



CIF TA Facility for Clean Energy Investments

First Call for Proposals

*Implementation support on Building Energy and Environment Rating System in Bangladesh and
a Cool Roof Program in Dhaka*

The World Bank



Proposal submission template

Country/ region

Bangladesh

Project Title

Implementation support on Building Energy and Environment Rating System in Bangladesh and a Cool Roof Program in Dhaka

Implementing MDB(s)

World Bank

MDB client

Sustainable and Renewable Energy Development Authority (SREDA), Bangladesh

MDB focal point

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Detailed description of proposed activity

Green rating of buildings is still in a nascent stage in Bangladesh due to the absence of a specific standard that would help in promoting a wide-ranging application. The Building Energy and Environment Rating (BEER) System is the first rating system for design and construction of buildings being developed in the country. Currently, there is a draft version of BEER outlined by SREDA (Sustainable and Renewable Energy Development Authority) of Bangladesh where the rating system is comprised of 50 credits divided in 9 categories.¹ Each credit defines a specific requirement for the building and, based on compliance level, assigns credit points. The aggregated credit points establish certification level, whose maximum value can reach up to 150 points. Categories are: Management and Planning, Project site, Water, Energy, Indoor environment, Construction materials, Construction health and safety, Innovation and Bonus points. Currently, BEER's scope covers existing buildings and new constructions by a single guideline including all typologies, but it is expected that specific rating guidelines will be developed by typology. BEER is linked to the Bangladesh National Building Code (BNBC) and Cool Roofs is an integral part of BEER and one of the passive measures for developing the energy efficient and green building design.

The proposed activity aims to provide support to the following areas and objectives for promoting buildings energy efficiency improvement in Bangladesh:

(i) Identify mechanisms that will help mainstream and implement the BEER System for promoting green, near zero energy, and energy efficient buildings at scale through institutional, awareness, capacity

¹ Since early 2020, SREDA had been considering renaming the BEER system to BEEER (Building Energy Efficiency and Environment Rating) system. However, the official name has not been changed, as of May 2020. Therefore, in this final proposal being submitted to CIF-TAF in May 2020, the original name, that is, BEER (Building Energy and Environment Rating) system has been used throughout the document.

building financial interventions and innovative business models and solutions, in conjunction with the Bangladesh National Building Codes.

- (ii) Develop a robust monitoring, reporting and verification system of BEER.
- (iii) Baseline survey of energy consumption in buildings for updating the BEER rating guide and tools
- (iv) Design a capacity building plan in the short, medium and long term targeted for all the stakeholders involved in the building sector and implementing the short-term plan, estimated in one-year deployment.
- (v) Development of a web-based application to implement an online certification system and automatize all the procedures involved, such as application submission, assessment and certification.
- (vi) Development of User Manual of Rating system, including how to comply with BEER's requirements and how to perform the registration, assessment and certification processes from the point of view of all stakeholders involved: architects, engineers, local administration, private certification bodies, etc.)
- (vii) Assessment of the potential for reducing cooling loads in air-conditioned and unconditioned buildings through building envelope measures. This potential will be calculated using simulation software and comparing conventional and energy efficient building (the building following all guidelines of BEER). To estimate the national level impact, the individual building energy savings will be extrapolated to national level based on target building population and data collected during survey of relevant stakeholders.
- (viii) Develop a Buildings Cool Roofs Program for Energy Savings and Urban Heat Island (UHI) Mitigation in Dhaka city.

Cool Roofs is one of the specific passive energy efficiency improvement measures that increases the reflectivity of roof surface by applying high reflective index-based paint or coatings thereby reducing the building heat gain through roofs and is included in BEER since it offers a simple and cost-effective solution to reducing the energy usage for space cooling of buildings. Dhaka is a city facing both serious energy security challenges and severe heat stress, equally across its high-income residents, low-income neighborhoods and informal slum settlements. Large-scale deployment of cool roofs in Dhaka would not only improve thermal comfort and energy savings while reducing heat stress in unconditioned buildings and reducing energy bills in conditioned buildings, but also provide the additional benefit of urban heat island (UHI) mitigation and climate resilience.

This proposed activity aims to demonstrate an effective and scalable model for stimulating rapid deployment of cool roofs through the design and application of innovative approaches and sustainable business models to address the major barriers to its adoption. The program design will include: building typologies, consumer profiles, materials to use, companies trained in cool roof implementation, awareness campaign, business models, and financing options. This activity will include the implementation of a tool that will suggest best suited roofing technologies for a given building. Different cool roof technologies will be analyzed to examine their viability, and applicability within the context of the Bangladesh buildings. The analysis will identify and prioritize, through benefit-cost analysis, the technologies with the highest potential impacts and co-benefits per building typology. In addition to reflective paint, there will be consideration of the solutions such as follows (inter alia):

- Cementitious and elastomeric coatings. They have the consistency of thick paint and contain additives that improve their adhesion, durability, suppression of algae and fungal growth, and ability to self-wash, or shed dirt under normal rainfall.
- Single-ply membranes. They are pre-fabricated sheets that are applied in a single layer to a low-sloped roof.
- Tile roofs. They can be made of clay, slate, or concrete. They can be also glazed to provide waterproofing or coated to provide customized colors and to increase solar reflectance.
- Shingles. Asphalt shingles are the most common roofing materials used on steep-sloped roofs. Cool colored metal roofing products also use infrared-reflecting pigments and have high durability and long life.
- Green roofs. Vegetated roofs retain and reduce peak stormwater runoff, extend the roof's service life, provide space for some urban agriculture, and improve air quality in cities. They help mitigate the urban heat island effect by cooling the urban spaces around them through evapotranspiration.

The program will consider areas which has a mix of public/government, commercial, residential buildings, along with slums and informal settlements. A pilot will be executed and monitored during one-year period to test and improve the processes and mechanisms defined in the program.

As the share of energy consumption for space cooling, in buildings in particular, is rising rapidly due to increased urbanization and growing income, there will be an emphasis on assessing the potential for energy savings and GHG reduction through efficient and sustainable cooling technologies and measures, and developing through the above activities, the associated policy, market-based and financial incentive mechanisms that could help Bangladesh deploy these sustainable cooling-informed measures at scale. This would include not only energy saving cooling technologies ranging from super-efficient air conditioners and chillers to energy efficient ceiling fans to cool roofs (which would contribute to enhancing energy security) but also use of lower GWP refrigerants (to be used in air conditioners and chillers stock), which could further reduce GHG emissions. This analysis together with the development of the policy-based or financial incentive-driven implementation and delivery models will help inform potential in the area of efficient and clean cooling.

