Terminal Evaluation – Energy Efficiency Improvement in Public Sector Buildings in China (PSBEE)

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UNDP China

UNDP PIMS ID: 5395

GEF ID: 6930

Region/Country: Asia Pacific/China

Focal Area: Climate Change Mitigation

Executing Agency: UNDP

Implementing Partner: Ministry of Housing and Urban-Rural Development (MOHURD) China

22nd December 2023 (October 2023 – December 2023)

Project/outcome Information		
Project/outcome title	Energy Efficiency Improvements in Public Sector Buildings in China (PSBEE)	
Quantum Project ID	00094663	
Corporate outcome and output	*Low carbon and other environmentally sustainable strategies and technologies are adapted widely to meet China's commitments and compliance with Multilateral Environmental Agreements*	
Country	People's Republic of China (PRC)	
Region	Asia Pacific	
Date project document signed	November 2018	
Project dates	**Start**	**Planned end**
	November 2018	December 2023
Total committed budget	**USD 8,932,420**	
Project expenditure at the time of evaluation	**USD 8,379,785.64**	
Funding source	**GEF Trust Fund**	
Implementing party[1]	**UNDP**	

Evaluation information		
Evaluation type (project/ outcome/thematic/country programme, etc.)	Project Outcome	
Final/midterm review/ other	Final	
Period under evaluation	**Start**	**End**
	November 2018	December 2023
Evaluators	Ms. Umm e Zia, Mr. Xie Ji, Mr. Cheng Jianhong, Mr. Gao Enyuan, and Ms. Michelle Wang	
Evaluator email address	umme.zia@cynosure-intl.com	
Evaluation dates	**Start**	**Completion**
	19th October 2023	31st December 2023

[1] This is the entity that has overall responsibility for implementation of the project (award), effective use of resources and delivery of outputs in the signed project document and workplan.

ACKNOWLEDEMENTS

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List of Abbreviations

ADB - Asian Development Bank

ADR - Annual Delivery Rate

APRs - Annual Progress Reports

AWP - Annual Work Plan

BEAS - Building Energy Audit System

CABEE - China Association of Building Energy Efficiency

CABR - China Academy of Building Research

CEO - Chief Executive Officer

CSO - Civil Society Organization

CSTID - Center of Science and Technology Industrialization Development

CTA - Chief Technical Advisor

DEA - Detailed Energy Audit

DOE - Design of Experiments

DOHURD - Department of Housing and Urban-Rural Development

EBAS - Energy Audit of Public Buildings

EC&EE - Energy Conservation and Energy Efficiency

EMIS - Energy Management Information System

EMVS - Energy Savings Measurement and Verification System

EPC - Engineering, Procurement, and Construction

ESCOs - Energy Service Companies

ESMVS - Energy Savings Measurement and Verification System

FGD - Focus Group Discussion

FYP - Five-Year Plan

GEF - Global Environment Facility

GHG - Greenhouse Gas

ISO - International Organization for Standardization

KII - Key Informant Interviews

LC - Low Carbon

MOHURD - Ministry of Housing and Urban-Rural Development

MTR - Mid-term Review

NDCs - Nationally Determined Contributions

NDRC - National Development and Reform Commission

NGO - Non-Governmental Organization

NGOA - National Government Offices Administration

PBEMIS - Public Building Energy Management Information System

PBEMIS - Public Buildings Energy Management Information System

PEA - Preliminary Energy Audit

PIF - Project Identification Form

PIRs - Project Implementation Reports

PMO - Project Management Office

PRF - Project Result Framework

ProDoc - Project Document

PSBEE - Energy Efficiency Improvement in Public Sector Buildings in China

PSC - Project Steering Committee

PSC - Project Steering Committee

QPRs - Quarterly Progress Reports

SDGs - Sustainable Development Goals

TAC - Technical Advisory Committee

TCE - Tonnes of Coal Equivalent

TE - Terminal Evaluation

ToC - Theory of Change

UNDP - United Nations Development Programme

UNEG - United Nations Evaluation Group

UNFCCC - United Nations Framework Convention on Climate Change

UNSDCF – United Nations Sustainable Development Cooperation Framework

USD - United States Dollar

Executive summary

Project Details		Project Milestones	
Project Title	Energy Efficiency Improvement in Public Sector Buildings in China (PSBEE)	PIF Approval Date:	21 October 2015
UNDP Project ID (PIMS #)	5395	CEO Endorsement Date (FSP) / Approval Date (MSP)	12 June 2017
GEF Project ID:	6930	ProDoc Signature Date:	20 November 2018
UNDP Quantum Business Unit, Project ID, Award ID	Project ID: 00094663 Award ID: 00094663.1	Date Project Manager Hired:	October 2018
Country:	People's Republic of China	Inception Workshop Date:	26 June 2019
Region:	Asia Pacific	Mid-Term Review Completion Date:	15 December 2021
Focal Area:	Climate change mitigation	Terminal Evaluation Completion date:	31 December 2023
GEF Operational Programme or Strategic Priorities/Objectives:	CCM-1. Program 1. CCM-1. Program 2.	Planned Operational Closure Date:	20 November 2022
		Revised Operational Closure Date:	31 December 2023
Trust Fund:	GEF Trust Fund		
Implementing Partner (GEF Executing Entity):	Ministry of Housing and Urban-Rural Development (MOHURD) China		
NGOs/CBOs involvement:	N.A.		
Private sector involvement:	Several private sector companies in different sectors, such as construction, design, energy efficiency, health, education, and transport, etc.		
Geospatial coordinates of project sites:	N.A.		

Financial Information		
PDF/PPG	**At approval (US$M)**	**At PDF/PPG completion (US$M)**
GEF PDF/PPG grants for project preparation	200,000	200,000
Co-financing for project preparation	NA	NA
Project	**At CEO Endorsement (US$M)**	**At TE (US$M)**
[1] UNDP contribution:	100,000	0
[2] Government:	54,000,000	1,207,400
[3] Other multi-/bi-laterals:	0	0
[4] Private Sector:	16,000,000	58,176,900
[5] NGOs:	0	0
[6] Total co-financing [1+2+3+4+5]:	70,100,000	59,384,300.00
[7] Total GEF funding:	8,932,420	8,379,785.64
[8] Total Project Funding [6+7]	79,032,420	67,764,085.64

The "Energy Efficiency Improvement in Public Sector Buildings in China (PSBEE)" project was implemented by the Ministry of Housing and Urban-Rural Development (MOHURD), supported by the UNDP, and financed by GEF, and implemented from November 2018 to December 2023. The Project focused on four key components which included: modifying Chinese policy related to energy efficiency (EE) in public sector buildings looking to heighten overall energy efficiency standards; developing energy efficiency monitoring and evaluation (M&E) capabilities for relevant local stakeholders; improving access to finance for energy efficiency projects; and improving local public sector worker capacities in terms of building energy efficiency. The project involved numerous stakeholders, including various public ministries and standards agencies and private financiers such as banks and insurance agencies. It was implemented across various regions in China including Beijing, Chongqing, Inner Mongolia, Qingdao, and Changsha. Overall, the project is calculated to have saved 73,000 tonnes of CO2 in GHG emissions and a reduced the estimated growth rate of GHG emissions from China's public building sector from 2.33 percent to 1.4 percent. These results push China closer towards its commitments to achieving the SDGs and are a good sign for global efforts towards the accomplishment of attaining net zero emissions.

The TE found the project to be successful. The overall ratings for monitoring and evaluation, outcome achievement, implementing agency execution, and sustainability are presented in the table below.

Table 1: Evaluation Ratings

1. Monitoring & Evaluation (M&E)	Rating
M&E design at entry	Satisfactory
M&E Plan Implementation	Satisfactory
Overall Quality of M&E	Satisfactory
2. Implementing Agency (IA) Implementation & Executing Agency (EA) Execution	**Rating**
Quality of UNDP Implementation/Oversight	Satisfactory
Quality of Implementing Partner Execution	Satisfactory
Overall quality of Implementation/Execution	Satisfactory
3. Assessment of Outcomes	**Rating**
Relevance	Satisfactory
Effectiveness	Satisfactory
Efficiency	Moderately Satisfactory
Overall Project Outcome Rating	Satisfactory
4. Sustainability	**Rating**
Financial sustainability	Moderately Likely
Socio-political sustainability	Likely
Institutional framework and governance sustainability	Likely
Environmental sustainability	Likely
Overall Likelihood of Sustainability	Moderately Likely

Summary of Findings:

1) The PSBEE project was found to be relevant to the priorities and needs of all key stakeholders, including GEF, UNDP, and the Government and People of China.
2) Although, the Project design was highly ambitious, the project has met or exceeded its key targets. Against an End of Project (EOP) target of 55.7 ktCO2, Project activities have resulted in GHG reduction of 73.0 ktCO2; and against an EOP target of 1.8%, 1.4% annual growth rate of GHG emissions was achieved through the Project's contributions.
3) Furthermore, the Project has resulted in the development of policies and standards, demonstration of EC&EE/LC technologies, and piloting new financing approaches in public and private buildings in five provinces across different climatic zones.
4) The PMO has efficiently coordinated at least 60 stakeholders engaged in project implementation, fostering collaboration and buy in, that proved to be a key element for the PSBEE project's success.
5) A Sizeable portion (37%) of the project's trainees were women. However, Gender concerns were not mainstreamed into other programming matters, such as women's access/utilization of public buildings, etc. No other cross-cutting issues in terms of human rights, equality, or safety were at risk due to the PSBEE project.

6) The project findings and results were disseminated to 239,000 people through five workshops conducted mainly online.
7) The PSBEE project's exit strategy included the engagement of key relevant organizations in the public and private sectors, development and revision of EE standards, data collection mechanisms through EMIS, demonstration of benefits of EE technologies and approaches in buildings, awareness raising about EC&EE/LC, and capacity building of technical professionals.

Lessons Learned:

1. Demonstration of EC&EE/LC technologies and financing requires significant collaboration and negotiation among a variety of stakeholders, such as technology providers, building managers, and financial institutions.

2. Non-availability and/or economic feasibility of EE financing mechanisms continues to be the major hurdle for buildings to transition to EC&EE/LC technologies. However, engagement with key financial services institutions and support to piloting their products can help fill this gap.

3. Among the EC&EE/LC technologies and approaches demonstrated by the project, hospitals and educational buildings have high potential for replication; whereas, among the technologies piloted with the project support, those aligned with carbon peaking-carbon neutrality strategy are likely to have significant support.

4. It is essential for projects of a highly technical nature such as the PSBEE to recruit technical experts at the very onset.

Recommendations:

Table 2: Recommendations Table

#	Recommendation	Relevant Agency	Timeframe
1.	Continue to focus on removing financial barriers. Initiatives should develop economically feasible financing mechanisms and incentive schemes and should develop consumer awareness about such mechanisms.	UNDP,GoC	Ongoing
2.	The concept of building energy efficiency must be extended to other associated sectors, such as construction materials and techniques.	UNDP, GoC	Short to Medium Term
3.	Increase time for demonstration projects to plan and pilot activities and also disseminate information to relevant audiences for greater chance at upscaling and replication.	UNDP, GoC	Ongoing
4.	MOHURD and NDRC should continue to disseminate energy efficiency information to relevant stakeholder such as building owners, construction companies, and financial service providers.	MOHURD, NDRC	Ongoing
5.	Promote easy to replicate EC&EE technologies in public and private buildings.	GoC	Ongoing
6.	GoC should incentivize mechanisms that push building owners, managers, financial institutions, and	GoC	Short to Medium Term

#	Recommendation	Relevant Agency	Timeframe
	construction companies to adopt more EE production processes.		
7.	Projects of a highly technical nature should include the hiring of relevant technical staff in its design.	MOHURD	Ongoing
8.	Future projects should have a greater focus on gender-equality and cross-cutting issues.	UNDP	Ongoing
9.	UNDP and Implementing Partner must communicate adequately to ensure that changes in strategy are well-documented.	UNDP/GoC (Implementing Partner)	Ongoing

1. Introduction

This report provides the terminal evaluation (TE) results of the **"Energy Efficiency Improvement in Public Sector Buildings in China"** (PSBEE) project implemented by the Ministry of Housing and Urban-Rural Development (MOHURD), supported by the UNDP, and financed by GEF. The project was planned as a four-year project, to be implemented from Nov 2018 to Nov 2022. Upon the completion of the project's mid-term review (MTR), the project management office (PMO) requested a 14-month extension which extended the project until 31 December 2023. The Project's budget from the GEF Trust Fund was USD 8,932,420 and its committed co-financing was USD 70,100,000, including planned contributions from UNDP, central and provincial governments, and the private sector.

