waste (electronic waste) used in investments supported by the Project
2: The project can risk the livelihoods of informal sector engaged in waste collection and processing and small energy and construction sectors.	Social & environmental	
3: The project interventions will generate some waste during the operation	Social & Environmental	A significant amount of wastewater is generated during composting and the cleaning of the facility. Instead of discharging the wastewater into drains, it can be collected in a small, covered storage tank below ground level. This stored wastewater can then be reused for new compost piles to maintain the moisture balance and enhance the decomposition process by mixing this wastewater with fresh water from pipes or rainwater tanks

4: Energy efficiency, renewable energy and waste-to-energy interventions remain non-priority areas for City Corporations and at national-level ministry departments	Institutional	The Project will work only with those Cities that will work as 'partner city' and therefore explicitly have expressed their interest. Policies and regulations at the national level (e.g. BNBC-Revised and recent net-metering regulations) continue to pressurize City Corporations to take appropriate actions to implement low-carbon interventions. The Project will work within the existing structure and try to improve by facilitating coordination between various national and local government entities (Coordination Mechanisms) By the end of the project, if city corporations see good progress in these cost-effective interventions, they will replicate these with public funds. Since the technologies promoted under the project are proven, it is a matter of demonstrating their cost-effectiveness (in the activities of Outcome 2).
5: Weak coordination between ministries and with cities	Institutional	The project will engage stakeholders at the earliest stage and promote cooperation by means of Coordination Mechanisms at the national level and at the local level in the partner City Corps
6: Lack of access to quality data hinder planning and investment decision making	Technical & economic	It is difficult to find consistent data on energy performance in a very wide range of buildings that are often not measured and if so, are not shared. Data and info gathering activities have explicitly been included in the Project (e.g., activities 1.1.3, 2.1.3, 2.2.2 and 3.1.3)
7: Lack of interest or commitment from private sector on low carbon investments in cities	Economic	The LCUD Project supports a model in which the Government provides an enabling environment to spur private investment (see e.g. the recent regulations on net-metering and EE in BNBC with incentive measures) and IDCOL is willing to provide the needed finance (various companies have already approached IDCOL on financing options for rooftop PV). The Project will add to this by preparing high-quality feasibility studies, investment appraisals, and business plans to facilitate investment decision making.
8: Non- implementation of new technologies due to high cost and, in WTE, lack of proven business models	Technical & economic	The EE and RE in building interventions promoted in the LCUD Project are cost-effective, even at current power tariffs and should have reasonable payback times. Assessment to employ the most appropriate and cost-effective technologies will facilitate bankable investments in waste-to-energy. In WTE, the Project will promote suitable PPP initiatives with clear and mutually beneficial agreements between the city/town governments and private sector entities.
9: Major adverse economic conditions force up interest rates and/or curtail bank lending for a significant period during the project's implementation.	Economic	In such a situation, other economic priorities of city/town governments and that of the private sector may take precedence over low carbon urban development actions. However, in recent years, Bangladesh has seen impressive economic growth at about 6% annually and in 2016 even at 7.1%, one of the fastest in the world. This situation is not likely to change in the coming years and does not risk interest rates greatly rising or significant bank lending restrictions.
10. Lack of participation of women in LCUD project planning and implementation process	Social	Gender analysis has been carried out during the project development stage. The PMU and the PSC will ensure that the Gender Action Plan recommended by the project is pursued and implemented. Women will be engaged during the consultation meetings, prioritized to avail the program and be included in the different capacity building programs.
11. Increased vulnerability to impact of climate change risks	Environment	Bangladesh has a number of national strategies and plans that address climate risk and adaptation. The Ministry of

		Environment, Forest and Climate Change (MoEFCC) has signed and ratified the United Nations Framework Convention on Climate Change. MoEFCC and thus, ensures that environmental matters are considered in development programming. MoEFCC is also required to review and monitor the impact of development initiatives on the environment across all sectors. The project will take into account these and follow detailed risk assessment of the proposed pilots including an approach to climate proofing illustrated below:

Climate Proofing[22] of Investment Components (Output 2.2: Implemented low-carbon investments in public and private buildings and built environment) **under Low Carbon Urban Development Project**

Activities	Major Climate risk and hazards	Climate Impacts & vulnerabilities of proposed site	Climate Risk Categorization	Proposed Climate proofing/resilient option	Resilient Design and Specification	Post Project maintenance &operation	Possible incremental cost on climate proofing
integration of RE (e.g. rooftop PV) in larger building (like school, college, hospitals) *Tentative location of Project site:* Dhaka and Chittagong	Flood Flash, Flood Waterl ogging, Heat wave Erratic rainfall, cyclone and Storm surge	-Appliance failure due to heavy rainfall -Increase demand of electricity during heat wave for using more cooling facility in buildings -reduction of energy storage due to cloud cover - increase temperature may lower cell efficiency and energy output. Increase temperature may lower capacity of underground conductors if high ambient temperature increases soil temperature. -Long cloud covers may	Medium (I=3, P=2)	Effective due diligence by the rooftop system installer that the roof is in good condition with no leak/cracks and satisfactory drainage.	Climate proof solar panel will be used or adequate measures will be place to protect the solar panel and battery from damage due to floods, high wind and extreme rainfall	-Buy Back arrangements with the solar panel manufacturers and guidelines for the recycling of all e-waste (electronic waste) used in investments supported by the Project - Engaging public and private building owner and create ownership among them for regular maintenance and monitoring during and after the project - For distributed solar systems: availability of mobile repair teams to ensure functioning of systems after damage from extreme events	10-20% increase in incremental cost for climate proofing option, operation and maintain ace during project investment activities. However incremental cost may vary based on various engineering and non-engineering solution

[22] **Meaning of Climate-Proofing;** "Climate proofing is a shorthand term for identifying risks to a development project (...), and ensuring that those risks are reduced to acceptable levels through long-lasting and environmentally sound, economically viable, and socially acceptable changes implemented at one or more of the following stages in the project cycle"; (ADB, 2005).The expression "climate proofing" is meant as a process that aims to identify risks that an investment project may face as a result of climate change, and to reduce those risks to levels considered to be acceptable. It does not imply a complete mitigation of the potential risks of climate change.

		increase lowers efficiency/output.					
Use of eco-friendly building materials like green brick *Tentative location of Project site:* Dhaka and Chittagong City Corporation	Flood, Flash Flood, Water logging, Erratic rainfall, storm surge	-Increase of transportation cost of building materials due to unfavorable weather condition; Damage of brick due to flooding and heavy rainfall	Low (I=2,P=2)	Weather condition will be taken into account for transporting building materials,	N/A	N/A	N/A
LED Street Lighting	Storm Erratic rainfall Thunderstorm	-Appliance failure due to heavy rainfall, strong wind and thunderstorm	Medium (I=3, P=2)	Climate proofing option will be used; lighting post should be strong enough to withstand strong wind	-design specification will be given during project implementation	-partnering and creating ownership among city corporation and local government to monitor post project operation and maintenance	10-15% increase of incremental cost during implementation and maintenance
Solid Waste Management in landfill site for waste to energy facility *Tentative location of Project site:* Narayangonj City Corporation for WtoE Facility Dhaka North City Corporation	Flood, Flash Flood, Heavy Rainfall	-Subject to inundation and flooding during heavy rainfall and flash flood -Odour and air pollution during heavy rainfall	Medium (I=3, P=2)	-For managing wastes, site will be chosen in such a way to avoid the risk of inundation -Waste segregation will be done in a closed and covered spaces -To avoid leakage during rainfall, advance technological option	A significant amount of wastewater may be generated during composting and the cleaning of the facility. Instead of discharging the wastewater into drains, it can be collected in a small covered storage tank below ground level. This stored wastewater can then be reused for new compost piles to maintain the	-Community based waste management -Waste segregation at source -Engaging local crapper to manage the landfill site	10-15% increase of incremental cost

				will be used	moisture balance and enhance the decomposition process by mixing this wastewater with fresh water from pipes or rainwater tanks.		
Waste to Energy Facility *Tentative location of Project site:* Narayangonj City Corporation and other partnering city corporation	Flood, Flash Flood, Heavy rainfall, Heat Wave	-Subject to flooding during heavy rainfall -Carbon and methane emission from waste to energy facility -Increase in electricity demand due to heat wave for cooling purpose	Moderate (I=3, P=3)	- An Environment Social Impact assessment and Management Plan with climate proofing for Waste to Energy plant.	- electricity generation by a mix of a) incineration and b) landfilled gas recovery -advance technology will be used to remove any kind of GHG emission	- Engaging Municipality local authority to monitor the function of waste to energy facility -ensuring regular monitoring by experts through the municipality	10-20% increase in incremental cost. Cost may vary depending upon the use of various engineering and non-engineering options.

4.4 Stakeholder engagement

Key project stakeholders and strategies for engaging them are given below. The reader is also referred to the list of project partners in Section 4.2 that includes the various **national government ministries, agencies and departments**, and at the local level, **City Corporations and urban Development Authorities** and are considered important stakeholders of the project.

A particularly important role is played by **development banks**, such as IDCOL, that will be particularly involved in providing finance to prospective project developers in the Outputs 2.2 (and 2.1). The proposed project also envisages partnerships with three groups of private sector stakeholders, the **building construction industry (contractors, service providers), building designers and developers, and building owners** as well as with private sector associations, such as the Real Estate and Housing Association in Bangladesh (REHAB) and the Federation of Bangladesh Chambers of Commerce & Industries (FBCCI).

The project will collaborate closely with **public and private institutes** that are involved in building, low-carbon and sustainable energy in the built environment, such as House Building Research Institute (HBRI), Bangladesh University of Engineering and Technology (BUET), Dhaka University (Institute of Energy), Islamic University of Technology (Dhaka), Jahangir Nagar University, Bangladesh University of Technology, Rajshahi University of Technology, and NGOs such as the Bangladesh Green Building Council (BGBC), and, in the area of waste management and waste-to-energy, with Waste Concern and Practical Action.

The PPG project team has met with a wide array of stakeholders during project preparation, including representatives of government entities and state-owned companies (e.g. SREDA, Narayanganj City Corporation, Dhaka North City Corp, IDCOL, PWD, RAJUK, UDD, Department of Environment), private sector representatives (e.g., FBCCI, development partners (World

Bank, European Union, JICA, KfW) and NGOs (Practical Action), civil society, beneficiaries and other project-affected people. UNDP will continue to engage with these and the other stakeholders (mentioned in the previous section 4.2) throughout the project period. The PSC will include a diversely representative array of these groups. A detailed Stakeholder Engagement Plan is provided in Annex G. Starting immediately during the inception period, the project will engage the stakeholders by means of organising an Inception Workshop. During the subsequent project implementation, there is the opportunity to involve stakeholders at the various workshops, seminars and technical training. The outreach, technical assistance and loan programmes will be designed in direct recognition of input received from these stakeholders.

4.5 South-South and Triangular Cooperation (SSTrC)

The project will rely on relevant international experience and best practices in low-carbon urban development and energy efficiency in buildings, with a particular focus on countries with similar geographic and socio-economic context. Given its proximity and economic ties with Bangladesh, India stands out in this respect as a source of experience and expertise for rooftop solar PV and energy efficiency in buildings. India has a mandatory Energy Conservation Building Code (ECBC), launched by India's Bureau for Energy Efficiency (BEE). BEE is promoting ECBC awareness and voluntary adoption through training and capacity building programmes, pilot demonstration projects, and identifying steps for a compliance check and monitoring of ECBC. An ECBC User Manual was developed to provide detailed guidance to the users on how to comply with the Code (the exercise could be replicated to Bangladesh). Bangladesh may further consider its policies based on the experience of India's solar roof-top PV[23].

Throughout the project implementation, the efforts to learn and engage relevant experts and companies from South Asia and South-East Asia and countries with similar context will continue and will be facilitated through UNDP Regional Hub for Asia and Pacific (Bangkok-based).

4.6 Mainstreaming gender

The Constitution of Bangladesh protects the equal rights for men and women. To ensure gender equality Bangladesh has developed a number of policies and strategies in the context of Millennium Development Goals (MDGs), the CEDAW (1979), the Beijing Platform of Action (1995), the consecutive country Five Year Plans, Climate change strategies, and action plans. The proposed Promoting Low Carbon Urban Development Project (LCUD Project) incorporates some core issues, namely, climate change, low carbon urban development and urban planning, technical or vocational education. The text below gives a summary of the situation of gender mainstreaming in the policies relevant to these core issues of the LCUD project.

The approach of mainstreaming gender and women empowerment in the overall development process started from the Fourth Five-Year Plan (1990-1995) till the latest Seventh Five-Year Plan (2016-2020) that have incorporated strategies and measures in reducing women's disadvantage, increasing women's voice and agency and promoting gender equality. The first ever Women's Development Policy (WDP) was formulated in 1997 and was updated in 2011. It has a section on promoting women's role in environmental management. The Sixth Five Year Plan (2011-2015) considered engagement of women in political and economic activities as cross-cutting issues and one of the main drivers of transformation. The Seventh Five-Year Plan (2016-2020) emphasizes the enabling of equal opportunities and rights for men and women and considers recognition of women as equal contributors in economic, social, and political development.

Bangladesh is addressing the impacts of climate change for a long time. Regarding climate change, Bangladesh has developed the National Adaptation Plan to Action (NAPA) for climate change (2005) that incorporates gender in a more comprehensive manner. This document emphasized the gender perspective of poverty reduction and livelihood security as the most important set of criteria for prioritization of adaptation needs and activities.

In addition, to manage impacts of climate change, Bangladesh has prepared the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2008 which was revised in 2009. This document suggests the integration of various aspects of

[23] India has set a target of 40 GW by 2022 with accompanying policy instruments put in place to achieve the target.

climate change such as mitigation, adaptation, technology development, and transfer and capacity building into the mainstream planning process. Out of the six pillars identified in the BCCSAP, four pillars incorporated gender issues, including, a) food security, social protection, and health; b) comprehensive disaster management; c) infrastructure and d) mitigation and low carbon development. The remaining two pillars of the BCCSAP are 1) research and knowledge management and 2) capacity building and institutional strengthening are crosscutting with the first four pillars.

The BCCSAP in its infrastructure section, of relevance to the LCUD project, addresses the increasing level of women's participation in climate change related infrastructure development and management, monitoring, maintenance, secured and uninterrupted mobility of women in transport sectors issues. In areas of mitigation and low carbon development, the BSCCAP also addresses increased level of women's participation, development of gender-responsive programmes to reduce GHG emissions at household level and increased access to energy and power technologies, entrepreneurship development programs related to waste management, solid waste, and drainage management and more participation of women in coastal and social forestry programs have been encouraged.

Bangladesh has developed the National Skills Development Policy in 2011. This document presents ways that will contribute to the sound implementation of national economic, social and employment policies of Bangladesh. This policy document useful for many different actors such as the private sector, non-profit actors, NGOs, civil society, and government ministries that are involved in delivering skills-based education. The Policy addresses gender concerns notable are a collection of sex-disaggregated data, ensure gender-friendly environment, gender-balanced workforce, and gender-balanced managerial positions.

Gender mainstreaming at the LCUD Project level:
The LCUD Project considers 'gender' not as women only but as both women and men who can make the best out of the impacts of the project. Hence, the Project will mainstream gender in the following ways-

At the project activity level-

- Collection, inclusion, and use of gender-disaggregated data in the various activities, and gender-relevant information technical reports, documents and awareness-raising materials of the Project;
- Revision and/or development of (LCUD) policy/es in the lens of gender and social-environmental safeguarding concerns;
- Encourage more increased and active participation of women at the planning, designing, and decision-making levels;
- Develop training and awareness raising materials integrated with gender concerns in LCUD energy efficiency issues including gender sensitivity (i.e. avoiding gender stereotypes, using inclusive language and using appropriate illustrations.
- Encourage more increased and active participation of women at the citizen awareness and participation
- Exchange of gender best practices/knowledge in urban sub-sectors for potential integration with policy/planning and implementation

At the partner and stakeholder level, the LCUD will follow the following strategies for gender mainstreaming-

- Sensitization of project stakeholders with regards to gender equality. Efforts will be made to promote a balance between male and female participation;
- In all the working teams of the Project governance structure, e.g. PSC; Project Management Unit, Working Groups - gender balance will be ensured by balancing representation of both male and female participants

4.7 Sustainability and scaling up

Sustainability

The proposed LCUD Project will include the incorporation of low carbon development strategies and technologies in the existing Development Plan, Area Plans and Structure Plans of the City Corporations and Development Authorities rather than coming up with another 'low-carbon' plan in the selected partner Cities. The Project intends to promote an integrated approach where planning and development are coordinated vertically (with national government departments),

horizontally (City Corporations and Development Authority, and with the private sector in public-private partnerships) and across sectors. Urban systems will be more interconnected and efficient and provide improved services. Moreover, the proposed project will link the project interventions with activities undertaken by SREDA and other government entities under the Energy Efficiency and Conservation Master Plan (to 2030). This will be achieved by establishing policy and planning linkages between the various entities by establishing a Coordination Mechanism at the national level and, at the local level, in the participating partner cities.

As a consequence of the Project's capacity strengthening activities (training, workshops, Centre of Expertise, BLCCN), more practitioners (building developers, owners, managers; waste management and WTE project developers; urban and city planners) will have detailed knowledge of green technologies and low carbon approaches. This will enable them to develop and plan green technology investments; promote the adoption of more efficient technologies; access finance and mobilise resources; establish effective partnerships between public and private interests. This will improve the performance of urban systems.

The project is first of its kind in Bangladesh as it promotes an integrated and holistic approach to urban development planning. The project is innovative due to: a) its city focus, few if no previous low carbon project in the country has taken the approach at this scale and scope; and b) the harmonization and enhancement of baseline activities (national plans with current urban area and structure planning) and other project actions to promote integrated urban planning and the adoption of green technologies. This integration across urban systems and between horizontal and vertical levels of government has not previously been addressed in Bangladesh in an integrated and coordinated way.

The Project works with SREDA as the Implementing Partner for the implementation and sustenance of the interventions on the promotion, demonstration and widespread application of low carbon city development planning and energy efficient design and operation of urban systems. DoE is another implementing partner to be involved mainly with awareness component. With SREDA's and DoE's direct involvement(in cooperation with the relevant ministries and departments) in the project, the long-term sustainability of these project interventions can be ensured. For example, the project will work with the Planning Commission (General Economics Division) on incorporation of LCUD elements in the 8th Five-Year Plan (its appropriate place in the country's overall planning will ensure a lasting role of LCUD). Similarly, the cooperation with UDD (Urban Development Directorate), which develops plans for many cities, will promote the mainstreaming of LCUD concepts in urban plans and strategy formulation. With the coordination and implementation of Component 3 planned through the Department of Environment, it further broadens the scope of policy and regulatory linkages for holistic and integrated approaches to the project interventions.

Replicability

To encourage replicability the project has adopted a balance between capacity building, activities to create an enabling environment for low carbon investment, and concrete investments. The selection of cities (Component 1) and investment projects (Component 2) underpins the strategic approach in that it presents concrete actions involving low-carbon investment areas which are relevant to the major development challenges of most of the participating cities, being electricity, and waste management. Emphasis on awareness raising and knowledge management (Component 3) will pro-actively identify lessons to inform replication and scaling-up and the institutional arrangements will be put in place to ensure then this reaches national and the local level.

In particular, a learning-by-doing approach is promoted whereby specific low-carbon planning actions will be supported in each city (Output 1.3). This will be followed up with on-going capacity development and on-the-job technical assistance during the normal local planning cycles to ensure low-carbon options are broadly considered. During the 5 years of the project each city completes a local planning cycle and the project will align and support this at each stage. The project will then support resource mobilisation either through public-private partnerships, engaging public financing mechanisms, or from local development banks (IDCOL, BIFFL) for private sector low-carbon investment proposals. Where possible, coordination and pooling of funding (loans, grants) will be sought with development partners that develop programmes on urban development, such as ADB's *City Region Development Project* (e.g. on waste management) and WB's *Rural*

Electrification and RE Development II (e.g. on waste management) as well as future programmes and projects of development partners and donors.

Specifically, the replication of investment projects of Component 2 (energy efficiency improvements and rooftop PV in larger residential, commercial-industrial and public buildings) will be encouraged through evidence-based planning (component 1) and awareness raising and knowledge management (Component 3) that will pro-actively engage decision-makers from the partnering cities and will be shared broadly across Bangladesh thereby, informing replication and scaling-up of these (and other low-carbon interventions and technologies). The demonstration of a sustainable commercially operated urban waste management and WTE schemes (through public-private partnership arrangement) will be implemented. There is a large scope for replication of community-led waste management (e.g. ward-level waste management committees and/or IRRCs, to promote and implement cost-effective waste management solutions). The proposed project will involve working closely with the relevant stakeholders in the area of urban waste management and thus showcase that this can be a cost-effective, income-generating, basis to add waste recovery and utilization in the form of producing electricity and selling compost.

Through enabling actions (e.g. promotion of PPPs, strengthening of community engagement and private sector participating in planning) and through the sharing of best practices and demonstration of bankable business plans, the participation of private sector will be encouraged. Consequently, this will lead to further investment and replication of the low-carbon investments.

5. PROJECT MANAGEMENT

5.1 Cost efficiency and effectiveness

There are positive social and environmental impacts of the proposed shift to a low-carbon city approach that will enhance urban systems and transform local economies to a more sustainable development pathway. These impacts include:

- Reduced dependence on fossil fuels. Bangladeshi's economy is sensitive to global energy prices. Whilst these financial risks are largely borne by the broader economy a significant portion is passed through to end-users.
- Improved air quality and waste management. By improving the effectiveness of urban systems, especially fuel substitution (renewable energy, waste-to-energy), avoidance (energy efficiency) and moving to other low-carbon options will have a climate change mitigation impact, by reducing CO_2 emissions (energy, waste) and methane CH_4 emissions (landfill gas capture and utilisation).
- Green jobs and market diversification. All the cities involved in the project have prioritised tourism as a key motivating factor leading them to a low carbon approach. Attaining low-carbon or green status means that cities and local enterprise can differentiate themselves in the market place. It is therefore expected that the project will lead to more jobs in terms of producing and supplying (new) low-carbon technologies and services.
- Gender benefits are expected primarily through increased awareness of the benefits of participation of community and marginal groups in local level planning and development processes and the availability of gender disaggregated data relating to low emission development. Further deliberation on a monitoring mechanism and identification of gender issues will be explored during the project implementation.

The Project will directly support investment in renewable energy (RE) and energy efficiency (EE) and will, therefore, lead to *direct greenhouse gas emission* (GHG) emission reductions. A GHG emission analysis has been conducted and is presented in Annex F. The direct GHG emissions reductions for the RE and EE investments in buildings and built environment is about 154 kilotonnes of CO_2 per year (see **Error! Reference source not found.**) or 1,573 kilotonnes over the investments' lifetime (of 10-12 years). This implies a GEF abatement support of USD 2.40 per ton of CO_2.

Box 10 Summary of direct greenhouse gas emission reduction (due to LCUD investments)

Type	Number	Investment USD	Energy savings/substit kWh/yr	GHG emission reduction	
				Annual tCO2/yr	Cumulative tCO2
Waste to energy	2	7,028,670	36,867,849	135,662	1,356,616
Rooftop PV - public	3	1,904,404	2,778,329	1,861	22,338
Rooftop PV - private	10	10,814,963	15,919,102	10,666	127,990
EE in public buildings	6	929,582	2,363,668	1,584	19,004
EE in private buildings	24	2,754,029	5,845,990	3,917	47,002
Total		**23,431,649**	**63,774,938**	**153,689**	**1,572,949**

These figures deviate from the CO_2 emission reduction figures mentioned in the PIF (at a total of 858 kilotons of CO_2)

- Lighting GHG emission reduction due to LED street lighting, 652 kilotons CO_2 lifetime reduction) is not included as streetlighting LED replacement is not a major activity any more of the LCUD Project;
- Instead, rooftop PV has been included, and with an expected 13 projects, giving a lifetime emission reduction of 126 kilotons CO_2, while EE improvements are assumed to take place in more buildings (30 buildings giving lifetime CO_2 avoidance of 36 kilotons of CO_2 instead of the PIF's 12 buildings with lifetime GHG reduction of 5.6 kilotons);
- Waste-to-energy in two projects is assumed to be commercial scale and GHG due to electricity/fuel substitution is 144 kilotons CO_2 (which roughly compares with the PIF's 100 kilotons), However, apparently the PIF does not include the reduction associated with the 'methane kick' (avoiding that the landfill's methane, 22 times more potent as CO_2, is

released in the air, but captured and burnt). Lifetime CO_2 reduction of WTE (only electricity and one fuel substitution project) is 1,357 kilotons of CO_2.

In addition, the Project will undertake several activities that will stimulate market transformation, in particular, support to the enabling policy and regulatory framework under Component 1 and capacity strengthening and awareness creation of Component 3. Further, experiencing and seeing the realization of energy efficiency improvements (building envelope, lighting, appliances) and renewable energy (e.g. rooftop PV) will encourage building developers, designers, and owners. Thus, there will be consequential GHG emission reductions of about 4,719 kilotons of CO_2 after the project's end.

5.2 Project management

Implementation arrangement

The project management arrangement will be the National Implemented Modality (NIM). The **Implementing Partner** (GEF local executing agency) for this project is Ministry of Power, Energy and Mineral Resources (MPEMR) with *SREDA (Sustainable and Renewable Energy Development Authority)* and the *Department of Environment (DoE)* as **Implementing Entities.** The overall governing body will be Project Steering Committee and Project Implementation Committee which will be multi-stakeholder bodies, in which MoPEMR, MoEFCC, SREDA, DoE, UNDP and a number of government entities will participate. A Project Management Unit will be established at SREDA and DoE in Dhaka. A Project Manager will be appointed to manage the project and report to the Project Steering Committee (PSC) and National Project Director (NPD). Technical experts may be located at the participating City Corporation or Development Authority offices. More details on the project management arrangements is given in Section 8.

Risks and risks monitoring

The risks that are shown Section 4.3 and Annex K below reflect remaining factors that lie outside the direct activities of the project, or along its periphery. As per standard UNDP requirements, the Project Manager will monitor risks quarterly and report on the status of risks to the UNDP Country Office. The UNDP Country Office will record progress in the UNDP QUANTUM risk log. Management responses to critical risks will also be reported to the GEF in the annual PIR.

Equipment, Supplies and Other Property

Ownership of equipment, supplies and other property financed from the project shall be vested in UNDP. Matters relating to the transfer of ownership by the UNDP shall be determined in accordance with applicable policies and procedures of the UNDP.

Collaborative arrangements

LCUD may cost-share certain implementation costs with other projects under the new UNDP Country Programme (CPD) 2018-2021. It is foreseen as well that the projects will co-organise a significant number of training, knowledge exchange and planning activities, for the same reasons as technical staff resources are shared. All of these will greatly reinforce the integrated approach taken by the new CPD. The Project's operational means, in particular at the sub-national level where different projects will coincide, will also be pooled, where possible. Organisational costs incurred by UNDP in terms of staff time are charged to the GEF Agency Fee, which is 9.5% of the GEF budget for the project, equivalent to USD 357,942 (as indicated in the GEF CEO Endorsement Request form).

Agreement on intellectual property rights and use of logo on the project's deliverables and disclosure of information: To accord proper acknowledgment to the GEF for providing grant funding, the GEF logo will appear together with the UNDP logo on all promotional materials, other written materials like publications developed by the project, and project hardware. Any citation on publications regarding projects funded by the GEF will also accord proper acknowledgment to the GEF. Information will be disclosed in accordance with relevant policies notably the UNDP Disclosure Policy[24] and the GEF policy on public involvement[25].

[24] See http://www.undp.org/content/undp/en/home/operations/transparency/information_disclosurepolicy/

[25] See https://www.thegef.org/gef/policies_guidelines

6. PROJECT RESULTS FRAMEWORK

This results framework is the same as the one required in the GEF CEO Endorsement template Annex A: Project Results Framework.

Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer-term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

This project will contribute to the following Sustainable Development Goal (s): Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all (*Target 7.3:* By 2030, double the global rate of improvement in energy efficiency). Goal 13: Take urgent action to combat climate change and its impacts (*Target 13.2*: Integrate climate change measures into national policies, strategies and planning; and Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation)
UNSDCF/Country Program Outcome (2022-2026): Strategic Priority 3: Sustainable, Healthy and Resilient Environment **Outcome 3**: By 2026, ecosystems are healthier, and all people, in particular the most vulnerable and marginalized in both rural and urban settings, benefit from and contribute in a gender-responsive manner to a cleaner and more resilient environment, an enriched natural resource base, low carbon development, and are prosperous and more resilient to climate change, shocks and disasters.
CPD (2022-2026) **Output 2.1:** More people in Bangladesh, especially the most vulnerable and marginalized, have increased capacities, knowledge, and skills to adopt sustainable consumption behaviours and lead in climate action.

	Objective and Outcome Indicators	Baseline (2017)	Mid-term target	End of Project (EoP) target	Data collection methods and *Assumptions*
Project Objective: Reduce greenhouse gas (GHG) emissions by enabling investments in renewable energy, energy-efficiency, to support urban development in Bangladesh	1) Lifetime direct GHG emissions avoided [GEF Core Indicator 6]	N/A	Mid-term targets are one-third of the end-of-project targets,	1.573 million tons of tCO_2 (lifetime) resulting from energy efficiency (EE), renewable energy (RE) and waste-to-energy interventions[26]	• Market surveys and/or project data (see Indicator 11 on investments in RE, EE and WTE) • Numbers of EE and RE investments (see Indicator 11) as given in project reports • See Annex F (methodology and assumptions) *Assumptions:* • *Support from companies and city entities* • *Energy performance data will be made available by (private) companies (confidentiality)* • *Feasibility of the proposed investments*
	2) Lifetime indirect GHG emissions avoided [GEF Core Indicator 6]	N/A	Indirect emissions are three times the direct emissions (replication factor = 3)	4.718 million tons of CO_2 as consequential (indirect) emission reduction after the project's end[27]	
	3) Number of beneficiaries, disaggregated by gender [GEF Core Indicator 11]	N/A	3,000 beneficiaries (half male, half female)	10,000 direct beneficiaries (half men, half women)	

[26] EE in public buildings (lifetime19 kiloton of CO_2 from avoided 2,363 MWh/yr), EE in private buildings (cumulative 47 kiloton CO_2 from avoided 5,846 MWh/yr), PV in public buildings (cumulative 22 kilotons CO_2 from substituted 2,778 MWh/yr), PV in private buildings (cumulative 128 kilotons of CO2 from substituted 15,919 MWh/yr), waste-to-energy (cumulative 1,356 kiloton of CO2 from substituted 36,868 MWh/yr)

[27] Indirect emissions are three times the direct emissions (replication factor = 3),

	Objective and Outcome Indicators	Baseline (2017)	Mid-term target	End of Project (EoP) target	Data collection methods and *Assumptions*
Outcome 1 Coordinated and integrated low-carbon urban plans and effective implementation of regulations	4) Status of EE BNBC [Revised] and other low-carbon policy instruments	BNBC [Revised, with EE] formulated; National 3R (Reduce, Re-use and Recycle) policy	BNBC [Revised, with EE] and adopted (Gazetted) an	BNBC [Revised, with EE] adopted; Proposal formulated and presented to the government for integrated fiscal-regulatory incentives, net metering and other instruments on EE and RE in buildings Proposal formulated on national waste management and waste resources (WTE, composting)	• Official documents • Project report on policy instruments • Manual on BNBC and GBG *Assumptions:* • *Commitment by the government and political support*
	5) Number of staff national and local government staff trained (incl female) and % that use LCUD planning in their work at project's end	N/A	Four events on LCUD-relevant themes in which 200 staff from national and local government entities participate (at least 30% female) Two multi-day detailed LCUD training events in which 40 staff participate (at least 30% female)	Seven events on LCUD-relevant themes in which 350 staff from national and local government entities participate (at least 30% female) Three multi-day detailed LCUD training events in which 60 staff participate (at least 30% female) Percentage of trainees that in Yr 4 use LCUD elements in planning and design	• Workshop and seminar reports • Project progress reports • Training materials • After-training evaluations, incl. a post-training survey in yr 4 *Assumptions:* • *Commitment by national and city government* • Willingness of staff to be trained
	6) Status of LCUD coordination at national level	N/A	An interinstitutional Coordination Mechanism established	Interinstitutional Coordination Mechanism established and holding at least 3 meetings a year	• Official documents; Minutes of meetings; Project reports *Assumptions:* • *Commitment by national and city government; willingness to be coordinated*
	7) Number of city corporations supported and status of support: a) number of LCUD-relevant plans or strategies b) Number of LCUD-relevant investment opportunities	N/A	At least one City Corporation supported with a) local coordination mechanism (corporation, development authority, PPPs) b) Integration of LCUD (with gender and social elements) in city development strategy and/or /Structure plans, and setting up GHG inventory system	At least two City Corp. have a) Functioning local coordination mechanism b) LCUD (with gender and social elements) integrated in approved in city development strategy, Area, and/or /Structure plans, c) City-level GHG inventory system c) City Corps have formulated investment plans for LCUD investments and measures (EE and RE in public buildings; waste management and WTE; other)	• Official documents; Project reports; Investment prospectus • City websites and registers *Assumptions:* • *Commitment by city corporations* • *Willingness of city planners to undergo training and implement LCUD in their planning work* • *National-level support for city corporation on LCUD*
	8) Status of SREDA building rating system	SREDA building rating system under development	SREDA building rating system extended with RE elements in place	SREDA building rating system officially endorsed by the government and implemented on a voluntary basis	• SREDA reports and documents • Project progress reports *Assumptions:*

	Objective and Outcome Indicators	Baseline (2017)	Mid-term target	End of Project (EoP) target	Data collection methods and *Assumptions*
					• *Official support for SREDA rating for voluntary application*
	9) Extended baseline and impact assessment (including impact on gender and selected SDGs)	Individual studies, articles and report, but no integrated study on potential EE in buildings, RE integration and WTE potential. Gender aspects usually not included	Study on national energy savings potential, socio-economic costs and benefits of selected low-carbon interventions with benchmarking (incl. gender-disaggregated info where possible)	Impact study at the end of the project with lessons learned and post-project LCUD action plan (proposed to the interinstitutional Coordination Mechanism, see Indicator 6)	• Project technical report (baseline; impact study) • Reports, documents from Bangladeshi institutions; Articles ; Internet *Assumptions:* • *Access and reliability of information and data made available by companies*
Outcome 2 Increased investments in EE (energy efficiency) and RE (renewable energy) in buildings and the built environment	10) Number of investments proposals in EE in public buildings and other low-carbon interventions	N/A	At least 25 investment opportunities identified by partner City Corp (see Indicator 7) and by Project Team in other cities	At least 10 investment projects implemented and supported by the project (one WTE, three rooftop PV, and six EE in buildings). Investment value and project numbers correspond with Indicator 1)[28]:	• Numbers of EE and RE investments as given in project reports (see also Indicators 11 and 12) • Project progress reports *Assumptions:* • *See Indicators 1) and 2)* • *Willingness of private and public sector managers/owners to invest and to participate in the Project*
	11) Number and size of investments in private buildings and other low-carbon interventions	N/A	At least 75 investment opportunities identified through Call for Proposals and by Project Team	At least 35 investment projects implemented and supported by the project (10 rooftop PV, 20 EE in buildings and one WTE). Investment value and project numbers correspond with Indicator 1)[29]:	
Outcome 3 Knowledge increased of practitioners and awareness raised of city dwellers on low-carbon, green, development	12) Number of LCUD-relevant awareness campaigns (through mass media)	Green Building Newsletter (Switch Asia project)	Achieve 50% of the end-of-project target Project newsletter	10 public and media events, Leaflets; Project newsletter converted in LCUD newsletter (by BLCCN)	• Mass media materials • Project progress reports • Surveys on target groups' responses *Assumptions:* • *Reasonable cost of mass media ads and air time* • *Interest shown by the public at large and target groups in particular*
	13) Number of stakeholders trained and/or awareness raised on LCUD concepts EE in buildings, building materials and integration of PV (with	Limited training on green buildings, WTE	Fifteen 'trainers' trained to led workshop, seminar and technical training Three events on LCUD-relevant themes in which 150 staff from public, NGO and	Fifteen 'trainers' trained; Five events on LCUD-relevant themes in which 350 staff from public, NGO and private stakeholders participate (at least 30% female) End-of-project workshop	• Workshop and training reports; Minutes of meeting • Project reports • Training materials • After-training evaluations, incl. post-training survey at yr 4

[28] EE in public buildings (USD 0.93 million), PV in public buildings (USD 1.90 million), WTE (USD 3.03 million)

[29] EE in private buildings (USD 2.75 million), PV in private buildings (10.81 million), WTE (USD 3.99 million)

	Objective and Outcome Indicators	Baseline (2017)	Mid-term target	End of Project (EoP) target	Data collection methods and *Assumptions*
	gender targets) and % of trainees that skills obtained		private stakeholders participate (at least 30% female) Project inception workshop Three multi-day targeted training events (30% female)	Five multi-day targeted training events (three on EE in buildings, PV in buildings, WTE, in which 60 staff participate (30% female) Percentage of trainees that use skills obtained in their work at yr 4	*Assumptions:* • *Willingness of stakeholders to participate in training and of females to participate (see also Gender assessment)* • *Availability of good experts to deliver training and workshops*
	14) Status of institutionalisation in awareness and capacity building	Individual government institutions and universities deal with LCUD on a theme-by-theme basis	a) Low-Carbon Cities Network (BLCCN) established with small secretariat with two-year work plan with gender-sensitive targets b) Centre of Expertise and Training inaugurated with approved two-year work plan with gender-sensitive targets (supported financially by LCUD project)	Functioning and fully operational and financially sustainable: a) Low-Carbon Cities Network (BLCCN) b) Centre of Expertise and training (with approved post-project work plans with gender-sensitive targets)	• Web portal, annual reports, annual work plans of Centre and of BLCCN • Project progress report • Publications, info materials, reports (see also Indicators 15) and 12) Assumptions: • Willingness of agency/ministry/ or institution to host BLCCN and to host the Centre
	15) Availability of updated information, via register and web portal (incl. gender-specific info)	N/A	Website established at selected Centre of Expertise and for BLCCN	Functioning LCUD and green buildings website, updated on weekly basis, also promoted on Facebook, YouTube, etc., and linked with UNDP website Availability of gender-specific info	• Web portal and statistics on visitors; Survey of web visitors' opinion • Database outputs • Reports with benchmarking data • Project reports *Assumptions:* • *Centre will host the webpage and database and will regularly maintain and update with new information* • *Willingness of entities to make energy performance and other data available*
	16) Database with sufficient, detailed and reliable energy performance data on (new) commercial buildings	No such database	Database established at SREDA and Centre of Expertise	Functioning database with sufficient data to establish benchmarks per type and size of (large) building (accessible through the websites of Indicator 15) Number of site visits and comments by visitors	
	17) Annual award ceremonies on best LCUD practices and greenest building	N/A	Two award ceremonies held	Four award ceremonies held	• SREDA • Media reports on ceremonies *Assumptions:* • *Interest of building and project developers and owners to participate*

7. MONITORING AND EVALUATION (M&E) PLAN

The project results, corresponding indicators and mid-term and end-of-project targets in the project results framework will be monitored annually and evaluated periodically during project implementation. If baseline data for some of the results indicators is not yet available, it will be collected during the first year of project implementation. The Monitoring Plan included in Annex details the roles, responsibilities, and frequency of monitoring project results.