Justification and theory of change

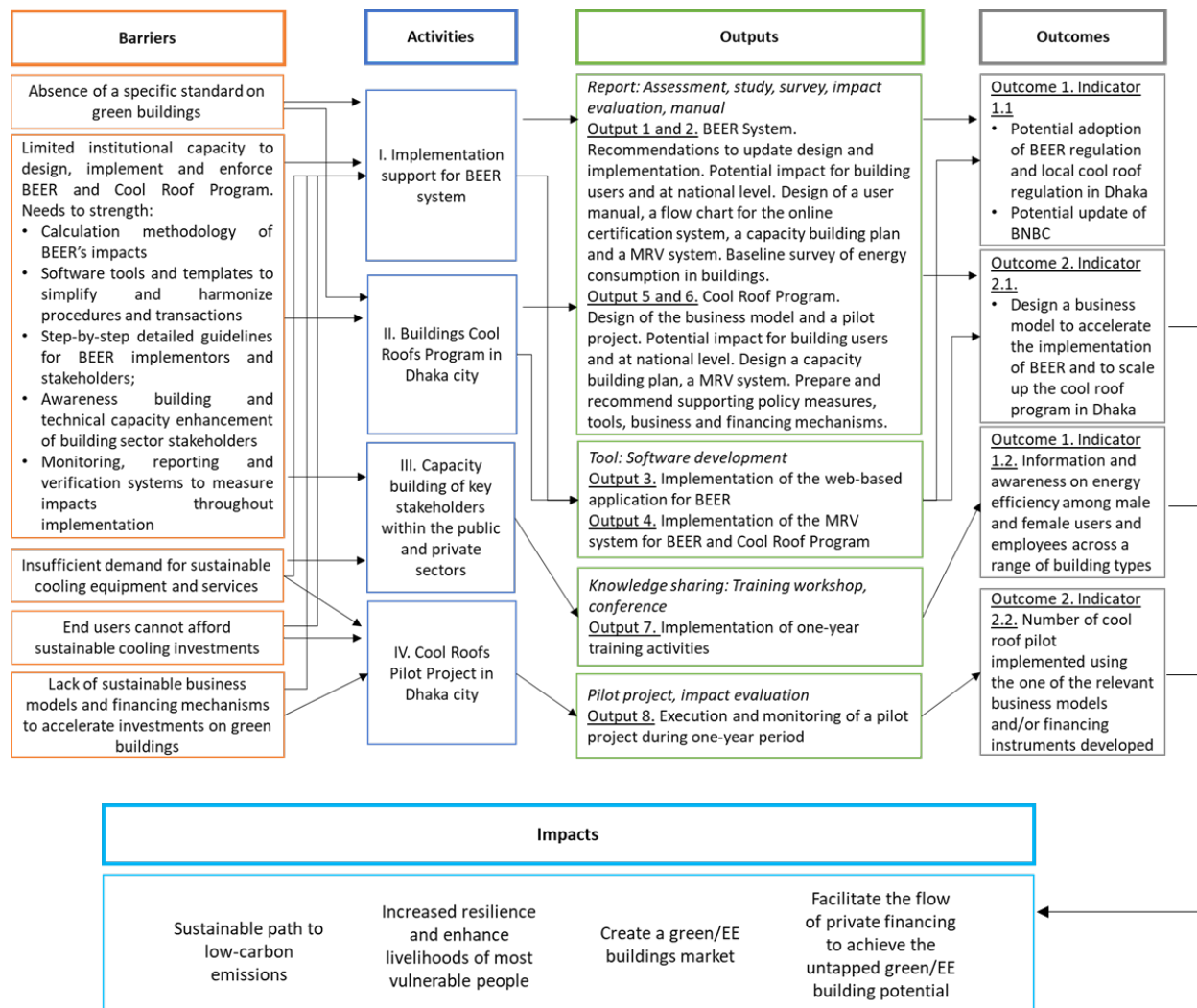
The importance of promoting the implementation of energy efficiency (EE) initiatives in Bangladesh to ensure a sustainable electricity consumption growth and to increase the country's competitiveness have been recognized by policy makers. The Energy Conservation (EC) Act, enacted in 2014 provides an enabling framework, along with the SREDA which was established subsequently. SREDA's function is to implement demand-side EE programs, and formulate policies, rules, regulations and guidelines, and facilitate and monitor the implementation of the various provisions of the EC Act. The SREDA EE & Energy Conservation Master Plan 2015-2030 lays out the action framework for policies, programs, legal documents (Act, Rules, Regulations, Circulars or Standards etc.). Under this national mandate to promote EE in buildings sector, in late 2018, SREDA drafted the Green Buildings Rating System called the "Buildings Energy and Environment Rating (BEER) for Design and Construction of Buildings.

Like in other developing countries, the building EE ecosystem in Bangladesh is complex with multiple stakeholders with various barriers, risks and risk perceptions which prevents the higher levels of uptake

of EE investments. The success of BEER and impacts will depend on how effectively SREDA is able to work with other public and private stakeholders in the green/EE buildings sector, particularly the private sector comprising of commercial building owners, material manufacturers, architects and building developers, and financiers. In terms of financing, as public finance is limited and small compared to the investment requirement of green/EE buildings sector in Bangladesh, there will be a need to develop business models and delivery mechanisms that help leverage and unlock the private capital mobilization. The focus of this proposal is to better understand the specific constraints and institutional mechanisms and develop the building blocks that would help facilitate the flow of private financing and achieve the untapped green/EE building potential.

The Bank team has been engaged with SREDA since 2014 in various TA and knowledge activities across energy efficiency sector. Upon request of SREDA, the Bank team had reviewed the BEER draft in early 2019 and had provided advice for improving it. In conjunction with Bank's engagement with SREDA and its recent requests, this proposed activity is expected to supplement (through co-financing) an ongoing Bangladesh Programmatic ASA "Sustainable Energy Support Program" with SREDA (as the main counterpart for its Energy Efficiency sub-task).