1.1 Evaluation Purpose

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP-supported GEF-financed projects are required to undergo a TE at the end of the project. The purpose of the TE was to measure the achievement of project results against project expected outcomes and draw lessons aimed at improving project sustainability and enhancement of overall UNDP programming. Accordingly, the TE:

- Identified potential project design problems;
- Assessed progress towards the achievement of the project objective;
- Identified and documented lessons learned (including lessons that might improve design and implementation of other UNDP-GEF projects); and
- Made recommendations to improve future development interventions.

1.2 Scope of the Evaluation

The scope of the TE covered the entire UNDP/GEF-funded project and its components. Accordingly, the TE assessed project performance against expectations set out in the project's Logical Framework. Moreover, the TE assessed results according to the criteria outlined in the Guidance for TEs of UNDP-supported GEF financed projects.

The evaluation covered the criteria of relevance, effectiveness, efficiency, sustainability, and impact as well as assessed the impact the project had on its beneficiaries, gender equality, and other cross-cutting issues. The evaluation report also includes a chapter providing a set of conclusions, recommendations, and lessons learned.

1.3 Evaluation Methodology

The TE was carried out from October to December 2023 and assessed the progress towards achievement of the project outcomes and outputs, the relevance of the various project outputs, and effectiveness and efficiency of the different activities undertaken to achieve the outputs. These outputs were assessed against the project's set targets as specified in the project document[2]. Moreover, inputs were analysed by assessing the contributions made by UNDP China and its implementing partners, the appropriateness and effectiveness of the partnership strategy utilized, and sustainability of the project's outcomes and outputs. The TE team engaged in various activities to undertake the evaluation, including literature review, development of evaluation tools, and meetings with project stakeholders.

Moreover, the evaluation adopted a consultative and participatory approach and employed mixed methodologies, combining qualitative and quantitative data to capture information relating to the assignment objectives. The specific evaluation questions and the methodology the TE team would use to answer them were elaborated in the Evaluation Matrix that was presented in the evaluation's Inception Report. The Evaluation Matrix can be found in Annex 1.

1.4 Data Collection and Analysis

Initially, to get an overview of the project's implementation mechanisms and associated challenges and opportunities, a detailed desk review was undertaken of relevant documents and sources of information. A list of documents reviewed is provided in Annex 1. The desk review helped to determine the stakeholders to be interviewed and also helped in development of the evaluation tools as well as facilitated an overall understanding of the project dynamics.

Following this, an Inception Meeting was held virtually between TE team, UNDP China, and PMO representatives on 19 October 2023. The Inception Meeting allowed for a more in-depth discussion on the TE approach, proposed methodology, selection, and sampling of stakeholders for interviews, method for undertaking interviews (i.e. face to face vs. virtually), tentative timeline for undertaking the terminal evaluation, support required by TE team from PMO and UNDP China, and expectations from the TE. During this meeting it was decided that the TE team will undertake key informant interviews (KIIs) and focus group discussions (FGDs) to obtain qualitative and quantitative data from relevant stakeholders that would aid in determining project performance, and that the data collection stage would last from 13-27 November 2023.

The TE Team comprised of Ms. Umm e Zia as the International Evaluation Expert/Team Lead, while national team members included Mr. Xie Ji, Mr. Cheng Jianhong, Mr. Gao Enyuan, and Ms. Michelle

[2] Documents assessed for project targets included the ProDoc, Inception Report, PPRs, and PIRs.

Wang. In-country data collection was undertaken by the National Team members, while the Team Leader participated in the evaluation remotely. During the evaluation mission, interviews were held with key project stakeholders, starting with the Project Management Office (PMO) staff responsible for overseeing the various program outputs and activities. KIIs were then held with 29 stakeholders including project steering committee (PSC) members, local government, academia, representatives of pilot project partners, and the private sector. A detailed list of the interviewees is presented in Annex 2.

To gain perspectives and feedback of project beneficiaries and assess the impact of the project's activities, the TE also undertook focus group discussions with the personnel of MOHURD and the provincial Departments of Housing and Urban-Rural Development who received trainings and capacity building on the implementation of various EC&EE and low-carbon programmes and initiatives. A total of 10 FGDs were conducted with 6-8 beneficiaries each from different regions where the project was implemented including Tianjin, Chongqing, Beijing, Guangzhou, and Suzhou. The evaluation ensured that all methodologies, data collection tools, and data analysis techniques were gender-responsive.

1.5 Ethics

The Evaluation followed the UNEG Ethical Guidelines and Code of Conduct for Evaluation in the UN System. Ethical considerations included obtaining participants' consent to participate in the interviews and were also informed that the TE report will not include direct quotes or attributions to any individual. Also, data confidentiality protocol was followed and only the TE team had access to the raw data.

1.6 Limitations

As the TE Team Lead had to work remotely, in many instances, she was reliant on the observations and findings of the National Team Members assigned by the UNDP. This limitation was mitigated through highly regular communication between the TE Team Lead and the National Team Members that kept the Team Lead informed throughout the data collection and report writing process.

With limited time available for undertaking this evaluation, the TE team had to expedite data collection and analysis activities in order to meet the deadline for submission of the Draft TE Report. The TE team and PMO successfully expedited this process through constant and timely communication, that appropriately provided the TE team with all information necessary for the generation of the report.

Table 3: Evaluation Limitations and Adopted Mitigation Measures

Category	Details of limitations	Mitigation measures
Remote Team Lead	Team Lead was operating remotely therefore	Team Lead and National Consultants were in constant

	was reliant on observations from national consultants	communication. Team Lead was regularly informed of new data.
Evaluation Timeline	Evaluation had a short timeline therefore data collection, analysis, and report writing process had to be expedited	The TE team was in constant communication with project staff for project data. PMO's provided all information required by TE team in a timely manner.

1.7 Structure of the Report

The remainder of this report is structured in a manner that gives the reader context of the project itself, before moving on to key findings, and the TE team's recommendations. Chapter 2 provides a description of the problem the project sought to address, the manner in which it intended to do so, what exactly its goals were, and what the project's midterm review found.

This will allow the reader to better understand the TE team's findings in the chapter 3 of the report. Chapters 3.1 to 3.5 pertain to the TE team's findings when it comes to key evaluation questions such as those relevant to the project's effectiveness, efficiency, progress to impact, relevance, etc. Chapter 3.6 concludes the report with key findings, conclusions, and recommendations.

2 Project Description

This section provides an overview of the PSBEE Project's timeline, its development context, problems that the Project sought to address, the Theory of Change, resources allocated, main stakeholders, and major outcomes of the Mid-term Review (MTR) conducted in 2021.

2.1 Project Start and Duration

The project was planned to be executed between November 2018 and November 2022. However, following delays due to procedural issues and COVID-19 pandemic, in 2022 the PSBEE Project was given an extension of 14 months, extending the planned end date to December 2023. The table below shows key events in the project timeline:

Table 4: Project Milestones

Milestone	Date
PIF Approval	October 2015
CEO Endorsement	June 2017
Project Document Signature	November 2018
Inception Workshop	June 2019
First Budget Disbursement	March 2019
Project Manager Hiring	October 2019
PSC Meetings	September 2020
	April 2021
	April 2022
	March 2023
Mid Term Review	December 2021
Original Closing Date	November 2022
Terminal Evaluation	October 2023 – Dec 2023
Revised Closing Date	December 2023

2.2 Development Context

Being the most populous country in the world and the second largest global economy by GDP, China is also the largest consumer of electricity, consuming 31% of the global electricity supply, as of 2022.[3] It is estimated that buildings contribute to 22% of total energy consumption in the country which equates to burning 1.09 billion tonnes of coal equivalents (TCE). 20%[4] of these buildings are estimated to be public building (201.8 million MTCE). As the government provides more and better services to its citizens, it is estimated that the demand for electricity in public buildings will grow by between 350 and 530 MTCE by 2035. Limiting this growth is crucial to limiting the release of greenhouse gas (GHG) emissions and achieving the targets set by the United Nations Framework Convention on Climate Change (UNFCCC). For more than a decade, the Chinese government has been working towards improving its energy conservation and energy efficiency (EC&EE), which includes improving the energy efficiency of public sector buildings. There has also been progress in establishing a policy and regulatory framework to enable the adoption of EC&EE technologies and practices in public buildings. Some of the key regulations available at the time of PSBEE design were:

- Incorporation of actions on energy efficiency in buildings in China's 13th Five-Year Plan (2016 – 2020), including the adoption of advanced standards on energy efficiency for buildings
- Adoption of the "Design Standard for Energy Efficiency of Public Buildings" in 2015
- Adoption of the "13th Five-Year Plan for Energy Efficiency and Green Energy in Buildings" in 2017
- Adoption of the "Energy-saving design standards for residential buildings in severe cold and cold regions" in 2018
- Adoption of the "Technical standard for nearly zero energy buildings" in 2019.

[3] Electricity Market Report, *International Energy Agency*, 2023, p 13.
[4] CEO Endorsement Request for the PSBEE Project, *UNDP*, 2017, p. 29.

While the country has made significant progress in the adoption EC&CC and low carbon technologies and practices, prevailing barriers limit a faster and more efficient deployment of these measures. The PSBEE project was one such initiative that attempted to assist various stakeholders to achieve this goal.

2.3 Problems the Project Sought to Address

The PSBEE project sought to improve the conservation and efficient use of energy in the operation of public buildings in China through the adoption of EC&CC and low carbon technologies and practices. The project followed a barriers removal strategy aimed at creating an enabling environment for the adoption of these technologies and practices. The barriers stated in the project document are:

- Inadequate policy and regulatory frameworks that promote and support EC&EE improvement initiatives in the public sector.
- Absence of an overall evaluation system for reviewing and analyzing the existing energy management procedures and practices in public sector entities and their facilities.
- Limited market-oriented financing mechanism for funding EC&EE technologies/products in the public sector.
- Low level of capacity and awareness of public sector technical and management personnel on the application of EC&EE and LC technologies.

2.4 Immediate and Development Objectives

The objective of the project was to facilitate the conservation and efficient use of energy in the operation of public buildings in China. The ultimate goal of the project was to manage the rate of growth of energy consumption and GHG emissions from the public sector in China[5]. The project sought to achieve this objective by means of:

- Formulating and enforcing EC&EE support policies
- Establishing and implementing public sector energy performance monitoring and evaluation systems
- Adopting EC&EE financing mechanisms
- Improving the capacity and awareness of the public sector; and,
- Providing information on EC&EE and LC technologies for buildings.

2.5 Description of the Project's Theory of Change[6]

Overall, the PSBEE Project's strategy included **four causal pathways** to achieve its overall goal of a "well-managed growth rate of energy consumption and associated GHG emissions from the public sector in China", and the project's objective of "facilitation of the energy conserving and energy efficient operation of buildings and building services in the public sector in China". When implemented in conjunction, these pathways were meant to enable the adoption of EC&CC and LC technologies and practices in public buildings.