As part of *Component 3: Sensitizing city dwellers and capacity strengthening for low-carbon urban initiatives,* the project monitoring and evaluation plan will also facilitate learning and ensure **knowledge** is shared and widely disseminated to support the scaling up and replication of project results. Also, within the other three Components the GEF-financed project will promote effective management of knowledge.

Project-level monitoring and evaluation will be undertaken in compliance with UNDP requirements as outlined in the UNDP POPP and UNDP Evaluation Policy. The UNDP Country Office is responsible for ensuring full compliance with all UNDP project monitoring, quality assurance, risk management, and evaluation requirements.

Additional mandatory GEF-specific M&E requirements will be undertaken in accordance with the GEF Monitoring Policy and the GEF Evaluation Policy and other relevant GEF policies[30] Error! Reference source not found. The costed M&E plan included below, and the Monitoring plan in Annex, will guide the GEF-specific M&E activities to be undertaken by this project.

In addition to these mandatory UNDP and GEF M&E requirements, other M&E activities deemed necessary to support project-level adaptive management will be agreed during the Project Inception Workshop and will be detailed in the Inception Report. This will include the exact role of project target groups and other stakeholders in project M&E activities including the GEF Operational Focal Point and national/regional institutes assigned to undertake project monitoring. The GEF Operational Focal Point will strive to ensure consistency in the approach taken to the GEF-specific M&E requirements (notably the GEF Core Indicators) across all GEF-financed projects in the country. This could be achieved for example by using one national institute to complete the GEF Core Indicators for all GEF-financed projects in the country, including projects supported by other GEF Agencies[31].

The **M&E plan** will be reviewed and revised as necessary during the project Inception Workshop to ensure project stakeholders understand their roles and responsibilities vis-à-vis project monitoring and evaluation. Indicators and their means of verification may also be fine-tuned at the inception workshop. General project monitoring is the responsibility of the Project Management Unit, but other project partners will have responsibilities to collect specific information to track the indicators. It is the responsibility of the Project Manager to inform UNDP of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely fashion.

M&E oversight and monitoring responsibilities:

Project Manager (PM): The Project Manager, supported by the Programme Specialist (Environment sustainability & Energy) and Technical Advisor (TA), is responsible for day-to-day project management and regular monitoring of project results and risks, including social and environmental risks. The Project Manager will ensure that all project staff maintain a high level of transparency, responsibility, and accountability in M&E and reporting of project results. The Project Manager will inform the PSC, PIC, the NPD, DPD, the UNDP Country Office and the Nature, Climate and Energy Vertical Fund (NCE-VF) Regional Technical Advisor (RTA) of any delays or difficulties as they arise during implementation so that appropriate support and corrective measures can be adopted. All other bodies will be informed by the NPD as and when required.

[30] See https://www.thegef.org/gef/policies_guidelines

[31] See https://www.thegef.org/gef/gef_agencies

The Project Manager in consultation with NPD will finalize Annual Work Plans based on the multi-year work plan included in Annex A, including a month-by-month projection of activities, as well as annual output targets. The Project Manager will ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality. This includes, but is not limited to, ensuring the results framework indicators are monitored annually in time for evidence-based reporting in the GEF PIR, and that the monitoring of risks and the various plans/strategies developed to support project implementation (e.g. gender strategy, stakeholder engagement, communication plan, etc.) occur on a regular basis.

Project Steering Committee (PSC): The PSC will take corrective action as needed to ensure the project achieves the desired results. The Board will hold project reviews to assess the performance of the project and appraise the Annual Work Plan for the following year. In the project's final year, the PSC will hold an end-of-project review to capture lessons learned and discuss opportunities for scaling up and to highlight project results and lessons learned with relevant audiences. This final review meeting will also discuss the findings outlined in the project terminal evaluation report and the management response. Results of this review, as well as findings outlined in the project terminal evaluation report and the management response, will be presented at a closing workshop open to a broad variety of stakeholders. PSC will preferably meet quarterly, bi-annually or at least annually.

Project Implementation Committee (PIC): The PIC will closely be involved with the PMU for micro implementing issues and will recommend measures of policy level to PSC if and when needed. The PIC will hold project reviews to assess the performance of the project and appraise the Annual Work Plan for the following year. In the project's final year, the PIC will hold an end-of-project review to capture lessons learned and discuss opportunities for scaling up and to highlight project results and lessons learned with relevant audiences. PIC will preferably meet quarterly or at least quarterly and/or bi-annually.

Project Implementing Partner: The Implementing Partners (SREDA) is responsible for providing any and all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary and appropriate. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes, and is aligned with national systems so that the data used by and generated by the project supports national systems.

Role of UNDP Country Office and Regional Hub:

UNDP Country Office: The UNDP Country Office will support the NPD & the Project Manager as needed, including through annual supervision missions. The annual supervision missions will take place according to the schedule outlined in the annual work plan. Supervision mission reports will be circulated to the project team, PSC and within all other committees within one month of the mission. The UNDP Country Office will initiate and organize key GEF M&E activities including the *annual GEF PIR*, the *independent mid-term review* and the *independent terminal evaluation*. The UNDP Country Office will also ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality.

The UNDP Country Office is responsible for complying with all UNDP project-level M&E requirements as outlined in the UNDP POPP. This includes ensuring the UNDP Quality Assurance Assessment during implementation is undertaken annually; that annual targets at the output level are developed, and monitored and reported using UNDP corporate systems; the regular updating of the QUANTUM risk log; and, the updating of the UNDP gender marker on an annual basis based on gender mainstreaming progress reported in the GEF PIR and the UNDP ROAR. Any quality concerns flagged during these M&E activities (e.g. annual GEF PIR quality assessment ratings) must be addressed by the UNDP Country Office and the NPD. The UNDP Country Office will retain all M&E records for this project for up to seven years after project financial closure to support ex-post evaluations undertaken by the UNDP Independent Evaluation Office (IEO) and/or the GEF Independent Evaluation Office (IEO).

Additional M&E and implementation quality assurance and troubleshooting support will be provided by the BPPS NCE Unit, i.e. the Regional Technical Advisor (based at Bangkok Regional Hub) and the BPPS NCE Directorate as needed.

Additional GEF monitoring and reporting requirements:

Inception Workshop and Report: A project inception workshop will be held within two months of project CEO endorsement, with the aim to:

a. Familiarize key stakeholders with the detailed project strategy and discuss any changes that may have taken place in the overall context since the project idea was initially conceptualized that may influence its strategy and implementation.
b. Discuss the roles and responsibilities of the project team, including reporting lines, stakeholder engagement strategies and conflict resolution mechanisms.
c. Review the results framework and monitoring plan.
d. Discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E budget; identify national/regional institutes to be involved in project-level M&E; discuss the role of the GEF OFP and other stakeholders in project-level M&E.
e. Update and review responsibilities for monitoring project strategies, including the risk log; SESP report, environmental and social management measures and other safeguard requirements; project grievance mechanisms; gender strategy; knowledge management strategy, and other relevant management strategies.
f. Review financial reporting procedures and budget monitoring and other mandatory requirements and agree on the arrangements for the annual audit.
g. Plan and schedule PSC meetings and finalize the first-year annual work plan.
h. Formally launch the Project.

The Project Manager will prepare the inception report no later than one month after the inception workshop. The inception report will be cleared by UNDP (Country Office and the BPPS NCE Regional Technical Adviser) and will be approved by the PSC.

GEF Project Implementation Report (PIR): The Project Manager, UNDP Country Office, and the BPPS NCE Regional Technical Advisor will provide objective input to the annual GEF PIR covering the reporting period July (previous year) to June (current year) for each year of project implementation. The Project Manager will ensure that the indicators included in the project results framework are monitored annually in advance of the PIR submission deadline so that progress can be reported in the PIR. Any environmental and social risks and related management plans will be monitored regularly, and progress will be reported in the PIR. The PIR submitted to the GEF will be shared with the PSC. The UNDP Country Office will coordinate the input of the GEF Operational Focal Point and other stakeholders to the PIR as appropriate. The quality rating of the previous year's PIR will be used to inform the preparation of the subsequent PIR.

Lessons learned and knowledge generation: Results from the project will be disseminated within and beyond the project intervention area through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to the project. The project will identify, analyse and share lessons learned that might be beneficial to the design and implementation of similar projects and disseminate these lessons widely. There will be continuous information exchange between this project and other projects of similar focus in the same country, region and globally.

GEF-7 Focal Area Core Indicators: A template is available that will be used to monitor global environmental benefits of the LUCD Project, at various stages during the project cycle, at PIF, at CEO ER, at the mid-term review (MTR) and the terminal evaluation (TE). The baseline/CEO Endorsement GEF-7 Focal Area Indicator template is included in *Annex F* to this project document. The template will be updated by the Project Manager/PMU Team, i.e. should not be filled by the evaluation consultants hired to undertake the mid-term review (MTR) or the terminal evaluation (TE), but shared with the MTR and TE consultants before the required review/evaluation missions take place. The updated GEF-7 Core Indicator template will be submitted to the GEF along with the completed Mid-term Review report and the Terminal Evaluation report.

Independent Mid-term Review (MTR): An independent mid-term review process will begin after the second PIR has been submitted to the GEF, and the MTR report will be submitted to the GEF in the same year as the 3rd PIR. The MTR findings and responses outlined in the management response will be incorporated as recommendations for enhanced

implementation during the final half of the project's duration. The terms of reference, the review process and the MTR report will follow guidance prepared by the UNDP IEO, available on the UNDP Evaluation Resource Center (ERC),for GEF-financed projects. As noted in this guidance, the evaluation will be 'independent, impartial and rigorous'. The consultants that will be hired to undertake the assignment will be independent of organizations that were involved in designing, executing or advising on the project to be evaluated. The GEF Operational Focal Point and other stakeholders will be involved and consulted during the terminal evaluation process. Additional quality assurance support is available from the BPPS/NCE. The final MTR report will be available in English and will be cleared by the UNDP Country Office and the BPPS NCE Regional Technical Adviser, and approved by the PSC.

Terminal Evaluation (TE): An independent terminal evaluation (TE) will take place upon completion of all major project outputs and activities. The terminal evaluation process will begin three months before operational closure of the project allowing the evaluation mission to proceed while the project team is still in place, yet ensuring the project is close enough to completion for the evaluation team to reach conclusions on key aspects such as project sustainability. The Project Manager will remain on contract until the TE report and management response has been finalized.

The TOR, the evaluation process and the final TE report will follow the guidance prepared by the UNDP IEO for GEF-financed projects available on the UNDP Evaluation Resource Center. As noted in this guidance, the evaluation will be 'independent, impartial and rigorous'. The consultants that will be hired to undertake the assignment will be independent of organizations that were involved in designing, executing or advising on the project to be evaluated. The GEF Operational Focal Point and other stakeholders will be involved and consulted during the terminal evaluation process. Additional quality assurance support is available from the BPPS/NCE. The final TE report will be cleared by UNDP (Country Office and BPPS NCE Regional Technical Adviser), and will be approved by the PSC. The TE report will be publicly available in English on the UNDP ERC. The UNDP Country Office will include the planned project terminal evaluation in the UNDP Country Office evaluation plan, and will upload the final terminal evaluation report in English and the corresponding management response to the UNDP Evaluation Resource Centre (ERC). Once uploaded to the ERC, the UNDP IEO will undertake a quality assessment and validate the findings and ratings in the TE report, and rate the quality of the TE report. The UNDP IEO assessment report will be sent to the GEF IEO along with the project terminal evaluation report.

Final Report: The project's terminal PIR along with the terminal evaluation (TE) report and corresponding management response will serve as the final project report package. The final project report package shall be discussed with the PSC during an end-of-project review meeting to discuss lesson learned and opportunities for scaling up.

Agreement on intellectual property rights and use of logo on the project's deliverables and disclosure of information: To accord proper acknowledgement to the GEF for providing grant funding, the GEF logo will appear together with the UNDP logo on all promotional materials, other written materials like publications developed by the project, and project hardware. Any citation on publications regarding projects funded by the GEF will also accord proper acknowledgement to the GEF. Information will be disclosed in accordance with relevant policies notably the UNDP Disclosure Policy[32] and the GEF policy on public involvement[33].

Box 9 Mandatory GEF M&E requirements and M&E budget

GEF M&E requirements	Primary responsibility	Indicative costs to be charged to the Project Budget (US$)		Time frame
		GEF grant	Co-financing	
Inception Workshop (IW)	UNDP Country Office (CO)	7,500	7,500	Within two months of project document signature
Inception Report	Project Manager (PM)	None	None	Within two weeks of Inception Workshop

[32] See http://www.undp.org/content/undp/en/home/operations/transparency/information_disclosurepolicy/

[33] See https://www.thegef.org/gef/policies_guidelines

GEF M&E requirements	Primary responsibility	Indicative costs to be charged to the Project Budget (US$)		Time frame
		GEF grant	Co-financing	
Standard UNDP monitoring and reporting requirements as outlined in the UNDP POPP	UNDP CO	None	None	Quarterly, annually
Risk management	PM; UNDP CO	None	None	Quarterly, annually
GEF Project Implementation Report (PIR)	Project Manager (PM), UNDP CO, UNDP HQs and UNDP RTA	None	None	Annually
Monitoring of environmental and social risks; Corresponding management, stakeholder engagement and gender plans and addressing grievances as relevant (ESMP M&E)	PM; UNDP CO	10,000	20,000	Continuous
Stakeholder Engagement Plan Gender Action Plan	PM; UNDP CO, BPPS NCE team	None	None	On-going
PSC meetings	PSC, NPD, UNDP CO; PM	1,000	None	Twice a year
Supervision and Oversight missions BPPS NCE; GEF Secretariat learning missions/site visits	UNDP CO BPPS NCE team	None, (covered by Agency Fee)	None	Troubleshooting as needed
Monitoring of indicators in project results framework, including updating GEF Core Indicators (at MTR and TE)	PM	None	10,000	Before MTR and TE take place
Independent Mid-term Review (MTR) and management response	UNDP CO, PM and BPPS NCE team	30,000	7,500	Between 2nd and 3rd PIR
Independent Terminal Evaluation (TE) including management response	UNDP CO, PM and BPPS NCE team	30,000	7,500	At least 3 months before operational closure
End-of-project workshop	UNDP CO and PM	7,500	7,500	Around the same time as TE
TOTAL indicative COST (excluding project team staff time, and UNDP staff and travel expenses		**86,000**	**60,000**	

8. GOVERNANCE AND MANAGEMENT ARRANGEMENTS

Roles and responsibilities of the Project's governance mechanism

Implementing Partner: The **Implementing Partner** for this project is Sustainable and Renewable Energy Development Authority (SREDA).

The Implementing Partner is the entity to which the UNDP Administrator has entrusted the implementation of UNDP assistance specified in this signed project document along with the assumption of full responsibility and accountability for the effective use of UNDP resources and the delivery of outputs, as set forth in this document.

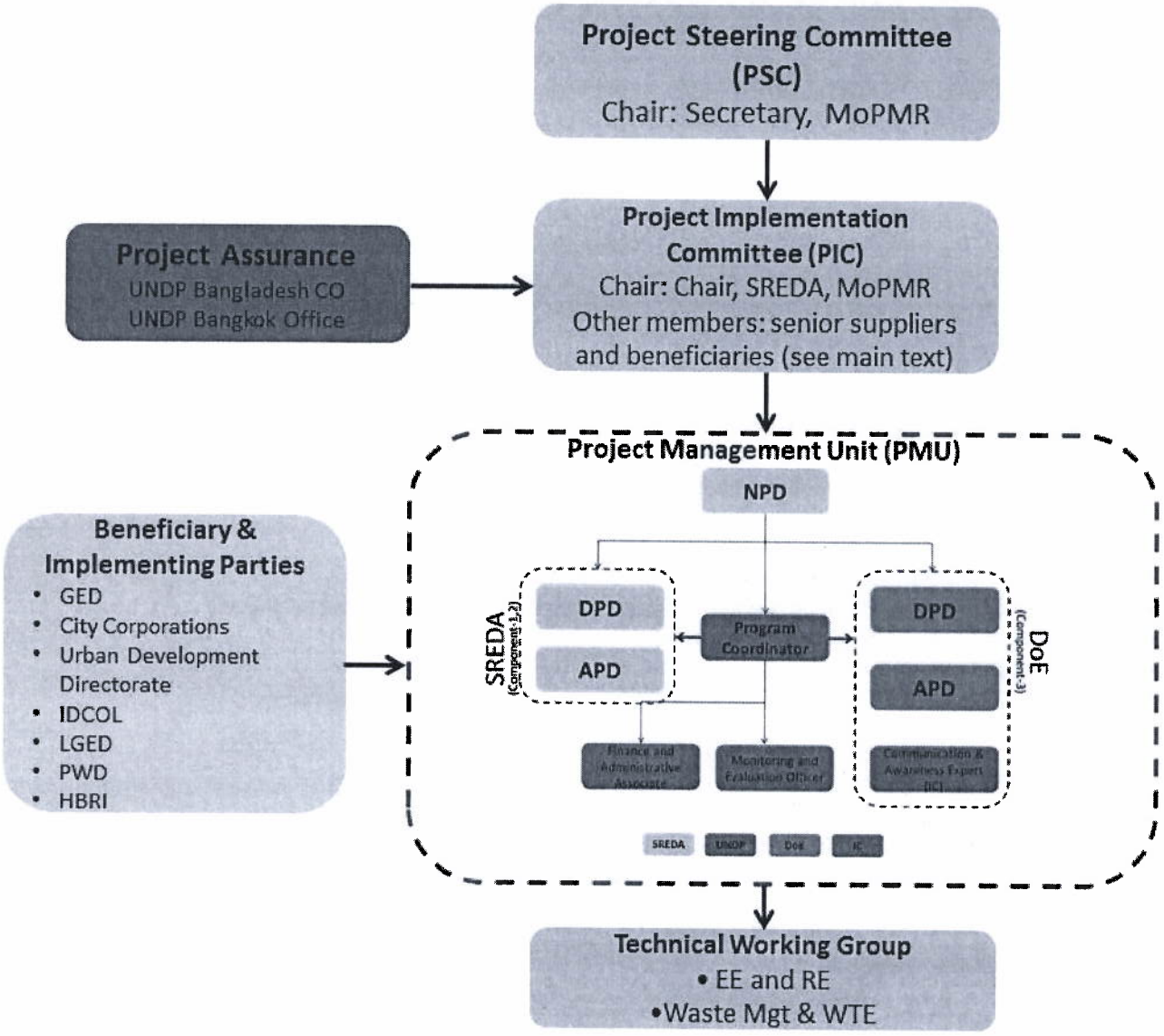
The Implementing Partner is responsible for executing this project. Specific tasks include:

- Project planning, coordination, management, monitoring, evaluation and reporting. This includes providing all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes and is aligned with national systems so that the data used and generated by the project supports national systems.
- Risk management as outlined in this Project Document;
- Procurement of goods and services, including human resources;
- Financial management, including overseeing financial expenditures against project budgets;
- Approving and signing the multiyear workplan;
- Approving and signing the combined delivery report at the end of the year; and,
- Signing the financial report or the funding authorization and certificate of expenditures.

UNDP: UNDP is accountable to the GEF for the implementation of this project. This includes oversight of project execution to ensure that the project is being carried out in accordance with agreed standards and provisions. UNDP is responsible for delivering GEF project cycle management services comprising project approval and start-up, project supervision and oversight, and project completion and evaluation. UNDP is also responsible for the Project Assurance role of Project implementation Committee.

The project organisation structure is as follows:

Box 12 Project governance and management setup



The **Project Steering Committee** (PSC) is responsible for making by consensus, management decisions when guidance is required by the National Project Director (NPD) and Project Manager, including recommendations for UNDP/Implementing Partner approval of project plans and revisions, and addressing any project level grievances. In order to ensure UNDP's ultimate accountability, PSC decisions should be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition.

In case consensus cannot be reached within the Board, the UNDP Resident Representative (or their designate) will mediate to find consensus and, if this cannot be found, will take the final decision to ensure project implementation is not unduly delayed. Specific responsibilities of the Project Board are as follows (Refer Annex C):

Specific responsibilities of the PSC include:

- Provide overall guidance and direction to the project, ensuring it remains within any specified constraints;
- Address project issues as raised by the project manager/NPD;

- Provide guidance on new project risks, and agree on possible mitigation and management actions to address specific risks;
- Agree on project manager's tolerances as required, within the parameters set by UNDP-GEF, and provide direction and advice for exceptional situations when the project manager's tolerances are exceeded;
- Advise on major and minor amendments to the project as and when necessary; within the parameters set by UNDP-GEF;
- Ensure coordination between various donor and government-funded projects and programmes;
- Ensure coordination with various government agencies and their participation in project activities;
- Track and monitor co-financing for this project;
- Review the project progress, assess performance, and appraise the Annual Work Plan for the following year;
- Appraise the annual project implementation report, including the quality assessment rating report;
- Ensure commitment of human resources to support project implementation, arbitrating any issues within the project;
- Review combined delivery reports prior to certification by the implementing partner;
- Provide direction and recommendations to ensure that the agreed deliverables are produced satisfactorily according to plans;
- Address project-level grievances;
- Approve the project Inception Report, Mid-term Review and Terminal Evaluation reports and corresponding management responses;
- Review the final project report package during an end-of-project review meeting to discuss lesson learned and opportunities for scaling up.
- Ensure highest levels of transparency and take all measures to avoid any real or perceived conflicts of interest.

It is composed of the following members (see Box 1):

- Chair: MoPMR (Secretary of designated official) and UNDP (Resident Representative or designated official)
- Implementing Entities: SREDA and DoE
- UNDP CO: Resident Representative or designated official
- Senior Suppliers: Planning Commission, Ministries and relevant Departments, co-financing partners (IDCOL), City Corporations (Narayanganj CC) and other partner CCs and Development Authorities
- Beneficiaries: other entities, such as NGOs, CSOs, private sector organisations

The Project Board will have the following roles:

Executive: The Executive represents ownership of the project who will chair the Project Board. The Executive is: Secretary, Ministry of Power, Energy and Mineral Resource *for the project.*

The Executive is ultimately responsible for the project, supported by the Senior Beneficiary and Senior Supplier. The Executive's role is to ensure that the project is focused throughout its life cycle on achieving its objectives and delivering outputs that will contribute to higher level outcomes. The executive has to ensure that the project gives value for money, ensuring cost-conscious approach to the project, balancing the demands of beneficiary and suppler.

Specific Responsibilities: (as part of the above responsibilities for the Project Board)

- Ensure that there is a coherent project organisation structure and logical set of plans;
- Set tolerances in the AWP and other plans as required for the Project Manager;
- Monitor and control the progress of the project at a strategic level;
- Ensure that risks are being tracked and mitigated as effectively as possible;
- Brief relevant stakeholders about project progress;
- Organise and chair Project Board meetings.

Senior Supplier: The Senior Supplier is an individual or group representing the interests of the parties concerned which provide funding and/or technical expertise to the project (designing, developing, facilitating, procuring, implementing). The

Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project. The Senior Supplier role must have the authority to commit or acquire supplier resources required. If necessary, more than one person may be required for this role. Typically, the implementing partner, UNDP and/or donor(s) would be represented under this role. The Senior Supplier are Planning Commission, Ministries and relevant Departments, co-financing partners (IDCOL), City Corporations (Narayanganj CC) and other partner CCs and Development Authorities.

Specific Responsibilities (as part of the above responsibilities for the Project Board)

- Make sure that progress towards the outputs remains consistent from the supplier perspective;
- Promote and maintain focus on the expected project output(s) from the point of view of supplier management;
- Ensure that the supplier resources required for the project are made available;
- Contribute supplier opinions on Project Board decisions on whether to implement recommendations on proposed changes;
- Arbitrate on, and ensure resolution of, any supplier priority or resource conflicts.

Senior Beneficiary: The Senior Beneficiary is an individual or group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries. The Senior Beneficiary role is held by a representative of the government or civil society. The Senior Beneficiaries are other entities, such as NGOs, CSOs, private sector organisations.

The Senior Beneficiary is responsible for validating the needs and for monitoring that the solution will meet those needs within the constraints of the project. The Senior Beneficiary role monitors progress against targets and quality criteria. This role may require more than one person to cover all the beneficiary interests. For the sake of effectiveness, the role should not be split between too many people.

Specific Responsibilities (as part of the above responsibilities for the Project Board)

- Prioritize and contribute beneficiaries' opinions on Project Board decisions on whether to implement recommendations on proposed changes;
- Specification of the Beneficiary's needs is accurate, complete and unambiguous;
- Implementation of activities at all stages is monitored to ensure that they will meet the beneficiary's needs and are progressing towards that target;
- Impact of potential changes is evaluated from the beneficiary point of view;
- Risks to the beneficiaries are frequently monitored.

Membership of the Board will be confirmed at Project Inception. Decision-making is to be by consensus of the members of the PSC present at a duly convened meeting, with the Co-chairs holding the final decision in case of ongoing disagreement. Other relevant stakeholders (i.e. CSOs, NGOs, private sector organisations) may be invited to attend PSC meetings as observers, as approved by the members, but without decision-making rights. The Board will meet twice per year but can be convened on an ad-hoc basis at the request of any of the members or of the Project Manager.

Given the wide range of institutions and organisations involved and thematic and technical issues covered by the Project, and to ensure more agile decision-making regarding output-level implementation, the Project governance structure is complemented by a **Project Implementation Committee (PIC).** The PIC is chaired by SREDA (Chairman or designated official), as the main senior beneficiary institution (at senior management level). hese include representative from (i) MoEFCC, DoE, (ii) MoPEMR, (iii) Bangladesh Institute of Planners, (iv) City Corporation, (v) City Dev Authority, (vi) Representative from private sector (e.g. IDCOL, BIFFL, etc.), (vii) HBRI, (ix) University, research agency and NGOs. The AC can form Working Groups that will focus on certain areas, for example, a) energy in buildings, b) waste management and WTE, c) WG for each of the partner cities.

MoPEMR will designate a senior official as the National Project Director (NPD) for the Project.

Project Manager: The Project Manager will run the project on a day-to-day basis under direct supervision of NPD within the constraints laid down by the PSC. The Project Manager is responsible for day-to-day management of the project. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost.

The Implementing Partner appoints the Project Manager, in consultation with NPD. Specific responsibilities of the project manager under direct supervision of NPD include:

- Provide direction and guidance to project team(s)/ responsible party (ies);
- Liaise with the PSC to assure the overall direction and integrity of the project;
- Identify and obtain any support and advice required for the management, planning and control of the project;
- Responsible for project administration;
- Plan the activities of the project and monitor progress against the project results framework and the approved annual workplan;
- Mobilize personnel, goods and services, training and micro-capital grants to initiative activities, including drafting terms of reference and work specifications, and overseeing all contractors' work;
- Monitor events as determined in the project monitoring schedule plan/timetable, and update the plan as required;
- Manage requests for the provision of financial resources by UNDP, through advance of funds, direct payments or reimbursement using the fund authorization and certificate of expenditures;
- Monitor financial resources and accounting to ensure the accuracy and reliability of financial reports;
- Be responsible for preparing and submitting financial reports to UNDP on a quarterly basis;
- Manage and monitor the project risks initially identified and submit new risks to the PSC for consideration and decision on possible actions if required; update the status of these risks by maintaining the project risks log;
- Capture lessons learned during project implementation;
- Prepare the annual workplan for the following year; and update the Quantum Project Management module if external access is made available.
- Prepare the GEF PIR and submit the final report to the PSC;
- Based on the GEF PIR and the PSC review, prepare the AWP for the following year.
- Ensure the mid-term review process is undertaken as per the UNDP guidance, and submit the final MTR report to the PSC.
- Identify follow-on actions and submit them for consideration to the PSC;
- Ensure the terminal evaluation process is undertaken as per the UNDP guidance, and submit the final TE report to the PSC.

Project Assurance: UNDP performs the quality assurance role and supports the PSC and Project Management Unit by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. The PSC cannot delegate any of its quality assurance responsibilities to the Project Manager. UNDP provides a three – tier oversight services involving the UNDP Country Offices and UNDP at regional and headquarters levels. Project assurance is totally independent of the Project Management function.

Project extensions: The UNDP-BPPS-NCE team Executive Coordinator must approve all requests for extension of the Project Completion Date and for other milestone extensions with hard deadlines. All extensions impose additional time and cost burdens at all levels and the GEF project budget cannot be increased beyond its originally approved amount. A single extension may be granted on an exceptional basis and subject to the conditions and maximum durations set out in the UNDP POPP. The project management costs during the extension period must remain within the originally approved amount, and any increase in PMC costs shall be covered by non-GEF resources; the additional UNDP oversight costs during the extension period must be covered by non-GEF resources, in accordance with UNDP's policy as set out in UNDP POPP.

For any extension request, UNDP CO and IP will consult and jointly present a clear plan indicating how and from which specific sources the additional oversight costs that will be incurred by UNDP will be covered during the extended period.

The BPPS-NCE Executive Coordinator will consult the Regional Bureaux (RBX) and may reject the extension request if no (external co-financing by the IP or internal UNDP CO resources) can be identified.

All extension requests, along with all supporting documentation, shall be submitted by the IP to the UNDP CO in line with the requirements and within the deadlines set out in the UNDP SOPs and policies in UNDP POPP.

Governance role for project target groups:
The Project is targeting a variety of groups, with different levels of decision-making and/or involvement. National and city energy and urban planning staff will take part in Project working groups for technical advice and definition of project activities. Businesses and private sector individuals, who will provide advice to enhance the design of Project deliverables (as low-carbon project proponents in Output 2.1 and through private sector representatives in the AIC). Municipalities and local leaders, who are being engaged in municipal planning and for the development of a pipeline of low-carbon initiatives in their administrations; and energy and other low-carbon technology end-users (their interests and expectations will be by direct engagement with civil society organisations and individuals).

Overall, UNDP will provide overall management and guidance from its Country Office (CO) in Dhaka and the Bangkok Regional Hub (BRH), and will be responsible for monitoring and evaluation of the project as per normal GEF and UNDP requirements. The **Project Management Unit (PMU)** under the NPD will manage the day-to-day activities of the Project under the guidance of the NPD. The PMU will consist of:

- A National Project Director, will be nominated from SREDA by MoPEMR, who will be responsible for the overall direction, strategic guidance and timely delivery of project outputs. NPD will be supported by APDs to be nominated by Chairman, SREDA.

A Project Manager, recruited by the Implementing Partner in consultation with NPD, who will manage the implementation and day-to-day operation of the project under the direct supervision of NPD .