The theory of change diagram below illustrates the logical underpinning of the proposed activity.



Consistency with selection criteria

The proposal, in coordination with SREDA, aims to help mainstream and promote adoption at scale of green, near zero energy and EE considerations in buildings across residential, commercial and public sector and anchored around BEER, by addressing the market barriers and challenges in the buildings EE sector.

The proposal is aligned and consistent with all the selection criteria as laid out in the CTF TAF's first call for proposals.

Bangladesh is a country greatly exposed to the impacts of climate change. Particularly, the building sector is seriously affected by rising temperatures and strongly determines the country's pathway towards sustainable development. A substantial amount of resources (energy, water, materials, etc.) is consumed during the construction and operation phases of buildings, and rising temperatures results in higher resources demand, as well as larger emissions of GHG. Consequently, savings of these resources during both the construction and operation process in the building sector is a national high priority for the

Government of Bangladesh to cost-effectively reduce GHG emissions, ensure energy security and promote sustainable growth. Furthermore, large fires are relatively common due to the lax safety regulations and poor building conditions, and the recent spate of fires in commercial and residential building is a big concern.

Energy Efficiency is considered under the mitigation contribution of the INDC of Bangladesh. The INDC specifically sets an unconditional contribution to reduce GHG emissions by 5% from Business as Usual (BAU) levels by 2030 in the power, transport and industry sectors, based on existing resources, and a conditional 15% reduction subject to international support. Bangladesh's strategy on mitigation sets out seven programs. One of them is *Improved energy efficiency in production and consumption of energy* to ensure energy secure and low-carbon development of the economy. Mitigation actions considered under this program are: (i) An Energy Efficiency labelling program to promote sales of high efficiency products in the Market; and (ii) Energy Efficiency measures for buildings, such as heat insulation and cooling measures, and a revised code on energy efficiency of new buildings. Possible conditional action-based contributions include promoting policies to induce greater level of energy efficiency and conservation in the household sector and the commercial sector based on the Bangladesh Energy Efficiency and Conservation Masterplan.

The proposed activity will contribute with the energy efficiency-based mitigation actions supporting the adoption of BEER regulation and local cool roof regulation in Dhaka, and the update of the energy efficiency requirements included in the Bangladesh National Building Code for new buildings. This activity will identify potential for reducing cooling loads in existing and new air-conditioned and unconditioned buildings through the implementation of BEER system and Cool Roof Program. Potential impact at national level will include: estimated energy savings (GWh, \$), the reduction of electricity load, the mitigation of urban heat island in Dhaka, and avoided greenhouse gas emissions (tCO₂). The proposed activity is expected to contribute to the Sustainable Development Goal 7: Access to affordable, reliable, sustainable, and modern energy.

In addition, un-conditioned buildings' users will benefit from improvement in thermal comfort and other health benefit due to energy conservation measures as cool roofs. Moreover, implementation of BEER is expected to ensure safety during the operation period of the building by enhancing fire prevention and to improve sustainable consumption of resources needed in the construction phase of buildings, aligned with Sustainable Development Goal 12.

Relevant regulations regarding building energy efficiency and conservation will be deeply analyzed, among others: Building Energy and Environment Rating, Bangladesh National Building Code (BNBC), Standards and Labelling for Appliances Regulation, Environment Act, Building Construction Act, SREDA Energy Efficiency & Conservation Masterplan, and Bangladesh Bank Refinancing scheme. This analysis will identify regulation potential gaps and will contribute to improve and strength the legal framework in order to create a stable macro-environment aimed at the development of integrated energy markets.

A training and capacity building plan will be designed for the short, medium and long term targeted for all the stakeholders involved in the building sector. The execution of this plan will contribute to capacity building in the country for the deployment and successful implementation of BEER at national level and the Cool Roof applications.

Different business models and financing and implementation mechanisms will be analyzed for implementation of cool roof solutions and to accelerate buildings' compliance with BEER. Tentative list of financial initiative mechanisms include: credit lines, loan guarantees, public financing, public super ESCOs, private ESCOs, concessional finance to provide subsidy on incremental capital investment, energy efficiency funds, utility DSM incentive programs, bulk purchase or manufacturer incentives. Based on this analysis, one or more business models supported by the most suitable financial mechanisms for Bangladesh will be designed involving all the key stakeholders to effectively address barriers and provide mechanisms to facilitate mobilization of private sector investment to enable implementation at scale.

The activity will also promote an active partnership model between all public and private stakeholders to harness competencies of different institutions.

The capacity building plan will inform private sector stakeholders of business models and successful experiences performed under the cool roofs pilot project, and will provide BEER certification examples carried out in pilot buildings. This will strengthen capacity to further mobilize private investments.

The approval of BEER regulation will set a framework for local banks to create financing products for buildings complying BEER's standards.

The cool roof pilot project will include a strategy to scale up cool roofs in Dhaka and other main cities around the country.

As detailed in section *Complementary and additionality*, The World Bank has an active lending portfolio in Bangladesh that contributes to the mainstreaming of clean energy finance mobilization and is working to keep on this track increasing finance mobilization in energy efficiency.

The integrated approach of the proposed activity will ensure the early engagement of key stakeholders, both from public and private sectors. The business model to be designed will consider every step from design through implementation involving relevant institutions, such as SREDA, Ministry of Housing and Public Works and its Department of Architecture, Housing and Building Research Institute, Department of Environment, Public Works Department, Capital Development Authority of the Government - RAJUK -, City Corporations, Real Estate and Housing Association, Garment Manufacturers and Exporters Association, Knitwear Manufacturers and Exporters Association, Association of Construction Industry, ASHARE, HVAC Importers, Solar Association, Steel and Cement Manufacturers, Glass Industries, and Engineers and Architects Association.

This approach will be coordinated with the IFC, private sector arm of the World Bank Group, given its engagement and relevant experience with the private sector in the country. EDGE, a building rating system developed and promoted worldwide by IFC, is already available for five major cities in Bangladesh.

Best international and regional practices (such as from India) will be considered as benchmarking for supporting this activity, such as the India Cooling Action Plan (ICAP), published by the Ministry of Environment, Forest and Climate Change of India in March 2019. The ICAP provides short, medium, and long-term recommendations across different sectors while providing linkages with various programs of the Government aimed at providing sustainable cooling and thermal comfort. An implementation framework is also set forth to coordinate the implementation of these recommendations. Through the knowledge and capacity building activities, relevant international institutions will be involved for

exchange of knowledge and best practice experiences with relevant Bangladesh counterparts and stakeholders.