[5] ProDoc, *GEF*, 2018, p 3.
[6] The PSBEE Project's Theory of Change was developed by the MTR Team and further adjusted by the TE Team.

The first causal pathway, implemented through **Component 1 aimed at removing policy and regulatory barriers**. The component sought to have an impact on the national level and replications of the solutions at the subnational (provincial) level.

Along this pathway, the project aimed at developing and adopting procedures on energy monitoring and reporting to support a proposed EMIS, and regulations on energy conservation in public buildings (output 1.3.). These policy developments, initially adopted at the national scale, were then to be evaluated, adjusted, and replicated at the sub-national level (output 1.4.). Likewise, the project sought to develop a national roadmap for the adoption of EC&CC and LC technologies and practices in public buildings, followed by similar roadmaps at the subnational level (output 1.2.). Two additional outputs were added to component one during the inception report: output 1.7. on developing regulations for life energy efficiency management and evaluation for large public buildings, and output 1.8. on methodology research on regional energy planning and operation management for public buildings, and demonstration. Furthermore, during project implementation, throughout the four project components, the focus on public buildings was redirected to 'buildings used by the general public'[7] regardless of public or private ownership.

This pathway led to the first direct outcome, defined as "strict enforcement of approved enhanced policies and rules and regulations on energy efficiency and low-carbon operation and maintenance of public sector buildings.". An underlying assumption (assumption one in Figure 1) was that the project could (through output 1.1.) correctly identify the existing policies and regulations that impeded the adoption of EC&CC and LC technologies and practices in public buildings. A second assumption along this pathway was related to the applicability at the subnational level of the policies and regulations that had been developed at the national level, and the willingness of subnational authorities and stakeholders to adopt them.

The **second causal pathway**, under **Component 2**, **addressed the barrier related to the absence of an evaluation system for energy performance of public buildings**. The proposed project solution for the lack of such system presented two main elements: (i) the design and implementation of an EMIS (output 2.1.3) with a supporting database (PBEMIS) and an energy savings measurement and verification system (ESMVS) (outputs 2.2.2. and 2.1.4.); and (ii) the design and implementation of a public building energy audit program (outputs 2.1.2. and 2.2.1.). During the inception report, two new outputs were added to component two: output 2.1.5. on establishing a green finance indicator system which supports the building energy efficiency improvement; and output 2.2.3. on investigating energy consumption of different types of public buildings. An assumption to deliver the outcome required that regulations developed under component one would be effectively enforced to ensure that managers of public buildings would report energy performance data to the EMIS and that they would have the appropriate set of incentives to improve energy management. Likewise, the delivery of the outcome required that building managers and other stakeholders (e.g. energy auditors, contractors, supervisors, etc.) found the information in EMIS accessible and useful to perform their duties (assumption 3).

A **third causal pathway** to address the barrier on limited financing mechanisms is implemented through a sub-set of activities and outputs under **Component 3**. These outputs aimed at increasing the availability of resources (including technical capacity, information, and financing) for EC&EE initiatives in public sector buildings and facilities **(outcome 3.1)** and piloting EC&EE and LC technologies and approaches in 22 buildings in the public and private sector **(outcome 3.2)**, including

[7] E.g., airports, hospitals, markets, etc.

10 buildings where existing EE financing mechanisms were used for the demonstrations. The outputs under this pathway were to lead to published directory of recommended applicable and cost-effective new EC&EE/LC technologies (systems and products) for public sector building administrators/manager (Output 3.1.3); an assessment of market-based financing scheme options; the establishment of a market-based financing scheme (output 3.2.1.); piloting of the established scheme (output 3.2.2.) whose results were to be then assessed and disseminated (output 3.2.4.) to facilitate plans for scaling-up and replication (output 3.2.5.). A critical assumption along this pathway (assumption 4) was that financial institutions had an interest to offer the financial product(s) developed by the project to real estate developers, property management companies, and ESCOs, in terms attractive to these stakeholders, and in volumes that would be large enough to make a difference in the market for EC&CC and LC technologies and practices in public buildings. However, during implementation, instead of developing a new financing mechanism, the Project carried out a comparative review of the various existing EE financing mechanisms in use in the country and the corresponding demos under output 3.2.5 were then implemented through such existing schemes then.

A **fourth causal pathway** sought to raise awareness, build technical capacities, and improve access to information related to EC&CC and LC technologies and practices in public buildings. The pathway was to be implemented with outputs and activities under **Outcome 3.1.** and to **Outcome 4** on "enhanced awareness and knowledge of public sector authorities and personnel and the citizenry on the cost-effective application of EC&EE technologies". As such, outputs along this pathway were to contribute to increasing the technical capacities and information available to support the adoption of EC&CC and LC technologies and practices. During the inception workshop, a sixth output was added to component four, on an information sharing platform for cities along the silk and belt route (output 4.2.3.). An assumption required to reach outcomes 3.1. and 4 was related to the project's capacity to generate effective partnerships for the delivery of training activities that would reach a significant number of practitioners in the buildings sector, and that those training activities would effectively build the capacities of these stakeholders (assumption 5).

Collectively, the five project outcomes were to lead to a state where stakeholders in the public buildings sector in China would improve access to EC&CC and LC technologies and practices, enabled by adequate policies and regulations, better technical capacities, information, and appropriate financial products. Beyond this state, the path to reach the project's goal required EC&CC and LC technologies and practices to be adopted by the public buildings sector at a scale that would be large enough to have a meaningful impact on the upward trends of energy consumption and GHG emissions (assumption 6). For that process to take place, key project products and processes would need to be sustained over time (e.g. EMIS, financing scheme, training centres, information network, etc.).

A Theory of Change figure is provided in Annex 4.

2.6 Expected Results

The PSBEE project aimed to facilitate the energy conserving and energy efficient operation of buildings and building services in the public sector in China and was designed to facilitate the realization of the envisioned alternative scenario in the energy performance of the public sector buildings in China. This project comprised of baseline and incremental activities that enhanced the outputs of the currently implemented and planned programs and activities in the public sector buildings in the country in improving the energy utilization performance of these buildings. These included, among others,

activities on the formulation and enforcement of EC&EE support policies, establishment and implementation of public sector energy performance monitoring and evaluation systems, EC&EE project financing mechanisms, improving the capacity and awareness of the public sector, and the provision of public information services on building EC&EE and low carbon technologies.

The stated **Goal** of the PSBEE Project was: Well-managed growth rate of energy consumption and associated GHG emissions from the public sector in China. While the Project's **Objective** was the: Facilitation of the energy conserving and energy efficient operation of buildings and building services in the public sector in China.

2.7 Total Resources

Table 5: Total Financial Resources Allocated and Used

	Allocation in ProDoc (US$)	Expenditure at Time of TE (US$)	Percentage Expenditure at Time of TE	Expected Expenditure at EOP
GEF	8,932,420.00	8,379,785.64	93.81%	97.17%
Co-Financing	70,100,000.00	59,384,300.00	85%	85%

2.8 Main Stakeholders

The project involved many stakeholders for different project components including central government agencies, local government entities, private sector representatives, academia, CSOs/NGOs, and other stakeholders such as schools and hospitals. The complete list of stakeholders engaged by the project is provided in Annex 5.

2.9 Context of the Mid Term Review

PSBEE's MTR was conducted in December 2021. The MTR generally found that the Project was performing close to expectations and had successfully achieved the mid-term targets of various indicators. However, the MTR also made some critical observations regarding the Project's implementation strategy. These included: i) change in focus from only public buildings to both public and private buildings; ii) change in the project strategy from developing and piloting an EE financing mechanism to assessment and utilizing existing financing mechanisms in the market under Outcome 3; iii) shortcomings in the monitoring method of the demonstrations under outcome 3. In addition, the MTR also observed some operational shortcomings in the Project, including: i) the lack of documentation confirming approval of the abovementioned changes in project strategy; ii) the lack of a monitoring plan; and iii) the absence of the CTA who was planned to be hired in the ProDoc.

Furthermore, citing the delays caused by a slow project start as well as COVID-19, the MTR recommended that the project be extended by 12 months for all activities to be completed and all outcomes to be achieved by the end of the Project.

In response to the MTR's feedback, the Project took several corrective actions/modifications, including the hiring of a CTA, development of monitoring plan, and formal approval by the PSC of changes made to the Project strategy. Moreover, an extension of 14 months was granted, shifting the Project closing date from November 2022 to December 2023.

3 Findings

3.1 Project Design/Formulation

3.1.1 Analysis of Results Framework: project logic and strategy, indicators

The TE found that the project strategy as elaborated in the Project Document and Results Framework was developed using standard UNDP-GEF approaches to Energy Efficiency (EE) projects, including a focus on policy support, capacity building, and demonstration of *EC&EE and LC technologies and practices* designed to remove barriers related to low levels of capacity, knowledge, and skills, and improve access to financing. Furthermore, the TE observed that sustainability was well integrated into the project design through measures such as policy and standards development, data collection, demonstrations, and capacity building.

However, although with some exceptions, the project´s components, outputs, and activities were presented clearly, the design strategy did not elaborate a Theory of Change (ToC), as such. Consequently, a ToC was developed by the MTR, which was also reviewed and revalidated by the TE. It is to be noted that while the final ToC is based on the Project strategy presented in the ProDoc, it also includes key adaptive changes that were made during project implementation. The TOC developed by the MTR and modified by the TE has been elaborated in section 2.5.

The TE found that a logical framework analysis approach was used for the design of the full-sized PSBEE project. The logic was finalized through analytical reviews and collaborative stakeholder workshops and was also detailed in narrative form in Section IV of the ProDoc. Also, key assumptions were listed in the Project Results Framework (PRF) and a risk analysis was summarized in a risk log included in Annex H of the ProDoc. In addition, the demonstration projects to be undertaken were also identified in the ProDoc.

The PRF included indicators at the goal and objective levels, and for each of the four main components. The TE found that with some exceptions, the choice of indicators provided a good balance between measurement of project outcomes and delivery of outputs. However, in some cases the indicators/targets were set unrealistically high. In particular, the ProDoc target for annual growth rate of GHG emissions to be reduced from 1.8% p.a. to 0.6% p.a. was highly ambitious give the limited scope of the Project. Similarly, while the statement for Component 1 mentioned ‘number of approved and enforced policies’, there was no guidance on how this was to be achieved as none of the outputs detailed in the ProDoc strategy included the monitoring and reporting of policy approval and enforcement. Furthermore, the prospect of approved and enforced policies was unrealistically ambitious given the limited scope of the project and the exogenous factors that could affect this progress, such as receptivity on part of the GoC. In addition, under Component 3.2, the number of buildings (20) to be financed through market-based financed scheme as well as another 20 buildings to have implemented EC&EE/LC technology application demonstrations was deemed to be too high considering the project resources. Consequently, during the inception phase, the targets each of the two indicators were revised to 10 buildings.

Conversely, under Component 2, the project’s target of having just 12 buildings to complete energy audits was unambitious and irrelevant, since according to the project reports, more than 16,000 energy audits of public buildings had already been conducted in China by 2017.

Also, the TE noted that in some cases, the organization of some outputs across the four project Outcomes was clear. For instance, while Outcome 3.2 was dedicated to demonstrations in public buildings, '*Increased application of EC&EE technologies in public sector buildings and facilities*', in the interest of a cohesive project design, Output 1.4 '*Completed demonstrations on the application of EC&EE policies and systems in 3 - 5 provincial Department of Housing and Urban-Rural Development (DOHURD) regions*' should have been placed under Outcome 3.2. Similarly, due to the striking similarities in Output 3.1.4 '*Designed market-based financing of new EC&EE and LC technology (system and product) applications'* and Output 3.2.1 *'Established scheme for market-based financing of new EC&EE/LC technology (system and product) applications',* these outputs could have been merged into Output 3.1.4.