- A Technical Team, recruited by the Implementing Partner in consultation with NPD, that will: i) develop programme standards; ii) provide technical support and guidance; iii) implement the policy research, dialogue and advocacy components of the project; iv) guide the implementation of social, gender, and environmental safeguards plans; v) implement capacity-building, knowledge management and communications activities; and vi) monitor project progress and support project M&E. The Technical team will consist of a full-time Monitoring and Evaluation Officer (M&E) and, on part-time basis, a Technical Advisor (TA) and short-term national/international consultants. Some Research Assistants can also be deployed as and when required.
- An Operations Team, recruited by the Implementing Partner in consultation with NPD, will manage finance, general administration, procurement, internal auditing and risk management functions of the project. This role involves: i) managing funds; ii) programme quality, iii) fiduciary risk management; iv) procurement; and v) the timely delivery of financial and programme reports to GEF. The team will at least consist of one full-time Finance and Administrative Associate/Assistant (FAA).

For Terms of Reference of project staff; PM or PC, M&E Associate and Financial-Administrative Assistant is referred to Annex C, while short-term consultancy positions are described in Annex B.

The **Project Manager** has the authority to run the project on a day-to-day basis on behalf of the PSC/PIC within the constraints laid down by the Board. The PC is responsible for executing project funds according to the work plans established by the Project Management Unit (PMU) and approved by the PSC. S/he is also in charge of overall monitoring and reporting to the Board and donors. S/he will be the interface between the PMU and Technical Committee, as well as UNDP Country Office's Operations and Programme Units. The Project Manager should ensure that the utilisation of project funds remains within the framework set by the Project Document and approved AWP, allowable deviation from time and budgets, PSC/UNDP Country Office decisions, UNDP Rules and Regulations, and national legislation. The PC will provide direction and guidance to the PMU, and will work with the Advisory Committee (AC). Finally, the PC or PM will report to the PSC and UNDP senior management and will liaise closely with the UNDP Regional Technical Advisor (based in Bangkok). Specific responsibilities are detailed in the Job Description (Annex C).

The NPD and DPD presents ownership of the project, representing MoPMR/SREDA and MoEFCC/DoE respectively. The NPD with assistance from DPD will be:

- Responsible for overall guidance to project management (for all components), including adherence to the Annual Work Plan (AWP) and achievement of planned results as outlined in the ProDoc,
- Responsible for the use of UNDP funds through effective management and well-established project review and oversight mechanisms.
- Ensure coordination with various ministries and agencies provide guidance to the Project team to coordinate with UNDP,

To assist with successfully delivering project outcomes and components, the Implementing Partner will assign the Responsible Parties to provide implementation support for specific outputs/activities. These Responsible Parties will act on behalf of the Implementing Partner on the basis of a written agreement or contract defining specific roles and responsibilities. The following **Responsible Parties** will enter into agreements with SREDA. Responsible Parties will be the key partners of the govt who will support the delivery of project components. Five key responsible parties will be (i) City Corporation, (ii)Urban Development Authorities, (iii) DoE, (iv) LGED, (v) PWD, and (vi) HBRI. They will ensure the realisation of project benefits and sustainability from the perspective of project beneficiaries. These are listed in the table on the next page.

To select non-government responsible partners, the Implementing Partner will award a contract to a competent NGO using its procurement policy. A *NGO/Firm selection committee* will be formed, which will be headed by the NPD with representation from MoPEMR, city corporation, city development authority, HBRI, University, relevant local government institutions, experts and UNDP.

Components	Responsible Parties	Modality
Low-carbon urban plans and effective implementation of regulations	Firm/research organization	The National Project Director (NPD) in consultation with UNDP will award a contract to a competent NGO or Firm using Public Procurement Rules (PPR), 2006.
EE and RE options in buildings and the built environment	LGD, HBRI, PWD,and Firm	The National Project Director (NPD) in consultation with UNDP will award a contract to a competent NGO or Firm using Public Procurement Rules (PPR), 2006.
Waste Management, Solid Waste Management	City Corporation/ NGO/Firm	The National Project Director (NPD) assisted by Deputy Project Director (DPD) in consultation with UNDP will award a contract to a competent NGO or Firm using Public Procurement Rules (PPR), 2006 or through UNDP..
Capacity building and awareness campaign	DoE and SREDA	Capacity-building/training will be provided by the NPD and DPD in consultation with DoE and SREDA at PIC
Knowledge management/study/research	EPRC, SREDA, University/NGO/Firm	Capacity-building/training will be provided by the NPD in consultation with DoE and SREDA at PIC

This Project governance and management setup will be finalzed in Technical Project Proposal of GoB after approval of the competent authority

9. FINANCIAL PLANNING AND MANAGEMENT

The total cost of the project is USD 69,567,810. This is financed through a GEF grant of USD 3,767,810 administered by UNDP and additional support of USD 65,800,000 as detailed below representing related project resources from UNDP, IDCOL and other co-financing resources. UNDP, as the GEF Implementing Agency, is responsible for the execution of the GEF resources and the cash co-financing transferred to UNDP bank account only.

Confirmed Co-financing: The actual realization of project co-financing will be monitored during the mid-term review and terminal evaluation process and will be reported to the GEF. Note that all project activities included in the project results framework that will be delivered by co-financing partners (even if the funds do not pass through UNDP accounts) must comply with UNDP's social and environmental standards. The planned parallel co-financing will be used as follows:

Co-financing source	Co-financing type	Co-financing (USD)	Planned Activities/Outputs	Risks	Risk Mitigation Measures
IDCOL	Loan	65,000,000	Financing facility to support RE and EE investments in buildings and waste-to-energy proposals (submitted in Component 2)	Private sector will not submit (sufficient) proposals. The risk is considered small, as companies have in the recent made inquiries to obtain IDCOL financing support, and recent regulations (BNBC-Revised and net-metering) encourage EE/RE investments	The Project will support proponents with proposal formulation and feasibility analysis, and IDCOL in providing technical assistance as part of their proposal assessment.
SREDA DoE	In-kind	700,000 43,000	Office space (for project staff and events); Support to and participation of staff in capacity building, and organisation of calls for proposals for private sector participation	Government diverts funds and priorities to other areas.	The Project will work within the Government regulations, i.e. either exist or are near approval (such as BNBC-2020, e-waste regulations, Energy Audit Reguation, Labeling regulation, Energy Management Guideline, BEEER etc) and with SREDA and DoE
UNDP	Grant	57,000	Implementation costs of (staff) of a policy-advisory, technical, financial and implementation nature essential to deliver development results	Slow roll-out of funds	Ensuring fast project roll-out by UNDP and GEF. Funds will also be made available in a timely manner
	TOTAL	65,800,000			

Budget Revision and Tolerance: As per UNDP requirements outlined in the UNDP POPP, the PSC will agree on a budget tolerance level for each plan under the overall annual work plan allowing the project manager to expend up to the tolerance level beyond the approved project budget amount for the year without requiring a revision from the PSC.

Should the following deviations occur, the Project Manager/CTA and UNDP Country Office will seek the approval of the BPPS/NCE-VF team to ensure accurate reporting to the GEF. It is **strongly encouraged** to maintain the expenditures within the approved budget at the budgetary account and at the component level:

a) Budget reallocations must prove that the suggested changes in the budget will not lead to material changes in the results to be achieved by the project. A strong justification is required and will be approved on an exceptional basis. Budget re-allocations among the components (including PMC) of the approved Total Budget and Work Plans (TBWP) that represent a value greater than 10% of the total GEF grant.
b) Introduction of new outputs/activities (i.e. budget items) that were not part of the agreed project document and TBWP that represent a value greater than 5% of the total GEF grant. The new budget items must be eligible as per the GEF and UNDP policies.
c) Project management cost (PMC): budget under PMC component is capped and cannot be increased.

UNDP is not in a position to increase the total budget above the amount approved by the donor, therefore any over-expenditure would have to be absorbed from non-GEF resources by the Implementing Partner (GEF Executing Entity)

Audit: The project will be audited as per UNDP Financial Regulations and Rules and applicable audit policies. Audit cycle and process must be discussed during the Inception workshop. If the Implementing Partner is an UN Agency, the project will be audited according to that Agencies applicable audit policies.

Project Closure: Project closure will be conducted as per UNDP requirements outlined in the UNDP POPP. All costs incurred to close the project must be included in the project closure budget and reported as final project commitments presented to the PSC during the final project review. The only costs a project may incur following the final project review are those included in the project closure budget.

Operational completion: The project will be operationally completed when the last UNDP-financed inputs have been provided and the related activities have been completed. This includes the final clearance of the Terminal Evaluation Report (that will be available in English) and the corresponding management response, and the end-of-project review PSC meeting. **Operational closure must happen with 3 months of posting the TE report to the UNDP ERC.** The Implementing Partner through a PSC decision will notify the UNDP Country Office when operational closure has been completed. At this time, the relevant parties will have already agreed and confirmed in writing on the arrangements for the disposal of any equipment that is still the property of UNDP.

Transfer or disposal of assets: In consultation with the NIM Implementing Partner and other Parties of the project, the UNDP programme manager (UNDP Resident Representative) is responsible for deciding on the transfer or disposal of assets. Transfer or disposal of assets is recommended to be reviewed and endorsed by the PSC following UNDP rules and regulations. Assets may be transferred to the government for project activities managed by a national institution at any time during the life of a project. In all cases of transfer, a transfer document must be prepared and kept on file[34]. The transfer should be done before Project Management Unit complete their assignments.

Financial completion (closure): The project will be financially closed when the following conditions have been met: a) The project is operationally completed or has been cancelled; b) The Implementing Partner has reported all financial transactions

[34] See https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PPM_Project%20Management_Closing.docx&action=default.

to UNDP; c) UNDP has closed the accounts for the project; d) UNDP and the Implementing Partner have certified a final Combined Delivery Report (which serves as final budget revision).

The project will be financially completed **within 6 months of operational closure or after the date of cancellation**. Between operational and financial closure, the implementing partner will identify and settle all financial obligations and prepare a final expenditure report. The UNDP Country Office will send the final signed closure documents including confirmation of final cumulative expenditure and unspent balance to the BPPS/NCE Unit for confirmation before the project will be financially closed in Quantum by the UNDP Country Office.

Refund to GEF: Should a refund of unspent funds to the GEF be necessary, this will be managed directly by the BPPS/GEF Directorate in New York. No action is required by the UNDP Country Office on the actual refund from UNDP project to the GEF Trustee.

10. TOTAL UNDP BUDGET AND WORK PLAN

Total Budget and Work Plan			
Quantum Project ID:	00115022	Quantum Award ID:	00115022.1
Quantum Award Title:	Promoting Energy-Related Low Carbon Urban Development in Bangladesh (LCUD)		
Quantum Business Unit	UNDP-BGD		
Quantum Output Project Title	Promoting Energy-Related Low Carbon Urban Development in Bangladesh (LCUD)		
UNDP-GEF PIMS No.	5571		
Implementing Partner	Sustainable Renewable Energy Development Authority (SREDA)		

GEF Component/QuantumActivity	Responsible Party (Quantum Implementing Agent)	QuantumFund ID	Donor Name	Quantum Budgetary Account Code	Quantum Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note:
Outcome 1: Coordinated and integrated low-carbon urban plans and effective implementation of regulations	SREDA	62000	GEF	71200	International Consultants	-	-	10,000	-	10,000	20,000	1A
		62000	GEF	71300	Local consultants	16,074	97,431	103,917	25,098	5,640	248,160	1B
		62000	GEF	71300	Local consultants as Specialists	28,332	28,332	28,332	28,332	28,332	141,660	2
		62000	GEF	71600	Travel	10,000	10,000	10,000	10,000	10,000	50,000	3
		62000	GEF	72100	Contractual Services -Companies	30,000	55,000	0	62,500	37,500	185,000	4
		62000	GEF	72200	Equipment & Furniture	8,000	8,000	8,000	3,000	3,000	30,000	5
		62000	GEF	74200	Audio Visual &Print Prod Costs	5,000	5,000	5,000	5,000	5,000	25,000	6
		62000	GEF	75700	Training, Workshops and Conference	10,000	15,000	20,000	15,000	10,000	70,000	7
					Total outcome 1	107,406	218,763	185,249	148,930	109,472	769,820	
Outcome 2: Increased investments in EE WTE, and RE in buildings and the built environment	SREDA	62000	GEF	71200	International Consultants	-	15,000.00	-	15,000.00	-	30,000	8A
		62000	GEF	71300	Local consultants	15,000	150,000	150,000	150,000	120,791	585,791	8B
		62000	GEF	71300	Local consultants – Specialists	47,220	47,220	47,220	47,220	47,220	236,100	9
		62000	GEF	71600	Travel	10,000	10,000	10,000	10,000	10,000	50,000	10
		62000	GEF	72100	Contractual Services- Companies	50,000	300,000	400,000	250,000	24,253	1,024,253	11
		62000	GEF	74200	Audio Visual &Print Prod Costs	4,000	4,000	4,000	4,000	4,000	20,000	12
		62000	GEF	75700	Training, Workshops and Conference	15,000	20,000	20,000	20,000	20,000	95,000	13

					Total outcome 2	141,220	546,220	631,220	496,220	226,264	2,041,144	
Outcome 3: Knowledge increased of practitioners and awareness raised of city dwellers on low-carbon, green, development	SREDA	62000	GEF	71200	International Consultant	-	-	5,000	-	5,000	10,000	14A
		62000	GEF	71300	Local consultants	5,814	35,241	37,570	9,078	2,040	89,743	14B
		62000	GEF	71300	Local consultants – Specialists	18,888	18,888	18,888	18,888	18,888	94,440	15
		62000	GEF	71600	Travel	11,000	11,000	11,000	11,000	10,000	54,000	16
		62000	GEF	72100	Contractual Services -companies	4,200	10,000	10,000	10,000	15,800	50,000	17
		62000	GEF	72200	Equipment & Furniture	25,000	14,000	3,000	3,000	0	45,000	18
		62000	GEF	72100	Contractual Services- Companies		87,500	100,000	80,000		267,500	19
		62000	GEF	74200	Audio Visual &Print Prod Costs	5,000	5,000	5,000	5,000	6,743	26,743	20
		62000	GEF	75700	Training, Workshops and Conference	20,000	30,000	30,000	40,000	20,000	140,000	21
					Total outcome 3	89,902	211,629	220,458	176,966	78,471	777,426	
Project management Unit	SREDA	62000	GEF	71400	Service Contracts - individual	18,000	18,000	18,000	18,000	18,000	90,000	22
		62000	GEF	72500	Office supplies	2,500	2,500	2,500	2,500	2,500	12,500	23
		62000	GEF	72400	Communication and Audio visual Equipment	2,500	2,500	2,500	2,500	2,500	12,500	24
		62000	GEF	73100	Rental & Maintenance-Premises	4,000	4,000	4,000	4,000	4,000	20,000	25
		62000	GEF	75700	Training, Workshops and Conference	2,000	2,000	2,000	2,000	2,000	10,000	26
		62000	GEF	74500	Miscellaneous Expenses	4,000	4,000	4,000	4,000	3,420	19,420	27
		62000	GEF	74100	Professional Services	3,000	3,000	3,000	3,000	3,000	15,000	28
					Total Management	36,000	36,000	36,000	36,000	35,420	179,420	
					PROJECT TOTAL	**374,528**	**1,012,612**	**1,072,927**	**858,116**	**449,627**	**3,767,810**	

Summary of Funds	Amount Year 1	Amount Year 2	Amount Year 3	Amount Year 4	Amount Year 5	Total
GEF	374,528	1,012,612	1,072,927	858,116	449,627	3,767,810
UNDP (grant)	11,400	11,400	11,400	11,400	11,400	57,000
IDCOL (loan)	15,000,000	15,000,000	20,000,000	10,000,000	5,000,000	65,000,000
DoE (in kind)	8,600	8,600	8,600	8,600	8,600	43,000
SREDA (in-kind)	140,000	140,000	140,000	140,000	140,000	700,000
Total	**15,534,528**	**16,172,612**	**21,232,927**	**11,018,116**	**5,609,627**	**69,567,810**

Budget Notes

No.	Description of Expenses
1	**A.** USD 20,000 for international consultants (6 weeks MTR+TE).
	B. USD 248,160 for local consultants (166 weeks : 30 weeks LCUD planning and policy, 50 weeks for City planning and coordination, 12 weeks for PPP, ESCO and green finance, 6 weeks for GHG inventory and reporting, 20 weeks for EE in buildings, 20 weeks for PV and RE in buildings, 10 weeks for Waste management, 18 weeks for Waste-to-energy)
2	USD 141,660 for time spent by national consultant (for specialist support to PMU as per Annex B) 43 weeks; CBA: 66 weeks; M&E: 73 weeks; TA: 27 weeks) on technical issues of Component 1
3	USD 50,000 for travel by national consultants and project staff related to activities of Component 1
4	USD 185,000 for company contracts for market/baseline/impact assessments and low-carbon data gathering
5	USD 30,000 for office equipment (computers, IT), and GHG inventory and database software and programming
6	USD 25,000 for Audio-visual and printing for project publications, reports and for printed materials for workshops and seminars
7	Organisation of seminar/workshop/trainings: venue, catering (USD 70,000)
8	**A.** USD 30,000 for international consultants (9 weeks MTR+TE).
	B. USD 585,791 for local consultants 329 weeks : 12 weeks for City planning and coordination, 18 weeks for PPP, ESCO and green finance, 20 weeks for GHG inventory and reporting; and to support feasibility assessment, business plan formulation of public and private sector proposals, and as-needed technical support to development finance institutions for techno-economic evaluation: technical assistance in RE and EE project formulation (Activity 2.1.1): 80 weeks for EE in buildings, 80 weeks for PV and RE in buildings, 32 weeks for Waste management, 87 weeks for Waste-to-energy)
9	USD 236,100 for time spent by national consultant (for specialist support to PMU as per Annex B): 42 weeks; M&E: 73 weeks; TA: 28 weeks) on technical issues and ESMF of Component 2
10	USD 50,000 for travel by international, national consultants and project staff related to activities of Component 2
11	USD 1,024,253; to support feasibility assessment, business plan formulation of public and private sector proposals, and as-needed technical support to development finance institutions for techno-economic evaluation thereof; limited 'viability gap funding' of public sector projects
12	Audio-visual and printing for project publications, reports and for printed materials for workshops and seminars (USD 20,000)
13	Organisation of seminar/workshops: venue, catering (USD 95,000)
14	**A.** USD 10,000 for international consultants (3 weeks for terminal evaluation).
	B. USD 89,743 for local consultant (60 weeks; 22 weeks, planning and policy; 14 weeks for city coordinators, 4 weeks for PPP/ESCO/finance; 6 weeks GHG database and data gathering; 6 weeks on technical experts EE/RE in buildings; 4 weeks waste management and WTE; 4 weeks)
15	USD 94,440 for time spent by national consultant (for specialist support to PMC as per Annex B): 42 weeks, CBA: 110 weeks, M&E: 73 weeks), on the organisation and delivery of training issues of Component 3
16	USD 54,000 for travel by international, national consultants and project staff related to activities of Component 3
17	USD 50,000 for contracts to support information dissemination (media campaigns, design)
18	USD 45,000 for PMU office furniture, ICT Equipment and establishment, and specialised technical software (e.g. building design)
19	USD 267,500 for setting up the Low-Carbon Cities Network and the LCUD Centre of Expertise and Training

20	USD 26,743 audio-visual and printing for project publications, reports and for printed materials for workshops and seminars
21	Organisation of seminar/workshops: venue, catering, and for specialised technical training (USD 140,000)
22	USD 90,000 Contractual Service - Individual; for project staff on administration and managerial tasks, total 60 Months @USD 1,500/month
23	USD 12,500 Office supplies for PMU
24	USD 12,500 connectivity charges. Communication, internet etc.
25	USD 20,000 Rental and Maintenances - utility bills etc.
26	Project Steering Committee (PSC) Meeting related expenditure. total USD 2,000 x 5 years = $10,000
27	Miscellaneous expenses for sundries, bank charge etc.
28	NIM Audit cost @USD 15,000 approx. will be covered as part of PMU.

11.LEGAL CONTEXT

This project document shall be the instrument referred to as such in Article 1 of the Standard Basic Assistance Agreement between the Government of Bangladesh and UNDP, (signed on 25/11/1986). All references in the SBAA to "Executing Agency" shall be deemed to refer to "Implementing Partner."

This project will be implemented by SREDA ("Implementing Partner") in accordance with its financial regulations, rules, practices, and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. Where the financial governance of an Implementing Partner does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition, the financial governance of UNDP shall apply.

12. RISK MANAGEMENT

1. Consistent with the Article III of the SBAA *[or the Supplemental Provisions to the Project Document]*, the responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP's property in the Implementing Partner's custody, rests with the Implementing Partner. To this end, the Implementing Partner shall:
   a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
   b) assume all risks and liabilities related to the Implementing Partner's security, and the full implementation of the security plan.

2. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the Implementing Partner's obligations under this Project Document.

3. The Implementing Partner agrees to undertake all reasonable efforts to ensure that no UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the United Nations Security Council Consolidated Sanctions List, and that no UNDP funds received pursuant to the Project Document are used for money laundering activities. The United Nations Security Council Consolidated Sanctions List can be accessed via https://www.un.org/securitycouncil/content/un-sc-consolidated-list.

4. The Implementing Partner acknowledges and agrees that UNDP will not tolerate sexual harassment and sexual exploitation and abuse of anyone by the Implementing Partner, and each of its responsible parties, their respective sub-recipients and other entities involved in Project implementation, either as contractors or subcontractors and their personnel, and any individuals performing services for them under the Project Document.

   (a) In the implementation of the activities under this Project Document, the Implementing Partner, and each of its sub-parties referred to above, shall comply with the standards of conduct set forth in the Secretary General's Bulletin ST/SGB/2003/13 of 9 October 2003, concerning "Special measures for protection from sexual exploitation and sexual abuse" ("SEA").

   (b) Moreover, and without limitation to the application of other regulations, rules, policies and procedures bearing upon the performance of the activities under this Project Document, in the implementation of activities, the Implementing Partner, and each of its sub-parties referred to above, shall not engage in any form of sexual harassment ("SH"). SH is defined as any unwelcome conduct of a sexual nature that might reasonably be expected or be perceived to cause offense or humiliation, when such conduct interferes with work, is made a condition of employment or creates an intimidating, hostile or offensive work environment. SH may occur in the workplace or in connection with work.

While typically involving a pattern of conduct, SH may take the form of a single incident. In assessing the reasonableness of expectations or perceptions, the perspective of the person who is the target of the conduct shall be considered.

5. a) In the performance of the activities under this Project Document, the Implementing Partner shall (with respect to its own activities), and shall require from its sub-parties referred to in paragraph 4 (with respect to their activities) that they, have minimum standards and procedures in place, or a plan to develop and/or improve such standards and procedures in order to be able to take effective preventive and investigative action. These should include: policies on sexual harassment and sexual exploitation and abuse; policies on whistleblowing/protection against retaliation; and complaints, disciplinary and investigative mechanisms. In line with this, the Implementing Partner will and will require that such sub-parties will take all appropriate measures to:

    i. Prevent its employees, agents or any other persons engaged to perform any services under this Project Document, from engaging in SH or SEA;

    ii. Offer employees and associated personnel training on prevention and response to SH and SEA, where the Implementing Partner and its sub-parties referred to in paragraph 4 have not put in place its own training regarding the prevention of SH and SEA, the Implementing Partner and its sub-parties may use the training material available at UNDP;

    iii. Report and monitor allegations of SH and SEA of which the Implementing Partner and its sub-parties referred to in paragraph 4 have been informed or have otherwise become aware, and status thereof;

    iv. Refer victims/survivors of SH and SEA to safe and confidential victim assistance; and

    v. Promptly and confidentially record and investigate any allegations credible enough to warrant an investigation of SH or SEA. The Implementing Partner shall advise UNDP of any such allegations received and investigations being conducted by itself or any of its sub-parties referred to in paragraph 4 with respect to their activities under the Project Document, and shall keep UNDP informed during the investigation by it or any of such sub-parties, to the extent that such notification (i) does not jeopardize the conduct of the investigation, including but not limited to the safety or security of persons, and/or (ii) is not in contravention of any laws applicable to it. Following the investigation, the Implementing Partner shall advise UNDP of any actions taken by it or any of the other entities further to the investigation.

    b) The Implementing Partner shall establish that it has complied with the foregoing, to the satisfaction of UNDP, when requested by UNDP or any party acting on its behalf to provide such confirmation. Failure of the Implementing Partner, and each of its sub-parties referred to in paragraph 4, to comply of the foregoing, as determined by UNDP, shall be considered grounds for suspension or termination of the Project.

6. Social and environmental sustainability will be enhanced through application of the UNDP Social and Environmental Standards (http://www.undp.org/ses) and related Accountability Mechanism (http://www.undp.org/secu-srm).

7. The Implementing Partner shall: (a) conduct project and programme-related activities in a manner consistent with the UNDP Social and Environmental Standards, (b) implement any management or mitigation plan prepared for the project or programme to comply with such standards, and (c) engage in a constructive and timely manner to address any concerns and complaints raised through the Accountability Mechanism. UNDP will seek to ensure that communities and other project stakeholders are informed of and have access to the Accountability Mechanism.

8. All signatories to the Project Document shall cooperate in good faith with any exercise to evaluate any programme or project-related commitments or compliance with the UNDP Social and Environmental Standards. This includes providing access to project sites, relevant personnel, information, and documentation.

9. The Implementing Partner will take appropriate steps to prevent misuse of funds, fraud or corruption, by its officials, consultants, responsible parties, subcontractors and sub-recipients in implementing the project or using UNDP funds.

10. In the implementation of the activities under this Project Document, UNDP places reasonable reliance upon the Implementing Partner for it to apply its laws, regulations and processes, and applicable international laws regarding anti money laundering and countering the financing of terrorism, to ensure consistency with the principles of then in force the UNDP Anti-Money Laundering and Countering the Financing of Terrorism Policy.

11. The Implementing Partner will ensure that its financial management, anti-corruption, anti-fraud and anti-money laundering and countering the financing of terrorism policies are in place and enforced for all funding received from or through UNDP.

12. The requirements of the following documents, then in force at the time of signature of the Project Document, apply to the Implementing Partner: (a) UNDP Policy on Fraud and other Corrupt Practices and (b) UNDP Office of Audit and Investigations Investigation Guidelines. The Implementing Partner agrees to the requirements of the above documents, which are an integral part of this Project Document and are available online at www.undp.org.

13. In the event that an investigation is required, UNDP has the obligation to conduct investigations relating to any aspect of UNDP projects and programmes in accordance with UNDP's regulations, rules, policies and procedures. The Implementing Partner shall provide its full cooperation, including making available personnel, relevant documentation, and granting access to the Implementing Partner's (and its consultants', responsible parties', subcontractors' and sub-recipients') premises, for such purposes at reasonable times and on reasonable conditions as may be required for the purpose of an investigation. Should there be a limitation in meeting this obligation, UNDP shall consult with the Implementing Partner to find a solution.

14. The signatories to this Project Document will promptly inform one another in case of any incidence of inappropriate use of funds, or credible allegation of fraud or corruption with due confidentiality.

    Where the Implementing Partner becomes aware that a UNDP project or activity, in whole or in part, is the focus of investigation for alleged fraud/corruption, the Implementing Partner will inform the UNDP Resident Representative/Head of Office, who will promptly inform UNDP's Office of Audit and Investigations (OAI). The Implementing Partner shall provide regular updates to the head of UNDP in the country and OAI of the status of, and actions relating to, such investigation.

15. UNDP shall be entitled to a refund from the Implementing Partner of any funds provided that have been used inappropriately, including through fraud, corruption or other financial irregularity, or otherwise paid other than in accordance with the terms and conditions of the Project Document. Such amount may be deducted by UNDP from any payment due to the Implementing Partner under this or any other agreement. Recovery of such amount by UNDP shall not diminish or curtail the Implementing Partner's obligations under this Project Document.

    Where such funds have not been refunded to UNDP, the Implementing Partner agrees that donors to UNDP (including the Government) whose funding is the source, in whole or in part, of the funds for the activities under this Project Document, may seek recourse to the Implementing Partner for the recovery of any funds determined by UNDP to have been used inappropriately, including through fraud, corruption or other financial irregularity, or otherwise paid other than in accordance with the terms and conditions of the Project Document.

    Note: The term "Project Document" as used in this clause shall be deemed to include any relevant subsidiary agreement further to the Project Document, including those with responsible parties, subcontractors and sub-recipients.

16. Each contract issued by the Implementing Partner in connection with this Project Document shall include a provision representing that no fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the proposal, have been given, received, or promised in connection with the selection process or in contract execution, and that the recipient of funds from the Implementing Partner shall cooperate with any and all investigations and post-payment audits.

17. Should UNDP refer to the relevant national authorities for appropriate legal action any alleged wrongdoing relating to the project, the Government will ensure that the relevant national authorities shall actively investigate the same and take appropriate legal action against all individuals found to have participated in the wrongdoing, recover and return any recovered funds to UNDP.

18. The Implementing Partner shall ensure that all of its obligations set forth under this section entitled "Risk Management" are passed on to each responsible party, subcontractor and sub-recipient and that all the clauses under this section entitled "Risk Management Standard Clauses" are included, *mutatis mutandis*, in all sub-contracts or sub-agreements entered into further to this Project Document.

ANNEXES

A. Multi-year workplan
B. Overview of technical consultancies and subcontracts
C. Terms of Reference for main project staff
D. Gender analysis and action plan
E. Baseline conditions and situation regarding LCUD
F. GEF Core Indicators and greenhouse gas emission reduction
G. Stakeholder engagement and communication plan
H. Additional budget and co-financing tables
I. UNDP Social and Environmental and Social Screening
J. UNDP Quantum Risk Register
K. Results of the capacity assessment of the project implementing partner and HACT micro assessment

Annex A. MULTI YEAR WORK PLAN

Output/activity per outome	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
OUTCOME 1 Coordinated and integrated low-carbon urban plans and effective implementation of regulations																				
Output 1.1 LCUD concepts integrated in regulatory measures and policy instruments																				
1.1.1 Review and study of status, issues and options of low-carbon policy instruments and incentives																				
1.1.2 Inter-institutional Coordination Mechanism and regular meetings on LCUD thematic areas																				
1.1.3 Studies on energy savings potential, costs and benefits of selected low-carbon interventions and available policy instruments																				
1.1.4 Review of SREDA Building Energy and Environment rating system and recommendations																				
1.1.5 Advisory services to Department of Environment of MoEFCC on LCUD interventions and related GHG MRV																				
Output 1.2 Capacity strengthened in national and local government entities on LCUD																				
1.2.1 General capacity needs assessment regarding low-carbon development																				
1.2.2 Training on mainstreaming LCUD (low-carbon urban development) and selected low-carbon measures and for urban planners and city officials																				
Output 1.3 City corporations (partner cities) supported in the incorporation of LCUD elements in city planning and investment in cost-effective LCUD options																				
1.3.1 Establishment of a low-carbon coordination Working Group in the selected partner city corporations																				
1.3.2 Tailor-made support on LCUD issues, key concepts and LCUD investment options provided to the partner city corporations																				
OUTCOME 2 Increased investments in EE (energy efficiency), waste to energy (WTE) and RE (renewable energy) in buildings and the built environment																				
Output 2.1 Identified EE and RE investments in public and private buildings and built environment and other low-carbon interventions																				
2.1.1 Selection of selection of public buildings (retrofit or new) and other low-carbon interventions (waste) in the partner City Corporation																				
2.1.2 Organisation of Call for Proposals (project concept) for non-governmental, private sector, entities to submit low-carbon																				
2.1.3 Energy audits, feasibility analysis, and business/finance plan for selected low-carbon investments in buildings and built environment (EE, RE, WTE); support to IDCOL and other finance institutions																				

Output/activity per outome	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 2.2 Implemented EE and RE investments in public and private buildings and other low-carbon interventions																				
2.2.1 Specific EE and low-carbon investments (public and private)																				
2.2.2 Monitoring and evaluation of the Project-supported investments, compliance with regulations, voluntary guidelines, and green building rating systems																				
OUTCOME 3 Increased investments in rural RE to meet household demand, PUE and enterprise development																				
Output 3.1 Capacity strengthened of practitioners and institutionalised capacity building on LCUD																				
3.1.1. Support the establishment of a multi-disciplinary LCUD Centre of Expertise and mainstreaming of LCUD in existing training curricula																				
3.1.2 Training and skills development on selected low-carbon interventions for professionals																				
3.1.3 Energy and low-carbon data gathering and database																				
Output 3.2 Assessed and facilitated commercial financial support for rural RE energy projects																				
3.2.1 Establishment of Bangladesh Low-Carbon Cities Network with a regularly updated website																				
3.2.2 Elaboration of knowledge products, case studies, best practices and lessons learnt																				
3.2.3 LCUD project and BLCCN communication plan and awareness-raising activities																				
3.2.4 Sensitisation of city dwellers, including youth																				
3.2.5 Promotion of South-South city-to-city exchange and facilitation of linkages with regional and global networks																				
3.2.6 Annual award ceremonies on best LCUD practices and greenest building																				
Output 3.3 Monitoring and evaluation																				

Annex B. OVERVIEW OF EXPERTS AND CONTRACTS

Expertise	Inter-national	National	Description
	(weeks)		
City planning and coordination		76	The Coordinator(s) are based in partner City to assist the Project team in elaborating city-level-based Project technical assistance workplans, establish and maintain contacts and coordination with Corporation and Development Authorities. They provide logistics support to activities of Outputs 1.3, and 2.1 and of the Project in their respective City. The Coordinator(s) advice on mainstreaming of LCUD elements in city, area and infrastructure plans act as a liaison between the City, national entities and the PMU. They support the technical experts on working with local communities (e.g. ward committees, IRRCs) and with the local private sector.
LCUD planning and policy		50	The expert will advise on current LCUD policies, planning and governance structures at the national and local level (partner cities), as well as the institutional arrangement for the national and city-level Coordination Mechanisms. S/he will support data collection on planning with the GHG inventory experts and baseline assessment contractor. The expert will work with PPP/ESCO experts with a review of the current electricity tariff system and the recently introduced net-metering policy and the role of other policy (fiscal and non-fiscal) instruments to improve the viability of these low-carbon investment categories.
PPP, ESCO and green finance		32	The expert(s) review the role of public-private partnerships (PPPs), energy service companies (ESCOs) in low-carbon infrastructure, EE-RE in buildings and waste-to-energy (WTE) initiatives. S/he will advise government entities, partner cities, private sector organisations and financial sector on issues and options in PPP and ESCO modalities. S/he will also support the project in training and the elaboration of training materials and participate/lead in workshops and seminars
GHG inventory, reporting and databases		32	The experts will work with DoE (Environment) and partner cities in setting up GHG accounting systems, tools and data systems. S/he will also support the project in training on city-level GHG accounting and reporting and the elaboration of training material and participate/lead in workshops and seminars. The experts will work with other technical experts in the development of database and information systems on GHG, building energy performance, and RE integration in the built environment.
Energy efficiency in buildings		106	These will be various experts that advice on a) the design and software modelling of EE and green buildings that comply with mandatory BNBC-Revised and voluntary guideline (GBG) and rating systems (e.g. SREDA, LEED), b) implementation, monitoring and elaboration of benchmarks for different categories of buildings, c) selected technical aspects of energy efficiency (lighting, air con, ventilation, etc.), d) work with City Corporations ion EE improvements in existing or state-of-the art EE technology in new buildings. The experts will provide technical inputs (construction and technology design, calculations, international experiences) to project proponents (developers, building owners, contractors, public building managers, etc.) on feasibility assessment, and to IDCOL for the techno-econ

Expertise	Inter-national	National	Description
			assessment of proposals. S/he will also support the project in training on selected EE topics and the elaboration of training material and participate/lead in workshops and seminars.
PV and RE in buildings		106	The expert(s) will provide advice on the integration of RE (such as rooftop PV, solar water heating) in buildings, and provide technical inputs (design details, calculations, international experiences) to project proponents (developers, building owners, contractors, public building managers, etc.) on feasibility assessment and to IDCOL for the techno-econ assessment of proposals. S/he will also support the project in training on selected EE topics and the elaboration of training material and participate/lead in workshops and seminars.
Waste management		44	The expert(s) will advise municipal/city entities on sustainable waste management practices and implementation (re-use, recover, recycle, reduce) and work with local initiatives and groups (e.g. ward committees, IRRCs) and NGOs on local waste management and citizen awareness creation, and (with the PPP/ESCO expert) on setting up public-private partnership. The expert will organise and deliver associated training, and seminar/workshops. The expert will work closely with the WTE expert in setting up waste-to-energy and composting facilities as the appropriate landfills in (partner) cities and with private investors.
Waste-to-energy	0	109	The expert will work with the partner city and/or private investors in setting up setting up waste-to-energy and composting facilities. The experts will provide technical inputs (construction and technology design, calculations, international experiences) to project proponents, and to IDCOL for the techno-econ assessment of WTE proposals. S/he will also support the project in training on selected EE topics and the elaboration of training material and participate/lead in workshops and seminars.
Review and evaluation	6	21	The experts will be hired to carry out the Project's mid-term review and terminal evaluation
Project Management		127	This project involves procurement and management of key contracts in the field of city planning and coordination, LCUD planning and policy, PPP, ESCO and green finance, GHG inventory, reporting and databases, Energy efficiency in buildings, PV and RE in buildings, Waste management, Waste-to-energy. These are highly technical in nature and need multi-sectoral technical knowledge to manage these contracts. Hence, Specialists (national consultant) will strengthen the capacity of the PMU and will support the PM functions under the guidance of the PSC and UNDP CO. Domain knowledge in the mentioned technical fields along with managerial capacity would be the key qualification of this expert. Component wise expertise will be considered after the capacity requirements are validated at the Project Inception Workshop.
Market assessments and low-carbon data	Contract(s) company/Individual (USD 150,000)		The contracted party will do data gathering (working with the various short-term experts) in carrying out the initial extended baseline and end-of-project assessment of Activity 1.1.3, including energy savings potential, socio-economic costs, and benefits of selected low-carbon interventions with benchmarking and impact analysis (EE and RE in buildings, waste management, and WTE). Related to this, the contractor will work with the GHG inventory expert, SREDA, Bureau of Statistics in gathering data and

Expertise	Inter-national	National	Description
			setting up databases on building energy performance, city GHG emissions, RE in buildings, and other low-carbon interventions.
Knowledge and information	Contract company/individual (USD 55,000)		The contracted party will contribute to developing case studies and knowledge products generation, including organising and developing the Projects awareness and media communication campaign, together with the Cap Building and Communications Advisor and the various technical experts.
Audit	Subcontract (USD 15,000)		Undertake project audits as per UNDP procedure and annual audit plan. Prepare final audit report as per UNDP instructions.