The project results framework will include a sex-disaggregated indicator, which will measure the number of women trained as a part of the capacity building plan.

Main focus area(s)

- Energy sector policy and regulation with investment relevance**
- Financial sector policy and regulation with energy relevance
- Transaction enablers**

Complementarity and additionality

The World Bank has an active lending portfolio of US\$2.4 billion in Bangladesh, with seven projects covering investments in generation (gas thermal and renewables), transmission, distribution, rural electrification and energy access, and dispatch efficiency. The proposed activity will inform financing activities in the area of large scale implementation of green/energy efficient buildings, which is not covered by the ongoing lending projects.

In addition, the Bank is engaged in a comprehensive policy dialogue on energy sector with the Government and other stakeholders and is providing a range of technical assistance capacity building and training both as part of the lending projects and as Bank executed trust fund activities. To build and expand upon the World Bank’s engagement and to support Bangladesh’s energy transition, the energy team plans to carry out a substantive ASA program covering planning, energy efficiency, emerging renewable technologies and battery storage, and the regulatory and institutional framework. This proposed activity is a part of the broader engagement to increase the capacity of the Government and its agencies to plan and implement policies and regulations, system operations and investments for sustainable energy development, access and transition under the Sustainable Energy Support Program ASA . ASA’s scope has been defined considering Government priorities, and is also fully consistent with the World Bank Group Country Partnership Framework FY2016-2021, particularly the objectives of narrowing the gap between demand and supply of power through increased power generation capacity and access to clean energy.

This proposed CIF-TAF supported activity will be co-financed by ESMAP. ESMAP funds have been already approved and an international technical consultants team is working together with the World Bank task team since that activity was launched in February 2020. The Sustainable and Renewable Energy Development Authority, SREDA, as the local counterpart is actively supporting this activity providing valuable feedback, data and information to carry out initial studies and assessments, contacting with key stakeholders, and identifying potential pilot buildings. TAF funds will complement and strengthen the results towards achieving the outcomes.

The proposed activity will add and complement other ongoing investment and TA activities that are not included in the mentioned ASA.

- Distributed renewable energy, such as rooftop solar PV, solar PV pumping, PV mini-grids and clean cooking, that are being supported by ongoing investment projects and both recipient and Bank

executed TA. This project will be a valuable input to determine suitable technologies in the context of Bangladesh buildings.

The Private Investment and Digital Entrepreneurship Project (PRIDE) is expected to develop guidelines for development of “green” industrial zones, including energy efficient buildings. “Livestock and Dairy Development Project in Bangladesh (LDDP)” lending project and the associated proposed ESMAP activity on Clean and energy efficient cooling for livestock supply chains in Bangladesh are focused on a specific industrial sub-sector. Both projects will complement the proposal activity since industrial buildings with process equipment’s have very specific requirements that are different from commercial and residential buildings. Therefore, such industrial buildings will not form a part of the proposed activity.

Transformational change and knowledge sharing

As the BEER system has been introduced by SREDA in coordination with other public and private sector stakeholders, it presents an institutional mechanism and opportunity to introduce green and sustainable buildings in Bangladesh at scale, and its implementation could provide a pathway to create a market transformation in the building sector which is going to expand in the country. The rating system covers many relevant aspects of building that have a bearing on energy demand and environmental impacts. However, to stimulate its implementation framework to become more robust and achieve real results in the ground, the following points need to be strengthened: Calculation methodology of BEER’s impacts; Inclusion of emerging technologies in this rapidly growing sector; Software tools and templates to simplify and harmonize procedures and transactions; Step-by-step detailed guidelines for BEER implementors and stakeholders; Awareness building and technical capacity enhancement of building sector stakeholders to encourage adoption of energy efficient and green building design, development, rating and implementation; Monitoring, reporting and verification systems to measure impacts throughout implementation; Business models and financing mechanisms to accelerate investments on green buildings, among others.

This activity will help to overcome the barriers mentioned above. The outputs for the different deliverables will be in the form of technical reports, advice, software tools, transaction templates, capacity building activities, and a pilot demonstration project which will further inform Government’s formulation of policies and implementation plans for transforming the Bangladesh buildings market for adopting green, near zero energy and energy efficient buildings at scale, which would contribute to GHG emissions avoidance, higher energy security and reliability.

The analysis will be conducted in collaboration with SREDA and other counterparts and will include continuous consultations through meetings and larger multi-stakeholder workshops to get feedback on inputs and methodologies, proposed mechanisms and business models, and to build local ownership of the recommendations. Knowledge sharing and dissemination will be done through reports and infographics, and through presentations to key sector stakeholders in workshops, trainings etc. The team will utilize, as appropriate, existing initiatives and forums by Government and Development partners to coordinate and disseminate the activities, including e.g. regular coordination meetings of the sector agencies organized by SREDA and other relevant stakeholders. All the deliverables will be filed in the institutional data repository i.e. WB Docs and the formal outputs or other relevant material (that is not sensitive) will be published either in the full, summary or in the form of a knowledge note.

Budget

Concept	Amount	Disbursement
Consultants' services (including support for pilot implementation and training/capacity building)	\$115,000	FY 20-21, FY 21-22
Travel (including support for pilot implementation and training/capacity building)	\$55,000	FY 20-21, FY 21-22
Training and capacity building, Dissemination, workshops, exchange visits, and seminars, etc	\$60,000	FY 20-21, FY 21-22
Operating costs to implement activities (including cool roofs pilot implementation and rolling out BEER online certification system)	\$120,000	FY 21-22
Total request for CIF-TAF	\$350,000	FY 20-21, FY 21-22
ESMAP Co-financing	\$80,000	FY 20-21

The estimated budget detailed breakdown by activities per component is shown below:

OUTPUTS EXPECTED	Amount	Financed by	Disbursement by
I. Implementation support for BEER system			
<u>Output 1.</u> Report: Assessment, study, survey, impact evaluation a. Consultants' services b. Travel Total: \$ 40,000	a. \$ 35,000 b. <u>\$ 5,000</u> Total: \$ 40,000	ESMAP	June 2021 Funds already committed: \$24,150
<u>Output 2.</u> Report: Assessment, study, survey, manual a. Consultants' services b. Travel Total: \$ 28,000	a. \$ 20,000 b. <u>\$ 8,000</u> Total: \$ 28,000	CIF-TAF	June 2021
<u>Output 3.</u> Tool: Software development Implementation of the web-based application a. Consultants' services b. Travel Total: \$ 28,000	a. \$ 20,000 b. <u>\$ 8,000</u> Total: \$ 28,000	CIF-TAF	June 2022
<u>Output 4.</u> Tool: Software development Implementation of the MRV system a. Consultants' services b. Travel Total: \$ 28,000	a. \$ 20,000 b. <u>\$ 8,000</u> Total: \$ 28,000	CIF-TAF	June 2022
II. Buildings Cool Roofs Program for Energy Savings and UHI Mitigation in Dhaka city			
<u>Output 5.</u> Report: Assessment, study, survey a. Consultants' services b. Travel Total: \$ 40,000	a. \$ 35,000 b. <u>\$ 5,000</u> Total: \$ 40,000	ESMAP	June 2021 Funds already committed: \$24,150

<u>Output 6.</u> Report: Assessment, study, impact evaluation			
a. Consultants' services	a. \$ 20,000	CIF-TAF	June 2021
b. Travel	b. <u>\$ 8,000</u>		
	Total: \$ 28,000		
III. Capacity building deployment			
<u>Output 7.</u> Knowledge sharing: Training workshop, conference			
a. Consultants' services	a. \$ 10,000	CIF-TAF	June 2022
b. Travel	b. \$ 11,500		
c. Training and capacity building, Dissemination, workshops, seminars, exchange visits, etc.	c. <u>\$ 60,000</u>		
	Total: \$ 81,500		
IV. Cool roofs pilot project in Dhaka			
<u>Output 8.</u> Pilot project, impact evaluation			
a. Consultants' services	a. \$ 25,000	CIF-TAF	June 2022
b. Travel	b. \$ 11,500		
c. Operating costs to implement activities (including cool roofs pilot implementation and rolling out BEER online certification system)	b. <u>\$120,000</u>		
	Total: \$ 156,500		
Total request for CIF-TAF	\$350,000	FY 20-21, FY 21-22	
ESMAP Co-financing	\$80,000	FY 20-21	

Implementation plan and timeline

The proposed activity, to be co-financed by CIF-TAF and ESMAP, will be implemented over FY20-21 (for ESMAP) and FY21-22. The ESMAP-supported activities will be completed by FY21, while CIF-TAF-supported activities will be completed by FY22, and no later than 24 months from the date of approval of funding by the CTF and SCF Trust Fund Committees. The detailed implementation plan and key milestones are provided below. The split between ESMAP and CIF-TAF of various tasks, deliverables/ outputs and outcomes, is provided in the table under the "Results Framework" section, later in this Proposal.

I. Implementation support for Building Energy and Environmental Rating (BEER) System for Green and Near Zero-Energy Buildings.

I.1. Review of the long-term strategy for sustainable building in the country defining scope, goals and milestones to achieve in different stages (short, medium and long term) including its potential impact at national level. The Review will include, inter alia: Benchmarking of international best practices in the design and implementation of Green Building Standards and Codes, Rating and Certification Systems for Sustainable Buildings, and Monitoring, Reporting and Verification Systems (MRV); Analysis of Bangladesh EE and building regulatory framework to determine connection between policies, plans, codes, rating systems and other initiatives such as appliance and equipment MEPS already developed, approved and under development; Analysis of national MRV systems already developed to facilitate a smooth integration of the sustainable building MRV and its inclusion in national inventories; Mapping out national

building sector institutional dimensions and procedures and human resource capabilities regarding design, construction processes, commissioning, administrative procedures for building projects review, approvals of construction permits and surveillance policies, among others; Potential for reducing cooling loads in existing and new air-conditioned and unconditioned buildings through building envelope measures, EE equipment and systems, etc. Impact at national level - energy savings (MW, GWh, \$), avoided greenhouse gas emissions (tCO₂) - and their contribution to national commitments, such as Nationally Determined Contribution (NDC).

1.2. Review and development of the Green Buildings Rating System called the “Buildings Energy and Environment Rating (BEER) for Design and Construction of Buildings. The Review will include: Analysis of the baseline consider in the current BEER draft and potential recommendations for its update including:

1) Review the existing building stock data for Bangladesh, identifying key issues and main data gaps for the purpose of defining archetype buildings; and gathering and analyzing data for defining building stock aggregation, determining the size of the universe and statistical sample of buildings (using existing data sources or conducting small sample surveys). Building stock aggregation will consider the most relevant building typologies in line with BEER and Bangladesh National Building Codes. To describe archetypical building’s characteristics for each building typology, the analysis will consider parameters regarding: (i) Architectural program, which describes how the building is being used and the services it provides to the occupants. From an energy point of view, program decisions influence many important drivers such as, internal gains, ventilation requirements, operating schedules, and comfort tolerances that will ultimately determine the energy performance; (ii) Geometry of the building and its elements. Form has important energy implications that stem from how the building interacts with the sun and ambient conditions; (iii) Materials used to construct the building, insulation levels, glazing systems, thermal mass, air tightness and thermal bridges. Building envelope has a major role in the building’s energy use intensity; (iv) Energy-consuming equipment, such as HVAC, lighting, control and water heating systems; and (v) Energy consumption data.

2) Review of the specific requirements defined in the rating guideline, vis-à-vis regional and global benchmarks, and potential recommendations for its update based on: BEER potential impact at national level - energy savings (MW, GWh, \$), avoided greenhouse gas emissions (tCO₂) - and their contribution to national commitments, such as Nationally Determined Contribution (NDC); Techno-economic analysis of specific energy conservation measures by building typology complying with rating guideline requirements, using materials/equipment available in the country. This analysis will consider, at least, energy savings, avoided greenhouse gas emissions and potential increase in the construction price of buildings due to the use of more efficient materials and equipment. EE requirement for building equipment will consider regulations for Energy Efficiency and Labeling System of Appliances developed or under development by SREDA.