Also, the TE found that in some cases, the means of verification listed in the PRF are unclear. For instance, as a means to verify the objective-level indicator of 'number of jobs created', the PRF specified 'building industry survey and sociological survey'. However, it was unclear whether these were surveys routinely conducted by the EE and/or public building sector, etc. or whether such surveys would be specific to the project.

Under Component 3, as elaborated in the Project strategy, the Project aimed to develop an incentive-based financing mechanism in order to overcome the lack of motivation to ensure EE in public sector buildings as one of the key identified barriers. However, no particular indicators for such an incentive-based system were provided in the PRF, e.g. amount of financing to be disbursed through such a scheme, etc. Furthermore, the PMO found the tasks of both development and application of a financing mechanism to be undertaken during project lifetime to be highly ambitious and in fact unrealistic, as the development of such a mechanism would be a time-consuming task that would leave little time towards the project end for demonstration in public buildings. Finally, while the indicators for Component 4 related to training and capacity building were SMART, they were not gender disaggregated.

3.1.2 Assumptions and Risks

The TE found that generally, the assumptions listed were reasonable and sound. One major exception to this was Component 3.1, under which the project aimed to '*design selected market-based financing scheme(s) for EC&EE/LC projects in the public buildings sector*'. While the ProDoc gives a step-by-step guidance on assessment of existing financing schemes in the market, etc. as well as a brief strategy to engage stakeholders from the private sectors, it does not take into account the limited time allotted to the project for the development, piloting, and implementation of such a scheme, as well as the traditional barriers associated with development of public private partnership. Furthermore, it was assumed that financial institutions will not only be interested in partnering with the Project but will also be receptive to the idea of such a financial scheme.

3.1.3 Planned stakeholder participation

The main stakeholders identified in the ProDoc were the Ministry of Housing and Urban-Rural Development (MOHURD) and the provincial Department of Housing and Urban-Rural Development

(DOHURD) units in the provinces. The other stakeholders are those including city and county governments, National Energy Conservation Centre (NECC), Standardization Administration of China, as well as those involved in the education and health sectors, EE sector certification and verification, building construction industry, and those in the private sector mainly banks/financial institutions, ESCOs and service companies. The TE found that many of the stakeholders identified in the ProDoc have been key to driving EE measures in China, e.g.

Furthermore, the ProDoc provided some guidance on attracting private sector partners, i.e. ESCOs and banks/financial institutions. This engagement strategy was to be based on three core elements, namely: i) knowing and understanding of the current energy utilization based on the establishment of an ICT-based system that would report energy use; ii) creation of demand for better energy management and increased EE in public buildings through measures such as introduction of mandatory EE targets and associated incentives; and iii) promotion of Engineering, Procurement, and Construction (EPC) contracts between public sector and ESCOs through the establishment of appropriate financial mechanism(s) such as guarantees or concessional lending, etc. to allow ESCOs to access capital to finance EE projects in public buildings.

3.1.4 Lessons from other relevant projects (e.g. same focal area) incorporated into project design and Linkages between project and other interventions within the sector

The ProDoc listed some ongoing and recent GEF and UNDP EE projects in China as entities which the PSBEE project could consult with for further refining and implementing activities. These included: GEFID 4621 China ADB - Hebei Energy Efficiency Improvement and Emission Reduction Project, GEFID 4869 China World Bank - Urban-Scale Building Energy Efficiency and Renewable Energy, GEFID 5669 China UNDP - Enabling Solid State Lighting Market Transformation Promotion of Light Emitting Diode Lighting, and GEFID 5360 China UNDP - Promoting Energy Efficient Electric Motors in Chinese Industries projects.

On the other hand, the TE is cognizant of the fact that the Government of China has developed key policies and strategies on Energy Efficiency and has also implemented numerous EE-related programs at least over the past decade. Similarly, the UNDP and GEF have a key comparative advantage in the design and implementation of EE projects in China and numerous other countries. In addition, there are examples of numerous other UN agencies, donors, and public and private sector initiatives on EE in China and elsewhere. However, the TE found that, with the exception of a brief reference to UNDP's work on EMIS in Croatia and the list of projects mentioned above for coordination, lessons learned from such past initiatives were not provided in the ProDoc, which could have further enriched the Project's strategy. Furthermore, the ProDoc lacked any discussion or baseline information on the existing government policies and standards for EE in the country. Such a listing of the existing national and sub-national EE policies and standards could have led to some guidance on the future policy direction to be taken by the Project.

3.1.5 Gender responsiveness of project design

The ProDoc discusses gender considerations in section IV (p. 45) and included a gender analysis in Annex N (no gender plan was included as part of the proposal). The emphasis of the gender mainstreaming approach followed by the project design was on ensuring equal employment opportunities in the building construction and management sector, and in enterprises in the field of EC&EE and LC technologies and practices. However, no Gender-disaggregated indicators were presented in the PRF.

3.1.6 Social and Environmental Safeguards

The ProDoc includes the report of the social and environmental safeguards screening following UNDP's policy. The project was classified as low risk, listing potential risks from the release of pollutants, and from the disposal of hazardous or dangerous materials during the implementation of demonstration projects. In response to these risks, demonstration projects are required to undergo an assessment to minimize environmental and social impacts.

In summary, while the project was designed in consultation with stakeholders, documented in accordance with UNDP-GEF project guidelines, and also outlined a detailed implementation strategy. However, a number of key targets were set unrealistically high. Therefore, the TE found the design of the PSBEE Project to be ***Moderately Satisfactory.***

3.2 Project Implementation

3.2.1 Adaptive Management

The TE found that the PSBEE Project has undergone several modifications since its initial design. These changes broadly occurred in three phases, namely the Project Design, Inception, and Implementation.

The **major change at the time of Design** was the change of designated Implementing Partner/GEF Executing Entity from the National Government Offices Administration (NGOA) to the Ministry of Housing and Urban-Rural Development (MOHURD). However, this change in IP was not fully reflected in the project strategy detailed in the project document. In particular, the planned focus of project activities continued to be on public sector buildings, which are a NGOA concern; whereas MOHURD oversees/regulates both public and private sector buildings. Nevertheless, in practice MOHURD selected both public and private sector buildings for demonstrations, as detailed in the section on Effectiveness.

Subsequent critical material modifications were made to project strategy at the culmination of the **inception phase** and approved by the PSC and also reflected in the work plan for 2019-2020. Of these, the major changes included: changes to initially identified pilot demonstration sites, modification of targets in the project logical framework, addition of project outputs, and adjustment of budget allocation, as follows:

- Pilot/demonstration projects were replaced (as the initially selected sites fell under the ambit of NGOA).
- Modification of Logframe targets:
    - Component 2: the number of public buildings that regularly submit energy supply and consumption reports annually to the EMIS was modified from 2,200 to at least 1,000; the number of public buildings that are classified as energy efficient was modified from 2,200 to at least 1,000.
    - Component 4: the number of public buildings with established energy management programs implementing EC&EE/LC projects was modified from 2,200 to at least 1,000.
- Adjustment on Budget allocation among four components.
    - The experts' consultancy and preliminary review of potential pilot/demonstration projects in Component 3 showed that the support for the incremental cost of pilot/demonstration projects would make the major part of the budget. Therefore, the budget for Component 3 was increased from USD 2 Million to USD 3.8 Million, while reducing the budget for Component 4.
- New outputs were added based on changed circumstances of building energy efficiency industry since the time of project design.
    - In component 1, two outputs were added, including Output 1.7 and Output 1.8
    - In component 2, two outputs were added (Output 2.1.5 and Output 2.2.3)
    - In component 4, one output was added (Output 4.2.3)

The main reasons cited for making these changes were the rapid growth in EE sector in China since the time of project design, the broader scope of MOHURD as compared to NGOA, and limited data availability in the country on building energy consumption data.

Finally, the project strategy was further adjusted during implementation and these changes were approved by the PSC. Among these, the major changes included:

- Output 3.2.2: Targeted No. of EC&EE/LC projects financed through the market-based financing scheme for public buildings was reduced from 20 to 10.
- Output 3.3.3: Targeted No. of successfully implemented EC&EE/LC technology application demonstrations in public buildings was reduced from 20 to 10.
- Instead of only focusing on public buildings, the inclusion of both public and private buildings as demonstration sites which were used by general public.
- Annual growth rate of GHG emissions, the corresponding targets of baseline level, midterm target level and end of project target level were modified to 2.33%, 2.05% and 1.80% from 2.33, 2.05, 1.80%[8].

Finally, due to delays caused by a late start and COVID-19, upon the recommendations of the MTR, the project was granted a no-cost extension of one year. Hence, the project end date was moved from the initially planned date of October 2022 to December 2023.

[8] as approved by PSC at annual PSC meeting in March 2023

In summary, the TE found that the PMO has been proactive in modifying the project strategy in response to the changing context and ground realities. This approach has enabled the achievement of all key outputs, as elaborated later in the section on Effectiveness.

3.2.2 Monitoring & Evaluation: design at entry (*), implementation (*), overall assessment of M&E (*)

The TE found that the M&E framework provided in the ProDoc was sound and gave guidance on which to establish the Project's M&E plan to be developed at Inception. In particular, USD 236,000 (2.6%) of total GEF grant was allocated to M&E. In addition, USD 260,000 co-financing was budgeted for this purpose.

During implementation of the PSBEE Project, the PMO, supported by TAC and the sub-contractors was responsible for the project M&E, whereas, UNDP, MOHURD, and the PSC provided guidance and oversight. In particular, the process for monitoring each assigned sub-contracts by the PMO involved an inception workshop, a mid-term review, and a final review. Project monitoring including QPRs and APRs submitted by the PMO were reviewed and approved by the UNDP and PSC. While annual PIRs were submitted by the UNDP to GEF. The UNDP also commissioned a MTR in 2021 and this TE in 2023. However, the TE found that the PIR and APRs are not very detailed and instructive on the processes that led to the achievement of targets and/or challenges faced in implementation thereby. On the other hand, the progress reports submitted by the CTA were found to be highly detailed, but, as these reports mostly focus on Outcomes 3.1 and 3.2, this still leaves a gap in documenting overall project progress.

Furthermore, while these monitoring processes were in place, the M&E Plan was not developed in 2022, after the recommendations of the MTR. Key monitoring gaps identified by the MTR included the approach and methodology for planning and monitoring the results of demonstration projects and the lack of data gathering mechanism for the PRF indicator on job creation. Following the MTR recommendations, the CTA assisted the PMO with the development of the M&E Plan, with its key features being the: (1) approach and methodology for the calculation of incremental GHG emissions and emissions reductions attributable to the demonstration projects and to their replication effects, (2) baseline and calculation method for the estimation of fuel savings to be reported under the first indicator of the project´s objective: "Cumulative fossil fuel savings due to project intervention", and (3)"No. of new jobs created with the application of EC&EE technologies and techniques in the public sector buildings in China. In fact, the development of the M&E Plan also provided the PMO a chance to re-validate the targets set in the logical framework and put revised targets more in line with the Project's activities. This included the targets for Annual growth rate of GHG emissions (%) and Accumulated fossil fuel savings (ktce), as outlined in the section on Adaptive Management.

The TE found that implementing these monitoring methods has enabled the Project to improve its M&E and assess progress on goal, objective, and outcome-level indicators of the PRF. Furthermore, the resulting data has been used to update the GEF Tracking Tool.