Annex C. TERMS OF REFERENCE OF KEY PROJECT STAFF

Project Steering Committee

The Project Steering Committee (PSC) will be responsible for making by consensus management decisions for the project when guidance is required by the Project Manager, including recommendations for UNDP/Implementing Partner approval of project plans and revisions.

In order to ensure UNDP's ultimate accountability, PB decisions should be made in accordance with standards[35] that shall ensure the best value to money, fairness, integrity transparency and effective international competition. In case a consensus cannot be reached, final decision shall rest with the UNDP Programme Manager. Project reviews by this group are made at designated decision points during the running of a project, or as necessary when raised by the Project Manager. This group is consulted by the Project Manager for decisions when tolerances (normally in terms of time and budget) have been exceeded.

The PB will review and approve project annual work plans (AWPs) and, as required, quarterly plans. The PB authorizes any major deviation from these agreed AWPs. It is the authority that signs off the completion of each AWP and authorizes the start of the next AWP. It ensures that required resources are committed and arbitrates on any conflicts within the project, or negotiates a solution to any problems between the project and external bodies. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities.

Specific responsibilities:

Defining a project

- Review and approve the Initiation Plan (if required and submitted to the LPAC).

Initiating a project

- Agree on Project Manager's responsibilities, as well as the responsibilities of the other members of the Project Management team;
- Delegate any Project Assurance function as appropriate;
- Review the Progress Report for the Initiation Stage (if an Initiation Plan was required);
- Review and appraise Project Plan, AWP and Quantum reports covering activity definition, quality criteria, issue log, updated risk log and monitoring and communication plans.

Running a project

- Provide overall guidance and direction to the project, ensuring it remains within any specified constraints;
- Address project issues as raised by the Project Manager;
- Provide guidance and agree on possible countermeasures/management actions to address specific risks;
- Agree on Project Manager's tolerances in the AWP and quarterly plans when required;
- Conduct regular meetings to review the Project Quarterly Progress Report and provide direction and recommendations to ensure that the agreed deliverables are produced satisfactorily according to plans.
- Review Combined Delivery Reports (CDR) prior to certification by the Implementing Partner;
- Appraise the Project Annual Review Report, make recommendations for the next AWP, and inform the Outcome Board (of UNDP) about the results of the review.

---

[35] UNDP Financial Rules and Regulations: Chapter E, Regulation 16.05: a) The administration by executing entities or, under the harmonized operational modalities, implementing partners, of resources obtained from or through UNDP shall be carried out under their respective financial regulations, rules, practices and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. b) Where the financial governance of an executing entity or, under the harmonized operational modalities, implementing partner, does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition, that of UNDP shall apply.

- Review and approve end project report, make recommendations for follow-on actions;
- Provide ad-hoc direction and advice for exception situations when the Project Manager's tolerances are exceeded;
- Assess and decide on project changes through revisions;

Closing a project
- Assure that all Project deliverables have been produced satisfactorily;
- Review and approve the Final Project Review Report, including Lessons-learned;
- Make recommendations for follow-on actions to be submitted to the UNDP Outcome Board;
- Commission project evaluation (only when required by partnership agreement)
- Notify operational completion of the project to the Outcome Board.

Project Implementation Committee (PIC) and working groups

The PIC will provide administrative and technical advice and inputs relating to project implementation with support from the PM. The PIC will be formed according to the specified template of Planning Commission. Indicative Terms of Reference are as follows. These will be reviewed by the PSC during project inception and may be extended as necessary.

- Review planned activities and ensure that they are technically sound and that, wherever possible, there is integration and synergy between the various project components during planning and implementation; and with low-carbon development initiatives at national and city level;
- Promote technical horizontal and vertical coordination, where such coordination is necessary and where opportunities for synergy and sharing of lessons exist;
- Provide technical advice to partner (and other) cities on specific issues concerning low-carbon urban planning and low-carbon or green investment areas;
- Provide advice and guidance on the Project's capacity building needs and training, and the implementation of stakeholder outreach (consumer awareness, knowledge, and information of municipalities);
- Share information on project progress and lessons learned with related stakeholders at the national level;
- Within the PIC, Technical Advisory Committee (TAC) will be formed to deal with specific thematic or geograpical aspects and issues, e.g. on a) EE and RE in buildings, b) waste management and WTE, c) for the partner cities. The TAC will meet on a regular and additional as-needed basis.
- Other tasks as indicated by the PSC

Terms of Reference for full-time PROJECT STAFF

Project Manager

Background
The Project Manager (PM), will be locally recruited following the government procedure, with input to the selection process from the Project partners. Under the supervision of the Implementing Partner, the PM will be responsible for the overall management of the Project and day-to-day oversight, under direct supervision of NPD including the mobilisation of all project inputs, supervision over project staff, consultants and sub-contractors. The position will be full time for the full duration of the project, i.e. 5 years (220 weeks)

The PM will report to the NPD and maintain co-ordination with the assigned UNDP Programme Manager for all of the Project's substantive and administrative issues. From the strategic point of view of the Project, the PM will report on a periodic basis to the PIC & PSC based on the NPD's instruction and will support the NPD. The PM will perform a liaison role with the government, UNDP, SREDA, project partners, and maintain close collaboration with other agencies providing co-financing. The PM will work closely with the Advisory Committee and its Working Groups.

Duties and Responsibilities
- Provide direction and guidance to project team(s)/ responsible party (ies);

- Liaise with the Project Steering Committee to assure the overall direction and integrity of the project;
- Identify and obtain any support and advice required for the management, planning and control of the project;
- Responsible for project administration;
- Plan the activities of the project and monitor progress against the project results framework and the approved annual workplan;
- Mobilize personnel, goods and services, training and micro-capital grants to initiative activities, including drafting terms of reference and work specifications, and overseeing all contractors' work;
- Monitor events as determined in the project monitoring schedule plan/timetable, and update the plan as required;
- Manage requests for the provision of financial resources by UNDP, through advance of funds, direct payments or reimbursement using the fund authorization and certificate of expenditures;
- Monitor financial resources and accounting to ensure the accuracy and reliability of financial reports;
- Be responsible for preparing and submitting financial reports to UNDP on a quarterly basis;
- Manage and monitor the project risks initially identified and submit new risks to the Project Steering Committee for consideration and decision on possible actions if required; update the status of these risks by maintaining the project risks log;
- Capture lessons learned during project implementation;
- Prepare the annual workplan for the following year; and update the Quantum Project Management module if external access is made available.
- Prepare the GEF PIR and submit the final report to the Project Steering Committee;
- Based on the GEF PIR and the Project Steering Committee review, prepare the AWP for the following year.
- Ensure the mid-term review process is undertaken as per the UNDP guidance, and submit the final MTR report to the Project Steering Committee.
- Identify follow-on actions and submit them for consideration to the Project Steering Committee;
- Ensure the terminal evaluation process is undertaken as per the UNDP guidance, and submit the final TE report to the Project Steering Committee;

Required skills and expertise; Competencies

- A university degree (MSc or PhD) in management, engineering, energy, economics, marketing, or another field with direct relevance to the project
- At least 15 years of experience in managing larger projects on energy, environment, and/or urban development
- At least 5 years of demonstrable project/programme management experience.
- At least 5 years of experience working with ministries or local institutions with relevance to the project
- Strong leadership, managerial and coordination skills, with a demonstrated ability to effectively coordinate the implementation of large multi-stakeholder projects, including financial and technical aspects.
- Ability to effectively manage technical and administrative teams, work with a wide range of stakeholders across various sectors and at all levels, to develop durable partnerships with collaborating agencies.
- Ability to administer budgets, train and work effectively with counterpart staff at all levels and with all groups involved in the project.
- Ability to coordinate and supervise multiple Project Implementation Units in their implementation of technical activities in partnership with a variety of subnational stakeholder groups, including community and government.
- Strong drafting, presentation and reporting skills.
- Strong communication skills, especially in timely and accurate responses to emails.
- Strong computer skills, in particular, mastery of all applications of the MS Office package and internet search.
- Excellent command of English and local language

M&E Officer

- Duties and Responsibilities: Under the direct supervision of the Project Manager, the incumbent will be assigned to develop and implement a monitoring system to capture the project activities and results under the supervision of Project Manager. S/he will be responsible specifically for (a) developing and setting up the overall framework for project monitoring and evaluation (M&E), (b) prepare the monthly, quarterly and annual monitoring plan for project activities,

(c) monitor and evaluate the compliance of actual progress and performance against the planned work plan and expected quality, (d) analysis of the effect of current actual performance to the project timetable and budgets, (e) prepare reports for project management including identification of problems, causes of potential bottlenecks (if any) in project implementations, (f) recommendations on how to reduce the impact of deviations vs. work plans, (g) prepare the ToRs for mid-term and final evaluation in accordance to UNDP and GEF guidelines, (h) design and implement a system to identify, analyze, and disseminate lesson learned, (i) assist the PM in preparation of various progress report, (j) coordinate with the international and national consultants and other stakeholders, (k) facilitate exchange of experiences by supporting and coordinating participation in any existing network of UNDP/GEF projects sharing common characteristics, (l) identify and participate in additional networks, for example scientific or policy-based networks that may also yield lessons that can benefit project implementation and (m) any other related activities as assigned by Project Manager.

- Qualifications and Experience: The incumbent should have a minimum Masters degree in Energy/Environment, Statistics, Economics or other relevant academic disciplines from a recognized university. S/he should have at least five (5) years hands-on experience in energy and environment field specifically monitoring and evaluation of projects. S/he should have proven experience in planning, design and implementation of M&E systems, the logical framework approach and other strategic planning approaches, training in M&E development and implementation and/or facilitating learning-oriented analysis sessions of M&E data with multiple stakeholders, data and information analysis and analytical report writing. S/he should have the willingness to undertake regular field visits and interact with different stakeholders, especially primary stakeholders. S/he must have willingness to undertake regular field visits and interact with different stakeholders, especially primary stakeholders. Computer proficiency in MS Office (Word, Excel and PowerPoint) and other common software is a prerequisite. Computer literacy in graphic design software will be appreciated. Fluent both in written and spoken English and Bengali is essential.

Financial and Administrative Associate

Under the guidance and supervision of the Project Manager, the Project Assistant will carry out the following tasks:

- Overall administration and financial services of the project such as processing payments, raising requisition, purchase order, projects logs, etc. using UNDP corporate software Quantum.
- Provide information to UNDP Project web, RRMC reporting, and administrative trouble shooting;
- Word processing, drafting routine letters/messages/reports, mailing; photocopying, binding, and filing
- Arrange travel, itinerary preparation for project related travels,
- Assist to arrange workshops/seminar/training programs and mailing,
- Make appointments and schedule meeting,
- Assist in work-plan and budgeting, and in the development and implementation of project accounting and reporting procedures,
- Arrangement for payments to be made by the project, and conducting of bank reconciliation
- Preparation of documentation and record keeping for procurement
- Maintenance of all office equipment and keeping inventory/records of supplies and their usage and any other duties assigned by Project Manager

The Project Associate will be recruited based on the following qualifications:

- A Bachelor's degree or an equivalent qualification;
- At least three years of work experience preferably in a UNDP rural development project. Previous experience with UN or government projects will be a definite asset;
- Very good inter-personal skills;
- Proficiency in the use of computer software applications especially MS Word and MS Excel.
- Excellent language skills in English (writing, speaking and reading) and in the local language

Besides some Research Assistants could be recruited based on need during the project implementation.

Further, the PMC will be supported by National Consultant - Specialists on a continued basis. Broadly, the TOR would be:

Under the overall supervision of Project Manager and in close consultation with PMU and UNDP CO the consultant will be accountable to provide technical and specialised support to the planning, technical review, procurement and implementation of following tasks:

- Review, analyze and support completion of the sectoral (for identified outcomes),Procurement plan
- Support PMU in reviewing various technical reports, publications, technical review of bidding documents, etc.;
- Support the PMU in development, reviewing and assessment of specifications of the required items under the project, including market search, etc.
- Technical approval and verification of procured items for the project, ensuring compatibility of the delivered items with the planned and requested specifications, safe storage, packaging, delivery to the beneficiaries, etc.
- Reviewing technical details of the project's reports and productions etc. providing PMU and SREDA with technical comments, editions.
- Providing required technical support to PMU, UNDP CO and the SREDA to fulfill new submission requirements, tranche requests, drafting of business model, etc.
- Regular coordination with other agencies involved in the project (SREDA, HBRI, UDD, etc.) for data collection and reporting;
- Provision of top quality advisory services at national and project-level on various green technologies and options;
- Assistance in preparation of project work plans based on the project logical framework, setting up baselines, indicators and annual targets, updating risk logs, progress reports, lessons learnt and monitoring packages;
- Technical monitoring of the project implementation against the work plan and the project document;
- Providing technical support to the PMU for organizing and conducting technical workshops, consultation meetings, review of contracts, field visits etc.;
  Any other tasks assigned by the Project Manager

Deliverables:

The Consultant is expected to submit, at the end of each calendar month, a summary report on the progress made in the fulfilment of his/her duties, during the reporting month. The progress reports should focus on the progress of the implementation of the Project as per the approved Project Work Plan.

Qualification, Experience and other Requirements:

- University degree in electrical or mechanical engineering with focus on renewable energy and clean energy technology
- Minimum 5 years professional experience at the national or international level in project planning and implementation preferably on the aspect of the climate change mitigation, renewable energy, clean energy, energy efficiency and conservation, etc.
- Familiarity with private sector operation in power and energy;
- Familiarity with climate change mitigation activities and urban sector in Bangladesh;
- The knowledge and skill of facilitation and negotiation techniques;
- Excellent interpersonal, oral communication and professional writing skills

Language requirement:

- Fluency in Bengali and English with excellent verbal and written skills in both languages

Tentative compositions of the Project Steering Committee (PSC) and the Project Implementation Committee (PIC)

- PSC and PIC will be formed by the guideline of public sector projec preparation and approval process issues by the planning commission:

Composition of Project Steering Committee (PSC)

01	Chairperson	Secretary, Power Division, Ministry of Power, Energy and Mineral Resources (MPEMR)
02	Member	Joint Secretary (Planning Wing), Power Division
03	Member	Joint Secretary (Development Wing), Power Division
04	Member	Chairman, SREDA
05	Member	Deputy Secretary, Planning Wing, Power Division
06	Member	Representative of NEC-ECNEC & Coordination Wing of the Planning Division
07	Member	Representative of the Industry and Energy Division of the Planning Commission
08	Member	Representative of Power Sector of IMED
09	Member	Representative of the Programming Division, Planning Commission
10	Member	Representative of Finance Division
11	Member	Representative of ERD Division
12	Member	Representative from SREDA
13	Member	Representative from UNDP
14	Member	National Project Director
15	Member	Representative from partner/beneficiary organization(s)
16	Member Secretary	Senior Assistant Secretary/ Assistant Secretary of Planning wing, Power Division

Composition of Project Implementation Committee (PIC)

01	Chairperson	Chairman, SREDA
02	Member	Representative from (Planning Wing), Power Division
03	Member	Representative from (Development Wing), Power Division
04	Member	Representative of the Industry and Energy Division of the Planning Commission
05	Member	Representative of the Programming Division, Planning Commission
06	Member	Representative of NEC-ECNEC & Coordination Wing of the Planning Commission
07	Member	Representative of Power Sector of IMED
08	Member	Representative of Economic Relation Division
09	Member	Representative from Finance Division
10	Member	National Project Director
11	Member	Representative from DOE
12	Member	Representative from Partner/beneficiary organization
13	Member	Representative from UNDP
14	Member Secretary	Assistant Project Director, SREDA

Annex D. GENDER ANALYSIS AND ACTION PLAN

D.1 Gender mainstreaming analysis

Population of Bangladesh:

The total population of Bangladesh was about 158.9 million, of which males 79.6 million and females 74.5 Million in 2015[36]. The urban population constituted 44.1 million and the rural population was 112.7 million[37]. Of this population, 30.8% of the total population was less than 15 years of age and people aged 65 and over constituted 5.1%. According to World Economic Forum's Global Gender Gap Report 2017, Bangladesh ranks 47th among 144 countries in the Global Gender Gap Index 2017. However, Bangladesh performed badly on the health and survival Sub-index of the Gender Gap Index and the ranking significantly dropped to 125th from the previous year's 93rd position.

The rate of urbanization in Bangladesh is significantly high compared to other South Asian countries. The rural-urban migration is the main contributing factor in the urban growth in Bangladesh. Better income opportunities are one of the core reasons of rapid population growth of Dhaka megacity compared to other parts of Bangladesh. The density of the population in Dhaka is around 34,000 people per square kilometre, making Dhaka one of the most densely populated cities in the world. Though rural-urban migration is taking place in Bangladesh from the independence, however, there is a lack of location and time specific migration information let alone sex-disaggregated information on migration. Hence, it can be said that in recent years there is a trend of more female migration over males[38].

Gendered status at the education system:

The education system in Bangladesh is divided into three broad levels, namely, a. primary, b. secondary and c. higher secondary. Technical-vocational education that is relevant to this LCUD project starts from the secondary and higher secondary level. Technology relevant education includes agriculture, engineering, medical, textile, leather technology, and ICT. According to the UNESCO Institute for Statistics (UIS) the literacy rate of Bangladesh was 72.8% in 2016 (that is the highest literacy rate ever in the past decades); the female literacy rate was 69.9%, lower than the male 75.6%.

Representation of women in the technical education system is significantly low. From a report by ADB it is found that number of female teachers in the technical education system in Bangladesh at large is 5,142 (19.5%) compared to the male teachers 21180 number of male teachers. A similar trend is found in the student sector where the number of female students in the technical education system at large is 165,474 (27%) compared to the 442,702 number of male students.[39]

Education and the labour force:

The labour force in Bangladesh is accelerating almost twice than the population growth. According to the World Bank, the labour force of Bangladesh increased from 34.69 million to 66.64 million between 1991 to 2017. The participation of women in the labour force is showing an increasing trend; female labour participation has increased from 20% to 29% between 1990 and 2017.

The labour market of Bangladesh is still male-dominated, although female participation in the labour force have increasing in recent years. In the rapid urbanization context in Bangladesh, technical education and competencies are effective

36 Bangladesh Statistics 2017, Bangladesh Bureau of Statistics

37 Statistical Pocket Book 2015, Bangladesh Bureau of Statistics

38 Rashid, M. (2013). *Rural-Urban Female Migration in Bangladesh: Need for Information Support and Institutional Responses*. Global Journal of Human Social Science, Sociology & Culture, [online] 13(5). Available at: https://globaljournals.org/GJHSS_Volume13/1-Rural-Urban-Female-Migration.pdf [Accessed 24 Nov. 2018].

39 Bangladesh Gender Equality Diagnostic of selected sectors by ADB

contributors in the growing urban economy and to which increasing participation by females is expected to further the goals of development. The 7th Five-Year Plan mentions the significant contributions made by the increased female labour participation particularly in the ready-made garment industry (RMG) industry, and encourages female enrolment in technical and vocational education as well as in tertiary education[40].

The average woman in Bangladesh earns about 60% of what her male counterpart earns for the same amount of work. Although women's participation is increasing in the country, they are deprived of a fair wage for their labour. Furthermore, there is a trend of declining levels of education among the female and male labour force in the past decades, and a high proportion of the female labour force had either no education or only primary education. The situation of tertiary level education is also not satisfactory. The level of tertiary education among the labour force is notably low. In 2010, only one in a thousand had a technical or vocational qualification and in technical and vocational education of only 2.43% of secondary enrolment. Furthermore, enrolment and continuation of males in tertiary education is significantly higher than of females[41].

Gendered scenario at the parliament and political level:

Regarding the political empowerment arena, Bangladesh is among top 10 countries of the index and stood 7th among 144 countries. In Bangladesh, 20.3% of parliamentary seats are held by women. The Bangladesh parliament consists of 350 members in total, in which 50 seats are reserved for women who are elected by the directly elected members of the parliament and the rest 300 members are elected directly[42]. However, the MPs including the women MPs are needed to make more active in the legislative, budgetary, monitoring and reporting processes and activities.

Women empowerment and enjoyment of rights:

The social and economic position of women in Bangladesh has improved in recent decades due to one of the reasons of women's increasing participation rates in the labour force. The expansion of the Ready-Made Garment (RMG) industry has provided new opportunities for women to find wage work in urban areas. The value of women's labour along with their social status has risen. On the other hand, gender inequality remains a serious barrier to women's advancement in other sectors. Bangladesh remains a highly "patriarchal" society. Women are subject to harassment and discrimination in their new workplaces. While there is nearly a gender balance in primary and secondary school enrolment rates, women are poorly represented in higher education (less than one-third of university students are female) and higher level technical and managerial positions. Among the structural constraints to women's autonomy and success in the labour market is the practice of child marriage, which limits access to education and employment while making young women married to older husbands more vulnerable when facing domestic violence[43].

Gender consideration in policies relevant to the LCUD project:

The proposed Low Carbon Urban Development project or LCUD incorporates some core issues broadly, namely, climate change, low carbon urban development, and urban planning, technical or vocational education. Relevant to these core issues of the LCUD below is the analysis of the relevant policies through the gender lens.

Bangladesh has developed various policies related to climate change. Though the climate change policies in Bangladesh, consider gender issues these policies do not mention specific goals or actions with regard to gender-sensitive programmes. Though the policies do acknowledge particular vulnerabilities of women, but they often do not address or guide operational

---

[40] The World Bank (2017). *Breaking the Glass Ceiling; Challenges to Female Participation in Technical Diploma Education in Bangladesh. Bangladesh Female Participation in Technical Education.* [online] South Asia Region, Education Global Practice: The World Bank. Available at: http://documents.worldbank.org/curated/en/717771486560820977/pdf/AUS2-REVISED-Bangladesh-Female-participation-in-TVET.pdf [Accessed 23 Nov. 2018].

[41] *ADB Briefs, No.62,* August 2016 employment and the Labor market in Bangladesh: overview of trends and challenges

[42] *Policy Brief on Gender Mainstreaming in Bangladesh*, Parliament,Standing Committee on The Ministry of Women and Children Affairs and Improving Democracy through Parliamentary Development (IPD) Project

[43] https://bangladesh.unfpa.org/sites/default/files/pub-pdf/4.%20Demographic%20Impact%20Study.pdf *The Impact of the Demographic Transition on Socioeconomic Development in Bangladesh: Future Prospects and Implications for Public Policy*, May 2015

plans to address these vulnerabilities. Moreover, these policies do not always address the specific needs of women. Hence there is a need to address gender-specific operational activities or strategies in these policies.

The Bangladesh Climate Change Strategy and Action Plans (BCCSAP) considers gender issues by specific programs. However, in this document, there is a lack of specific attempts to integrate or mainstream gender across all sectors and programs. For instance, in the BCCSAP of the nine programs with 29 activities under the theme 'Food, Security, Social Protection and Health' only one activity has a specific linkage to women and gender issue.

Urban Development is another core issue of the proposed LCUD project and there exist several policies that address urban development through different approaches. One of such is National Urban Policy 2011 (draft). This policy contains twelve objectives, 21 major thematic areas to reach the vision of the policy with a number of recommendations. However, this document is limited in its presentation of gender-sensitive planning[44].

The Dhaka Structure Plan 2016-2035 which gives a direction of the development to the city for the next 20 years (2016-2035). The three thematic areas or 'visions' this document are, Livability, Functionality, and Resilience and mentions two framework conditions, a. respect towards local socio-cultural fabric & b. environmental sustainability. This document presented all possible issues concerning the development of the Dhaka Metropolitan area in separate chapters with analysis from temporal, spatial and various scenario-based approaches. However, similarly, the concerns regarding gender and gender-sensitive actions are notably lacking in this document[45].

Waste disposal is a concern for Bangladesh where only the urban population is generating 0.56 kg per person of municipal solid waste (MSW) every day. The limited waste management capacity of the present 334 municipalities and city corporations is leading to a big amount of waste lying around in different locations creating harmful environmental conditions for the inhabitants. Average total solid waste generation in Bangladesh is 14,249 t/day of which Dhaka city corporation contributes more than 4,978 t/day (). Many of the wastes of Dhaka City Corporation are collected from the roadsides in hazardous condition[46].Though there are a good number of policies, acts, regulations are in place regarding various issues concerning urban development separately or in an integrated manner, also available such type of documents regarding climate change issues, however, regarding waste management or specific target or action plans of achieving waste disposal, composting, energy recovery, storage, handling, collection, transportation, and disposal of waste is notably not available in such documents[47], let alone gender concerns in it.

Gender issues in the proposed Low Carbon Urban Development (LCUD) project:

Bangladesh, a primarily rural country is going through a transition by faster urbanization with 6 percent urban population growth where the country population growth is 2.2%. Almost 25% of the national population are living in urban areas in Bangladesh. In this context, the LCUD project considers both men and women of the urban population.

The project's Theory of Change notes various causes that underlie the development challenge, several of which have these gender-related dimensions:

- *Poor representation of women in the senior level (decision-making) positions:*

Although the Bangladesh government has included various policies and acts regarding women empowerment and gender equality in national policies, however, the policies regarding renewable energy and energy efficiency need to make room for gender equality and women empowerment aspects. Representation of women in the technical education system at large is significantly low compared to men. This also has resulted in a limited number of skilled women working in the energy

44 Institutionalizing gender equality urban development experience of the Bangladesh local government engineering department, August 2017, Asian Development Bank

45 Dhaka Structure Plan 2016—2035, (Draft)

46 Shams, S., Sahu, J., Rahman, S. and Ahsan, A. (2017). *Sustainable waste management policy in Bangladesh for reduction of greenhouse gases.* Sustainable Cities and Society, 33, pp.18-26.

47 Ibid.

sector. In this respect, the LCUD project aims to promote more gender equality in the skills and knowledge development of the low carbon urban development issue.

- *Lack of skills/capacity*

It has been observed that women participation in Science, Technology, Engineering and Maths, including energy-related education and professional jobs, is notably limited. This has been attributed to various socio-economic reasons. Promotion of skills/capacity building in the energy efficiency sector is crucial, it being one of the sectors with a very low number of female participants. Following the 7th Five Year Plan of Bangladesh this project will encourage women participation at the various stages of the project life-cycle.

Gender and stakeholder engagement:

At the preparatory phase of the project, a stakeholder mapping exercise was undertaken and accordingly stakeholders were identified both female and male stakeholders of varying ages and from all walks of life were invited to give input on the project. During the project, every effort will be made to ensure that qualified women are invited and encouraged to participate in the project activities, to make sure that the proportional representation of both male and females is attained. A number of institutions will be consulted on gender issues at national and local levels and will include inter alia gender focal points at government ministries, civil society organisations working in the fields of gender and climate change as well as research institutions and development partners working on gender issues.

D.2 Gender action plan

Gender will be mainstreamed on a number of components of the programme. The table below shows indicators and targets for these activities, taken directly from the project Results Framework, with gender-related conditions highlighted. Box give gender-related elements in the Theory of Change of the Project (see Section 2 in the main text), and **Error! Reference source not found.** provides the Gender Action Plan.

Box 10 Gender-related indicators and targets (from the project Results Framework)

	Objective and Outcome Indicators	End of Project (EoP) target
Project Objective:	3) Number of beneficiaries, **disaggregated by gender** [GEF Core Indicator 11]	
Outcomes:	5) Number of staff national and local government staff trained **(incl. female)**	Seven events on LCUD-relevant themes in which 350 staff from national and local government entities participate **(at least 30% female)** Three multi-day detailed LCUD training events in which 60 staff participate **(at least 30% female)**
	9) Extended baseline and impact assessment **(including gender and selected SDGs)**	Impact study at the end of the project with lessons learned and post-project LCUD action plan (proposed to the interinstitutional Coordination Mechanism, see Indicator 6),
	13) Number of stakeholders trained and/or awareness raised on LCUD concepts EE in buildings, building materials and integration of PV **(with gender targets)**	Five events on LCUD-relevant themes in which 250 staff from public, NGO and private stakeholders participate **(at least 30% female)'** End-of-project workshop Five multi-day targeted training events (three on EE in buildings, PV in buildings, WTE, in which 60 staff participate **(at least 30% female)**
	14) Status of institutionalization in awareness and capacity building	Functioning and fully operational and financially sustainable: a) Lov-Carbon Cities Network (BLCCN) b) Centre of Expertise and training (with approved post-project work plans with **gender-sensitive targets)**

	Objective and Outcome Indicators	End of Project (EoP) target
	15) Availability of updated information, via register and web portal **(incl. gender-specific info)**	Functioning LCUD and green buildings website, updated on weekly basis, also promoted on Facebook, YouTube, etc., and linked with UNDP website **Availability of gender-specific info**

Box 11 Gender-aspects in Theory of Change

Goal	Outcomes	Outcome TOC	Outputs	Key Assumptions	Risks and Barriers
Develop gender, social and environmental safeguard-inclusive energy planning, policies, codes, acts and strategies for urban development by the end of the project	Urban development Energy planning and policy development are gender social and environmental safeguard inclusive, participatory and responsive	Active engagement of women in energy efficiency planning, policies, and design stages results in more people, society and environment-friendly urban development	Number of women are expert in urban development planning, policy-making and investment planning Integration of gender, society, and environment-friendly aspects in urban development planning, policy-making are in place Increased number of women professionals as planner, policy maker and designer	Limited availability of women energy efficiency experts especially in the planning and designing roles Limited availability of energy efficiency experts who is/are well aware of the gender-integrated energy efficiency issues and concerns Lack of active roles in financial negotiations and in investment decisions regarding energy efficient projects or issues Limited opportunity for creating a space for women within the organization in the energy efficiency sector Curriculum regarding energy sector is limited to the gender and social issues	Curriculum regarding energy sector is limited to the energy efficiency, gender, and social issues. This is resulting in developing experts who are limited to foresee the integrated gender and social concerns in it.
Develop curricula related to energy sector inclusive of gender, social and environmental safeguarding issues and concerns	The energy sector graduates will be aware of and are able to incorporate gender, social and environmental issues (incl. low-carbon) concerns urban development issues Review of policies, codes, acts, plans and designs regarding (low-carbon) urban development through the lens of gender and social-	People give conscious efforts in recognising and respecting gender, social issues in different spheres of life More women are considering energy waste, or building sector as a mode of their profession A positive behavioural change regarding more sustainable lifestyle has initiated among	Availability of a number of revised curricula of the energy sector Increased number of female students enrolled in subjects related to low-carbon development Number of students [including female students] will be aware of the gender, social and environmental concerns and issues with the energy and waste sector and in the	Coordination among different departments of expertise will increase to share the knowledge between experts and students The process of curricula revision, redesign and approval might be time consuming enough which could led a time gap in establishing a revised curriculum Tendency of conducting more research and studies	Investment in education does not necessarily translate into employment; High skill barriers in the energy service sector Weak education systems.