3) Review the proposed procedures, institutional mechanisms to implement BEER and recommend institutional, awareness, and financial interventions for this regulation to be successfully implemented, in conjunction with the Bangladesh National Building Codes, and private sector stakeholders as well to justify compliance with EE and environment requirements defined in the rating guideline.

4) Review the current inspection and surveillance processes for BEER certification - documents submission, review, approval and certification processes and recommend improvements vis-à-vis global best practices.

5) Help SREDA and other stakeholders prepare BEER Rating Guide and technical support to develop the online certification system and automation, including development of a web-based application to implement an online certification system and automatize all the procedures involved. Assess feasibility of expanding the use of existing tools like IFC's EDGE Buildings Tool.

6) Development of the User Manual of Rating System and Rolling out of the BEER Online Certification system

I.3. Design a training and capacity building plan in the short, medium and long term targeted for all the stakeholders involved in the building sector, including Government officials, builders, architects, engineers, college students, manufactures, installers, users of green/energy efficient buildings, among others.

I.4. Develop a proposal for a MRV to follow-up on the energy savings and greenhouse gas emission reductions, as the result of the implementation of the BEER. The proposal will establish both the measuring methodology and monitoring framework and systems, by drawing upon international experiences.

II. Developing a Buildings Cool Roofs Program for Energy Savings and UHI Mitigation in Dhaka.

II.1. Benchmarking of regional and international best practices and technologies in cool roofs.

II.2. Identify key barriers and opportunities for large scale adoption of the use of cool roofs in Dhaka, including: awareness, existing availability of materials, financial incentives, policies and frameworks vis a vis BEER and BNBC, market for cool surface products, among others.

II.3. Design an effective and scalable business model for stimulating rapid deployment of cool roofs in selected areas of Dhaka. SREDA had earlier (for the Million Cool Roofs Challenge Program Competition in early 2019) selected Tejgaon and adjoining Gulshan areas of Dhaka for a 1 million m² target, which includes a mix of public/government, commercial, residential buildings, along with slums and informal settlements.

II.4. Calculate the potential impact for building users of the Buildings Cool Roof Program.

II.5. Calculate the potential impact at national level of the Buildings Cool Roof Program.

II.6. Design a capacity building plan for all the stakeholders involved in program.

II.7. Develop a proposal for a MRV to follow-up on the energy savings and greenhouse gas emission reductions, as the result of the implementation of the Cool Roofs Program.

II.8. Prepare and recommend supporting policy measures (vis a vis BNBC and BEER) and tools, along with sustainable business and financing mechanisms (and their institutional frameworks), that can help scaling up the deployment of cool roofs across different building/consumer categories (including buildings that do not currently have air conditioning, for example houses in slums and informal settlements in low-income neighborhoods, and buildings that have air conditioning (such as middle- and high-income residents and can reduce their energy consumption).

III. Capacity building deployment.

The outputs resulting from this activity will be delivered to SREDA throughout interim and final reports that will be presented for further consultations with relevant SREDA and other officials, and selected stakeholders in the green and EE buildings sector. A multi-stakeholder dissemination workshop will be held in Bangladesh to disseminate the results and also to build capacity among relevant stakeholders and to engage them in the execution of the capacity building plan in the future. In addition to the design of the capacity building plans defined in milestones I.3. and II.6., the proposed activity includes direct support in implementing the short-term plan (estimated in one-year deployment) wherein training materials will be developed and delivered through a series of regular programs (which would include presentations, case studies, etc).

The training and capacity building plan has three-fold strategy: 1. Training and Capacity Building Program. It will include courses, seminars, workshops and exchange visits (to other countries) on topics of green and energy efficient building best practices, transition to conventional projects into green buildings, the BEER and the Cool Roofs Program. Leading builders and architects of the private sector, and also public sector architects, engineers and government officials involved in the development of building policies, codes and plans will be eligible to participate in this training program. During the capacity building plan design, technical capacities among all relevant stakeholders (included within government) will be mapped out. Depending on technical capacity, different levels will be defined for training activities, adapting contents accordingly, for example: initiation and advanced. Separate training activities will be specifically designed and carried out for government officials regarding BEER implementation, evaluation processes and measure and verification protocols. 2. Training the Trainers Program. The program’s objective will be to scale up capacity building in a short period within the country, hence enabling capacity building for thousands of professionals. In these programs, faculty members from architectural and engineering colleges, senior consultants and similar profiles will be targeted, as well as public and private sector architects, engineers and government officials who will be able to scale up capacity building among the public and private sector. 3. Future Specialists. Review and updating the green buildings component in the architecture curriculum to prepare the future professionals.

IV. Implementation of Cool Roofs Pilot in Dhaka.

The business model designed in II.3. will include the design of a pilot to test and improve the processes and mechanisms defined in the program. The pilot will be executed and monitored during one-year period to compare actual impacts (energy savings, reduction of GHG emissions, improvement in thermal comfort and other health benefit, among others) with results expected. The pilot will also provide lessons learned and key information to update processes to scale-up the program and optimize results.

Implementation plan and timeline

A detailed timeline for main milestones is presented below:

Milestone/Deliverable	Timeline*
Inception meeting	W1
Inception report delivery	W6
Kick-off meeting in Bangladesh	W7
Interim report delivery and Presentation Activity I:	W18

Interim report delivery and Presentation Activity II	W19
Consultation meeting/workshop/knowledge sharing** in Bangladesh - Interim results	W20
Final report delivery and Presentation Activity I:	W39
Final report delivery and Presentation Activity II:	W40
Dissemination meeting/workshop/knowledge sharing in Bangladesh - final results	W41
Implementation of training and capacity building plan – short term (one-year)	W90
Implementation of cool roofs pilot	W90
Rolling out of the BEER Online Certification System	W90

**(Weeks from the start of the activity)*

***Please see Transformational change and knowledge sharing*

Relevant stakeholders will be met during the kick-off meeting phase and interim report discussion phase. Additionally, meeting or conference calls will be organized during the project execution for data collection, local knowledge, interim results presentations and further discussion.

The capacity building plan will include an activity for dissemination of the final outcomes within the country.

Progress reports will be prepared in June 2021 and June 2020 to update CIF AU on activity progress and results.