In addition, the MTR observed that "significant changes to the project scope are not being adequately approved and documented, including for example the process for the selection and award of grants to demonstration projects, the extension of the project scope to private buildings, and the deviation from the plan for removing financial barriers". However, the TE found that this issue was rectified and

detailed calculations and reasoning was provided to the PSC for making any adjustments in the Project strategy going forward.

In summary, the TE observed that the ProDoc provided substantial resources for M&E and also stipulated the development of a project monitoring framework. Hence, M&E at design was found to be ***Satisfactory.*** On the other hand, while standard monitoring and reporting procedures for UNDP-GEF projects were followed throughout the life of the PSBEE project, a major overhaul of the monitoring methods was required after the MTR to ensure correct and comprehensive reporting against planned targets. Consequently, the Project's M&E was found to be ***Satisfactory*** during implementation.

3.2.3 Actual stakeholder participation and partnership arrangements

The TE observed that the Project engaged a broad range of stakeholders, including government agencies at the Central and Local levels, academia, CSOs, and private sector, etc. In total, 60 stakeholders were engaged, of which 55 were sub-contractors providing services such as research, technical advisory, and demonstration. In addition, some key stakeholders were also engaged indirectly, as they were involved in incremental activities through the demonstration sites, generally including banks and ESCOs. TE interviews revealed that this extensive stakeholder engagement was key to achieving Project results.

On the other hand, the TE found that key national ministries and provincial units of the Ministries of Education and Health, as was foreseen in the ProDoc, were not engaged in the Project. This was a lost opportunity in terms of broadly disseminating EE concepts among the public sector.

3.2.4 UNDP implementation/oversight (*), Implementing Partner execution (*) and overall assessment of implementation/oversight and execution (*)

Overall, UNDP was found to have provided guidance and oversight to the project design and implementation in accordance with UNDP-GEF processes. However, as pointed out earlier, the project's shortcomings related to calculation of benefits from demonstration activities went unnoticed until the MTR, while the PMO also made some changes to the implementation strategy without seeking formal approval from the PSC (e.g. inclusion of private sector buildings in the project and using existing EE financing mechanisms instead of developing a new financing mechanism as we planned in the project document). However, these issues were rectified in response to the observations made by the MTR as the UNDP supported the project in the recruitment of a competent CTA. In view of this, the TE found that UNDP implementation/oversight was eventually ***Satisfactory.***

In terms of MOHURD's role as the Implementing Partner for executing the PSBEE project, the TE found that significant effort was directed at engagement of relevant sub-contractors, demonstration units, and other stakeholders. However, in the first half of the project key project strategy decisions were made without seeking formal approval from the PSC. This led to significant change in the project approach from what was anticipated at design, especially with respect to focus on public buildings as well as the development of EE financing mechanism. In addition, a CTA was not hired as was planned

in the ProDoc. However, once the MTR raised concerns about some of these issues and provided guidance, the PMO managed by MOHURD was able to rectify these measures and achieve project targets. Overall, the TE found that IP execution was ***Satisfactory.***

3.2.5 Risk Management

Major risks identified in the ProDoc were: (i) political support to project implementation, (ii) poor communication and coordination between different government levels, (iii) materialization of co-financing commitments, (iv) level of technical capacities in public buildings sector, (v) low participation from managers and staff from public buildings, (vi) failure to implement proposed policies and regulations, and (vii) sustainability of project outcomes. In 2020, COVID-19 was also added as a risk. However, no safeguards-related risks were identified.

The risk log was reported in QPRs, APRs, and PIRs. The TE noticed that key risks that materialized during implementation were COVID-19 that affected progress, insufficient support from local governments, and low interest in training activities. Major mitigation measures adopted by the PMO included adoption of alternative strategies such as remote work as well as pro-active engagement and collaboration between stakeholders. These actions helped mitigate identified risks (i), (ii), and (v). The project also involved various policy makers/implementing bodies which greatly mitigated risks (vi) and (vii). The commitment shown by local stakeholders also contributed to greater willingness to provide to co-financing as well as take part in capacity building exercises, contributing to risk (iii) and (iv), respectively.
The project has adopted a grievance redress mechanism following MOHURD requirements. However, no complaints have been recorded since the project started.

3.2.6 Social and Environmental Standards

The ProDoc assigned a “low” rating to the PSBEE Project’s social and environmental risk. The risk screening results showed that there were no clear direct impacts and risks. Of all of the project activities, it was anticipated that the demos and associated activities could present some potential risk of negative social and environmental impacts if factors that would prevent from such risks happening were not considered during their implementation. However, no such risks were reported in the risk logs during implementation.

3.3 Project Results and Impact

3.3.1 Progress Towards Objective and Expected Outcomes

The table below shows the project’s performance with regard to its indicators. The data used in this table is derived from the latest PIR (2023).

Table 6: PSBEE Performance Towards Indicators

No.	Description of Indicator	Baseline	End of Project Target	Status (as of TE)
GOAL: Reduction of greenhouse gas emissions through the widespread application of public building energy efficiency				
1	Cumulative CO2 emissions reduction, ktons	0	55.7	73
2	Annual growth rate of GHG emissions, %	2.33	1.8	1.4
OBJECTIVE: Facilitation of the energy conserving and energy efficient operation of buildings and building services in the public sector in China				
3	Cumulative fossil fuel savings due to project intervention, tce (corrected from ktce per approval by PSC and RTA)	0	6,523	31,249
4	No. of new jobs created with the application of EC&EE technologies and techniques in the public buildings sector in China	0	3,600	7,397
Outcome 1: Strict enforcement of approved enhanced policies and rules and regulations on energy efficiency and low carbon operation and maintenance of public sector buildings				
5	No. of approved and enforced policies, and associated guidance and implementing rules and regulations (IRRs) .	0	8	8
6	No. of improved and updated public sector building energy standards.	0	2	2
Outcome 2: Better control and enhanced management of the energy performance of public sector buildings				
7	No. of official building energy audits completed each year under the energy audit system starting Year 1.	0	12	136
8	No. of public buildings that regularly submit energy supply and consumption reports annually to the EMIS.	0	1000	2,329
9	No. of public buildings that are classified as energy efficient.	0	1000	1,638
Outcome 3.1: Increased availability of resources (technical capacity, information and financing) for EC&EE initiatives in public sector buildings and facilities				
10	No. of public buildings utilizing the established system for providing information about the features, technical specifications, and costs of new EC&EE low carbon technologies each year starting Year 2	0	100	201
11	No. of banks that are providing financing for EC&EE/LC projects through the market-based financing scheme for public buildings	2	5	6
Outcome 3.2: Increased application of EC&EE technologies in public sector buildings and facilities				
12	No. of EC&EE/LC projects financed through the market-based financing scheme for public buildings.	0	10	10
13	No. of successfully implemented EC&EE/LC technology application demonstrations in public buildings.	0	10	11
14	No. of EC&EE/LC projects implemented in public buildings in other provinces that replicate the demonstrations.	0	10	13
Outcome 4: Enhanced awareness and knowledge of public sector authorities and personnel and the citizenry on the cost-effective application of EC&EE technologies				
15	No. of trained public building personnel that are qualified and skilled in the design and cost-effective implementation and evaluation of EC&EE projects.	0	3,600	2,462
16	No. of public buildings with established energy management programs and are implementing EC&EE/LC projects.	0	1,228	1,403

Based on calculations reported by the CTA, the TE determined that the project has exceeded its goal of GHG reduction. Against an End of Project (EOP) target of 55.7 $ktCO_2$, the 19 demonstrations implemented through the Project have resulted in GHG reduction of 73.0 $ktCO_2$ directly. These results are especially encouraging since of the 19 demos, 15 have been operating for two years and an additional four demos have operated for only one year thus far.

In addition, the project contributed to the indirect mitigation of 22,241,277 metric tonnes of CO2. These achievements contributed to global environmental benefits. Also, in terms of reducing annual growth of GHG emissions resulting from public buildings in China, against an EOP target of 1.8%, a 1.4% annual growth rate of GHG emissions was achieved through the Project's contributions. The baseline annual growth rate of these emissions was calculated as 2.33% in the MTR. Therefore, the project contributed to a 0.93% reduction in GHG emissions growth, significantly higher than the EOP target of 0.53%. Replication of these efforts throughout public buildings in China has the potential to significantly reduce annual GHG emissions in this sector.

At the objective-level, the project reported to have resulted in cumulative fossil fuel savings due to project interventions as 31,249 tce, nearly 5-fold higher than the EOP target of 6,523 tce.

Similarly, a survey conducted by the Project with support from the China Association of Building Energy Efficiency (CABEE), revealed that against a PRF target of at least 700 jobs to be created through the project, a total of 7,397 jobs were created as a result of project interventions (including 3,597 jobs directly jobs created directly and 3,800 created indirectly).

The section below assesses the project's results per output which will contribute to broader component level analysis in the following effectiveness section.

Component 1: Public Sector EC&EE Policy and Regulatory Frameworks

Component 1 was meant to result in Outcome 1 as the **"Strict enforcement of approved enhanced policies and rules and regulations on energy efficiency and low carbon operation and maintenance of public sector buildings".** Outcome 1 was to be achieved after the commencement of the 8 outputs pertaining to: i) assessment of foreign and domestic EC&EE LC policies and regulations for public sector buildings; ii) formulation and promotion of EC&EE improvement roadmaps; iii) formulation and enforcement of policies; iv) demonstration on the application of EC&EE policies in three to five regions; v) follow-up plan for the replication of the pilots; vi) development/improvement of public sector building energy standards; vii) EE management and evaluation regulation for public buildings; and viii) methodology research on regional energy planning.

The monitoring framework associated two outcome indicators with Outcome 1. Specifically, indicator 1 sought to approve and enforce 8 policies and guidance documents, while indicator 2 sought to develop 2 updated public sector building energy standards.

Below, the TE presents its findings at the output level of Component 1.

Output 1.1: Completed comprehensive assessment of applicable foreign and domestic energy conservation and energy efficiency (EC&EE) and low carbon (LC) policies and regulations for public sector buildings

In December 2020, the project developed the report titled "*Report on foreign and domestic energy conservation & management policies and regulations for public buildings*" which provided a detailed overview of EE & EC policies being implemented across different countries and within China. This report provided the PMO with crucial context for the achievement of successive outputs and was published in 2020.

Output 1.2: Formulated and promoted EC&EE improvement roadmaps

Working alongside activities for output 1.1, the PSBEE project developed 4 documents including: i) "Current status and barriers of EE improvement in public buildings", ii) "Analysis of energy use scenarios and energy efficiency objectives of public buildings", iii) "Road map for EE improvement of public buildings", and iv) "Road map for EE improvement of public buildings in five provinces & municipalities", and relevant supporting materials. The reports were reviewed and finalized in January 2021. Eventually, the recommendations provided by the energy efficiency roadmaps were incorporated into the 14th Five Year Plan on Building Energy Efficiency of Beijing, Changsha, Qingdao, Chongqing and other provinces and cities. The reports were reviewed and finalized in January 2021.

Under this output, two large conferences and 10 seminars were also hosted that gathered input for future policy and regulatory development.