Goal	Outcomes	Outcome TOC	Outputs	Key Assumptions	Risks and Barriers
	environmental safeguarding Skill, information and social norms barriers for women SE entrepreneurs are removed, as indicated by: % distribution of tertiary graduates by sex and field of study	the common mass including children More women are selecting energy-related and low-carbon technical subjects for higher study	urban development arena Increased number of women professionals in the energy sector [gender disaggregated info] Increased demand (in percentage) of energy efficient building and living materials Number of studies and research are conducted on energy efficiency in urban development through the lens of gender, social and environmental safeguarding Access to technical education, training, and information for women in sustainable energy is improved. Women's entrepreneurial skills and knowledge is enhanced.	on integrated approach of energy efficiency in urban development	
Promote inclusion and active participation of women in the awareness and skill development sessions and trainings on LCUD inclusive of gender by the end of the project	Increased number of skilled and trained professionals including women on LCUD inclusive of gender and social issues by the end of the project Increased availability of women professionals in the energy, building, and waste ector Women voice is recognised, respected and approved in the planning, policy and design arena regarding LCUD	Recognised, appreciated and active role of women professionals as planners, policymakers and energy efficient building and material designer Active role of women professionals in negotiating energy efficient issues Identification of gaps in the existing policies and practices and availability of revised and new policies, acts and codes	The number of women professionals in the energy and waste sectors has increased from before Increased number of professionals including women who are skilled in integrating gender, social and environmental issues and concerns in the energy, building, and waste sectors	Due to the common practice of considering men professionals in the energy sector the institutions might be reluctant to recognise, respect and create more women inclusive skill development opportunities	Gender blind attitude against women's active role in the energy sector

Box 12 Gender and social inclusion action plan: a gender mainstreaming measurement tool

Gender-related activity	Output	Indicator	Possible Output
Ensure full representation of vulnerable groups including women, and their meaningful participation in projects and programs Strengthen women economic empowerment	**Functional project-level integration**	Women representation in all capacity building workshops and training, as well as at any working group or committee for project implementation and monitoring Design features that impact positively on women and implement them and remove those that negatively impact the project.	Ensure women are represented at governing structures e.g. at Board level, to ensure their participation in projects
	Social integration and sustainability	Number of changes in the social regular lifestyle (e.g. consumption of energy, waste disposal, etc.) of people Gender disaggregated information related to the LCUD issues	Concerns of vulnerable groups, including women and girls, are addressed and their voices are integrated into all development projects and programmes through participatory approaches.
	Economic integration and sustainability	Improve information and knowledge access on sustainable consumption and production and household waste management (both males and females) by mobile, radio, and TV and printed media	All vulnerable groups' needs, including women's, are incorporated into the project cycle at all the phases of the projects to ensure economic sustainability.
Capacity building and cost-related issues disaggregated by gender	An increased number of women receive technical training and participate in projects. The energy, building, and waste sector have sufficient women working in it and no longer lags behind with women representation.	Participation of women and girls for renewable energy in technical training and education on energy, low-carbon building, waste, and other LCUD investment areas Ensure equitable allocation of resources for the implementation of appropriate implementation measures Event reports with gender disaggregated information	At least one area where skills lack mostly among women entrepreneurs is identified and a matching training programme to address this shortage is implemented. Reviewed curriculum with inclusion of Gender, social and environmental safeguarding issues and concerns.
Gender-responsive budget allocation to mainstream gender through the project preparation, implementation, and monitoring	An increased number of women who are more accessible to public participation and in LCUD projects formulation, implementation & monitoring	Sustainable consumption and waste management practices for (female-headed) households are promoted by allocating some of the budget for (gender-sensitive) awareness campaigning Participation of women in decision-making at the national, city and community (ward) level institutions and committees	A set target of women can reduce their obstacles participation in community and in public bodies
Gender-sensitive communication	Safe and inclusive environment is created for the vulnerable groups and women to enhance their participation, to challenge gender bias and to portray gender equality	Ensure the content of training materials, project documents, IEC materials including written text as well as audio and visual developed with inclusive language and appropriate illustrations without gender bias and stereotype	Significant women participation and representation are encouraged during capacity building training or workshops
Enable better databases, planning and actions through disaggregated data	Disaggregated statistical data and gender-related findings on project outcomes and indicators policy integration of gender considerations	Data are collected and tabulated separately for women and men, where possible, with specific indicators measuring changes to gender equality and empowerment for adjustments to activities and implementation approaches to better outcomes of gender equality. Case studies or success stories are collected as for gender-related findings at the intervention area to prove the results of gender mainstreaming Availability of the dataset; Use of the database by the stakeholders	Evidence that adapts the better program accordingly, measure changes to gender equality, policy integration of gender considerations Agencies are mainstreaming gender (and social and environmental issues) in their work

Gender-related activity	Output	Indicator	Possible Output
Sensitization of project stakeholders with regards to gender equality	Effective gender mainstreaming in LCUD planning, implementation and capacity building	Invest in developing competency and knowledge on gender mainstreaming for Government's counterparts, community leaders and partner agency as well as UNDP's project staff Integrate gender sessions where possible in each capacity-building training or workshop	Targeted and trained stakeholders are well oriented on gender issues and more confident to mainstream gender throughout the whole project circle
Monitoring on gender mainstreaming implementation	Adjustments to activities and implementation approaches and accountability to gender equality	Make sure gender balance practice applying in project staff recruitment process and hire gender-oriented staff (both male and female) for project implementation Project staff is assigned and designated to implement and monitor the gender mainstreaming activities accordingly and their performance appraisal is evaluated by accomplishment on the assigned gender tasks. Ensure Gender Analysis (UNDP in-house gender specialist) getting involved in the gender-mainstreaming activities as oversight, providing technical advice for implementation of the whole project circle through a gender lens. Carry out impact assessments on how the development of energy investments contribute to gender equality and economic empowerment	Availability of gender-disaggregated information regarding LCUD issues and LCUD investment areas.

Annex E. BASELINE CONDITIONS AND SITUATION, LOW-CARBON URBAN DEVELOPMENT

E.1 Urban and energy planning

Plans that deal with regional and local development, as well as energy, include:

- *Perspective Plan (2010 - 2021)* was formulated in April 2012 by the Planning Commission and it is the most fundamental long-term plan of the government.
- *Sixth Five Year Plan FY2011-FY2015, Accelerating Growth and Reducing Poverty, Strategic Directions and Policy Framework* was also formulated by Planning Commission to materialize above-mentioned Perspective Plan. This plan serves as the Poverty Reduction Strategy Paper (PRSP).
- *Annual Development Programme (ADP)* is to be decided in line with the above five-year plan.

The *Planning Commission* (PC) a public policy institution of the Government of Bangladesh, in which a number of ministries related to 'economy' participate. The PC is responsible for policy development initiatives for the expansion of the public infrastructure of the country, in tandem under the Ministry of Planning and alongside the Ministry of Finance[48].

Bangladesh is divided into eight administrative division. each named after their respective divisional headquarters: Barisal, Chittagong, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet. Divisions are subdivided into 64 Districts (*zila*). There are 64 districts in Bangladesh, each further subdivided into *upazila* (subdistricts) or *thana*. Under those, there are Unions (consisting of several villages) in rural areas, while the large cities (Metropolis) are governed by City Corporations[49] and other urban areas (General Cities) are governed by about 327 Municipal Corporations (*pourashava*).

The *Ministry of Local Government, Rural Development and Cooperatives (MLGRDC)* is the ministry responsible for the housing and building, regional and rural policy, municipal and cities administration and finances, and the conduct of elections. It provides local governance support, as well as the development of certain infrastructures, such as rural roads, bridges, water and sewerage. The Ministry has published a *National Urban Sector Policy* (draft, 2014). Under the Ministry, *the Local Government Engineering Department (LGED),* one of the largest public sector organizations in Bangladesh, is entrusted for planning, development, and maintenance of local level rural, urban and small-scale water resources infrastructure throughout the country.

In the five main cities, spatial planning and development are carried out by urban *Development Authorities*. These are the *Rajdhani Unnayan Kartripakkha (RAJUK, Capital Development Authority), Chittagong Development Authority (CDA), Rajshahi Development Authority (RDA), Khulna Development Authority (KDA)* and *Cox's Bazar Development Authority (CoxDA).* For example, the Capital Development Authority (RAJUK) is responsible for planning and development of the Dhaka metropolitan area, which covers Dhaka City and surrounding districts. RAJUK has made the Dhaka Metropolitan Development Plan, Dhaka Structure Plan, and Urban Area Plan. The Development Authorities are under the *Ministry of Housing and Public Works (MHPW).*

MHPW is responsible for the Bangladesh National Building Code (BNBC) and issuing the Green Building Guidelines (GBG). The *Public Works Department (PWD),* whose working arena covers design and construction and maintenance of public

---

48 To financially back up the above plans, Ministry of Finance establishes a five-year *Medium-Term Budgetary Framework (MTBF)* of which the *Annual Budget* is decided.

49 Dhaka, Chittagong, Khulna, Sylhet, Rajshahi, Comilla, Mymensingh, Barisal, Rangpur, Narayanganj, and Gazipur. Dhaka has two Corporations: Dhaka North City (DNCC) and Dhaka South City (DSCC)

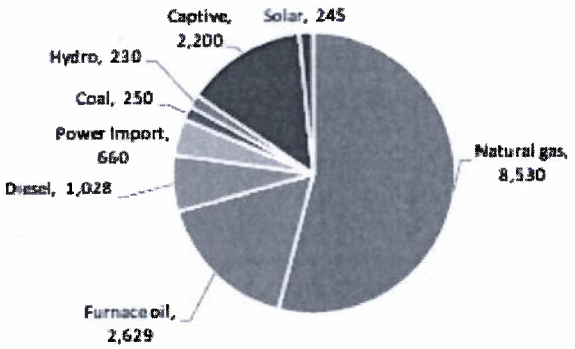
* The Annex E is based on baseline reporting by PPG Team leader, J. Van den Akker, with contributions from PPG team members A.Kabir, U. Bhattarjee, A. Khan and D. Miah

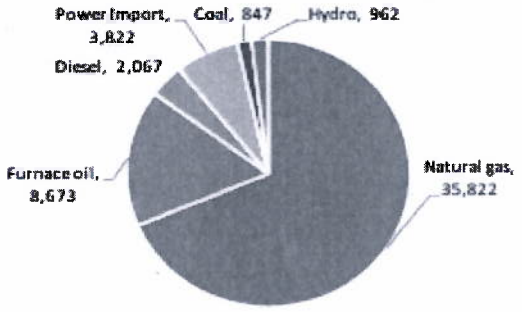
buildings, national monuments, public parks, falls under MHPW, as does the *Urban Development Directorate (UDD)* which contributes to developing master plans and land-use plans for small, medium and large town and cities of Bangladesh. The *National Housing Authority (NHA)* implements building and housing projects on behalf of the government.

To set out the overall framework for the improved performance of this sector, the *National Energy Policy (NEP)* was prepared and adopted by the government in 1996. In Bangladesh, the energy, gas, and electricity sectors are the responsibility of the MPEMR (Ministry of Power, Energy, and Mineral Resources). Its executing arms for electricity are the *Power Division* (which has overall authority for the electricity sector) and the *Power Cell* (which regulates the development of the electricity sector, including the implementation of reforms). The Power Cell's scope of responsibility includes renewable energy; it coordinates and supports the implementation of energy projects by NGOs and private actors.

The utility electricity sector in Bangladesh has one national grid with an installed capacity of 16,048 MW as of July 2018. In 2015, 92% of the urban population and 67% of the rural population have access to electricity for their source of light. An average of 78% of the population has access to electricity in Bangladesh. Bangladesh will need an estimated 34,000 MW of power by 2030 to sustain its economic growth of over 7%. The Bangladesh Government plans to drastically increase the capacity of coal from 1.6% (250 MW) in 2017 to 35% (13,300 MW) by 2030 and reduce its reliance on natural gas from 53.1% (8,530 MW) in 2017 to 35% in 2030 (13,300 MW), according[50] to the *Power System Master Plan 2016*. The *Renewable Energy Policy* was published in 2002 and revised in 2008. The government plans to increase the share of renewables in power

Box 13 Installed capacity and electricity generation per fuel type





Left: installed capacity in MW by fuel type (Nov 2017)

Right: generation in GWh by fuel type (FY 2015-16)

Source: ICCAD (2018) based on SDREDA data

generation from about 1% in 2000 to 10% in 2020.

The *Sustainable and Renewable Energy Authority (SREDA)* was established in 2012 as the implementing body (under MPEMR) to promote renewable energy and energy efficiency and conservation, for the nation-wide monitoring of energy consumption, and it coordinates EE policies and implementation among the line ministries and with non-governmental organisations (NGOs). SREDA and the Power Division have published in 2015 the *Energy Efficiency and Conservation Master Plan up to 2030.* The Plan sets the target of reducing energy intensity (per GDP) by 20% by 2030 (compared to 2013 levels). It contains a description of five Programmes, Energy Audit, Energy Efficiency Labelling, Building Energy Efficiency Rating, Energy Efficiency Financing, and Energy Efficiency Awareness (and that specify 19 EE measures).

[50] Data from bpdb.gov.bd, www.wikipedia.org/wiki/Electricity_sector_in_Bangladesh, and ICCAD (2018)

Box 17 Urban centres in Bangladesh

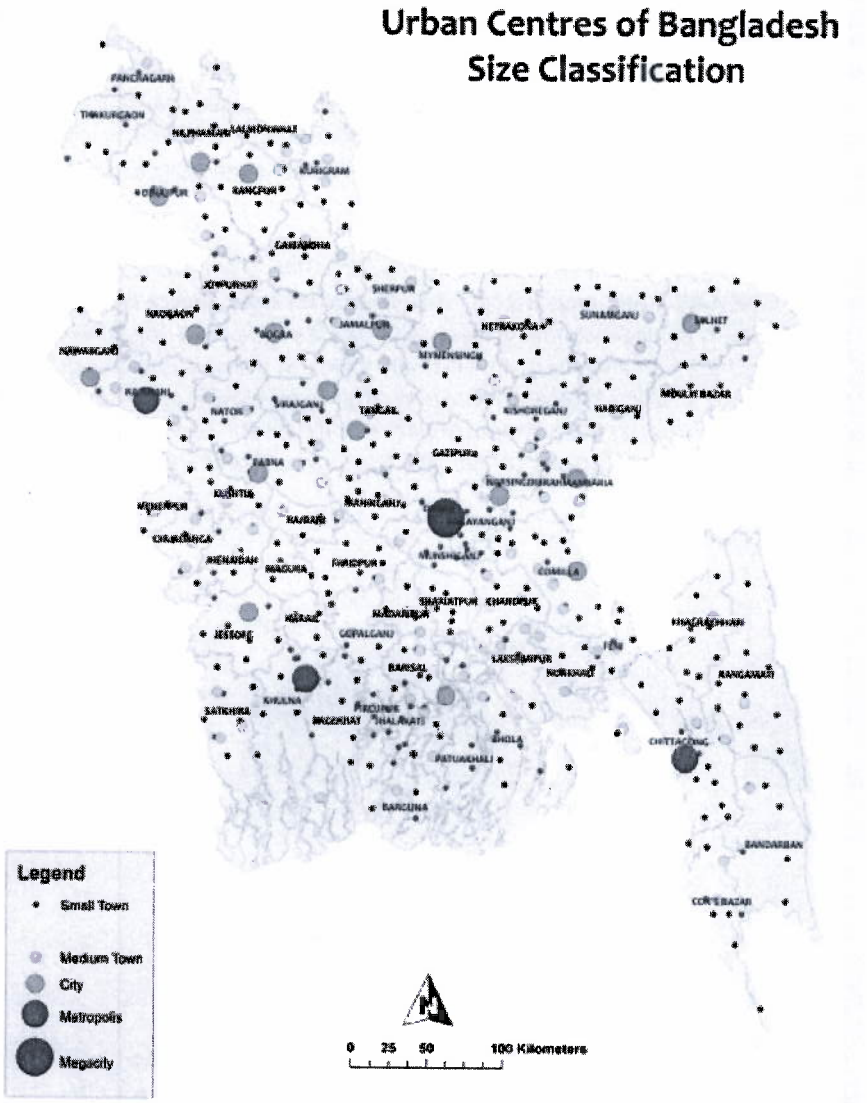


Figure taken from PowerPoint presentation, *Strategy for Urban Sector Development in Bangladesh*, Taibur Rahman, Planning Commission

The Ministry of Environment, Forests and Climate Change in 2008 released the *Bangladesh Climate Change Strategy and Action Plan*, which will be the main basis of the Bangladesh government's efforts to combat climate change over the next years. Bangladeshi's *Intended National Determined Contribution (INDC)* was published in 2015 by MEFCC. The INDC calls for a 5-15% reduction in greenhouse gas (GHG) emissions in the power, transport and industry sectors from business-as-usual levels in 2030, for the increased composting of organic waste (diverting 50% of managed waste in landfills by 2030), and landfill gas capture and (70% of landfill gas captured to be used for electricity generation by 2030). Regarding commercial buildings, the INDC aims at a 25% reduction in energy consumption by 2030. Regarding renewable energy, the INDC states that all new coal-based power plants should use super-critical technology and the grid should be supplied with 400 MW of wind power and 1000 MW of utility-scale solar power plants by 2030.

The *Infrastructure Development Company Limited (IDCOL)* is a state-owned non-banking financial institution that aims at playing a major role in bridging the financing gap for developing medium to large-scale infrastructure and private sector sustainable energy projects in Bangladesh. It administers financing for rural energy and renewable energy development projects (mainly solar home systems (SHS) and biogas) with 15 participating national NGOs. The *Bangladesh Infrastructure Finance Fund Limited (BIFFL)* is a Government-owned non-banking financial institution. Apart from large infrastructure, connectivity (telecom) , tourism, it finances energy and power projects.

E.2 Low-carbon urban development

Cities and climate change have a causal relationship. Cities, as major emitters of greenhouse gases, contribute to climate change. Again, the changing climate can have severe impacts on cities, all the more important as they house a large, increasing, part of the population and productive assets. The **low-carbon urban development (LCUD) approach** has become an emerging framework to address the challenge of climate change (see **Box 18**).

Effective low carbon urban development requires effective urban and land-use planning that creates land-use patterns within cities that can provide services without the loss or degradation of natural habitats.. The urban form includes population density, open spaces, extent of impervious surfaces, road networks, trip distances, civic infrastructure, etc. Together with the structures (built forces) and natural parameters, the city morphology has a great bearing on energy use and, therefore, on emissions. The density and diversity of the urban form influence a city's energy use. It is observed, for

Box 18 Selected investment areas, issues and options in low-carbon urban development

Urban planning *Issues* • Absence of appropriate policies and regulatory frameworks for supporting sustainable and LCUD of cities • Multiplicity of organisations and agencies involve in urban governance and management and lack of coordination • Absence of a common platform for mutual exchange of ideas	*Options:* • Mainstreaming of LCUD and green planning in urban and land-use policy and planning at national and local level • Coordination mechanism between various layers of government and between agencies on green cities and LCUD
Solid waste *Issues* • Waste management (lack of enforcement of inadequate waste regulations); pollution • Lack of policy instruments and implementation; urban planning based on traditional principles • Open dumping of urban waste; overburdened landfills • Informal sector livelihood • Land availability and site capacity • Waste management (3R) on pilot scale only; WTE options have remained at study level • Institutional and technical capacity • Limited access to public and private financing • Awareness	*Options:* • Reduce, recycle, re-use, recover, re-think • Waste-to-energy (incineration; methane capture and use for energy; composting) • PPP implementation models • Financial incentives • Awareness raising and capacity strengthening activities
EE in buildings and built environment *Issues* • Insufficient of EE in national and local level building code • Lack of planning and building enforcement capacity and coordination between national agency and local governments • Price and affordability of RE; net-metering; retrofitting • RE and EE tend to be implemented at demo/pilot level • Institutional and technical capacity • Limited access to public and private financing • Low level of awareness and attitude towards green initiatives in cities • No common forum to share experience and promote good practices among urban sector stakeholders	*Options:* • Green infrastructure (efficient public lighting) • EC in building codes; building design standards; benchmarking • Verification, enforcement and rating systems • Energy management in large buildings • Improved EE interventions (EE building design; building envelope; lighting; HVAC) • EE appliances and equipment • RE in buildings (rooftop PV; other) • Building materials • PPP implementation models • Financial incentives (loans, tax incentives, subsidies)

Note:
The table shows only the investment areas that are relevant to the UNDP/GEF *LCUD in Bangladesh* project. Other areas include transport, sanitation, stormwater and drainage, wastewater, water supply, urban agriculture, green industry, and land-use and city greening. See, for example, *Green City Development Toolkit,* Asian Development Bank (2015)

example, that compact cities emit less CO_2 emissions, on a per capita basis, from passenger transportation than sprawled cities.

Urban sprawl is a major challenge for cities. As cities spread out, work-related travel distances and other travel activities increase. This can be explained in three ways: i) compact cities enable shorter trips, which can be taken by walking and cycling, ii) compact cities offer scale and viability for public transport, and iii) a sprawled development is expensive, as it uses infrastructure less intensively than dense urban areas. However, there is no 'one cut fit all' planning. Urban planning needs to be tailored to challenges city face, city form, city typology and the spatial organisation of activities.

Bangladesh's contribution to greenhouse gas emission is small, less than 0.2% of the world total, reflecting its low per capita consumption of energy. On the other hand, Bangladesh is widely recognized as one of the most climate-vulnerable countries in the world. It experiences frequent natural disasters, which causes loss of life, damage to infrastructure and economic assets and adversely impacts on lives and livelihoods especially of poor people. This is reflected in the *Bangladesh Climate Change Strategy and Action Plan 2009 (BCCSAP)*, developed by the Ministry of Environment, Forest and Climate Change (MoEFCC)[51], which prioritizes adaptation and disaster risk reduction, and also address low carbon development, mitigation, technology transfer, and the mobilization and international provision of adequate finance. While most of the BCCSAP focuses on adaptation, a small part of it looks at reducing Bangladesh's greenhouse gas emissions and promoting low-carbon development. This action plan has six pillars and 'mitigation and low carbon development' (no.5) is a prominent one. It urges the adoption of environmental protection in urbanization planning. Nonetheless, in practice, this is not translated into physical action on the ground, as urban and infrastructure planning is not under the responsibility of MEFCC, but under other line ministries.

Overall development planning (resource allocation) in Bangladesh is sectoral. Allocations are made based on the Five-Year Plan, which is a combination of allocation to different ministries to meet their development goals within stipulated time. Seldom, cross-sectoral projects are implemented. In the same way, the climate change strategy and action plan have been initiated through MEFCC but city plans are prepared by development authorities, city corporations, municipalities and by urban development directorate, which are under the Ministries of LGRDC and of Housing and Public works, respectively. Due to lack of coordination and synergy between inter-ministerial objectives and strategy, schemes by one ministry are not properly reflected by other ministries. As a result, we do not see the implementation of BCCSAP strategies into the physical planning of cities.

However, there are several isolated steps that the government has taken in recent time to support the low carbon development, for example:

- The government has decided to reduce the supplementary duty on imported hybrid cars over octane-driven cars.
- Subsidy (in different forms) has been introduced for solar panels.
- Energy efficiency measures are promoted for industries and manufacturing industries.
- Prioritizing climate resilience projects for cities with rapid population growth and coastal location.
- Promoting Bangladesh's brick industry to adopt green technology

Identifying what investment is required in urban areas to enable economic activity, and create liveable and vibrant cities in an environmentally sustainable way is the key challenge for decision makers. Identifying strategic investments and developing a project pipeline is a crucial step in city planning. Strategic Investments are those investments that have the potential to provide catalytic impacts or provide a critical enabling link to support green and low-carbon development within a city. For low-carbon cities, strategic investment can be grouped in a number of multi-sectoral investment areas. These include 1) low-carbon transport, 2) low-carbon industries, 3) greener water and wastewater management (water supply, wastewater and sanitation, water management and drainage), 4) carbon-positive solid waste management, 5) energy efficiency (EE), renewable energy (RE) and low-carbon materials in buildings and the built environment.

The *Promoting Energy-Related Low Carbon Urban Development in Bangladesh* (LCUD) Project focusses on the last two green investment categories, namely a) waste-to-energy (WTE) and municipal solid waste management, b) EE and RE in buildings

[51] Now called Ministry of Environment, Forests and Climate Change (MEFCC)

and the built environment (in particular EE public lighting, improvement of the energy performance index (EPI) of buildings, and solar PV applications in buildings). Low-carbon urban (green) planning involves the integration of the various investment categories to achieve an integrated low-carbon (green) city development, by means of: a) policy and regulations, b) strategic planning of development interventions and investments, and c) links to finance.

Bangladesh's urban population has been growing at a yearly average rate of 6% since independence in 1971, resulting in the urban population growing six-fold. Bangladesh is experiencing a very high rate of urbanization. Approximately 35% of Bangladesh's population currently lives in urban areas. Of this urban population, more than 60% live in the five largest metropolitan areas: Dhaka, Chittagong, Khulna, Sylhet, and Rajshahi. The key drivers for urbanization in Bangladesh are: (i) country-wide demographic transition from rural areas to urban centres; (ii) displaced/landless people migration to urban areas; (iii) conversion of rural growth centres into urban areas; (iv) the agriculture sector is no longer able to absorb the surplus labour force entering the economy every year, and many from this sector move to cities where the economic opportunities are much better, and (v) lack of educational, health facilities, social and cultural opportunities in rural areas[52].

The burgeoning development of Bangladeshi cities is accompanied by some key issues: (a) poor urban planning and management, and lack of coordination amongst agencies, (c) higher energy consumption and increased greenhouse gas (GHG) emission, (d) inadequate solid waste management leading to environmental issues such as pollution, and (e) expansion of metropolitan cities in an uncoordinated and non-integrated manner, including the rapid growth of slums and squatter settlements, that exert pressure on land, land use, and housing and results in overloaded urban infrastructures and transport systems that need to be improved and expanded. Furthermore, the impact of climate change will accelerate Bangladesh's ongoing urbanization as well as deepen the scale and severity of urban poverty.

Issues in urban planning

Cities of different size are assigned to different planning authorities for their plan (physical) making. According to urban development practices in Bangladesh, all divisional Cities have a 'Development Authority' responsible to develop a physical plan (generally for a 20-year period). For other cities of all sizes, local municipalities have the mandate to prepare master plans. Again, the UDD has the responsibility to prepare and maintain plans for all tiers of the urban area. In addition, LGED also prepares master plans for many municipal areas. *All this is done without much coordination among the planning bodies or hierarchy in their functioning:*

- In the early 80s, the government made a new national administrative setup into 64 districts and upgraded the *thanas* as *pazilas.* By considering *upazila sadar* as a focal point of regional development, it was necessary to develop and provide new services Since 1983, UDD has prepared some 50 district-level and 392 *upazila*-level master/ land use plans. However, the biggest challenge has been the implementation. UDD does not have the mandate, neither the capacity nor the financial resources to implement plans the development projects mentioned in these plans. At the same time, there is no entity of the same line ministry (MHPW) at district and *upazila* level to update or carry out these plans; as a result, most remain on the shelf;
- One of LGED's responsibilities is infrastructure development in urban local government area. As a guideline to invest for the urban infrastructure, LGED has initiated since the early 200s the preparation of master plans for 237 municipalities of different tiers (out of 329);
- The Development Authorities prepare master plans for their city areas, control development (e.g., building development approval), and develop infrastructure (mainly roads for residential neighbourhoods). Development Authorities invite consultants to prepare the master plan, approve development plans and manage land-use allocation according to the master plans.
- Urban Bangladesh is divided into 11 City corporations and 329 municipalities of different tiers (A, B, and C) that fall under the Ministry of LGRDC. They have the mandate to prepare plans and to provide municipal services to its residents. However, in general, (smaller) municipalities have little capacity to prepare master plans, as they do not have a 'planning department' or even town planners; and usually, they will invite consulting companies to do the job.

52 Project Identification Form (PIF)

As an example of the multiplicity in urban management and planning development Dhaka City[53], a list of institutions involved is given below. Apart from having two City Corporations (Dhaka North and Dhaka South), there is the Capital Development Authority (RAJUK), and at the national level, the *Planning Commission* (PC) is involved, as well as a number of *ministries and departments:*

- Housing and Works (MHPW), *depts:* PWD, UDD, NHA (note: RAJUK falls under MHPW)
- MLGRDC, *depts:* DCC, DWASS, DPHE, LGED, DTCE (note: the two City Corps. fall under MLGRDC)
- Ministry of Land, *depts:* DLRS
- Ministry of Water Resources, *depts:* BWDB and WARPO
- Departments of other ministries, DESA, DOE, DMP, and agencies of Health, BWTA, etc.

In principle, agencies have to follow the Dhaka Metropolitan Development Plan (DMDP) but department/agencies of the follow their line ministry's guidelines. Also, they cover different geographical jurisdictions, leaving gaps in some areas, while others are covered by the parallel, but un-coordinated, functions of the about 42 planning entities.

E.3 Solid waste management and waste-to-energy

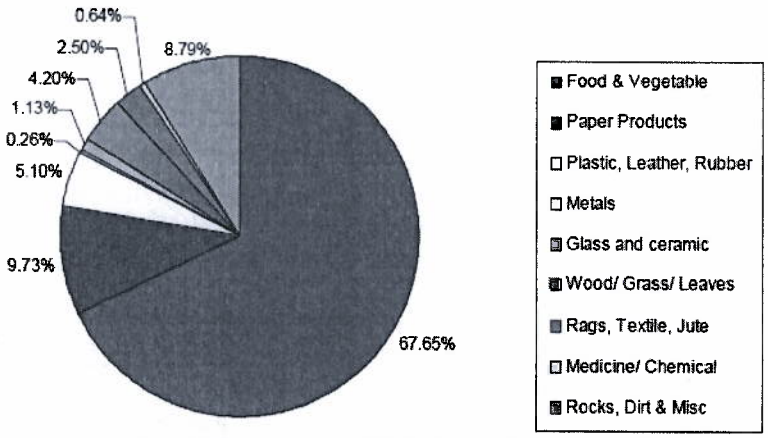
Status of solid waste management

It is estimated that approximately over 16,380 tons of waste was produced per day in the urban areas of Bangladesh (with an urban population of 32.7 million in 2004, at 0.41 kg per capita per day), which is over 4.86 million tons annually, of which about 4,200 tons a day in Dhaka[54]. This had increased to 6,100 tons a day in 2006 (waste generation in Dhaka increased by 90% over the past 10 years)[55].

The solid urban waste amount will grow up to 47,000 tons per day in 2025 (when the urban population is projected to be 78.4 million). The per capita generation of municipal solid waste range from 0.325 to 0.485 kg/cap/day depending on season, income, food habit etc. The composition of the entire waste stream was about 74.4% organic matter, 9.1% paper, 3.5% plastic, 1.9% textile and wood, 0.8% leather and rubber, 1.5% metal, 0.8% glass and 8% other waste[56] (see Box 19).

Currently, 45% of the urban solid waste remains uncollected and is dumped somewhere in roadside bins or anywhere in unsanitary ways. Domestic wastes are placed generally on footpaths, open spaces and dustbins by city dwellers. The people face grave health risks due to an alarming rise of pollution from rotten piles of garbage.

Box 19 Composition of urban solid waste



Source: Community Based Solid Waste Management Through Public-Private-Community Partnerships: Experience of Waste Concern in Bangladesh

53 *Strategy for Urban Sector Development in Bangladesh*, Md. Taibur Rahman

54 *National 3R Strategy for Waste Management*, Department of Environment (DoE), MoEFC (December 2010); SREDA website

55 *Waste Management in Bangladesh: Current Situation and Suggestions for Action*, by: F. Nasrin, in: International Research Journal of Social Sciences, Vol. 5(10), Oct 2016

56 *Municipal Solid Waste and Recovery Potential: Bangladesh Perspective*, in Bangladesh Perspective, Iranian Journal of Environmental Health Science & Engineering, 2007, Vol. 4, No. 2 by Alamgir, M and Ahsan, A

About 55% is collected by municipalities and brought to the crude disposal site. However, even the collected wastes are not managed at a satisfactory level. Dumping areas are overburdened. The impacts are that low-lying areas, drains, and canals are clogged with waste; surface and groundwater get polluted; diseases spread (vermin) and the soil condition worsens (leachate). To make matters worse, the medical waste from hospitals and clinics (that often do not maintain safe management) is often mixed up with domestic solid waste and disposed at the city corporation's common dumping place, and thus causes health issues by increasing infectious disease risks (e.g. viral hepatitis, typhoid, pneumonia, gangrene)[57]. The solid waste has a substantial organic content which is left unutilised, while the escaping methane gas resulting from its decomposition leaves bad odours and contributes to global warming.

Box 20 Total waste generation in urban areas of Bangladesh in 2005

City/Town	*WGR (kg/cap/day)	No. of City/Town	Total Population (2005)	Population** (2005)	TWG*** (Ton/day)		Average TWG (Ton/day)
					Dry season	Wet season	
Dhaka	0.56	1	6,116,731	6,728,404	3,767.91	5,501.14	4,634.52
Chittagong	0.48	1	2,383,725	2,622,098	1,258.61	1,837.57	1,548.09
Rajshahi	0.3	1	425,798	468,378	140.51	205.15	172.83
Khulna	0.27	1	879,422	967,365	261.19	381.34	321.26
Barisal	0.25	1	397,281	437,009	109.25	159.51	134.38
Sylhet	0.3	1	351,724	386,896	116.07	169.46	142.76
Pourashavas	0.25	298	13,831,187	15,214,306	3,803.58	5,553.22	4,678.40
Other Urban Centers	0.15	218	8,379,647	9,217,612	1,382.64	2,018.66	1,700.65
Total	-	522	32,765,516	36,042,067	10,839.75	15,826.04	13,332.89

Source: National 3R Strategy for Waste Management, Department of Environment (DoE), MoEFCC (December 2010); *Community Based Solid Waste Management Through Public-Private-Community Partnerships: Experience of Waste Concern in Bangladesh*

Common sources of e-waste include televisions, air conditioners, computers, mobile phones, IT equipment, CFL bulbs, fridges, and electric fans. The production of e-waste has been rising at the alarming rate of 20% per year and will reach 462,000 tons per year by 2035, if the current trend continues. Such items contain precious metals such as gold, silver, copper, iron, and some other heavy metals, but they can also contain mercury and lead – two of the most hazardous metals to human health[58]. Regulations on e-waste have been proposed (by Department of Environment) but after several rounds of consultation and revision remain in draft form. E-waste recycling is entirely controlled by large informal sector in Bangladesh.

Health conditions of waste pickers at the waste disposal site is often very poor. Unhygienic as well as unorganized handling may posses serious and long-term impact on urban poor population whose income generation depends on waste picking from landfills and dump sites. Most recycling is done through the informal sector (see Box 21).