Stakeholder engagement and partnerships

The focus will be specifically on analyzing the barriers and developing the institutional framework and implementation mechanisms. Implementation issues like monitoring systems, financial incentives, associated technical capacity building and awareness approaches will be examined and best practice experiences will be used to develop recommendations for ensuring that the BEER system is successfully implemented. As appropriate, the analysis and recommendations will be differentiated at building sub-sector level (e.g. commercial vs. residential). The team will engage with the various stakeholder groups in the building sector, including the private sector, in order to develop suitable incentives and monitoring and compliance mechanisms.

Potential relevant stakeholders will be SREDA, Ministry of Housing and Public Works and its Department of Architecture, Housing and Building Research Institute, Department of Environment, Public Works Department, Capital Development Authority of the Government - RAJUK -, City Corporations, Real Estate and Housing Association, Garment Manufacturers and Exporters Association, Knitwear Manufacturers and Exporters Association, Association of Construction Industry, ASHARE, HVAC Importers, Solar Association, Steel and Cement Manufacturers, Glass Industries, and Engineers and Architects Association.

Results framework

Government's green and EE building program is in early stage and is associated with weak institutional and delivery capacity and lack of building blocks to scale up its implementation. The proposed activity will include advice on the development of a Buildings Energy Efficiency Rating (BEER) system including the online certification system, including: baseline survey of energy consumption in buildings; development of a user manual; web-based development for application submission and assessment; and assessment of potential for reducing cooling loads through building envelope measures and cool roofs in urban areas, resulting in urban heat island mitigation.

The proposed results framework below shows the outcomes and indicators defined for the activity and the outputs expected:

OUTCOMES AND INDICATORS DEFINED		
OUTCOME 1:	Energy-focused policy and regulatory framework for investments in energy efficient and/or green buildings enhanced	
Indicator 1.1.	<ul style="list-style-type: none"> Number of energy related policies, laws, or regulations adopted, strengthened, or changed to support investments, including private capital mobilization, for energy efficient and/or green buildings 	
	Baseline	0
	Target value (June 2021)	1
Indicator 1.2.	<ul style="list-style-type: none"> Information and awareness on energy efficiency among male and female users and employees across a range of building types 	
	Baseline	0 / 0% total and 0/0% women
	Target value (June 2022)	500 / 100% total and 200/40% women
OUTCOME 2:	Increased adoption of business models and financing instruments that enable and de-risk clean energy investments (transaction enablers) in energy efficient and green buildings sector	
Indicator 2.1.	<ul style="list-style-type: none"> Number of business models, including with private sector participation, designed and expected to be implemented 	
	Baseline	0
	Target value (June 2021)	2
Indicator 2.2.	<ul style="list-style-type: none"> Number of cool roof pilot implemented using the one of the relevant business models and/or financing instruments developed 	
	Baseline	0
	Target value (June 2022)	1

OUTPUTS EXPECTED	Contribution to Outcomes	Financed by	Delivery date
I. Implementation support for BEER system			
<u>Output 1.</u> Report: Assessment, study, survey, impact evaluation I.1. Recommendations to optimize the long-term strategy for sustainable building I.2. a) Recommendations to update: building baseline; requirements defined in the rating guide;	<u>Outcome 1. Indicator 1.1</u> - Potential adoption of BEER regulation - Potential update of Bangladesh National Building Code	ESMAP	June 2021

institutional awareness and financial interventions for BEER's implementation; submission, assessment, approval and certification processes I.2. b) Potential impact for building user and at national level I.2. c) Design of a flow chart for the online certification system	<u>Outcome 2. Indicator 2.1.</u> - Design a business model to accelerate the implementation of BEER		
<u>Output 2.</u> Report: Assessment, study, survey, manual I.2. d) Baseline survey of energy consumption in buildings I.2. e) Development of a user manual of the rating system I.3. Design a capacity building plan I.4. Design a MRV system		CIF-TAF	June 2021
<u>Output 3.</u> Tool: Software development Implementation of the web-based application based on the flow chart designed in output 1		CIF-TAF	June 2022
<u>Output 4.</u> Tool: Software development Implementation of the MRV system outlined in output 2		CIF-TAF	June 2022
II. Buildings Cool Roofs Program for Energy Savings and UHI Mitigation in Dhaka city			
<u>Output 5.</u> Report: Assessment, study, survey II. 1. Benchmarking and best practices II.2. Key barriers and opportunities II.3. Design of the business model and a pilot project	<u>Outcome 1. Indicator 1.1</u> - Potential adoption of local cool roof regulation in Dhaka <u>Outcome 2. Indicator 2.1.</u> - Design a business model for the scale up of the cool roof program in Dhaka	ESMAP	June 2021
<u>Output 6.</u> Report: Assessment, study, impact evaluation II.4. Potential impact for building users II.5. Potential impact at national level II.6. Design a capacity building plan II.7. Design a MRV system II.8. Prepare and recommend supporting policy measures, tools, business and financing mechanisms		CIF-TAF	June 2021

OUTPUTS EXPECTED	Contribution to Outcomes	Finance d by	Delivery date
III. Capacity building deployment			
<u>Output 7.</u> Knowledge sharing: Training workshop, conference Implementation of one-year training activities based on capacity buildings plans designed for BEER system and cool roof program in outputs 2 and 6 Number of people trained, including disaggregated by gender (in short term, one-year plan) including	<u>Outcome 1. Indicator 1.2.</u>	CIF-TAF	June 2022

Government officials, private sector and other relevant stakeholders, in the area of energy efficient and green buildings design, development, rating and implementation			
IV. Cool roofs pilot project in Dhaka			
Output 8. Pilot project, impact evaluation Execution and monitoring of a pilot project during one-year period	Outcome 2. Indicator 2.2.	CIF-TAF	June 2022

The target value of indicators 1.1. and 2.1. is expected to be achieved in June 2021, because Activities I and II must be almost completed, and outputs 1, 2, 5 and 6 delivered by then.

The target value of indicators 1.2. and 2.2 is expected to be achieved in June 2022, because Activities III and IV will be mainly based on findings of Activities I and II. Therefore, Activities III and IV will be expected to start around June 2021 and will last until June 2022.

The proposal activity will include the potential energy savings of BEER implementation and the Cool Roof Programs considering different energy efficiency scenarios until 2030 (Outputs 1 and 5).