Output 1.3: Formulated and enforced policies including the associated guidance and implementing rules and regulations (IRRs) on energy monitoring and reporting, energy savings verification, and energy conservation in public buildings

Output 1.4: Completed demonstrations on the application of EC&EE policies and systems in 3 - 5 provincial Department of Housing and Urban-Rural Development (DOHURD) regions

The project supported the development of eight policies between the period of Dec 2019 and May 2021, which are displayed in the table below:

Table 7: Policies/Documents Developed Under PSBEE

#	Document Title	Status of Publication/Adoption
1	Report on public building energy information management system related policies and supporting incentives – English and Chinese versions	Draft
2	Detailed implementation rules and application guideline	Published
3	Detailed technical guideline for public buildings' information management	Adopted by Xingtai city, Hebei Province
4	Report on policy and regulation framework for energy saving measurement and verification of public buildings	Approved by PMO
5	Energy saving measurement and verification outline for Ninghe District of Tianjin	Policy Paper
6	Analysis report on regulation and financial policy for energy saving & cost reduction of public buildings	Approved by PMO
7	Guidelines on investment and financing of green insurance credit enhancement model for public buildings	Approved by PMO

8	Evaluation report on the effectiveness and impact of economic incentive policies or systems in public buildings	Approved by PMO

As indicated in the table above, the TE observed that of the four documents developed under this output, one has been published, while the Detailed technical guideline for public buildings' information management was also adopted by the Xingtai city (Hebei Province). Whereas, the Report on public building energy information management system related policies and supporting incentives was developed in both English and Chinese languages, but exists only in draft form.

After the development of these policies, under **output 1.4,** these were demonstrated in 5 Chinese provinces of: Beijing, Chongqing, Inner Mongolia, Qingdao, and Changsha between Q4 2021 and September 2022. The expected impacts of these demonstrations were to show that the policies and guidance would increase participation in energy monitoring, reporting, and auditing, which would indirectly save energy and energy costs. Project monitoring reports suggested that these demonstrations were highly successful showing "strong and long-term impact"[9]. However, specific details of the performance of these demonstrations were not reported, e.g. their contribution to the PSBEE Project's goal of GHG reduction or energy saving, etc.

Output 1.5: Developed and approved follow-up plan for the replication of piloted EC&EE improvement policies in public buildings in other provinces

Furthermore, the PMO also reported that the policies developed under output 1.3 were incorporated in various government planning documents with the purpose of replication of piloted EC&EE improvement policies. Among these, key planning documents were the policies were integrated include: the Beijing 14th FYP for green building green development, "civil building carbon emission reduction work plan", "public building energy saving renovation technology regulations", "Chongqing 14th FYP green building " planning (2021-2025) ", among others. Monitoring the impact of these policies/plans was beyond the scope of the Project. However, interviewed key informants reported that impact of these policies were likely be demonstrated in due course as the planning documents are implemented.

Output 1.6: Developed improved and updated public sector building energy standards

Starting in October 2020, the Project commissioned a review of the China's EE evaluation systems with reference to European Union EE systems. The activities under this output resulted in the development of several standards, including "Technical Standards for Energy Conservation Retrofits of Public Buildings" and the "Energy Efficiency Assessment Standards for Public Buildings", which is a group standard compiled by the China Academy of Building Research (CABR) and issued by the Standardization Administration of China. In addition, the "Technical standard for EE retrofitting of public buildings" (JG176-2022) was updated and issued by MOHURD in 2022, including EE verification indicators, performance indicators for building envelope, equipment, and the retrofitted system. Furthermore, interviews with the PMO revealed that the developed standards were promoted widely in the Project's outreach and training activities.

[9] Project Progress Report 2023, UNDP, p 3.

Output 1.7: Developed life energy efficiency management and evaluation regulation for large public buildings

Output 1.7 was added to the project design during PSBEE's inception phase. Activities began and were concluded in 2020 with the final outputs being the documents "Administrative Measures for energy conservation of large public buildings in Qingdao" and "Administrative Measures for the Assessment and Examination of Energy Conservation of Civil Construction Projects in Qingdao".

Output 1.8: Methodology research on regional energy planning & operation management for public buildings, and demonstration

Output 1.8 was added to the project design during PSBEE's inception phase. Activities began in November 2021 and were completed by September 2022. The following documents were developed: "*Analysis Report on Regional Energy Development Trend of Public Buildings*" and "*Report on Planning and Operation Management of Regional Energy System of Public Buildings*". These documents provided the standardized planning and management methodologies of regional energy system for public buildings.

Component 2: Energy Performance Monitoring and Evaluation System for Public Sector Buildings

Component 2 intended in the result of an outcome to develop a comprehensive tracking system through which public building EE could be monitored. Specifically, the ProDoc states that the outcome of component 2 will be **"Better control and enhanced management of the energy performance of public sector buildings"** which was to be achieved through comprehensive research on energy management and audit systems being applied in different countries, followed by the development of an energy management information system (EMIS), a building energy audit system (BEAS), and an energy savings measurement and verification system (EMVS). The project also intended to support the conduction of building energy audits and the development of a public buildings energy consumption database. Three indicators were associated with this outcome, namely: i) number of building energy audits completed each year, ii) number of buildings that regularly submit energy consumption reports to the EMIS, and iii) number of public buildings classified as energy efficient.

Output 2.1.1: Reviewed and verified supplemental baseline energy information in the various major types of buildings within the public sector

Activities for this output began in October 2019 and were completed in November 2020. The project reviewed existing EMIS systems such as the building energy management system (BEMS) developed by the UNDP in Croatia as well as already established EC&EE activities of public buildings in China. This research allowed the project team to develop three research documents titled "Research report on energy management information system of public buildings", "Research on validation method of energy consumption baseline data of public buildings", and "Technical guidelines for the validation and reporting of energy consumption baseline data of public buildings". These activities helped the project team design and formulate data classifications, indexes, expression methods and develop analytical baseline data and standardised reporting methods for the EMIS.

Output 2.1.2: Established public sector building energy audit system

After a thorough review of energy audits systems that involved the development of two reports, including the "Report on energy audit methods, system status and demand analysis of public buildings" and the "Evaluation report for the application of public building energy audit system". and holding a seminar with relevant stakeholders, the project successfully developed an online system 'Energy Audit of Public Buildings (EBAS)' to be used for output 2.2.1. Additionally, the capacity needs of auditors were also assessed.

The TE learned that as part of the system, two types of audits were developed: i) preliminary energy audit (PEA); and ii) detailed energy audit (DEA). The purpose of having two separate audits was to save time. The project anticipated that a PEA would take 1 to 2 months to complete while a DEA would take 3 months. This way, if an audited building appeared to have a high level of potential energy savings during the PEA, it may then undergo a DEA to establish exactly how the said building could enable higher level of energy and energy cost savings.

Output 2.1.3: Established public sector buildings energy management information system (EMIS)

Output 2.1.4: Established energy savings measurement & verification system (ESMVS) in public buildings sector

Output 2.2.4: Data Analysis and sharing from energy efficiency monitoring for public buildings

Activities for this output started in September 2019. After thorough research and the development of four documents on energy management systems and their mechanisms, the EMIS was developed and integrated into the Building Energy Conservation and Green Building Comprehensive Information Management Platform of the Quota and Standard Division of the MOHURD in June 2022. The system is currently being operated by the Technology and Industrialisation Development Centre at MOHURD. Thus far, more than 1,000 buildings have uploaded information on retrofitting, enabling MOHURD to develop their annual energy consumption analysis report, which includes parameters such as energy consumption intensity per unit area, retrofit costs, and energy saving benefits for different climatic zones. This information is to help MOHURD develop EE strategies and rules, such as energy consumption quotas for different climatic zones and building types and information on EC/EE technologies suitable to different climatic zones, etc.

Furthermore, activities for developing the ESVMS began in December 2019, and entailed the development of four guiding documents on the establishment, monitoring, and evaluation of the ESMVS. The system was made operational in May 2021 in tandem with the EMIS.

Output 2.1.5: Established green finance indicator system which supports the building energy efficiency improvement

This output was completed in September 2021. A report titled "Green finance supporting models for building energy efficiency improvement" was developed, providing an analysis of the current green finance models and products and corresponding suggestions on how green finance supports EE improvement of public buildings from the perspectives of government, financing institutions, and partner enterprises.

Output 2.2.1: Completed energy audits of public sector buildings

Due to delayed project implementation and the pandemic, the project could not conduct audits as planned. After drafting an implementation plan for the audits, the audits began in late 2021, as opposed to the originally planned late 2020/early 2021. Despite this, the project far exceeded the number of audits it had targeted to execute (283%), having audited 136 buildings including schools, public sector offices, and hospitals as compared to the target of 48 buildings (12 buildings per year).

Output 2.2.2: Established Public Buildings EMIS (PBEMIS) database

By June 2023, a detailed database had been established that contained detailed information on building energy consumption, energy audit results, analysis of energy data, and results of energy savings measurements and verifications among other points of data. After its development, personnel from the relevant department in MOHURD were trained to use the and maintain the database. As of the TE, 2,239 buildings are submitting EC&EE data to the EMIS, which has exceeded the target set for this indicator (1,000 buildings).

Output 2.2.3: Investigation on Energy consumption of Different Types of Public Buildings

The data collected by the project team helped them develop novel research on energy efficiency in Chinese buildings. Specifically, activities under this output focused on the creation of 4 documents: “Investigation Plan for Current Energy Consumption of Public Buildings", "Survey and Analysis Report of Energy Consumption of Public Buildings", "Statistical Analysis Method of Energy Consumption of Public Buildings", and "Policy recommendation on Energy Consumption Statistic and Reporting Regulation of Public Buildings".

Output 2.2.5: Development of carbon peak and carbon neutrality plan of building sector

“The Carbon Neutrality Promotion for Building Sector in China” was envisioned as a follow up project to PSBEE. This output was intended to design this project. The design was completed in September 2023 with the core carbon neutrality assessment system set up to contribute to the full enforcement China’s of carbon neutrality goal by 2060.

Component 3: EC&EE improvement promotion and demonstration programs for public sector buildings

Component 3 comprised of two Outcomes. Outcome 3.1 pertained to preparing groundwork, such as availability of resources (technical capacity, information, and financing) for EC&EE initiatives in public sector buildings and facilities, and Outcome 3.2 aimed to apply EC&EE technologies in public sector buildings and facilities as demonstration.

Outcome 3.1: Increased availability of resources (technical capacity, information, and financing) for EC&EE initiatives in public sector buildings and facilities.

Output 3.1.1: Established scheme for providing information about the features, technical specifications and costs of new EC&EE low carbon technologies (including products) for the public sector.

Activities under output 3.1.1. started in October 2020 and a report on "Energy management data and information analysis for public buildings" was approved in 2021. The report included operational suggestions on information acquisition, departmental coordination, roles and responsibilities, data content format, data collection mechanism, and utilization.

Output 3.1.2: Published directory of recommended applicable and cost-effective new EC&EE/LC technologies (systems and products) for public sector building administrators/manager

Activities under this output were initiated in Q3 of 2021 and resulted in the development of a catalogue/directory of energy-saving and low-carbon technology/product for public buildings, providing an assessment of 100+ public building energy-saving and low-carbon technology/product and suppliers. In addition, an online information platform for technology/product promotion was also developed under this output.

Output 3.1.3: Completed assessment of market-based financing scheme options

Activities under this output were completed in 2022. This included a review of existing market-based financing schemes for EC&EE and LC technologies in public buildings and a list of potential schemes to be promoted by the PSBEE project. Under this output, the project delivered two main research products, including:

• Report on "Evaluation of the effectiveness and impact of economic incentive policies or systems in public buildings" summarizing the potential barriers to scheme application and providing recommendations for overcoming these challenges; and

• Policy brief on "Guidelines on investment and financing of green insurance credit enhancement model for public buildings".

Output 3.1.4: Designed market-based financing of new EC&EE/LC technology (system and product) application

The activities under this output were started in Q3 2021. However, instead of designing a market-based financing from scratch of new EC&EE/LC technology (system and product) application to be piloted in ten demonstration projects under component 2, the project commissioned an in-depth assessment of the existing financing mechanisms available in the Chinese market.