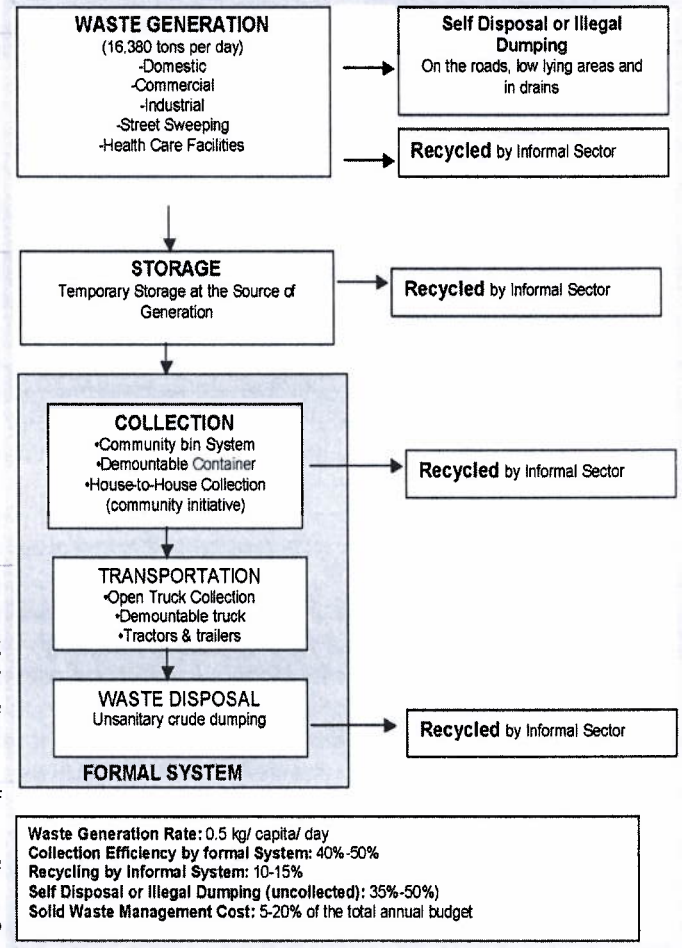
---

57 Medical waste constitutes 6% of total waste collected by Dhaka City Corporations. Average generation is 1 kg per bed per day. Source: *Waste Management in Dhaka City*, by N.M. Kazi (1998), and S. Tabassum, *Hospital Waste Management*, M.Sc thesis, North-South University Dhaka (1999)

58 *Assessment of Generation of e-Waste, its Impacts on the Environment and Resource Recovery Potential in Bangladesh*, Bangladesh University of Engineering and Technology (BUET, 2018)

Box 21 Solid waste management and practices in Banagladesh

Activity	General status in Bangladesh
Reduction	- Reuse and recycling is done - Segregation of recyclable waste with economic value (such as newspaper, bottles, cans, glass, plastic, metal, rubber and different containers - Soiled recyclables materials from the source of waste, dustbins and dumpsites are retrieved by waste pickers for their survival.
Collection	- No provision storage exists at or near the point of source - Waste is collected by: a) Community bin system (brick, concrete), b) demountable containers, c) house-to-house d) designated open spaces, e) illegal dumping
Transportation	- Conventional open trucks, demountable containers and tractors and trailers for the waste collectiopn - No provision of transfer stations to transfer waste from the multiple handling of waste exists. - Waste mixed with contaminated/infected substances - Transportation does not synchronize with the capacity of collection points.
Recycling	- Most recycling is done through the informal sector and waste picking. Some local government bodies are replicating Waste Concern"s model of community based waste management (IRRCs) or the ward-based community mobilization model
Incineration	- Not common or successful because of high capital and operation costs, high moisture content and low calorific value of waste makes waste not viable for. - At present few incinerators are used to manage health care related waste in a number of town and cities.
Land filling	- Usually open crude dumping is adopted. This system is most unhygienic and inefficient - Hospital waste, toxic waste and untreated industrial waste are also disposed of at the municipal landfill.
Costs	- 5-20% of annual municipal budget is used for Solid Waste Management



Source: Waste generation and management in Bangladesh: An overview, in : Asian Journal of Medical and Biological Research 2015, 1 (1), 114-120, by Md. A. Abedin and M. Jahirrudin

There is a severe lack in source-separation practices and disposal in Bangladesh. The citizenry is not aware enough, illiterate and educated people alike. Most of the households throw the waste on the streets, lane, and outside of dustbins as and when waste is generated. Thus, dumped waste blocks the manhole, drains and creates water stagnation in many areas on a permanent basis.

The conventional waste management practices require substantial amounts of land (about 140 acres a year) and the cost the municipalities about USD 6 to 30 per ton. Land for waste disposal is also scarce. This cause the sector a top priority for introducing better management practices (and this be a pre-condition for setting up waste-to-energy facilities (as will be discussed further)[59].

Existing regulations and guidelines on waste management

The *Environment Policy* (1992) intends to restrict disposal of municipal, industrial or agricultural wastes in any water bodies like rivers, ponds, and drains. It also discourages open truck transportation during daytime collection of waste.

The *Municipal Ordinance* (1983) authorizes city corporations and municipalities to take the responsibility of removal, collection, and disposal of waste of all categories. The municipal authorities are to make adequate arrangement for removal of refuse from all public streets, public latrines, drains and all buildings and land vested in the municipality and for the collection and proper disposal of such refuse. It also discourages open truck transportation during daytime collection of waste. However, financial and technical capacities of the city authorities are not enough to make it at a satisfactory level.

According to the *Environment Conservation Rule*, 1997, landfill activity by industrial, household and commercial waste is categorized as Red Category activity and therefore undertaking any landfill project must consider environmental impact assessment and NO Objection Certificate (NOC) need to be obtained.

A major issue with existing regulations is their monitoring and enforcement. For example, Dhaka City Corporation Ordinance (1983) provides for the punishment of jail and penalty of BDT 50 to 10,000 for littering wastes on the streets if anyone is found violating the rule. Also, residents have to dump waste in the city corporation dustbins or containers after 7 p.m. However, these rules are never followed as there is no monitoring body to oversee the violation of the law[60]. Many dispose their waste at any time and place (and at will in whatever dustbin or next to it).

The *3R Strategy* was developed with the support of United Nations Centre for Regional development (UNCRD) and Ministry of Environment of Government of Japan[61]. *3R Strategy* proposes a new approach based on 'reduce, re-use and recycle' (3R) and the remaining waste is collected and treated in environmentally sound facilities. In comparison with the conventional approach as sketched above, this means that the waste disposal system is not only seen as an end-of-pipe solution, but the 3R strategy focuses on the entire aspect of waste management from generation to final disposal site, in which waste is not merely seen as not having value, but in which materials can be recovered, refined or recycled for re-use. If the waste is separated and packaged them into separate bags according to kitchen waste, paper, plastics, and electronic parts, it will be easy for concerned authority to collect and separate waste and to recycle. The 3R Strategy's aim was for waste management to achieve complete elimination of waste disposal on open dumps, rivers, and floodplains by 2015, and promote recycling of waste through mandatory segregation of waste at source as well as create a market for recycled products and provide incentives for recycling of waste. Being in 2018, we can observe that this lofty goal is far from being achieved, although the programme has met some success in household-level implementation.

In Bangladesh, the organisation *Waste Concern*, building on the before-mentioned '3R' strategy, whose design it technically supported, has been promoting to include a more decentralised approach, termed "4R" (reduce, recover, recycle, re-use)[62],

---

59 Ibid.

60 *Waste Management in Bangladesh: Current Situation and Suggestions for Action*, by: F. Nasrin, in: International Research Journal of Social Sciences, Vol. 5(10), Oct 2016

61 *National 3R Strategy for Waste Management*, Department of Environment (DoE), 2010

62 Some authors talk of a '5R' strategy, but in which the fifth "R" can have different meaning, for example *re-think*, *re-process*, *repair*, *refuse*,

involving local communities and the private sector. The new approach consists of waste segregation at the source, training and awareness raising and house-to-house waste collection, with the waste transported in an organised way to community-scale transfer stations and small composting plans, and to city-scale composting plants and sanitary landfills. The aim in the approach is to have all of the household waste collected, of which 6% would consist of recyclables, 70-80% would be composted, while 14% of the non-compostable part would end up in landfills.

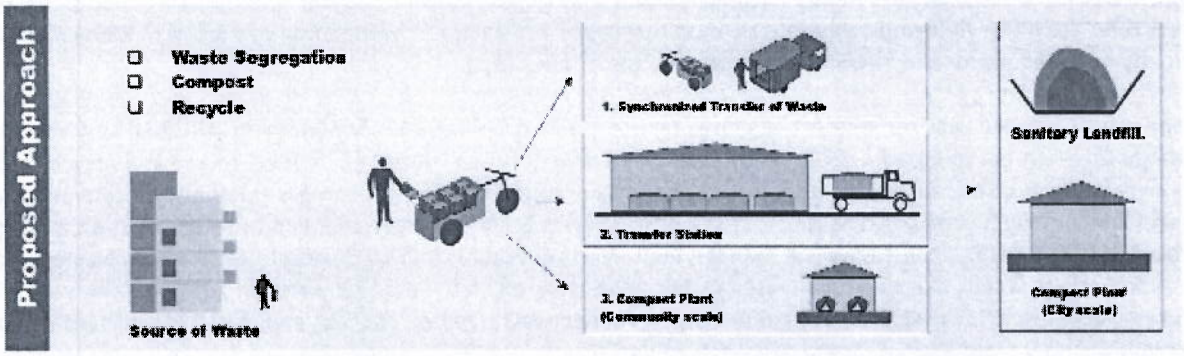
Waste as a resource

This '4R approach locally by *Integrated Resource Recovery Centres* (IRRCs) that can be initiated and operated by municipalities, private-sector enterprises, and civil society organizations, or a combination of all three through different partnership models. IRRCs directly benefit the urban poor, providing informal waste pickers with better, more stable incomes and safer working conditions. The capacity to process waste can vary from 2 to 20 tons per day. IRRCs can be established within neighbourhoods, in several areas in one city or in the outskirts of the city. Key features of an IRRC are the close involvement of the surrounding communities and the small scale of the facilities. Households are trained on how to separate organic and inorganic waste. A single centre can process between 2 and 20 tons of waste a day, serving a population of 1,000-50,000 people. With carefully sorted organic waste, IRRCs use the aerated box method to produce good quality compost (see Box). The compost can be sold at USD 45 per ton. Other income streams for the IRRC are: collection of fees from serviced households, sale of recyclables to junk dealers, the sale of biogas (if the gas from organic waste decomposition can be recovered) and the collection of cooking oil (for sale and conversion into biodiesel). The IRRC approach has provided solutions for decentralized waste management for cities in Bangladesh and creates an opportunity for public-private partnerships. Despite these opportunities, Waste Concern's IIRC scheme has neither been replicated nor scaled-up.

A 2012 study in various cities in Bangladesh found[63], among others, that:

- Per capita waste in Chittagong City Corporation (CC) was 0.34 kg/capita/day, while for Rajshahi CC, Rangpur Municipality

Box 22 Utilisation of organic waste for composting and landfill gas recovery



Source: Community Based Solid Waste Management Through Public-Private-Community Partnerships: Experience of Waste Concern in Bangladesh

and Patuakhali Municipality the generation rates were 0.245; 0.242; and 0.22 kg/capita/day respectively;

- The compostable part varied between 71-85% (Chittagong), 79-85% (Rajsjahi), 68-85% Rangpur and 85-87% Patuakhali. Waste collection in the cities were 42%, 72%, 32%, and 60% respectively;
- Analysis of leachate samples collected from landfill sites of Chittagong City Corporation and Rajshahi City Corporation shows that it contains very high BOD, COD and ammonia content compared to the national standard for discharge to inland surface water

[63] Chittagong, Rajshahi, Rangpur and Patuakhali Corporations. *Study on Municipal Waste Management* (2012), by the Bangladeshi Municipal Development Fund (BMDF)

- The informal sector is playing an important role in recycling of solid waste in the study area, dealing only with inorganic waste. It is estimated that in Chittagong City Corporation are 12% of waste was recycled, and at 4.7 %, 4.8% and 4.6% for Rajshahi City Corporation, Rangpur Municipality, and Patuakhali Municipality respectively
- In terms of disposal of solid waste, it was found that none of the study areas controlled or sanitary landfill sites. In fact, none had any environmental clearance certificate for landfill sites
- Regarding collection of waste, almost all the study areas had a house-to-house waste collection system which should be extended to cover the entire city. By changing the waste collection trucks and improving primary and secondary collection of waste, it would be possible to collect 100% of the waste within the existing budget of the city/town authorities;
- The opportunity for converting organic waste into compost and biogas for Chittagong, compost and biogas plant for Rajshahi and compost plants in Rangpur and Patuakhali.

Waste to energy

The fourth "R" in the '4R' approach stands for 'recovery'. The organic content in the waste can be a source for composting, while the landfill gas that is produced by bio-methanation of the organic content, can be captured, burnt (which converts methane into carbon dioxide which has a lower global warming potential), or better, be put to use for electricity generation or converted into a fuel, referred to as "waste to energy" (WTE). There are two types of technology around the world for waste to energy (WTE) conversion which include a) thermal conversion (incineration, gasification, pyrolysis), and b) non-thermal conversion (landfill gas recovery and use of the gas in direct combustion of gasifiers to generate power or further processing to have refuse-derived fuels (substituting for fossil fuels). Advantages of gasification technology include a great reduction in waste volumes and its ability to process a variety of waste streams, small land size requirement and with output energy of heat and electricity. A major disadvantage of this technology is the requirement of a constant supply of waste feedstock with less than 30% moisture content, which is an issue in Bangladeshi's wet climate. The anaerobic digestion of wet biodegradable waste of the landfill, like wood and vegetables generates low heating-value biogas (referred to as landfill gas). The major disadvantages of anaerobic digestion include the need for vast land areas (an issue in Bangladesh) and the cost of sanitation.

The subject of waste-to-energy has been studies in various articles and reports[64], including the recent *Conducting a Feasibility Study on Waste-to-Energy Conversion in Six Municipalities in Bangladesh* (2017) by the UNDP/GEF SREPGen project. Out of the six sites, the study recommends Mymensingh and Cox Bazaar for piloting WTE plants (gasification, anaerobic digestion; composting). Another study by K. Islam of University of Chittagong (2016) examines the potential for electricity generation by a mix of a) incineration and b) LFG recovery[65]. However, so far, the actual implementation in Bangladesh has been limited to pilot activities in research centres. In Bangladesh, Waste Concern has been conducting R&D in collaboration with Bangladesh University of Engineering and Technology (BUET) to look at the opportunity of generating energy (biogas) from slaughterhouse waste, municipal waste, and fecal sludge. A number of waste-to-energy projects have been proposed by Waste Concern, such as the Integrated Landfill and Resource Recovery Center (IL&RRC) at Jessore, or the CDM activities on composting and waste-to-energy at Matuail, one of Dhaka's landfill sites[66]. However, these projects have been discontinued, or are still under study and there is no (commercial) WTE facility operating[67]. The reason is that proper collection and sorting is often absent and needs to be organised before a landfill can be established, while often, in densely populated Bangladesh, land availability and getting approval for land acquisition form a major barrier in establishing landfill. Government support in terms of subsidy or in any other form (e.g. feed-in tariff for supply of landfill-generated electricity

---

64 Anaearobic digestion: *Feasibility Study of Waste to Energy and Power Generation of Dhaka City*, by Md. Sohel Rana, Thesis, University of Dhaka (2016). Incineration: *Energy Recovery from Municipal Solid Waste*, by Alam, M.D. and Boie, W, paper at Conference on Mechanical Engineering, Dec 2001, Dhaka;

65 *Municipal Solid Waste to Energy Generation in Bangladesh: Possible Scenarios to Generate Renewable Electricity in Dhaka and Chittagong City*, by K.M.Nazmul Islam, in "Journal of Renewable Energy", Volume 2016, Article ID 1712370

66 Including the two CDM projects by Waste Concern and the Dutch World Wide Recycling at Matuail on Landfill Gas Extraction and Utilization (CDM-EB Ref 078) and Composting (CDM-EB Ref 169) of which only the latter reached the stage of issuing certified emission reduction (CER).

67 A project was proposed by the Dutch company World Wide Recycling with Waste Concern (with an estimated investment need of USD 3.5 million for landfill gas extraction and USD 6.5 million for composting at Mutaiil and submitted to UNFCCC CDM Executive Board, but never got implemented.

to the grid) to make WTE economically attractive to the private sector are not available. A few Dhaka-based entrepreneurs who have set-up small-scale compost plants are now struggling for survival.

E.4 Energy efficiency and renewable energy in buildings and the built environment

Energy efficiency in buildings

The amount of energy consumption in buildings is rapidly increasing in buildings in our country together with the rise in new buildings construction. 'Energy efficiency and conservation (EE&C) measures for buildings are as followings:

- Reduction of incoming heat from outside to inside by means of heat insulation, air-tight door/window, and sunshine control;
- Introduction of energy efficiency building equipment and appliance (e.g. air conditioning, lighting,
- Appropriate use, operation, and maintenance of the building and building equipment.

The Ministry of Housing and Public Works (MHPW) has updated the existing Bangladesh National Building Code (BNBC). Bangladesh National Building Code (BNBC) is the mandatory program which provides regulation and/or minimum requirements of building type (office, residence, commercial building, etc.), size (height, floor area), structure strength, indoor condition, construction material, etc. The House Building Research Institute (HBRI) carried out feasibility and suitability analysis to upgrade the Bangladesh National Building Code (BNBC) promoting green buildings and incorporating energy efficiency and conservation (EE&C) elements. The Revised BNBC has been developed for some time but is still waiting for Gazette notification.

Box 23 EE&C issues proposed to be incorporated in the Revised BNCB

Category	Content
Building envelope	• Roof insulation; green roofing • Window-to-wall ratio; window opening • Location (shading; orientation)
HVAC	• HVAC Ceiling and other fans
Hot water supply	• Solar hot water system (SWH)
Lighting	• Lighting system; day lighting features; lighting power density • Occupancy sensors
Lift and escalator	• EE of lift and escalator
Renewable energy (RE)	• Solar PV (roof-top, other) • Other RE
Other	• Water management (re-use of water; EE fitting in toilets)

Source: Energy Efficiency Master Plan up to 2030, SREDA and Power Division, MoPEMR
HVAC = heating, ventilation and air-conditioing

Some of the EE&C in the Revised BNBC quote criteria from other countries, in particular, neighbouring India. However, these would need to be them more compatible to Bangladesh's climate, culture, and manner and more acceptable to its laws and regulations. Regarding energy efficiency and sustainability, the Revised BNBC [68] mentions (see also **Box 23**), among others, to

- Keep 50% of open space of a site of any occupancy as permeable – having green cover or perforated paving.
- Have a vegetation plan for areas over 3 acres
- Have rainwater harvesting system for buildings over 4000 m^2 area
- Maintain a window to wall ratio (as per provided table)
- Maintain 50% green roofing
- Have renewable energy for 3-5 % of the light and fan loads
- Maintain distance between buildings to allow ample light and ventilation.

[68] See Part III *General Building Requirements, Control and Regulation,* Chapter 4 *Energy Efficiency and Sustainability*

India has an energy efficiency building code which is mandatory since 2007 for commercial buildings or building complexes that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. The code is also applicable to all buildings with a conditioned floor area of 1,000 m^2 or greater. The code is recommended for all other buildings[69]. Analysis done during the development of ECBC[70] shows energy savings of 27%–40% in an ECBC compliant building over a typical commercial building, with annual energy consumption of 200 kWh/m^2.

In order to widely promote EE&C for buildings in our country, the application of EE&C requirement issues in EBNBC [Revised] will be implemented and extended in a phased manner (under study by MoHPW). In order to encourage proper and effective EE&C implementation in BNBC, an EE&C Building Manual for local governments, building owners and users, designers, and constructors, will be developed and published by MOHPW. In the whole process and planning, a number of stakeholders will be involved, as indicated in Box 24 below.

The Green Building Guideline (GBG) is a voluntary program and is developing as a guideline for the design and construction of upper-grade EE&C and low environmental impact buildings rather than the buildings under the Revised BNBC. Type of buildings the GBG targets are offices, rental & mercantile (shopping malls), residential, hospitals, airport buildings, schools and hotels in new large-scale projects by both the public and private sectors. The GBG, as a voluntary programme, will be developed to reduce not only energy and water consumptions but looks at the environmental impacts during construction, use and decommissioning of the buildings, at waste management, indoor environmental condition, as well as the use of

Box 24 Role and responsibilities of stakeholders in EE&C in buildings and in BNBC

Category	SREDA-MoPEMR	HBRI-MoHPW	Local govr't	Designer	Developer/ constructor	User
Promotion of EE&C and of EE&C in BNBC	x	x	x			
Formulation of EE&C in BNBC	x	x				
Monitoring and review	x	x				
Information provision	x[1]	x[1]	x[2]	x[3]	x[4]	
Implementation of EE&C measures (compliance)				x	x	x
Implementation of EE&C measures (voluntary)						x
Lifestyle modification; consideration of lifecycle costs;				x	x	x
Other Considerations of 3R					x	x

Source: Energy Efficiency Master Plan up to 2030, SREDA and Power Division, MoPEMR

HVAC = heating, ventilation and air-conditioing

1 SREDA to MoHPW; MoHPW to local government, building owners and users, designers and developers/constructors

2 Local government to building owners and users, designers and developers/constructors

3 Designer to building developers and owners

4 Explanation to building owners and users

sustainable building materials. A Green Building Assessment System will be developed by MHPW, in accordance with the GBG, which is compatible with Bangladeshi's climate, culture, and manner and is acceptable for its laws and regulations. The system will start to be voluntarily basis, and in future, the Green Building Assessment System with GBG will be used as

69 Bureau of Energy Efficiency (BEE). *Energy Conservation Building Code* (2006). The Code applies (a) Building envelopes, except for unconditioned storage spaces or warehouses, (b) Mechanical systems and equipment, including heating, ventilating, and air conditioning, (c) Service hot water heating, (d) Interior and exterior lighting, and (e) Electrical power and motors.

70 The study *High-Performance Commercial Buildings* (by BEE and TERI) looks at two buildings, the Microsoft Building in Hyderabad and the ITC Green Building in Gurgaon, and looks at four aspects, namely building design, building envelope, the lighting system and the HVAC system, and the impact on cooling demand, electric load and the energy performance index (EPI). It finds that if the Microsoft Building would have been conventionally built, cooling demand would have been 2340 TR, electric load 4710 kW and EPI 208 kWh/m^2/yr, with ECBC compliance this is 1770 TR, 3070 kW and 145 kWh/m^2/yr and with additional energy design features these could be lowered to cooling demand of 1560 TR, electric load of 2760 kW and EPI of 129 kWh/m^2/yr. Iif the ITC Green Building would have been conventionally built, cooling demand would have been 1270 TR, electric load 1180 kW and EPI 161 kWh/m2/yr, with ECBC compliance this is 570 TR, 470 kW and 73 kWh/m2/yr and with additional energy design features these could be lowered to cooling demand of 490 TR, electric load of 4290 kW and EPI of 59 kWh/m2/yr.

an evaluation method for certification of "Green building" and/or "Net zero energy building". Green building owners may be rewarded or incentives may be given.

Based on experience in the past, although codes/guides like the BNBC and GBG emphasizes new specific objects (in this case energy efficiency and other eco-friendly elements), when it comes to implementation at the national and local levels, this may be very lax (see the list of barrier and gaps in the Boxes 2, 3 and 4 in Section 3).

The EE&C in the Revised BNBC and the GBC complement a number of other initiatives and measures that will be promoted by the government as part of its EE&C Master plan up to 2030:

- Labelling programme for electric appliances, such as room air-conditioners, ovens and electric water heaters, rice cookers, refrigerators and freezers, TV, three-phase electric motors, irons, washing machines, and lighting[71] (supplemented by minimum energy standards, if necessary);
- Energy management in industrial subsectors.

Apart from mandatory EE&C elements in the Revised BNBC and the voluntary Green Building Guidelines (GBG), the EE&C Masterplan suggest other policy instruments. The state and local governments can choose a range of inducements context wise for promoting green building based on the fiscal outlook, the current level of developments activity, and the scope of the green building program.

The following incentives can be offered to motivate people towards green building:

- Tax incentives are one of the robust and widely used forms of incentives to promote green building. These incentives can be offered in any of the following areas: corporate tax, gross recipients' tax, income tax, property tax or ad valorem tax, sales tax etc.
- Tax abatement in accordance with the existing law of Bangladesh can be the most flexible incentive because municipalities have the opportunity to approve a number of green performance standards and allocate the abatement to any tax jurisdiction.
- Incremental tax rebates, which would be offered at different levels of development, have also been suggested as a means to encourage all parties involved in the development or ownership process to build green. In Bangladesh, the amount of allowable investment equals actual investment or 20% of total income or Tk. 100,00,000, whichever is less. Tax rebate amounts to 10% of the allowable investment.
- Grant programs can be effective in a developing country like Bangladesh and it can be considered in fiscal policy, which can offset some of the increased development costs that arise from a green building project. Grants can be used to subsidize the cost of certification or as lump sum amounts applied to the total cost of the building;
- States and municipalities can establish a low-interest loan fund to be used specifically for green improvements. Bangladesh House Building Finance Corporation (BHBFC) provides credit facilities for construction, repair, and re-modelling of the dwelling which can also provide financing on green building. Jurisdictions can use performance contracting to provide loans at reduced interest rates to developers that agree to build to specified green standards. National Housing Finance and Investments Ltd (NHFIL) can also provide loans in this regard.

At present, almost 1500 companies are active in the real estate sector in Bangladesh and among them, almost 1080 companies are working under the Real Estate and Housing Association in Bangladesh (REHAB). Unfortunately, new commercial apartment and other buildings rarely fulfil the green building criteria. The first challenge is to make the low-carbon and green building concepts knowns amongst buildings designers, developers, constructors, and owners. Also, the scope to promote green buildings is huge for public housing projects.

Since 2008, the Bangladesh Green Building Council (BGBC) has been working to unify stakeholders and to promote tenets of sustainable architecture and green building design principles in Bangladesh, mainly energy and water efficiency (+ renewable energy), waste management, air quality, and sustainable building products. The Council offers Leadership in Energy and Environmental Design (LEED) certifications to interested projects and firms. LEED certification looks at a)

[71] Bangladesh participated in the regional UNDP/GEF "Barrier Removal to the Cost-Effective Development and Implementation of Energy Standards and Labeling Project (BRESL)" which was implemented from 2008 to 2015

innovation (novel features and procedures), b) indoor environment quality (use of natural light and efficient air conditioning, c) materials and resources (responsible construction of waste management and sustainable sources of materials), d) location and transportation (access to public transportation and green vehicles), e) sustainable sites (sufficient green open space and pollution reduction), f) energy and atmosphere (optimising sustainable energy use and production and metering), and g) water efficiency (indoor and outdoor water reduction). LEED, or Leadership in Energy and Environmental Design, is the most widely used green building rating system in the world, initiated by the US Green Building Council. LEED provides a framework to create healthy, highly efficient and cost-saving green buildings. LEED certification is a globally recognized symbol of sustainability achievement. In Bangladesh, about 573 buildings have been registered, of which some 81 have been awarded LEED certificates up to date[72], equivalent to 14,640 ft^3 surface area. Apart from LEED, there are several other rating systems utilised globally, as indicated in the Box below.

The IFC of the World Bank Group has sponsored the development of EDGE (Excellence in Design for Greater Efficiencies). EDGE certification rewards developers who implement strategies to reduce energy and water use in their buildings, as well as embodied energy in materials. Offered at a modest cost, EDGE certification includes a preliminary certificate at the end of the design audit, and final certification after a construction audit. The preliminary EDGE certificate can be used to promote the project with the EDGE brand and develop a value proposition for customers who wish to own, rent or work in a green building. EDGE is available for new building designs as well as for existing buildings. A project that reaches the EDGE standard of 20 percent less energy use, 20 percent less water use, and 20 percent less embodied energy in materials compared to a base case building.

See www.edgebuildings.com.

Box 25 Building rating systems and features

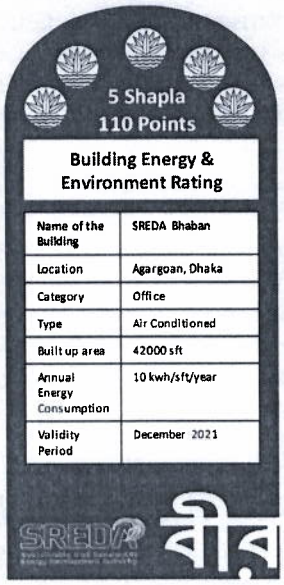
Country	Rating System	Observation
U.S.A (country wise chapter)	USGBC LEED (Leadership in Energy and Environment design)	Widely accepted Rating system and also popular in Bangladesh 570+ Projects in Bangladesh
UK Europe & Commonwealth	BREEAM Building Research Establishment Environmental Assessment Method	Mother of all rating systems
Japan	CASBEE Comprehensive Assessment System for Built Environment Efficiency	Very Comprehensive rating for Building and Cities
Australia/ Newzeland	Green Star	Customize and similar to LEED
Singapore	Green Mark	
IFC (world wide)	EDGE Excellence in Design for Greater Efficiencies	Simple and easy online based tool
India	GRIHA Green Rating for Integrated Habitat Assessmen.	Popular in India
	IGBC	Operated by CII and with wide range of rating for each types of Buildings Origin from LEED
	ECBC Energy Conservation Building Code	Developed by BEE and Mandatory at 12 state of India

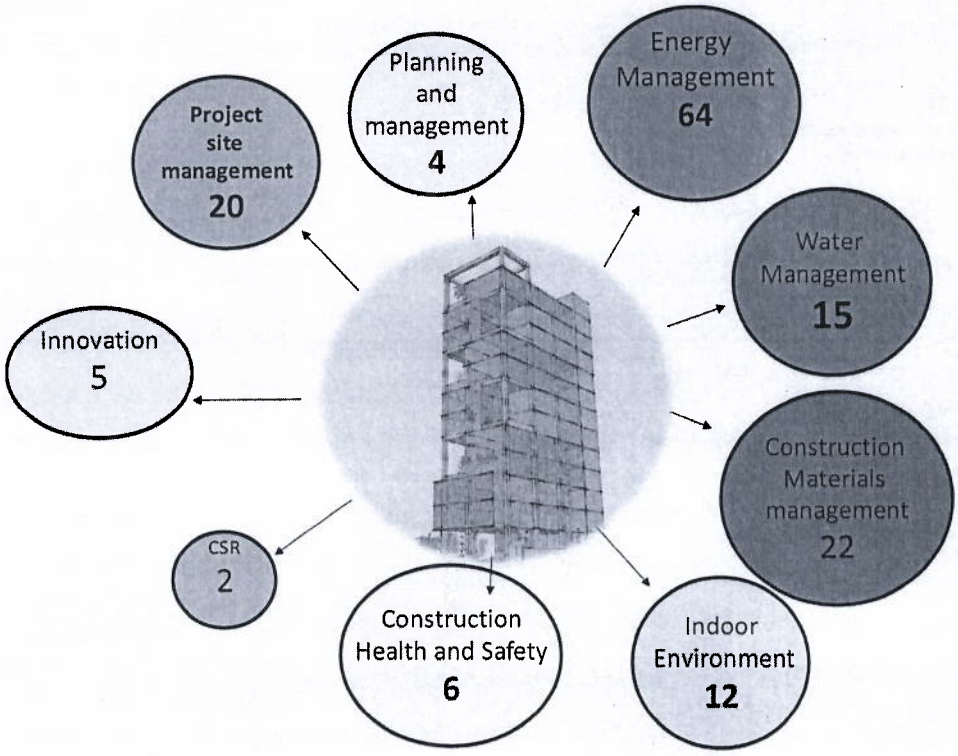
Source: PowerPoint *'Promoting Low Carbon Urban Development in Bangladesh' Project covering aspects of Green Building*, by N. Rahman (SREDA).

72 http://www.gbig.org/places/77; and PowerPoint *'Promoting Low Carbon Urban Development in Bangladesh' Project covering aspects of Green Building*, by Nazifur Rahman (SREDA)

Box 26 Proposed Bangladesh building energy and environment certification and label

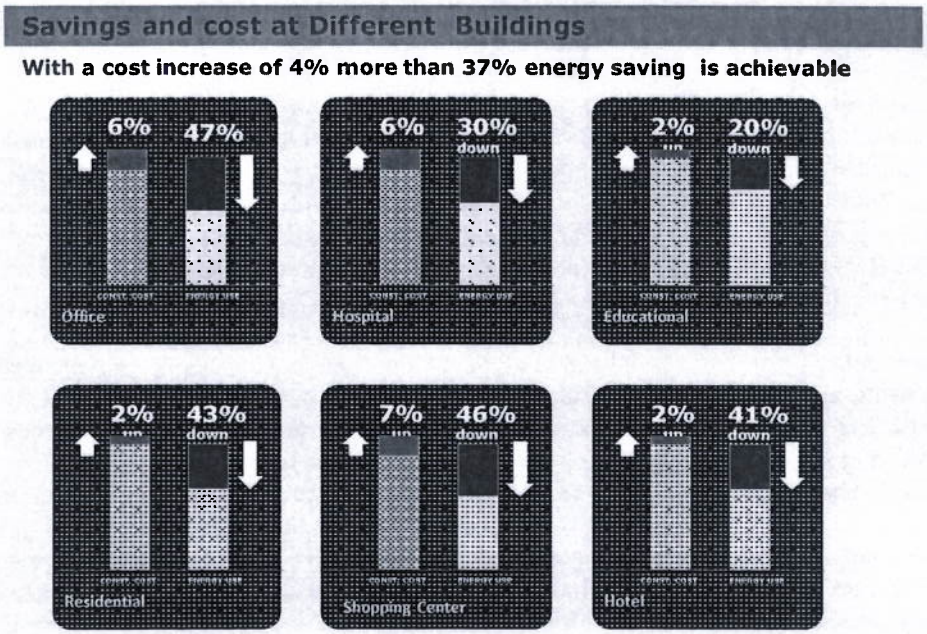
Certification level	Points
	40-50
	51-60
	61-70
	71-90
	91-150
	150 points





Source: PowerPoint *'Promoting Low Carbon Urban Development in Bangladesh' Project covering aspects of Green Building*, by N. Rahman (SREDA)

Box 14 Potential savings in different types of buildings



Source: PowerPoint *'Promoting Low Carbon Urban Development in Bangladesh' Project covering aspects of Green Building*, by N. Rahman (SREDA)

The HBRI has carried out a survey among 30 buildings in size categories (office, hospital, schools, shopping centre, hotel) with a total floor area of 796,000 m^2 (on average about 10 years old)" and of which 10 were 10-storied buildings. The survey found that average energy consumption was 277 kWh/m^2/year (half of the surface area was air-conditioned on average and 87% of the buildings used single glazing. It further found that with a cost increase of 4% in construction, more than 37% of energy savings can be achieved (see Box 27).

SREDA plans to introduce a building energy and environment rating system (that builds on the above-mentioned rating systems used globally but incorporate local climate conditions and other country characteristics) and introduce a label with five certification levels, based on a system of maximum 150 points (see Box 26).

Sustainable production of bricks and resource-efficient bricks

The brick sector in Bangladesh contributes about 1% of gross domestic product and generates employment for about 750,000 people. The brick sector has grown rapidly in the last decade, led by continuous economic expansion since the 1990s and the subsequent construction boom. Available market data indicate that there are about 6,900 brickfields in Bangladesh, 92% of which are polluting. These produce about 22.7 billion fired clay bricks and demand is currently growing at 7-8% a year[73].