Assumptions and risks/ risk management

Many countries around the world have ordered population lockdowns to prevent the spread of COVID-19 pandemic. As a consequence, home-based work is mandatory for WB employees and government officials of Bangladesh, and travel between countries is heavily restricted. Bangladesh government offices are expected to be opened at the end of May, however travel restrictions are expected to last longer.

To mitigate the impact that this situation could have on the project, the analytical work has been prioritized for the following months (studies, assessments, impact analysis), and in-country missions will be replaced by regularly virtual meetings. At least one conference per week will be held between SREDA and the WB team for coordination and project follow-up, and additional conferences including different stakeholders will be also held to collect data and inputs needed for analytical work development.

As soon as travel restrictions allowed, missions to Bangladesh will be restored. The agenda of missions to be held until June 2021 is expected to include meetings with SREDA, key stakeholders, the WB team and specialist firms and consultants hired to the WB to support the project. Covid-19 prevention protocols defined by the WB will be in place during meetings in Bangladesh, such as maximum number of participants in the meeting room, social distancing, use of personal protective equipment - masks, globes or other -, hydroalcoholic gels, meeting rooms disinfection before meetings, or others.

Activities to be deployed on the field and expected to gather a large number of participants, such as dissemination workshops or training programs, or cool roofs interventions in buildings are expected to be delivered between June 2021 and June 2022. The activities will be implemented following all the security and health protocols in place at that moment regarding Covid19.

The proposed activity aim at enabling environment to create a green and energy efficient building market in Bangladesh. Green building projects are subjected to inherent risks, usually related with

consultants, contractors, materials, legal, contractual, financial and economic issues. Common risks are: Lack of green construction experience and qualification leading to contractors and subcontractors agreeing to standards that are not within their expertise and competence; Doubts about long-term viability and performance of new and untested products, materials and technologies; Failure to receive materials/products in a timely fashion causing delays; Lack of expertise in new products/technologies; Inconsistencies between regulations; Concern that project owners and participants lose potential benefits because of the stringent standards of certification; High cost of certification process; Scarcity of insurance solutions; or Failure to use of financial incentives because of delays or lower certification levels than expected.

The scope of the proposed activity has been defined to mitigate the risks identified above, and will include support for: (i) the design of the regulatory framework, to avoid inconsistencies or gaps; (ii) the implementation of the certification system, providing formats, calculation methodologies and web-based tools to harmonize the application, evaluation and certification processes and reduce costs; (iii) the deployment of capacity building, to provide knowledge of green / energy efficiency buildings and certification system qualification, within the public and private sectors; (iv) demonstrations of pilot projects, to provide successful examples of the implementation of energy efficiency measures; and (v) definition of business models, to facilitate the mobilization of private investments.

The private sector will be involved from an early stage in the design of the certification system and the implementation process to consider the peculiarities of the construction market and to obtain a tailored rating system for Bangladesh. This will facilitate a smooth and successful implementation.

As this activity will be embedded in the EE component of the larger programmatic ASA which had been discussed with SREDA, the risks related to the proposed activity are low. The analytical work and TA will be conducted by a mix of international and/ or national firms and individuals (STCs), who will be procured in accordance with Bank guidelines for Bank-executed projects. The Bank team, and if found necessary peer reviewers, will review and quality control reports and presentations. While the planned activities are anchored in existing Government plans and policies, the concept of energy transition is new and may be met with some skepticism in the light of the country's planned huge additions of generation capacity; this risk is best mitigated through active consultation and engagement with the various counterparts. Furthermore, outputs from the analytical work will be consulted upon in workshops with key sector stakeholders and the TA will be conducted in close collaboration with the Bangladesh counterparts.

Funds provided by CIF-TAF will be key to achieve the outcomes defined in *"Results framework"* and to facilitate a smooth implementation of BEER and the Cool Roof Program in Dhaka with a potential scaling up to other major cities. TAF funds will complement and help strength ESMAP initiative's scope as follows:

- Inclusion of all sectors in building typologies covered by BEER: residential, commercial and industrial, amplifying the potential impact of the rating system.
- Updating building baselines. EE specifications and levels for the rating system and the cool roof program will be derived from baselines, hence not accurate baselines would lead to smaller impacts than expected.
- Rolling out of the BEER online certification system. Implementation and deployment in the field would be very difficult and complex without an online tool able to automatize and standardize processes.

- Execution of one-year capacity building in the field. Lack of capacity building will jeopardize the roll-out and successful implementation of BEER and Cool Roof Program.
- Development of a monitoring, reporting and verification system for BEER and Cool Roof Programs. This system would be a tool to measure impacts, set sector-level decarbonization targets, update procedures and business models, and optimize results derived of the implementation of the EE initiatives deployed through this proposed activity.
- Implementation of a pilot project for the Cool Roof Program in Dhaka. The pilot would provide lessons learned and key information to update processes, scale-up the program and optimize results.

Co-financing, if any

Yes, from ESMAP. ESMAP funds are already approved and available to start the activities described in the implementation plan.

Gender considerations and expected results

Gender considerations and gender equality design considerations will be integrated into the proposed activity which would include technical support for developing standards, formats, templates, business models. The designs for gender-responsive interventions, outputs, business models will be developed. Also, the various impacts related to gender considerations in implementation, and in terms of beneficiaries will be examined and incorporated, through ex ante and ex post analysis.

The baseline survey for energy consumption in buildings will look at gender differences in energy user behaviors, perceptions of energy efficiency, and awareness and attitudes on energy efficiency among employees and users of public buildings. The survey results will be sex-disaggregated.

The architectural program investigation that is planned to examine uses and services of a building, operating schedules and comfort tolerances among users, will also consider gendered patterns of use.

Based on the baseline survey and the architectural program investigation results, the capacity plan to be designed will define activities to address any potential gender gaps in the area of energy efficiency. The capacity plan will also include conducting awareness raising campaigns on energy efficiency, considering the engagement of both men and women and tailor messages based on gender-differentiated concerns, priorities, and perceptions toward energy efficiency in public building.

Two gender indicators have been included in the proposal: one indicator measuring the number of people trained, disaggregated by gender, in short term, one-year plan, including Government officials, private sector and other relevant stakeholders, in the area of energy efficient and green buildings design, development, rating and implementation; and other indicator measuring increased information and awareness on energy efficiency among male and female users and employees across a range of building types.