Based on TE interviews and document review, the Evaluation determined that due to the slow start of the project as well as the time-consuming nature of developing a financing/incentive mechanism, the PMO and demo contractors envisaged that waiting for this pre-requisite would push the start of the demonstrations that were to be financed through this newly developed mechanism towards the end of the project. Such a scenario was then feared to have jeapordized the possibility of achieving the energy savings and GHG emission reduction targets established in the PRF. This led the PMO to discard the ProDoc strategy of developing a new financing mechanism from scratch and instead, similar products already available on the market and offered by several financial institutions were accessed to

start the 10 demos under output 3.2.2. According to project progress reports, these demos applied a variety of financing mechanisms, such as green credit, insurance, financial leasing, contract energy management, and benefit sharing, etc. Also, against a target of five banks, these demos were able to seek financial support from six banks, including: 1-ADB, 2-Shanghai Stock Exchange, 3-Shanghai Branch of China Merchants Bank, 4-Bank of Qingdao, 5-Guangfa Financing & Leasing (Guangdong) Com. Ltd., and 6- Guangzhou Nansha Branch, Bank of China.

Nevertheless, as pointed out by the MTR, this shift in strategy was a departure from the original design that was not adequately approved and documented as the potential impact of this new approach was not elaborated. To rectify this situation, under the guidance of the CTA hired after the MTR, the PMO recruited a financial consultant to analyze all the 10 demos from Output 3.2.2 in order to evaluate the pros and cons of the financing/incentive mechanisms showcased in each demo and their relative potential for financing the replication and scale-up of the PBSEE supported demos as well as similar EE/EC/RE projects in both public and private buildings.

A Draft assessment report to this end was prepared as of November 2023 and pending finalization by the project end in December 2023. The report is organized into three sections: i) analysis of the financial and technical performance of the 10 demos under output 3.2.2; ii) selection of the proposed optimal financial mechanism using a set of crucial criteria (i.e., highest Internal Rate of Return or Net Present Value, least risky financial mechanism for all stakeholders, FM perceived as the most beneficial by the investors; etc.); and iii) implementation of the designed FM in a replication project.

Output 3.1.5: Selected EC&EE/LC projects (total of 20) in public buildings in selected public sub-sectors.

The PSBEE project was expected to identify and implement 40 projects for the demonstration of EC&EE/LC technology applications in public buildings, including 20 demos where the project-developed EE financing scheme was to be piloted and 20 demos where EC&EE/LC technologies were demonstrated. The number of demonstration projects was later reduced to 20 (i.e. 10 in each category) during the inception phase in 2019. However, in the end the project selected 22 demos to ensure that the project's objective level targets were met. Initially, three demos were identified in September 2019 through public bidding and the remaining were selected in several batches in 2020.

It Is to be noted though that the selected demonstration projects were different from those proposed in the ProDoc (Annex K). The demonstration projects selected during project design could not be pursued later during implementation as the project's implementing partner was changed before project start. Furthermore, while the project design specified an exclusive focus on public sector buildings, eight of the 22 buildings were in the private sector. TE interviews revealed that this change too was a result of the change in IP, since MOHURD as the current IP oversees both public and private sector buildings and instead selected sites that were used by general public, e.g. airports and hospitals, etc. On the other hand, the TE found that although this was a departure from the ProDoc, the alternative strategy has enabled the project to introduce and pilot EC&EE/LC technologies and approaches in a broader range of buildings.

The TE learned that the demonstration projects selected by the PSBEE project had made a cumulative baseline investment of USD 28,614,895 for deploying EC&EE/LC technology applications. In addition, investment for the incremental activities to demonstrate EC&EE/LC technology totaled USD 6,475,324 of which USD 3,061,011 (47.3%) were GEF resources and the remaining USD 3,414,313 (52.7%) were from resources such as the building owners, financing institutes, and ESCOs, etc. Nevertheless, the

MTR found some technical gaps in the agreements signed between the buildings and PSBEE project, as these were limited to the proponents reporting on the implementation of demo projects and did not specify the use of GEF grants to improve the energy performance of the demo projects. More critically, the MTR observed that these agreements failed to show *"their adherence to the GEF's incremental-cost principles, the application of cost-efficiency criteria, and their potential to deliver energy savings and GHG emissions reductions that are attributable to the PSBEE project and to the GEF grants awarded to these demonstrations"*.

Based on the recommendations of the MTR, the project CTA with support from the PMO reviewed the contracts in 2022 and determined that while these key elements[10] were indeed missing from the contracts, all the contractors had in fact kept detailed information regarding the baseline projects, on which the demos selection has been based, as well as a comprehensive description of the incremental activities and their costs designed as part of the PSBEE Project. Using this information, the CTA revised demo descriptions based on standards used for GEF-funded projects and in accordance with UNDP/GEF common practice. This review of the 22 selected demos also confirmed that all the selected sites were financially feasible and therefore could potentially be replicated and scaled-up in similar building types in other locations countrywide.

Output 3.1.6 - *Completed feasibility analyses and design of 20 EC&EE and LC technology application demonstrations*

All the sites selected for demo projects had already made significant investment in EC&EE and LC technology application and were in the advanced stages of implementation. Hence, the preliminary formalities such as feasibility study and construction plan, etc. had already been developed. In fact, the soundness of these studies and plans were reviewed by the PBSEE selection committee as part of the bidding process as a selection criterion. Nevertheless, in some cases, PSBEE technical experts provided further comments and advice to these sub-projects.

OUTCOME 3.2: Increased application of EC&EE technologies in public sector buildings and facilities

Output 3.2.1: Established scheme for market-based financing of new EC&EE/LC technology (system and product) applications.

Planned activities under this output entailed the i) establishment and operationalization of the selected financing scheme(s), ii) Conduct of promotional campaigns for the financing/incentive schemes, and iii) Capacity development for public buildings for using the scheme. As elaborated in the discussion under output 3.1.4, instead of developing a new financing/incentive scheme, the PSBEE Project opted to make use of the existing schemes available in China to be implemented in 10 selected pilot sites (output 3.2.2). Hence, the financing scheme for each demo was developed by the respective funding institute.

Output 3.2.2: Implemented 10 EC&EE/LC projects financed through market-based financing scheme in public buildings in selected public sub-sectors.

[10]incremental-cost reasoning, determining the incremental energy savings and GHG emissions reductions that will be realized from the incorporation of GEF-funded incremental activities, and the cost efficiency criteria through the calculation of financial parameters (i.e., static payback period, Net Present Value or NPV, and Internal Rate of Return or IRR)

Output 3.2.3: Implemented 10 EC&EE/LC technology application demonstrations in public buildings.

Against a target of 10 buildings, the PSBEE project supported a total of 12 LC/EE technology demonstrations; while the project also met its target of 10 demonstrations financed through market-oriented financing mechanism. Annex 6 provides a list of the 22 demos implemented by the project. In addition, the demonstration projects selected to showcase financial mechanisms for energy efficiency in public buildings are presented in Annex 7. According to project progress reports, these buildings covered a total area of over 5 million m^2 and used a mix of LC/EE technologies, including: PV power production, heat pump integrated air-conditioning system, comprehensive energy management platform, application of Energy Performance Contract, power demand side management, and smart power management, etc.

As reported in the section on 'progress towards goal', an assessment of the performance from 19 of the 22 demos revealed that these sub-projects have cumulatively resulted in GHG reduction of 73.0 $ktCO_2$. This includes 15 demos that were in operation for two years at the time of the assessment and the remaining 4 having been in operation for one year. On the other hand, in two of the remaining 22 demos the energy consuming equipment had not been used for a long time due to low occupancy in these two buildings (Demos #9 and #21); while, a third demo (Demo # 11) had been in operation for less than a year and therefore not included in the energy calculations reported here.

Although a new financing mechanism was not developed by the project, TE interviews revealed that the PSBEE project allowed for new financial instruments to be tested by stakeholders, such as the green insurance and energy fee trusteeship mechanism. For instance, green insurance was an innovative idea applied by one of the sub-grantees, the Beijing City Sub-center Investment and Construction Group. Due to the novelty of this idea, its implementation was time consuming and required a thorough understanding of the process by all entities involved. The piloting of these mechanisms also brought together stakeholders such as banks, construction companies, and property management companies, etc. However, the TE team ascertained from discussions with stakeholders that the piloted financial mechanisms would require further improvement that can only be brought about with continued application and experimentation. As such, the duration of one year allotted to the demonstration was reported to be too brief to develop and implement these new approaches. Another major learning from implementation of the demonstrations was the challenge in getting timely and accurate data on EC&EE/LC from the buildings. The challenge was further exacerbated when working with large buildings such as airports.

Similarly, in other instances, the project has helped push forward the use of green financial products such as green credit and green bonds, etc. Two examples of the utilisation of such products in PSBEE are the demonstrations in the China Mobile Nansha Data Centre Building Retrofit Project and the Qingdao Haitian Centre. These low-cost loans or bonds are often subsidised by government which enable banks to promote them and be profitable from them.

Output 3.2.4: Published reports on the impacts of the EC&EE/LC project financing and demonstration program

Output 3.2.5: Developed sustainable follow-up plans for the replication of the demonstrated applicable and feasible EC&EE/LC technologies in the public sector buildings in 5 other provinces

The TE found that the results of the project demonstrations were analyzed and documented in detail both by the project CTA as well as the assigned experts. These assessments included contribution

towards GHG reduction, fossil fuel saving, challenges associated with technology and financing, as well as highlighting processes. The information was disseminated through promotional materials and seminars held in five provinces and cities, covering the four main climate zones in China, and were attended by more than ten thousand people.

Also, against a target of 10 replications, the project reported 13 replications in 5 provinces/cities, including Beijing, Qingdao, and Chongqing, etc. Furthermore, against a target of 100, the project reported that 200 buildings have so far utilized the established system for providing information about the features, technical specifications and costs of new EC&EE low carbon technologies.

Component 4: Public Sector EC&EE Capacity and Awareness Enhancement Program

Component 4 focused on removing the barrier of lack of technical capacity and awareness of public sector authorities on the application of EC&EE technologies. The expected outcome of this component was **'Enhanced awareness and knowledge of public sector authorities and personnel and the citizenry on the cost-effective application of EC&EE technologies'.** To achieve this outcome, the project intended to take dual-pronged measures, i.e.: i) build the capacity and awareness of public sector workers through promotional campaigns and workshops; and ii) develop EC&EE training centres in different regions of China so public authorities could be trained regularly on EC&EE. Activities under component 4 were conducted in association with the China Association of Building Energy Efficiency (CABEE). Two indicators were designed to assess the achievement of this outcome being: i) the number of trained public building personnel that are qualified skilled in the design and cost-effective implementation and evaluation EC&EE projects; and ii) the number of public buildings with established energy management programs and are implementing EC&EE/LC projects.

Output 4.1.1: Completed project promotional campaigns and workshops in target segments of the public sector

From 2020 to 2022, the project conducted a series of five Training Needs Assessments using online and offline surveys with the participation of 155,400 public sector officials, among which half were women. The survey provided insight into the levels EC&EE awareness, staff capability, and capacity building needs.

Output 4.1.2: Completed trainings for MOHURD and DOHURD authorities and technical staff on the implementation of the various EC&EE/LC programs

Activities under this output specifically resulted in 5 training sessions and 3 study tours that were attended by 1,792 public personnel. The post-training evaluation results were positive as participants reported having attained significant information on EC&EE/LC initiatives/standards. The trainees also provided highly positive feedback to the TE team, claiming that they were well designed, relevant to their work, and developed their knowledge of EC&EE/LC technologies, policies, and initiatives.