Many construction projects use traditional bricks that are produced by burning topsoil from agricultural lands. Besides releasing a heavy amount of carbon into the atmosphere[74], they damage the environment through their heavy use of clay mined from agricultural lands, causing depletion of topsoil[75] and arable land degradation. Around 30% of brick kilns use

---

[73] Source: ADB Sector assessment (summary): brick (2011-12) and *Green Building*, Year 1, Issue 2 (Jan-June 2017)

[74] Brickfields consume 4.78 million tons of coal a year and 1.9 million tons of firewood, emitting 9.8 million tons of CO_2 annually (source: ADB, 2016)

[75] The government has a vision of substantially reduce the production of traditional bricks and switch to alternative bricks by 50% by the year of 2021 (source: SWITCH-Asia project Promoting Sustainable Building in Bangladesh project)

firewood illegally for brick burning, thus aggravating deforestation. Acid deposits from brick kilns negatively affect agricultural productivity.

Brick making is an energy-inefficient industry based on small-scale kilns with limited financial capacity and dominated by a single raw material (clay) and product (solid clay brick). There are generally six types of brick kilns in Bangladesh: (i) bull's trench kilns (BTKs), (ii) fixed chimney kilns (FCKs), (iii) improved zigzag kilns, (iv) vertical shaft brick kiln (VSBKs), (v) Hoffman kilns, and (vi) tunnel kilns. Prior to 2004, most of the kilns in Bangladesh were BTKs, a relatively primitive design developed over 150 years ago After the promulgation of the brick burning rules in 2002, most BTKs were converted to FCKs, which are more energy efficient, but essentially still a BTK, with a chimney added. Of the most efficient types, VSBK and HKK still only a few are in operation.

The long-term government policy or strategy should aim to (i) move from traditional brick-making technologies (i.e., FCKs) to cleaner ones (VSBKs, HHKs, and tunnel kilns), particularly in the promotion of most advanced tunnel kilns; (ii) develop modern, energy efficient bricks such as perforated and hollow bricks and alternative construction methods that are less energy intensive and use raw materials other than topsoil clay; (iii) modernize the brick sector in Bangladesh by rationalizing it into fewer businesses with large production capacity to attain technical, operational, and environmental efficiencies.

A number of donor-funded initiatives address or have addressed the issues and barriers to a more sustainable production of resource-efficient bricks. Lack of targeted financing has been one of the main obstacles to the development of the brick sector. The issue is being addressed since 2012 by the ADB Financing *Brick Kiln Efficiency Improvement Project* by setting up a designated credit facility (with USD 50 million provided by ADB) at the Bangadesh Bank, catalyzing domestic resources, in order to provide finance for the upgrading and construction of more energy-efficient brick kilns. The UNDP/GEF *Improving Kiln Efficiency in the Brick-Making Industry (IKEBMI)* was implemented during 2010-2016 with a technology support component, demonstration projects, managerial and technical capacity building, and awareness-raising activities as well as a policy-regulations component. The EU-funded SWITCH-Asia project *Promoting Sustainable Building in Bangladesh* project is implemented by Oxfam in partnership with the Bangladesh Environmental Lawyer Association (BELA), Housing and Building Research Institute (HBRI) and Jagorani Chakra Foundation (JCF). The project will primarily influence patterns of consumption, promoting the purchase and use of alternative bricks and other green construction materials. Unlike the clay bricks, the alternative non-burnt bricks do not require the use of topsoil[76] but are made of other materials, such as dredged soil from riverbeds, cement, and other ingredients.

The Green Building concept promotes the use of sustainable building materials, i.e. the use of fired clay bricks that are used in the most energy-efficient way possible (in Bangladesh: VSBKs, HHKs, and tunnel kilns) and use of alternative non-fire bricks. The government should promote the use of such resource-efficient bricks in its own public infrastructure, and put restrictions on the use of inefficiently produced bricks. Architects and engineers can play a major role in making eco-friendly building materials popular at the consumer level. Awareness and capacity building amongst masons are important as they influence buyer's decisions on the procurement of bricks and other building materials.

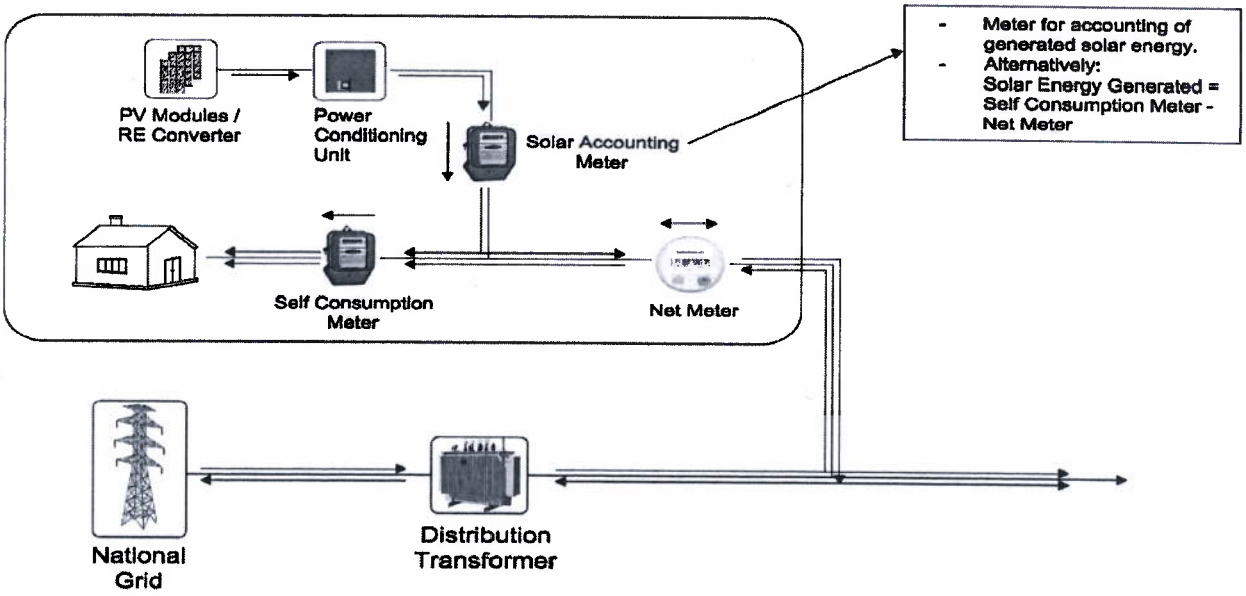
Rooftop solar PV and net-metering

The use of renewable energy is attractive for solar energy application in many developing countries. This technology referred to as photovoltaic (PV), converts the solar energy into electricity through electromagnetic means when PV module is exposed to sunlight. In rooftop PV systems, the solar panels are integrated into the building, typically installed on the roof, it produces electricity at day time and directly convert them into AC power and use for the building's loads during day time or export to the grid and save on the electricity bills. Unlike off-grid systems, there is no need to store energy in batteries and this reduces the need for costly batteries.

In November 2010 the Power Division instructed distribution utilities to request new applicants for residential connection to meet 3% of their demand by installing solar panels if sanctioned load exceeds 2kW. Industrial and commercial customers

[76] According to the Bangladesh Brick Manufacturing Owners Association 1,270 million cubic feet of top soil are being used to serve an annual demand of around 15-17 billion of bricks for both residential and office purposes

Box 15 Typical net-metering architecture



Source: Evolution of Rooftop PV in Bangladesh, PowerPoint by P.Maidan, 3rd Rooftop Summit, New Delhi, May 2018

with load up to 50kW are required to meet 7% of lighting & fan load from solar and when load exceeds 50kW it is 10%. The garments industry should meet 5%of lighting and fan load from solar.

The Power Division has drafted the net-metering regulations. Once a 'net-metering policy' is formally approved by the Government, the power distribution entities like DESCO, DPDC, REB and PDB will be obliged to buy electricity from their own consumers, especially the rooftop solar users. Eligible consumers are domestic/residential consumers, commercial and industrial consumers (having at least 10 kW of electricity load). The installed RE capacity can be a maximum of 70% with respect to the consumer's maximum demand or sanctioned load. In most cases, the tariff for excess power delivery to the grid is the same as the tariff that can be saved in case of self-consumption. For consumers with differentiated tariffs (peak and off-peak), the injected power will be calculated at the lowest (off-peak) tariff. Tariff-wise, self-consumption, and net-metering are the same. For consumers, it has the additional advantage that rooftop solar plant can deliver power during load shedding, at prices lower than the alternative of diesel generators.

Recent GIZ and IDCOL studies show that PV rooftop systems are viable on commercial and industrial buildings[77] (at the current tariff of about BDT 8-11 as compared to the rooftop PV price of about BDT 9/kWh; see also Annex F). From every 100 ft^2 about 1 kW of electricity can be generated. For utilities a disadvantage is the loss of sales revenue, however, one advantage is that it reduces day peak load demand and transmission and distribution losses as power is consumed at the point of generation. Grid impact studies are now planned to estimate the impact of larger-scale rooftop PV on the grid and the need for integrating connection standards in the Bangladesh grid code.

The first key rooftop project installed at the Prime Minister's office. From then onwards, various government institutions and the private sector have embraced solar solutions as a form of alternative form to meet the partial energy required. Although the total installed capacity of rooftop solar is less than 25 MW till date, estimated capacity in Bangladesh is about

[77] *Evolution of Rooftop PV in Bangladesh*, PowerPoint by P.Maidan, 3rd Rooftop Summit, New Delhi, May 2018

Box 16 The role of energy service companies in EE and RE in built environment

Although the advocates of energy efficiency claim that EE is a 'win-win' proposition as implementation of EE will reduce both cost and negative externalities, even (potential) projects with convincing returns remain largely unimplemented or under-implemented. Upfront cost also poses challenge to the implementation of EE (and PV) in building projects. Often, decision-makers are unaware of the benefits of a low-carbon investment, or are uncertain on the future returns. Worse, if two parties are involved. For example, a building owner will want to reduce capital cost (preferring lower investment in inefficient buildings), while the tenant wants to reduce the operating cost (that is, the utility bills). Energy cost may be a small part of overall operation, production and maintenance cost. Building and industry owners, due to such bias and/or market failures, put less worth on future returns from energy savings.

In a traditional 'CAPEX' model, a company may install the RE facility (rooftop PV in a building; WTE on a landfill) or realise the EE improvements, and the O&M (operation and maintenance) is done by the client itself or the service company. The client absorbs the risks in terms of project viability. However, an intermediary can minimize the associated risks, for example, by arranging finance or providing assurance over energy savings. An Energy Service Company (ESCO) is a such an intermediary, that is, a legal entity, that delivers EE improvement or RE production services (and usually owns the system) in a user's facility or premises, and assumes some degree of financial risk during the process. The payment for the services delivered is performance based as agreed between ESCO and the service recipient.

There are two ESCO models. In a shared-savings model, the ESCO carries out energy audits or assessment, arranges appropriate finance to cover the upfront capital cost of the project and implements the project at the industry premises. Once the project is implemented, the ESCO ensures proper monitoring and verification (M&V) of energy savings or RE production. The client pays the ESCO a percentage of its achieved savings (or RE production) from the project or a fixed amount subject to ex-ante calculation of energy savings (or production), sufficient for the ESCO to repay the upfront investment to its lenders, cover M&V and any other associated costs. In a guaranteed savings model, the client arranges finances for the project from suitable bank or financial institution and implements the project with technical support from the ESCO. The client also meets the periodic debt service obligations to the bank or financial institution. The ESCO bears no responsibility of financing project and repayment to the lender, However, the ESCO provides guarantee on minimum monthly energy savings (or RE production), as calculated ex-ante during investment decision, to the client.

In Bangladesh, GIZ has supporting ESCO-type projects on efficient lighting in the garment industry with BUET as technical partner*). In future, ESCOs can be instrumental in meeting the energy efficiency and renewable targets of government plans. Commerce and industry are interested in sales of products and/or services, while landfill owners manage waste, rather than having interest or experience in energy management or sustainable energy production. An ESCO can function as a one-stop-shop energy service provider and implement the appropriate EE, RE or WTE solution, while its risk mitigation features will help the clients absorb the benefits of the EE or RE intervention. With increasing demand, the ESCO may be able to provide the service at a lower cost to the clients due to economies of scale.

*) *Reducing Energy Efficiency Gap in Bangladesh: Role of ESCO as intermediary*, by S. Alam and M. Anam (GIZ), at Annual Banking Conference, 2016, Bangladesh Institute of Bank Management

1000 MW among which 400 MW will be on (semi-)government buildings and about 400 MW on the rooftop of garments and textile buildings (having about 42 million m^2 of roof space)[78]. The Bangladesh Power Development Board (BPDB) has recently tendered 200MW of grid-connected solar PV projects to be developed across four locations in the country. One example is a 790 kW grid-connected rooftop solar portfolio across several government buildings in Jamalpur District. The rooftop projects will be installed above several office buildings, a 250-bed hospital, a nursing institute, a district education office building, and a judicial court to name a few. The project sponsor will be selected through a competitive bidding process including technical, commercial and financial proposals as well as a tariff proposal[79].

[78] Ibid.

[79] https://www.pv-tech.org/news/bangladesh-tenders-for-nearly-1mw-rooftop-project-on-government-buildings

Annex F. CALCULATIONS OF TARGETED ENERGY SAVINGS AND GREENHOUSE GAS EMISSION REDUCTIONS

F.1 Direct and indirect GHG emission reduction estimates

GEF projects typically focus on facilitating future market development, addressing the causes of the development and environmental problem, and addressing barriers to put the right conditions in place so that emissions and energy needs will not rise or rise less in future. A requirement of any GEF climate change mitigation project proposal is to provide estimates of the emission reductions, "*direct*" emission reduction (caused by the Project-supported projects of leveraged investments, Outcome 2), and "*indirect*" emission reduction (caused by the implementation of the policies and planning, capacity building and awareness creation put in place, Components 1 and 3). The term "consequential" emission is now sometimes used for what previously was called 'indirect', although both terms will be used in this Annex.

Direct emission reduction

The following table presents the summary of the CO_2 emission avoidance due to the implementation of investments in EE improvements in (public and private) buildings, integration of solar PV in buildings, and waste-to-energy (WTE) projects of Component 2 of the Project.

Waste to energy

It is assumed that two waste-to-energy projects will be realized in the timeframe of the Project, one with a public and one with a private entity. Regarding the public entity, one partner city will realise a WTE project associated with its municipal waste management plan. One candidate is Narayanganj City which produces about 350 tons of solid waste a day, of which 290 tons is collected (the rest of the garbage is left are unattended or locally dumped on the riverside or canals which results in serious environmental degradation and public-health risk to the local inhabitants). The proposal is to acquire 9.5 hectares of land to develop a sanitary landfill near Siddirganj in Narayangani City[80] to be able to store more collected waste. The LCUD will support Narayangang to add to the existing landfill plan, a) composting facility, and b) a methane recovery and utilization facility (using the gas to generate electricity for the landfill's own use and to supply to the grid).

An example of a possible private sector project is the demonstration project proposed by the international NGO Practical Action (PA). The PA proposal is based on an integrated solid waste management approach, which will include a) community-based waste collection, b) disposal and recycling at the waste facility, and c) recovery and sales of products: 1) organic compost, 2) capturing landfill gas and processing into compressed biogas that can be used as vehicle fuel (replacing diesel in trucks), and processing the bio-slurry into organic fertilizer[81].

A proposal was submitted to the CDM Executive Board for a composting facility (USD 6.5 million investment, processing 700 tons of waste a day and generate 488 kilotons of CO_2 over an 8-yr period) and waste-to-electricity (USD 3.5 million, generating generate 990 kilotons of CO_2 over an 8-year period, at 3-6 MW generation capacity) at Dhaka's Matuail landfill, developed by Waste Concern with a Dutch investor, World Wide Recycling Ltd[82]. However, the projects never reached the implementation stage. A recent study on was carried out by the UNDP/GEF SREPGen Project[83] on the possibilities for WTE in six municipalities, Mymensingh, Cox"s Bazar, Sirajganj, Dinajpur, Habiganj and Jessore, in which two options are

[80] The maximum capacity will be 1.15 million tons with a disposal capacity of 84.3 kilotons of waste a year. The most serious problem will cause by landfill gases explosion and/or fire hazard. In order to prevent fire and/or explosion hazards, impacts on ecological system and or offensive odour to surrounding areas, gas venting facilities as part of semi-aerobic system of waste decomposition will be installed in future. Source: Narayanganj DPP (Development Project Proposal; draft 2018)

[81] *Low Carbon Development Initiatives in Urban Context: Current Programmes*, by U.K. Saha, Practical Action, 2018

[82] Project Summary (2004), *Landfill Gas Extraction and Utilisation at Mantuail Landfill Site*, UNDP/Waste Concern; *Composting of Organic Waste in Dhaka*, UNDP/Waste Concern (2004)

[83] *Conducting a Feasibility Study in Waste-to-Energy* Conversion *in Six Municipalities in Bangladesh*, SREPGen-UNDP/SREDA (2017)

considered to convert, i.e. gasification of organic waste, and anaerobic digestion, and use the captured gas to generate power. The detailed analysis It has been shown in this study that efficient waste management and treatment systems not only allow to reduce the peak emission by a factor of 1.5 to 6.7 but also allows to reduce drastically and on a long-term basis the quantity of GHG released into the atmosphere. It further concludes that the mixed MSW may be too wet, associated with a too low calorific value to be incinerated or gasified properly, requiring a pre-treatment step involving sorting and drying and auxiliary fuel, thus adding to investment cost. Therefore, the anaerobic digestion module is comparatively suitable in terms of a technological point of view. However, financial viability is questionable (the study gave negative IRRs), however, indicating that "due to the limitation of cost estimation of commercial project, developing a decision-making financial business model proved difficult".

For the purpose of estimating GHG emission reduction, two model WTE facilities have been calculated, based on a) estimated of the LFG (landfill) extraction (generated through anaerobic decomposition of the organic content of the waste) and power production and b) using organic content for compost production. The CO_2 savings come from a) composting, b) use of part of the captured LFG as fuel to replace diesel, and c) avoided LFG emissions (assuming that the LFG part not used

Box 30 Estimates of GHG emission reduction, costs and benefits of waste-to-energy projects

Waste-to-energy (LFG for electricity)			Waste-to-energy (LFG for CNG)		
Investment compost+ WTE	**3,035,295**	USD	Investment LFG to CNG	**3,993,375**	USD
Power	**0.8**	MW	Energy content gas	**35**	
Methane cpntent	**0.51**		Energy content LFG	**17.94**	MJ/m3
Energy content LFG	**17.94**	MJ/m3	Energy content diesel	**33200**	MJ/m3
	4.98	kWh/m3			
Efficiency	**29%**	Engine plus compressor			
Production (average)	**5,802**	MWh/yr			
LFG extraction (average)	**4,042,580**	m3/yr	Diesel replaced	**3,369**	m3
Operating	**7,500**	hrs	LFG extract (av.)	**6,233,968**	m3
CO2-eq content	**7.526**	kg/m3 LFG	CO2-eq content LFG	**7.526**	kg/m3 LFG
CO2 grid	**670**	kgCO2/MWh	CO2 content diesel	**2,800**	kgCO2/m3
Compost production	**15,565**	ton/yr	Compost production	**15,565**	ton/yr
Avoided CO2, composting	**21,932**	tCO2/yr	Avoided CO2, composting	**21,932**	tCO2
Avoided CO2, LFG extraction	**30,424**	tCO2/yr	Avoided CO2, LFG extraction	**46,917**	tCO2/yr
Avoided CO2, electricity	**5,025**	tCO2/yr	Avoided CO2, diesel	**9,432**	tCO2/yr
Total CO2 reduction	**57,381**		Total CO2 reduction	**78,281**	tCO2/yr
10 yr period	**573,811**		10 yr period	**782,805**	tCO2
O&M	165,207	USD/yr	O&M	217,354	USD/yr
Annualised cost investment	907,386	USD/yr	Annualised investment	1,063,309	USD/yr
Total annual cost	**1,072,593**	USD/yr	Total annual cost	**1,280,663**	USD/yr
Revenue (compost)	560,346	USD/yr	Revenue (compost)	560,346	USD/yr
Revenue (at 0.138 USD/kWh)	781,877	USD/yr	Revenue (sale of fuel)	1,169,032	USD/yr
Net revenue (at 0.138 USD/kWh)	**269,630**	USD/yr	**Net revenue**	**448,715**	USD/yr
Assumed tariff: wind feed-in / commercial sales		0.135 USD/kWh	Diesel price	0.77	USD/litre
			CNG price	0.37	per m3
			Price of compost	36	USD/ton

Data are based on info in SREPGen-UNDP/SREDA (2017), Practical Action (2018), UNDP/Waste Concern (2004) *Waste to Energy: A New Dimension in Generating Electricity in Bangladesh,* in IACSIT International Journal of Engineering and Technology, Vol. 4, No. 4 (2012), by K.F. Shariar and H. Al Bustam. CDM Project Design Document, *Landfill Gas Extraction and Utilization at the Matuail landfill site Dhaka* (2004). *Technical and economical feasibility analysis of energy generation though the biogas from waste in landfill,* Viana de Abreu et.al., Journal of Petroleum Technology and Alternative Fuels Vol. 2(6), pp. 95-102 (2011); *Pre-Feasibility Analysis for the Conversion of Landfill Gas to Liquefied Natural Gas to Fuel Refuse Trucks in India,* Texas Transportation Institute (2009); *Promoting Methane Recovery and Utilisation from Mixed Refuse in China,* UNDP/ Ecosecurities (2003); CDM Project Design Document, *Uganda Municipal Waste Compost Programme,*
Diesel price taken from www.globalpetrolprices.com (Jul 2017). Electricity price, based on wind feed-in tariff (sale to grid, USD 0.135 USD/kWh), commercial sales tariff (USD 0.138 USD/kWh)

to replace diesel is burnt). The cost-benefit calculations (see Box 30) show that these projects can generate net annual revenues (depending on actual tariffs and fuel prices), although payback times would be around 9-12 years.

Energy efficiency in buildings

According to a BRAC University study, Dhaka's buildings are quite inefficient and the consumption of electrical energy can be significantly reduced up to 8%-15% energy reduction in electrical equipment and up to 28%-45% in lighting by replacing them with more efficient components[84]. Energy efficiency opportunities in public, industrial and commercial buildings can be found in:

- Space cooling and ventilation (using efficient components, proper use, and maintenance, use variable speed drives in fans, control and monitoring of air conditioning and ventilation; take advantage of natural ventilation, keep space cooling at acceptable levels);
- Hot water (use of solar water heating; water-saving devices, regular maintenance for optimum performance, awareness on water usage; use efficient boilers and isolate ducts and pipes, and maintain boiler and piping system; recovery and recycling of hot water
- Lighting (use low-energy lighting, such as LEDs; regular maintenance; occupancy sensors and switch-off policy);
- Efficient office and small power equipment (with turn off, power-down, timers);
- Low-loss electric motors, variable-speed controls
- Building envelope (insulation properties of windows, roofs and windows; regular maintenance and check on moisture levels; clever use of curtains and blinds; improved glazing; design of buildings for controlled admission of natural lights)
- Apply combined heat and power (CHP) schemes.
- Smart metering and control systems to modulate supply in real time.

The table on the left presents energy savings and corresponding that can be obtained in a typical hotel in a tropical zone by applying measures as mentioned above in retrofit. Thus, in this example, the energy performance index (EPI) of the hotel buildings is improved from the original 390 kWh/m^2 to 323 kWh/m^2.

Box 31 Energy savings in an average hotel

Example, hotel (average)		
Size of the hotel	100	room
Floor space	4636	m2
Energy consumption (before)	1,808,752	kWh
Energy consumption (after)	1,496,228	kWh
Savings	312,524	kWh
Investment	171,598	USD
Tariff (commercial)	0.138	USD/kWh
Monetary avings	43,067	USD/yr
Payback	4.0	yrs
CO_2 reduction	209	tCO_2/yr
Lifetime EE measures	12	yrs
Cumulative CO_2 reduction	2,513	tCO_2

EPI (before)	390	kWh/m2
EPI (after)	323	kWh/m2

Improvements	**Savings kWh**	**Investment USD**
Air con	143,142	108,319
Control	31,969	24,187
Exhaust fan	1,363	786
Ligthing	35,158	10,572
Maintenance	73,552	8,731
Pool pumps & pumps	11,604	2,518
Window film	14,828	11,016
Other	908	5,469
Total	**312,524**	**171,598**

Source:
Based on *Energy Efficiency and Micro-Generation in Caribbean Hotels Consultancy,* CHENACT (2012); *High Performance Commercial Buildings,* Bureau of Energy Efficiency; India
Grid emission factor of 670 kgCO_2 per MWh (www.doe-bd.org/gef.html)

Of course, this is an approximation, the actual savings will depend on the type of building and baseline, climatic conditions, size of the building. In a similar way, the energy savings in a typical hospital, office building, shopping mall, school, etc, can be calculated and a summary is provided in the table in Box 32.

84 *Energy Footprint of Selective Commercial Buildings in Dhaka,* Thesis, by T. Hassan, BRAC University (2015)

Box 17 Energy savings in larger commercial and public buildings

	Surface area (m^2)	Investment (USD)	Savings (kWh/yr)	Savings (USD/yr)	Payback (yr)	GHG reduction (CO_2/yr)	GHG reduction Lifetime
Commercial							
Hotel	4,636	171,598	312,524	43,067	4.0	209	2,513
Office	4,626	99,370	142,000	19,568	5.1	95	1,142
Shopping mall	8,632	73,286	276,225	38,065	1.9	185	2,221
Public buildings							0
Institute	9,988	104,334	476,625	33,306	3.1	319	3,832
Hospital	7,599	148,542	368,275	25,734	5.8	247	2,961
School	4,203	211,915	336,934	23,544	9.0	226	2,709

Source:

Data of **Error! Reference source not found.**; High *Performance Commercial Buildings,* Bureau of Energy Efficiency; India*; Situation Analysis of Commercial Buildings in India* (Bureau of Energy Efficiency, November 2008)

Renewable energy (rooftop solar PV)

The Boxes 33 and 34 below provide two calculation examples of the installation of PV systems on rooftops on buildings, one for a 500 kW system on a public building (e.g. school, institute) and the second for a 1 MW system on a commercial or industrial building. The analysis shows that profitability will depend on the type of tariff. At the current (commercial) tariff, rooftop PV based on net-metering are viable (in local currency cost of energy of BDT 9 per kWh versus average tariff of about BDT 8-11 per kWh, but not for public institutions or residential houses (yet) that pay a lower tariff. Box 32 and **Error! Reference source not found.** show revenue estimates for both tariff; at the lower tariff the PV system would be loss-making, but at the higher tariff would yield a net revenue.

Box 18 Analysis rooftop PV on a smaller building

Lifetime	12		Area	3134	m2
Capacity PV system	501	kW	Insolation	5.06	kWh/m2/day
Tariff (institutions)	0.070	USD/kWh		1846.9	kWh/yr/m2
Tariff (commercial)	0.138	USD/kWh	Irradiation	5788185	kWh/yr
Energy production	926,110	kWh/yr	Efficiency PV+system	16%	
Investment cost	634,801	USD	Energy supplied	926109.5	kWh/yr
Annualised cost	93,166	USD			
O&M cost	7,692	USD/yr	*Cost of PV system*		
Total cost	100,858	USD/yr	PV panels	404,032	
Revenue (tariff institutions)	64,715	USD/yr	Inverter	53,846	
Revenue (commercial tariff)	127,622	USD/yr	Balance of system	92,308	
Cost of generation	0.109	USD/kWh	Installation, etc.	84,615	
CO_2 reduction	620	tCO_2/yr	*Total cost*	*634,801*	
Cumulative reduction	7,446	tCO2			

Source:

Based on *Feasibility Study of Grid-Connected Rooftop-based Power Plant,* A. Jain and S. Gosal, in: International Journal of Technical Research & Science, No.: 2454- 2024 (online); *Estimation and Analysis of Rooftop Solar System in Bangladesh,* by: J. Azad, Thesis, Institute of Energy, University of Dhaka (2016). Grid emission factor of 670 $kgCO_2$ per MWh (www.doe-bd.org/gef.html). Tariffs taken from Daily Star (Nov 2017)

Box 34 Analysis rooftop PV on a larger building

Capacity PV system	1000	kW			
Tariff (institutions)	0.070	USD/kWh	Average residential tariff	0.068	USD/kWh
Tariff (commercial)	0.138	USD/kWh	Average commercial tariff	0.138	
Energy production	1,591,910	kWh/yr	Averrage institutional tariff	0.070	
Investment cost	1,081,496	USD	Average public lighting	0.094	
Annualised cost	158,724	USD/yr	Exchange rate	82.00	BDT/USD
O&M cost	13,105	USD/yr			
Total cost	171829	USD/yr			
Revenue (tariff institutions)	111,240	USD/yr			
Revenue (commercial tariff)	219,373	USD/yr			
Cost of generation	0.108	USD/kWh			
CO_2 reduction	1,067	tCO_2/yr			
Cumulative reduction	12,799	tCO_2			

Source:
Based on data of REF _Ref534920033 \h * MERGEFORMAT Box 33. Feasibility Study of Grid Connected Rooftop Solar PV Setup in BVUCOEP Campus, A. Jha, et.al. in IJESC (Vol.6, Issue, No.4). Grid emission factor of 670 kgCO2 per MWh (www.doe-bd.org/gef.html). Tariffs taken from Daily Star (Nov 2017). Exchange rate: OANDA (mid 2018)

The direct GHG emission reduction will be due to the investments in rooftop PV in 13 public and private buildings, energy efficiency in 30 public and private buildings and two waste to energy projects (Component 2 of the Project). Based on the GHG emissions estimates for these cases as given in the Boxes 27 to 31, the **total direct GHG emission reduction** of the LCUD Project can be determined. This is summarised in the table of **Error! Reference source not found.** below:

Box 35 Summary of direct greenhouse gas emission reduction (due to LCUD investments) [85]

Type	Number	Investment USD	Energy savings/substit kWh/yr	GHG emission reduction	
				Annual tCO2/yr	Cumulative tCO2
Waste to energy	2	7,028,670	36,867,849	135,662	1,356,616
Rooftop PV - public	3	1,904,404	2,778,329	1,861	22,338
Rooftop PV - private	10	10,814,963	15,919,102	10,666	127,990
EE in public buildings	6	929,582	2,363,668	1,584	19,004
EE in private buildings	24	2,754,029	5,845,990	3,917	47,002
Total		**23,431,649**	**63,774,938**	**153,689**	**1,572,949**

Consequential ERs (CERs) are those resulting from indirect replications that are stimulated by the project policy support capacity building and finance strengthening activities. The replications generating CERs are those that do not receive any direct support from the project, either as TA or investment, and thus may be called "indirect replications." The bottom-up approach used here is based on a *simple replication factor (RF)* deemed feasible by the project team to estimate the amount of systems installed during the ten years influence period. Thus, the **consequential GHG emission avoidance** 4,719 kilotons of CO_2.

[85] The credit line of IDCOL for RE and EE (in built environment) is currently USD 65 million (see Co-financing Letter), which is 3 times larger than the investment of USD 22 million associated with the direct GHG emission reduction. The Project already assumes that there about 100 investment proposals identified, of which about 45 will reach implementation or financial agreement stage by the end of the LCUD Project. Other proposals would be implemented thereafter (provided business plan would be approved and finance obtained), hence the 'replication factor of "two".

	project proposals. The Project will provide training and awareness creation support to other Bangladeshi financial service providers regarding the potential and feasibility assessment of low-carbon investments, in particular on EE and RE in the built environment and waste-to-energy
City Corporations Urban Development Authorities	The Project will partner with partner cities (under MLPGRC), e.g. Narayanganj CC and the associated Urban Development Authorities (that are under MHPW) in coordination of the various plans (Development Plan, Area Plan, Structure Plan) and the mainstreaming of LCUD issues and options in these plans and setting up urban-level Coordination mechanisms to achieve coordination and mainstreaming. At sub-urban level, the LCUD the project will work with local organizations (ward committees, IRRCs, other) in setting up sustainable waste management structures that will support the cities' waste and landfilling initiatives. The LCUD Project will support City and Authorities with identifying low-carbon investment opportunities.
Private sector and organisations	The private sector investors will provide a commitment for financing (if needed with IDCOL loan support) and detailed design and implementation of low-carbon investment project (Output 2.2) and are invited to participate in the Project's training activities (Component 3). The Project will work with private sector organisations, such as the FBCCI (Federation of Bangladesh Chambers of Commerce and Industry), REHAB (Real-estate and Housing Association) and the Bangladesh Green Building Council (BGBC)
Institutes and academia[88]; NGOs	The Project will work with the Bangladesh Institute of Planners, on providing advice and general guidelines related to city planning and policy research, and with academia and research institutes policy research and studies to strengthen baseline data, impact analysis, etc. Cooperation will be sought with one such university/institute to host a Centre of Expertise and Training on low-carbon urban planning and interventions (EE in buildings, rooftop PV, waste and waste to energy). Cooperation will be sought with entities and NGOs that work on waste management (e.g. Waste Concern, Practical Action) and on citizen awareness creation on sustainable consumption and production.

The Project will effectively engage the stakeholders involved in the project to get their support and guide the project implementation to achieve higher results.

- Project outreach proposed includes project website, media (print/audiovisual), workshops, training etc.
- The PMU and the PSC will ensure that the Gender Action Plan recommended by the project is pursued and implemented. The various groups especially women will be engaged during the consultation meetings, prioritized to avail the program and be included in the different capacity building programs. The project will also ensure that it is in line with national energy, climate change, and waste management policies and plans (described in Annex E);
- Meetings, monitoring visits, surveys, and written communications will be used to receive feedback to continue the ongoing dialogue as well as during the course of implementation.
- The project will follow a participatory approach in decision making by engaging all the relevant stakeholders. The Government agencies, NGOs, CSOs, and the private sector actors will be actively involved during the project implementation.

Responsibilities

The PMU is primarily responsible for carrying out the specified stakeholder engagement activities. The stakeholders will be engaged while carrying out various assessments and studies, training and workshop events

Grievance mechanism

People concerned with or potentially affected by the project can express their grievances for consideration and redress. The Project Management Unit will receive grievances and will try to resolve at the PMU level if possible. If not possible then the issues will be referred to the PSC that will try to settle the issues amicably. In the event the party is not accepting the decision then he/she can put the case to Arbitration. At any time, any person or group of persons affected by a UNDP-supported project can make a claim to the UNDP Social and Environmental Compliance Unit (SECU, www.undp.org/secu) and/or the

[88] Examples are BUET (Bangladesh University of Engineering and Technology), Institute of Energy (Dhaka University), Jahangir Nagar University, Rajshahi University of Engineering & Technology, Jessore Science & Technology University, Chittagong University, Pabna University of Science & Technology, Islamic University of Technology, American International University, BRAC University

SRM (Stakeholder Response Mechanism, www.undp.org/srm) through https://undp.tnwreports.com and by e-mail (project.concerns@undp.org). Project-affected people will be informed of how to submit a complaint or concern. In addition, site-specific work place grievance mechanisms will be in place to ensure workers can submit workplace concerns.

Monitoring and reporting

The project stakeholders would be engaged at various levels to carry out the monitoring activities. Then the PMU will laisse with relevant Government agencies and other partners and collect data and monitor the activities on a regular basis. The PMU will report back the results to the stakeholders at the earliest through letters or conduct meetings both individually as well as through engagement of all relevant agencies.

Communications plan

The LCUD project will also emphasize strong communications with a broader range of stakeholders. Key elements of the project's communication strategy are outlined in the table below:

Key element	Relevant group	Means
1. Project governance meetings; PSC meetings; Advisory Committee and working group meetings	All stakeholders that are members of the Board or its Working Groups or are invited to attend	Meetings
2. Seminars/workshops and training events, including the Inception workshop, and End-of-project workshop	National and city-level government officials Financial and private sector NGOs and CSOs Building and landfill owners and managers; building constructors, designers, architects; building tenants	Workshop, meeting, seminar, training On-the-job training
3. Project documents, thematic reports and publications	Various government departments and decision-makers	Direct dissemination (e.g. email or hard copy) to persons. Access via the Project website
4. Technical reports and tools/software (GHG inventory, EE design, PV System, etc.	City community groups that take initiatives to implement local waste management systems and awareness creation on sustainable consumption Engineers and persons working or interested in working in RE & EE in buildings and WTE Energy, waste and urban planners and city officials Development partners and NGOs	Direct dissemination (e.g. email or hard copy/ USB-drive) Access via the Project website to reports and documents and database and info systems
5. Project knowledge capturing and info dissemination	Government (national, city) officials Financial and private sector Development partners and NGOs Citizenry and community groups	Online access to all project materials and other relevant low-carbon and green development information
6. Reports (feasibility assessments; non-confidential parts of business plans; monitoring) of RE, EE and WTE investments	Various national and local and regional level officials; CSOs Financial and private sector Development partners Technical professionals; experts/ academics	Direct dissemination to person directly involved Summaries with non-confidential info access through the website

Budget available is part of the various project activities. The budget for seminar/workshops/events and printing of reports. Documents, etc., and Output 3.3 (codified info and knowledge) is, together, about USD 468,000

Annex H. ADDITIONAL BUDGET TABLES

BUDGET per activity and budget line

			Internat. Consultants - MTR+TE	Service Contract - individuals PM+M&E	Local consultants	Travel	Contractul Services - Company	Equipment	Audio Visual&Print Prod Costs	Operation and Maintenance	Learning Cost-Training, workshops, seminar	Others (72500, 72400, 73100, 74500)
			(71200)	(71400)	(71300)	(71600)	(72100)	(72200)	(74200)	(74300)	(75700)	Others
		(USD)										
TOTAL		***3,767,810***	60,000	550,200	527,947	154,000	1,852,500	55,000	71,743	150,000	245,000	101,420
Project management		**179,420**		78,000								101420
Outcome 1	*Low-carbon urban planning and implementation of*	**769,820**										
1.1	LCUD concepts integrated in regulations and policy	169,463		35,415	74,448	12,500			7,500	16,500	23,100	
1.2	Capacity strengthened in government entities on L	259,371		35,415	86,856	12,500	67,500	10,000	7,500	16,500	23,100	
1.3	City corporation supported in LCUD planning and im	258,163		35,415	74,448	12,500	67,500	20,000	7,500	17,000	23,800	
1.4	M&E	82,823	20,000	35,415	12,408	12,500			2,500			
Outcome 2	*Implementation of low-carbon investment in cities*	**2,041,144**										
2.1	Identified low-carbon in public and private built en	518,516		70,830	85,520	16,667	280,000		8,000	25,000	32,500	
2.2	Implemented low-carbon in public and private built	1,438,849		141,660	95,022	16,667	1,120,000		8,000	25,000	32,500	
2.3	M&E	83,779	30,000	23,610	9,502	16,667			4,000			
Outcome 3	*Knowledge increased and awareness raised on LCUD*	**777,426**										
3.1	Institutionalised capacity strengthening on LCUD	346,164		28,332	40,384	18,000	158,750	10,000	10,697	25,000	55,000	
3.2	Codified information and knowledge on low-carbon	361,945		37,776	40,384	18,000	158,750	15,000	12,034	25,000	55,000	
3.3	M&E	69,318	10,000	28,332	8,974	18,000			4,011			

USE OF CONSULTANTS/EXPERTS PER COMPONENT

Experts (person.weeks) Component	Internat Total	National Total	International			National		
			1	2	3	1	2	3
LCUD planning and policy	0	50	0	0	0	30		20
City planning and coordination		76				50	12	14
PPP, ESCO and green finance	0	32	0	0	0	12	18	2
GHG inventory and reporting	0	32	0	0	0	6	20	6
EE in buildings	0	46	0	0	0	20	20	6
PV and RE in buildings	0	46	0	0	0	20	20	6
Waste management		30				10	18	2
Waste-to-energy	0	40	0	0	0	18	18	4
TOTAL	0	352				166	126	60

Annex I. UNDP SOCIAL AND ENVIRONMENTAL SOCIAL SCREENING

The completed template, which constitutes the Social and Environmental Screening Report, must be included as an annex to the Project Document. Please refer to the Social and Environmental Screening Procedure and Toolkit for guidance on how to answer the 6 questions.

Project Information

Project Information	
1. Project Title	Promoting Energy-Related Low Carbon Urban Development in Bangladesh
2. Project Number	5571
3. Location (Global/Region/Country)	Bangladesh

Part A. Integrating Overarching Principles to Strengthen Social and Environmental Sustainability

QUESTION 1: How Does the Project Integrate the Overarching Principles in order to Strengthen Social and Environmental Sustainability?

Briefly describe in the space below how the Project mainstreams the human-rights based approach

The project targets the Cities (e.g., Dhaka, Chittagong, Gazipur, Narayanganj, and Khulna) in piloting initiatives towards a low carbon development path by reducing GHG emissions generation. The project influences city government planners and decision-makers to integrate and implement energy efficiency and renewable energy in public and private buildings, and waste-to-energy projects in collaboration with the private sector in their city corporation (and development authority) development plans. Further, it will improve private investments in these areas to support urban development in Bangladesh. The project also integrates platform for enough learning, awareness raising, knowledge building and sharing platform of the project relevant issues for all. The Project will contribute to upholding basic human rights of people of Bangladesh through the delivery of interrelated impacts such as enhanced living standards in urban areas through better waste management, livelihood opportunities, enhanced human health, improved awareness, trainings and reduced environment degradation through a reduced level of GHG emissions.

The proposed LCUD project promotes equality of women and men in the project activities, equality of people with different abilities and equality of people of any ethnical background. This vision of LCUD is pretty aligned with the Constitution of Bangladesh and The Persons with Disabilities Rights and Protection Act in Bangladesh 2013 gives many equal rights to PWDs including the right to education and training and in discrimination-free employment opportunities. Moreover, Bangladesh has ratified Convention on Elimination of All Forms of Discrimination Against Women, International Convention on Elimination of All Forms of Racial Discrimination, International Covenant Economic, Social and Cultural Rights, International Covenant on Civil and Political Rights.

The LCUD Project also supported by The Constitution of Bangladesh that provides Right to an adequate standard of living (art. 15), Right to health (art. 15(a)), Right to education (art. 15) Right to the equal protection of the laws (art. 27), Right to freedom from discrimination on the grounds of race (art. 28), Right to freedom from discrimination o Right to freedom of movement (art. 36), Right to freedom of speech and expression (art. 39), Right to own and transfer property (art. 42), Right to social security (art. 15) and Right to work (art. 20, art. 40).

The application of the human rights-based approach in the project is also supported by a strong commitment to stakeholder engagement, articulated in the Stakeholder Engagement Plan, disclosure of information about the project, and availability of a grievance mechanism for project affected people.

Briefly describe in the space below how the Project is likely to improve gender equality and women's empowerment

The LCUD Project promotes more women participation at the various phases of the project from the beginning till the end to ensure equality of both women and men in the low carbon urban development initiative. In this regard LCUD is aligned with CEDAW, the Constitution of Bangladesh especially with the article 27 that protects all citizen, article 28(1) that declares no discrimination against religion, race, caste, sex and place of birth; article 28(2) that declares equal rights of also declares human rights women everywhere in the state and public life and Article 29(1) and (2) ensures equality of all citizens in the employment.

The LCUD project is focusing on women inclusion in urban development issue, which is contributing ensuring of the equality of women and men as stated in the National Women Development Policy 2011 and this objective of equality promotion is reflected in consequent national Five-Year Plans which are the mainstream national development policies. The Government of Bangladesh (GoB) in its 7th Five-Year Plan recognizes the significant contributions made by the increased female labour participation particularly in the readymade garment industry (RMG) and encourages female enrolment in technical and vocational education as well as in tertiary education.

Gender will be mainstreamed on a number of components of the programme. As per the gender and social action plan, the project will achieve/ include the following:

- Women representation in all capacity building workshops and training, as well as at any working group or committee for project implementation and monitoring
- Design features that impact positively on women and implement them and remove those that negatively impact the project
- Concerns of vulnerable groups, including women and girls, are addressed and their voices are integrated into all development projects and programmes through participatory approaches.
- All vulnerable groups' needs, including women's, are incorporated into the project cycle at all the phases of the projects to ensure economic sustainability.
- Participation of women and girls for renewable energy in technical training and education on energy, low-carbon building, waste, and other LCUD investment areas
- Sustainable consumption and waste management practices for (female-headed) households are promoted by allocating some of the budget for (gender-sensitive) awareness campaigning
- Ensure gender balance practice applying in project staff recruitment process and hire gender-oriented staff (both male and female) for project implementation

Briefly describe in the space below how the Project mainstreams environmental sustainability

The proposed project is consistent with the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), Sixth and Seventh Five Year Plan (2010-2014) and (2016-2020), and National Perspective Plan. The low-carbon resilient development of BCCSAP was built on six pillars where mitigation and low-carbon development is one of the six pillars. This seeks to link policy, plan, programme, and capacity development objectives in the context of national development. The proposed LCUD Project is consistent with Bangladesh 2nd National Communications to the UNFCCC that identified cities need to play a key role while addressing the issue of climate change as they are most vulnerable. Sustainable waste management in major cities is identified as one of the mitigation options where landfill gas recovery and utilisation is identified as one of the waste-to-energy technologies, but its feasibility will be assessed during the project phase. It can be stated that the proposed project is consistent with national priorities and strategies, which will help Bangladesh to address GHG emissions by investing in low carbon development projects

Bangladesh enacted a National Energy Policy in 1996 and established the Sustainable Renewable Energy Development Authority (SREDA) in 2012. These initiatives give special importance to low carbon interventions in policies and plans as well as its mainstreaming but call for awareness campaigns, the gradual implementation of low carbon programs and capacity building and institutional strengthening to take it forward. The Ministry of Power & Mineral Resources, Ministry of Local Government & RD&C, Ministry of Housing and Public Works, Department of Environment, City Corporations, City / Urban Development Authorities and the Bangladesh Standards and Testing Institute.

Bangladesh National Building Code (BNBC) is the mandatory programme for providing regulations and minimum requirements of building type, size, strength, interior and exterior conditions, construction materials etc. Though the BNBC has been revised (approval pending) and forms a core programme of promoting energy efficiency and conversation of the buildings[89].

89 Energy Efficiency and Conservation Master Plan up to 2030 by Sustainable And Renewable Energy Development Authority (SREDA) and Power Division, Ministry Of Power, Energy And Mineral Resources,

Part B. Identifying and Managing Social and Environmental Risks

QUESTION 2: What are the Potential Social and Environmental Risks? *Note: Describe briefly potential social and environmental risks identified in Attachment 1 – Risk Screening Checklist (based on any "Yes" responses). If no risks have been identified in Attachment 1 then note "No Risks Identified" and skip to Question 4 and Select "Low Risk". Questions 5 and 6 not required for Low-Risk Projects.*	**QUESTION 3: What is the level of significance of the potential social and environmental risks?** *Note: Respond to Questions 4 and 5 below before proceeding to Question 6*			**QUESTION 6: What social and environmental assessment and management measures have been conducted and/or are required to address potential risks (for Risks with Moderate and High Significance)?**
Risk Description	***Impact and Probability (1-5)***	***Significance (Low, Moderate, High)***	***Comments***	***Description of assessment and management measures as reflected in the Project design. If ESIA or SESA is required note that the assessment should consider all potential impacts and risks.***
Risk 1 (Standard 3): The improper management of installation, operation and maintenance of the proposed low carbon technical interventions in the project such as waste processing and management practices, energy efficiency and renewable energy installations and can potentially cause risks of health and safety to local communities	I = 3 P = 2	Moderate	The waste processing facilities usually lead to air, noise and water pollution and health issues if not handled properly for the nearby communities. Safety assessment of buildings for solar rooftops or nearby waste facilities are an important consideration for ensuring the safety of communities. E.g, building roof condition, drainage and stability and electrical connections are some of the factors to be considered during installation of solar rooftop systems,	During the PPG stage, the key project interventions were assessed for potential impacts and notes that these interventions would largely confine to demand-side measures in buildings/built environment and will promote best practices in waste management processes. Measures; the project will support: a. Effective due diligence by the rooftop system installer that the roof is in good condition with no leak/cracks and satisfactory drainage. b. Compliance to local laws ensured or permissions sought for any changes to the roof and carry out rectifications to ensure roof has proper and adequate drainage shall be obtained from the building owner/approval authority, if required. c. Social and environmental screening will be part of the feasibility and impact assessments of investment proposals (Activity 2.1.1 and 2.1.2) and site-specific management plans will be in place prior to the implementation of any activities that may pose environmental and social risks. Proposed
Risk 2: (Standard 3) The project can risk the health and safety of waste pickers engaged in the informal sector	I = 3 P = 2	Moderate	Health hazard of waste pickers at the waste disposal site is often very poor. Unhygienic as	

Government of the People's Republic of Bangladesh, March 2015. Available at: http://sreda.gov.bd/files/EEC_Master_Plan_SREDA.pdf

of waste collection and processing and small energy and construction sectors.			well as unorganized handling may possess serious and long-term impact on the urban poor population whose income generation depends on waste picking from landfills and dump sites. For example, e-waste recycling is entirely controlled by large informal sector in Bangladesh.	investments categorized as 'high risk' (this may well apply to WTE plants if proposed) would be excluded from the scope of project funding and if needed, approval by the Project Steering Committee and overall recategorization of the project to High Risk would be pursued. In such cases, a comprehensive Environment Social Impact assessment and Management Plan will be required before the proposal can by accepted for financial support by the LCUD Project It should be stressed that the focus in the project is on Waste-to-energy only as an *add-on* to an existing or proposed waste site. In other words, with or without the Project a waste site is or will be there. The Project does not directly involve itself in setting up waste management. In reality, the Project can have a positive social and environmental impact. The screening and assessment will be mandatory, and if waste sites are not managed properly in a socially acceptable or environmentally sound way, this will lead to the Project not being able to support waste-to-energy development on the site. In assessing a WTE proposal, the evaluators will look at how the site is managed. The Project can provide support for improvement (as part of ESMP). For example, community-based waste management could be good solution. Recycling rate and urban poor employed can be mobilized through waste separation scheme project. Informal sector recycling should be considered as a starting point to become formalized by providing necessary technical support, awareness of health impact and know-how in required technical fields. The Project can influence project proponents to replicating Waste Concerns model of community-based and/or ward-based recycling and waste management. The informal sector tertiary economic activity of waste picking/sorting that provides a steady source of income. The Project will check the involvement of informal workers and improved working conditions for people in the communities where such community-ward based waste management committees operate.
Risk 3: Occupational health and safety of workers on the sites, during construction and operation.	I=3 P=3	Moderate	The execution of project interventions such as solar PV installation, use, maintenance, etc. use can potentially pose risks to safety and health of the workers employed.	Necessary processes and measures that address the safety and health of project workers will be in place prior to implementation of investments. These processes and measures may be encompassed and implemented through the relevant party's occupational health and safety management processes and will include:

				(a) Identification and assessment of potential hazards and risks, particularly those that could result in serious injury, ill health or death and those identified through worker health surveillance. (b) Elimination of hazards and minimization of risks through implementation of preventive and protective measures in the following order of priority: elimination or substitution, engineering and organizational controls, administrative controls, and where residual hazards and risks cannot be controlled through these collective measures, provision of personal protective equipment at no cost to the worker; (c) Safety and health training, including the proper use and maintenance of personal protective equipment, at no cost to workers conducted by competent persons and the maintenance of training records; (d) Recording and notification of occupational accidents and incidents and any resulting injuries, ill health or death; (e) Emergency prevention and preparedness and response arrangements to emergency situations; and (f) Employment injury benefits and/or remedies for adverse impacts such as occupational injuries, disability, ill health or disease and death. (g) Site-specific workplace grievance mechanism(s) will be provided for all project workers to raise workplace concerns.
Risk 4: (Standard 7) The project interventions will generate some waste during the operation	I = 2 P = 3	Moderate	Energy Efficient appliances like LED bulbs, air conditioners, fans etc should be handled properly after their useful life is over as they contain chemicals and if not disposed properly, may reach landfills and leach into the soil; Similarly, Improper disposal of damaged and/or discarded solar panels in solar rooftop systems may lead to exposure to harmful chemicals and toxic substances. Solar panel wastes include heavy metals such as silver, copper, lead, arsenic, cadmium, selenium which are harmful.	As part of the Social and Environmental screening for proposed project interventions, the potential for waste generation will be identified. Where waste generation cannot be avoided, interventions will reduce the generation of waste, and recover and reuse waste in a manner that is safe for human health and the environment. Where waste cannot be recovered or reused, it will be treated, destroyed, or disposed of in an environmentally sound manner. For example, a significant amount of wastewater is generated during composting and the cleaning of the facility. Instead of discharging the wastewater into drains, it can be collected in a small, covered storage tank below ground level. This stored wastewater can then be reused for new compost piles to maintain the moisture balance and enhance the decomposition process by mixing this wastewater with fresh water from pipes or rainwater tanks. For all project interventions that may generate waste or wastewater a site-specific Pollution Prevention Plan or Waste Management Plan will be in place. If the generated waste is considered hazardous, reasonable alternatives for its environmentally sound disposal will be

			Wastewater may also be generated during composting and cleaning of facilities.	adopted. When hazardous waste disposal is conducted by third parties, UNDP will ensure the use of contractors that are reputable and legitimate enterprises licensed by the relevant government regulatory agencies and that chain of custody documentation to the final destination is obtained. The project will avoid or, when avoidance is not feasible, minimize and control release of hazardous materials resulting from their production, transportation, handling, storage and use. Where avoidance is not possible, the health risks, including potential differentiated effects on men, women and children, of the potential use of hazardous materials will be assessed. Buy Back arrangements with the solar panel manufacturers and guidelines for the recycling of all e-waste (electronic waste) used in investments supported by the Project.
Risk 5: (Standard 2): Increased vulnerability to impact of climate change risks	I = 3 P = 3	Moderate	The project interventions are likely to impacted due to increased vulnerability to climate induced risks such as extreme events, temperature rise, etc.	As part of the social and environmental screening for proposed project interventions, the potential for climate vulnerability risks will be identified. Specific climate proofing measures have been identified and will be implemented in the proposed investments, as described in the Project Document.
Risk 6: (Principle 2) Lack of participation of women in LCUD project planning and implementation process	I =3 P =3	Moderate	Traditionally there is very less representation of women in the technical education system (energy and low carbon related topics).	Gender analysis has been carried out during the project development stage. The PMU and the PSC will ensure that the Gender Action Plan recommended by the project is pursued and implemented. Women will be engaged during the consultation meetings, prioritized to avail the program and be included in the different capacity building programs. As part of the social and environmental screening for proposed project interventions, potential risks related to gender equality will be identified.
Risk 7: (Standard 6) Potential for impacts on indigenous peoples within the project's area of influence	I=2 P=1	Low	Project s	Prior to implementation of any activities that may affect the lands, rights, territories, natural resources or livelihoods of indigenous peoples a screening will be conducted to identify potential impacts and in cases that there are such risks, appropriate measures in place consistent with UNDP's SES, Standard 6. This will be included in the procedures to be developed for Component 2 related to environmental and social screening, assessment and management.

QUESTION 4: What is the overall Project risk categorization?

Select one (see SESP for guidance)		Comments
Low Risk	☐	
Moderate Risk	X	The proposed LCUD project can be categorized as Orange B of ECR of the GoB.

			The proposed LCUD project will work on waste-to-energy initiatives, efficiency and renewable energy issues among the low carbon urban development objective at large. WTE will only support investment proposals that have sound social and environmentally sound management of waste sites. Nonetheless, there is risk in the waste management process for people who will work on transporting waste (from the point of source to the point of destination) and work on recycling/waste picking and may face health risks if dealing with hazardous wastes. Hence, for every project proposal a social and environmental screening needs to be done and site-specific management plans in place prior to the implementation of any activities that may have social and/or environmental risks. If a proposed intervention is screened as "High Risk" this would require approval by the Project Steering Committee and a recategorization of the overall project from Moderate to High. This would trigger the need for a more comprehensive ESIA and ESMP. However, the project currently do not intend to fund "high risk" interventions. Procedures to ensure social and environmental screening, assessment and risk management for proposed interventions will be developed for Component 2 prior to funds being released for these investments.
	High Risk	☐	
	QUESTION 5: Based on the identified risks and risk categorization, what requirements of the SES are relevant?		
	Check all that apply		**Comments**
	Principle 1: Human Rights	☐	
	Principle 2: Gender Equality and Women's Empowerment	X	The project is designed to be gender-responsive in implementation. It will seek to identify and integrate the different needs, constraints, contributions and priorities of women, men, girls and boys; reduce gender inequalities in access to and control over resources and the benefits of development. will ensure that both women and men are able to participate meaningfully and equitably, have equitable access to project resources, and receive comparable social and economic benefits.
	Principle 3: Environmental Sustainability	☐	
	1. Biodiversity Conservation and Natural Resource Management	☐	
	2. Climate Change Mitigation and Adaptation	X	The expected environmental and social impacts can be mitigated through implementation of an appropriate environmental code of practice and environmental management plan, social management

			plans, while the technology employed in LCUD itself forms a climate change mitigation measure.
	3. Community Health, Safety and Working Conditions	**X**	The management of solid municipal waste may pose to low category of health risk especially to the people who will be involved in transporting waste from the point of source to the point of destination. There are also safety risks related to waste management and installation of RE and EE measures. However, proper health safety measures and codes will be followed and WTE projects will only be established at properly managed landfill sites.
	4. Cultural Heritage	☐	
	5. Displacement and Resettlement	☐	
	6. Indigenous Peoples	☐	
	7. Pollution Prevention and Resource Efficiency	**X**	

Final Sign Off

Signature	***Date***	***Description***
QA Assessor	01 December 2015	UNDP staff member responsible for the Project, typically a UNDP Programme Officer. Final signature confirms they have "checked" to ensure that the SESP is adequately conducted.
QA Approver		UNDP senior manager, typically the UNDP Deputy Country Director (DCD), Country Director (CD), Deputy Resident Representative (DRR), or Resident Representative (RR). The QA Approver cannot also be the QA Assessor. Final signature confirms they have "cleared" the SESP prior to submittal to the PAC.
PAC Chair		UNDP chair of the PAC. In some cases, PAC Chair may also be the QA Approver. Final signature confirms that the SESP was considered as part of the project appraisal and considered in recommendations of the PAC.

SESP Attachment 1. Social and Environmental Risk Screening Checklist

Checklist Potential Social and Environmental Risks		
Principles 1: Human Rights		Answer (Yes/No)
1.	Could the Project lead to adverse impacts on the enjoyment of the human rights (civil, political, economic, social or cultural) of the affected population and particularly of marginalized groups?	No
2.	Is there a likelihood that the Project would have inequitable or discriminatory adverse impacts on affected populations, particularly people living in poverty or marginalized or excluded individuals or groups? [90]	No
3.	Could the Project potentially restrict availability, quality of and access to resources or basic services, in particular to marginalized individuals or groups?	No
4.	Is there a likelihood that the Project would exclude any potentially affected stakeholders, in particular, marginalized groups, from fully participating in decisions that may affect them?	No
5.	Is there a risk that duty-bearers do not have the capacity to meet their obligations in the Project?	No
6.	Is there a risk that rights-holders do not have the capacity to claim their rights?	No
7.	Have local communities or individuals, given the opportunity, raised human rights concerns regarding the Project during the stakeholder engagement process?	No
8.	Is there a risk that the Project would exacerbate conflicts among and/or the risk of violence to project-affected communities and individuals?	No
Principle 2: Gender Equality and Women's Empowerment		
1.	Is there a likelihood that the proposed Project would have adverse impacts on gender equality and/or the situation of women and girls?	Yes
2.	Would the Project potentially reproduce discriminations against women based on gender, especially regarding participation in design and implementation or access to opportunities and benefits?	No
3.	Have women's groups/leaders raised gender equality concerns regarding the Project during the stakeholder engagement process and has this been included in the overall Project proposal and in the risk assessment?	No
4.	Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and positions of women and men in accessing environmental goods and services? *For example, activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their livelihoods and well being*	No
Principle 3: Environmental Sustainability: Screening questions regarding environmental risks are encompassed by the specific Standard-related questions below		
Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management		
1.1	Would the Project potentially cause adverse impacts to habitats (e.g. modified, natural, and critical habitats) and/or ecosystems and ecosystem services? *For example, through habitat loss, conversion or degradation, fragmentation, hydrological changes*	NO

[90] Prohibited grounds of discrimination include race, ethnicity, gender, age, language, disability, sexual orientation, religion, political or other opinion, national or social or geographical origin, property, birth or other status including as an indigenous person or as a member of a minority. References to "women and men" or similar is understood to include women and men, boys and girls, and other groups discriminated against based on their gender identities, such as transgender people and transsexuals.

1.2	Are any Project activities proposed within or adjacent to critical habitats and/or environmentally sensitive areas, including legally protected areas (e.g. nature reserve, national park), areas proposed for protection, or recognized as such by authoritative sources and/or indigenous peoples or local communities?	No
1.3	Does the Project involve changes to the use of lands and resources that may have adverse impacts on habitats, ecosystems, and/or livelihoods? (Note: if restrictions and/or limitations of access to lands would apply, refer to Standard 5)	No
1.4	Would Project activities pose risks to endangered species?	No
1.5	Would the Project pose a risk of introducing invasive alien species?	No
1.6	Does the Project involve harvesting of natural forests, plantation development, or reforestation?	No
1.7	Does the Project involve the production and/or harvesting of fish populations or other aquatic species?	No
1.8	Does the Project involve significant extraction, diversion or containment of surface or ground water? *For example, construction of dams, reservoirs, river basin developments, groundwater extraction*	No
1.9	Does the Project involve utilization of genetic resources? (e.g. collection and/or harvesting, commercial development)	No
1.10	Would the Project generate potential adverse transboundary or global environmental concerns?	No
1.11	Would the Project result in secondary or consequential development activities which could lead to adverse social and environmental effects, or would it generate cumulative impacts with other known existing or planned activities in the area? *For example, a new road through forested lands will generate direct environmental and social impacts (e.g. felling of trees, earthworks, potential relocation of inhabitants). The new road may also facilitate encroachment on lands by illegal settlers or generate unplanned commercial development along the route, potentially in sensitive areas. These are indirect, secondary, or induced impacts that need to be considered. Also, if similar developments in the same forested area are planned, then cumulative impacts of multiple activities (even if not part of the same Project) need to be considered.*	No
Standard 2: Climate Change Mitigation and Adaptation		
2.1	Will the proposed Project result in significant[91] greenhouse gas emissions or may exacerbate climate change?	No
2.2	Would the potential outcomes of the Project be sensitive or vulnerable to potential impacts of climate change?	Yes
2.3	Is the proposed Project likely to directly or indirectly increase social and environmental vulnerability to climate change now or in the future (also known as maladaptive practices)? *For example, changes to land use planning may encourage further development of floodplains, potentially increasing the population's vulnerability to climate change, specifically flooding*	No
Standard 3: Community Health, Safety and Working Conditions		
3.1	Would elements of Project construction, operation, or decommissioning pose potential safety risks to local communities?	Yes
3.2	Would the Project pose potential risks to community health and safety due to the transport, storage, and use and/or disposal of hazardous or dangerous materials (e.g. explosives, fuel, and other chemicals during construction and operation)?	No
3.3	Does the Project involve large-scale infrastructure development (e.g. dams, roads, buildings)?	No

[91] In regards to CO_2, 'significant emissions' corresponds generally to more than 25,000 tons per year (from both direct and indirect sources). [The Guidance Note on Climate Change Mitigation and Adaptation provides additional information on GHG emissions.]

3.4	Would failure of structural elements of the Project pose risks to communities? (e.g. collapse of buildings or infrastructure)	Yes
3.5	Would the proposed Project be susceptible to or lead to increased vulnerability to earthquakes, subsidence, landslides, erosion, flooding or extreme climatic conditions?	Yes
3.6	Would the Project result in potential increased health risks (e.g. from water-borne or other vector-borne diseases or communicable infections such as HIV/AIDS)?	No
3.7	Does the Project pose potential risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during Project construction, operation, or decommissioning?	Yes
3.8	Does the Project involve support for employment or livelihoods that may fail to comply with national and international labor standards (i.e. principles and standards of ILO fundamental conventions)?	Yes
3.9	Does the Project engage security personnel that may pose a potential risk to health and safety of communities and/or individuals (e.g. due to a lack of adequate training or accountability)?	No
Standard 4: Cultural Heritage		
4.1	Will the proposed Project result in interventions that would potentially adversely impact sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g. knowledge, innovations, practices)? (Note: Projects intended to protect and conserve Cultural Heritage may also have inadvertent adverse impacts)	No
4.2	Does the Project propose utilizing tangible and/or intangible forms of cultural heritage for commercial or other purposes?	No
Standard 5: Displacement and Resettlement		
5.1	Would the Project potentially involve temporary or permanent and full or partial physical displacement?	No
5.2	Would the Project possibly result in economic displacement (e.g. loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	No
5.3	Is there a risk that the Project would lead to forced evictions?[92]	No
5.4	Would the proposed Project possibly affect land tenure arrangements and/or community-based property rights/customary rights to land, territories and/or resources?	No
Standard 6: Indigenous Peoples		
6.1	Are indigenous peoples present in the Project area (including Project area of influence)?	Yes
6.2	Is it likely that the Project or portions of the Project will be located on lands and territories claimed by indigenous peoples?	No
6.3	Would the proposed Project potentially affect the human rights, lands, natural resources, territories, and traditional livelihoods of indigenous peoples (regardless of whether indigenous peoples possess the legal titles to such areas, whether the Project is located within or outside of the lands and territories inhabited by the affected peoples, or whether the indigenous peoples are recognized as indigenous peoples by the country in question)? *If the answer to the screening question 6.3 is "yes" the potential risk impacts are considered potentially severe and/or critical and the Project would be categorized as either Moderate or High Risk.*	No

[92] Forced evictions include acts and/or omissions involving the coerced or involuntary displacement of individuals, groups, or communities from homes and/or lands and common property resources that were occupied or depended upon, thus eliminating the ability of an individual, group, or community to reside or work in a particular dwelling, residence, or location without the provision of, and access to, appropriate forms of legal or other protections.

6.4	Has there been an absence of culturally appropriate consultations carried out with the objective of achieving FPIC on matters that may affect the rights and interests, lands, resources, territories and traditional livelihoods of the indigenous peoples concerned?	No
6.5	Does the proposed Project involve the utilization and/or commercial development of natural resources on lands and territories claimed by indigenous peoples?	No
6.6	Is there a potential for forced eviction or the whole or partial physical or economic displacement of indigenous peoples, including through access restrictions to lands, territories, and resources?	No
6.7	Would the Project adversely affect the development priorities of indigenous peoples as defined by them?	No
6.8	Would the Project potentially affect the physical and cultural survival of indigenous peoples?	No
6.9	Would the Project potentially affect the Cultural Heritage of indigenous peoples, including through the commercialization or use of their traditional knowledge and practices?	No
Standard 7: Pollution Prevention and Resource Efficiency		
7.1	Would the Project potentially result in the release of pollutants to the environment due to routine or non-routine circumstances with the potential for adverse local, regional, and/or transboundary impacts?	Yes
7.2	Would the proposed Project potentially result in the generation of waste (both hazardous and non-hazardous)?	Yes
7.3	Will the proposed Project potentially involve the manufacture, trade, release, and/or use of hazardous chemicals and/or materials? Does the Project propose the use of chemicals or materials subject to international bans or phase-outs? *For example, DDT, PCBs and other chemicals listed in international conventions such as the Stockholm Conventions on Persistent Organic Pollutants or the Montreal Protocol*	Yes
7.4	Will the proposed Project involve the application of pesticides that may have a negative effect on the environment or human health?	No
7.5	Does the Project include activities that require significant consumption of raw materials, energy, and/or water?	No

				lead to the Project not being able to support waste-to-energy development on the site. In assessing a WTE proposal, the evaluators will look at how the site is managed. The Project can provide support for improvement (as part of SEMP). For example, community-based waste management could be good solution. Recycling rate and urban poor employed can be mobilized through waste separation scheme project. Informal sector recycling should be considered as a starting point to become formalized by providing necessary technical support, awareness of health impact and know-how in required technical fields. The Project can influence project proponents to replicating Waste Concerns model of community-based and/or ward-based recycling and waste management. The informal sector tertiary economic activity of waste picking/sorting that provides a steady source of income. The Project will check the involvement of informal workers and improved working conditions for people in the communities where such community-ward based waste management committees operate.	
8	Environmental Risk (Standard 7.2): The project interventions will generate some waste during the operation	Environmental	Moderate (I = 2, P = 3)	A significant amount of wastewater is generated during composting and the cleaning of the facility. Instead of discharging the wastewater into drains, it can be collected in a small covered storage tank below ground level. This stored wastewater can then be reused for new compost piles to maintain the moisture balance and enhance the decomposition process by mixing this wastewater with fresh water from pipes or rainwater tanks	**SREDA and implementing partners**
9	Workers and Community Health, Safety and Working Conditions	Social	Low (I = 2, P = 2)	The management of solid municipal waste may pose to low category of health risk especially to the people who will be involved in transporting waste from the point of source to the point of destination. However, proper health safety measures and codes will be followed as WTE projects can only be established at properly managed landfill sites. A site-specific occupational health and safety management plan will be prepared and occupational health and safety issue will be included in contractors bidding document to comply with.	**SREDA and implementing partners**
10	Lack of participation of women in LCUD project planning and implementation process	Organizational-operational	Moderate (I =3, P =3)	Traditionally there is very less representation of women in the technical education system (energy and low carbon related topics). Gender analysis has been carried out during the project development stage. The PMU and the PSC will ensure that the Gender Action Plan recommended by the project is pursued and implemented. Women will be engaged during the consultation	**Local and national stakeholders**

			meetings, prioritized to avail the program and be included in the different capacity building programs.

Annex K. RESULTS OF THE CAPACITY ASSESSMENT OF THE PROJECT IMPLEMENTING PARTNER AND HACT MICRO ASSESSMENT

HACT assessment reports can be accessed here