Output 4.1.3: Completed and post-evaluated EC&EE/LC capacity development programs for the public buildings sector

The project designed capacity development programs, training manuals, and online training sessions on energy efficiency and the low-carbon intensity use of public sector buildings. These

programmes/sessions were based on the Chinese government's "Carbon Peak, Carbon Neutral" objectives.

Output 4.2.1: Established information network for the promotion and dissemination of knowledge on public sector EC&EE and LC technology applications

Activities under this output resulted in the development of an information network that targeted the sharing of the latest EC&EE/LC technology and market development information among public building managers/administrators and building developers in China. The following modules were created for this network: Creative Technology, Theme Activity, Current Sector Policy, High Quality Building Reporting.

Output 4.2.2: Established public sector EC&EE/LC management cum education training centres in the different climate regions

The project supported the development of 5 separate training centres in Beijing, Tianjin, Chongqing, Suzhou, and Guangzhou which were selected after a thorough evaluation of potential cities. These centres are based in different climate regions as energy efficiency is subject to climatic variability. These training sessions provide trainings on a continual basis. The project also developed two documents to guide the operations of the training centres, titled "Operational Plan of Training Centre" and "Standard for Training Centre Establishment".

Output 4.2.3: Established platform for information sharing on low-carbon technology, standard & policy applied public buildings among main cities along the silk & belt route

Activities under this output were focused on developing research related to green low-carbon energy saving building standards in Southern China and comparing them with similar policies in other countries from Southeast Asia and Europe. The output resulted in three studies: "*Comparative Study on the Technical Standard System of Green, Low-Carbon and Energy Efficient Building*", "*Comparison of green low-carbon energy-efficient building standards and related policy systems* ", "*Policy recommendation for planning international green low-carbon energy-saving building standard system and standard implementation management system*".

The project also developed a platform for sharing information on low carbon technologies for cities present along the silk and belt route. In addition, three draft brochures have been developed, summarizing the project activities on policy, technology, and demonstrations.

3.3.2 Relevance

The PSBEE project aimed to improve the energy efficiency and energy conservation of public buildings in China. Operationalising China's public sector buildings is estimated to emit 8%[11] of the country's

[11] Peng et al, Decarbonization path of China's public building sector from bottom to top, *Carbon Neutrality*, 2022, p 1.

total energy consumption which amounts to over 2 billion tonnes[12] of carbon dioxide. By making these buildings more efficient, their energy consumption will decrease, relative to their expected levels in the future. As almost all stakeholders have prioritised efforts leading to the reduction of carbon emissions, the project is contributing directly to their goals and priorities of all stakeholders.

In 2015, the Chinese government claimed in its Nationally Determined Contributions (NDCs) that it intended to have peak carbon emissions by 2030 and carbon neutrality by 2060[13]. This was a highly ambitious goal, as it meant that China would transition from peak carbon emission levels to neutrality in just 30 years, when most other nations committed to neutrality 40 years after their peak. In 2020, President Xi Jinping went a step further and declared that China would be adopting stricter policies on carbon emissions with the goal of achieving peak emissions before 2030 and carbon neutrality before 2060. This is in line with China's commitments to achieving the UN Sustainable Development Goals (SDGs) which target greenhouse gas reduction and net zero. Further evidence of China's commitments is found in its internal policies on energy efficiency in public buildings. The 13th Five-Year Plan for Energy and Resource Conservation by Public Institutions commits to achieving a peak 225 metric tonne of coal equivalents (mtce) for public building operations while aiming at reducing energy consumption per person and per unit building area by 11 and 10 percent respectively[14]. China's MOHURD established its Department of Building Energy and Science & Technology to advance and supervise the implementation of EC&EE initiatives in the public sector. Although the department has achieved modest achievements in this regard, it is expected that energy consumption in general will see a further increase in China, including from public buildings, therefore both MOHURD and the Department of Building Energy must do more if they are to contribute to achieve China's overall net zero targets.

The UNDP's purpose is to achieve the UN SDGs by 2030. The PSBEE project can claim to be directly contributing to SDGs 11 (Sustainable Cities and Communities) and 13 (Climate Action) as it targets improved sustainability of public buildings and reduction in greenhouse gas emissions. UNDP's Country Programme Document for China also highlights its commitment to achieving these goals with specific references to reducing China's greenhouse gas emissions[15] in accordance with the targets mentioned in United Nations Sustainable Development Cooperation Framework (UNSDCF) for The People's Republic Of China[16]. GEF has also committed to achieving the UN SDGs through integrated programs working towards achieving a variety of goals including building sustainable cities and climate change. Before commencement of the project, GEF's CEO, claimed that the project is "in conformity with GEF focal areas strategies and in line with GEF policies and procedures"[17].

These facts suggest that the project was highly relevant to national stakeholder priorities and was completely in-line with UNDP and GEF's strategic priorities. However, in order to maximise relevancy, projects must actively and purposefully engage relevant stakeholders in project design and execution. The project integrated the help of various Chinese government agencies to complete the project including MOHURD, DOHURD, CABEE, CABR, National Energy Conservation Centre (NECC), Standardization Administration of China. These agencies and various city governments played crucial

[12] Ibid, p 15.
[13] China's Achievements, New Goals and New Measures for Nationally Determined Contributions, *UNFCCC*, p2.
[14] The 13th Five-Year Plan for Energy and Resource Conservation by Public Institutions, *International Energy Agency*, 2017.
[15] Country Programme Document for China (2021 – 2025), *UNDP*, p 7.
[16] United Nations Sustainable Development Cooperation Framework for the People's Republic Of China, *United Nations and Government of China*, 2021.
[17] CEO Endorsement, Energy Efficiency Improvement in Public Sector Buildings, GEF, 2017.

roles in the project's execution. Additionally, various private sector organisations such as energy service companies (ESCOs) and banks were incorporated into the project as well.

The project also kept in mind results and lessons learned of other similar projects being undertaken on EE in China. Specifically, four projects illuminated the project's design and implementation: GEFID 4621 China ADB - Hebei Energy Efficiency Improvement and Emission Reduction Project, GEFID 4869 China World Bank - Urban-Scale Building Energy Efficiency and Renewable Energy, GEFID 5669 China UNDP - Enabling Solid State Lighting Market Transformation Promotion of Light Emitting Diode Lighting, and GEFID 5360 China UNDP - Promoting Energy Efficient Electric Motors in Chinese Industries.

The TE team has found that the project was ***Satisfactory*** as it was in-line with the priorities of all major stakeholders; it was inclusive of a large number of stakeholders in the implementation phase that involved national public and private partners; and was cognizant of previous activities conducted by GEF and other partners within China with regards to energy efficiency.

3.3.3 Effectiveness

This section provides an analysis of the PSBEE project's effectiveness in the extent to which the expected outcomes and objectives have been achieved.

Component 1

The activities under component 1 have been deemed largely successful by the TE team, with all target indicators having been achieved by the End of Project, as reported in the annual project progress reports. In particular, the integration of developed policy documents in existing overarching policy documents at the central and provincial levels will facilitate the availability technical and financial resources for the implementation of these policies. Furthermore, some of the policy outcomes were also developed with input and/or support from influential agencies such as the China Association of Building Energy Efficiency and relevant government departments in Hebei Province, Tianjin City, etc., which have a certain degree of influence over the building industry and are likely to promote the enforcement/implementation of these standards.

Similarly, the standards developed/modified with Project support are likely to influence industry practices, particularly as they have been developed with the involvement of key standard development and enforcement bodies, including CABR, Standardization Administration of China, and MOHURD.

On the other hand, the TE noticed that while the Outcome statement for Component mentioned "strict enforcement of approved enhanced policies and rules and regulations…" which suggests that policy enforcement is a crucial part of achieving Outcome 1. However, the TE team found that the project design did not describe any mechanism through which the project could monitor whether these policies were being enforced. Interviews with project management also revealed that they did not monitor policy enforcement due to it not being within the scope of the project.

Overall, the TE concluded that activities under Outcome 1 were delivered on time, with support from key stakeholders, and incorporated into long-term government planning documents. Accordingly, effectiveness of Outcome 1 was found to be ***Satisfactory.***

Component 2

The TE found that under Outcome 2, the Project reported significant overachievement against several outputs. Overall, against a target of 48 buildings 136 (283%) buildings have been audited; 2,329 have submitted EC&EE reports the EMIS as compared the target of 1,000 buildings; and 1,638 buildings have been classified as energy efficient according to the standards developed under Outcome 1. In addition to these indicators, activities under outcome 2 resulted in the development of the EMIS, ESMVS, PBEMIS, and BEAS which are reportedly supportive by MOHURD in the development and enforcement of EE guidelines, schemes, regulations, etc. Accordingly, the TE found the effectiveness of Outcome 2 ***Satisfactory.***

Component 3

The project strategy for Outcome 3 underwent critical modifications, including selection of both public and private sector buildings and utilization of existing financial mechanisms instead of developing a new mechanism. Moreover, the methodology for monitoring EC&EE/LC results was refined after the MTR. However, by the EOP, the activities under this component enabled the PSBEE project to surpass its goal and objective-level targets, including GHG reductions, fossil fuel savings, and job creation. Accordingly, the TE found the Effectiveness of Outcome 3 to be ***Satisfactory***.

Component 4

The TE concluded that the project has successfully developed strong capacity within public sector officials of EC&EE/LC technologies and standards. However, the Project fell short of meeting its target of training 3,600 public building personnel as it was able to certify only 2,462 (68%) personnel. A key challenge in this regard has been the low demand for training due to the slowing down of the construction industry in the recent years. In addition, professionals in the industry need to be convinced of the benefits of these trainings. Furthermore, while trainees reported the trainings to be helpful in improving their professional knowledge and capacities in areas such as building carbon emissions, carbon emission calculation methods, and improved technologies, etc., in some instances the training topics were found to be too advanced, e.g. learning about new concepts such as the energy fee trusteeship mechanism.

However, with support from the five training centers established by the project, an additional **10,125** participants participated in trainings that did not lead to certification. Also, the Project against a target of 1,000 buildings, the project resulted in the establishment of energy management and EC&EE projects in 1,403 buildings, translating into 40.3% overachievement. Hence, the TE found effectiveness of Outcome 4 as ***Satisfactory.***

Overall, the project has successfully contributed to the goals mentioned in its project document and inception report, thus contributing towards broader goals and strategic priorities held by UNDP, the Government of China, and GEF. The TE team found that outputs and outcomes were suitably effecting the target indicators and that the milestones achieved by the project were similar to those envisioned in the project's design phase. Overall, the TE finds that the project has been highly effective. It's effectiveness therefore is determined to be ***Satisfactory***.

3.3.4 Efficiency

Efficiency of the PSBEE project was my measured by assessing how economically resources and inputs (funds, expertise, time, etc.) were converted to results. Accordingly, the TE analyzed Project Management, Timeliness, and Financial Management.

Project Management

The PSBEE project was implemented under UNDP's NIM modality with MOHURD acting as Implementing Partner. The project management structure, as defined in the ProDoc, consists of a PSC, a PMO, and a TAC.

Project Steering Committee: The PSC has met four times since project start, with meetings taking place in September 2020, April 2021, April 2022, and March 2023. These meetings were used to review progress presented by the PMO and approve Work Plan for the subsequent year. In the process, the PSC reviewed and approved critical changes to the project design, including those elaborated in the section on 'Adaptive Management' of this report.

The PSC has also provided strategic guidance to the PSBEE project, having recommended work on: (i) renewable energy, (ii) financial mechanisms, (iii) innovative technologies (i.e. artificial intelligence, energy storage, etc.), (iv) cooperation with countries along the Belt and Road Initiative74, (v) project demonstrations of carbon-neutral buildings, (vi). expanding the work to disseminate the project results, including case studies, publications, etc., (vii) improving the understanding of GHG emissions from buildings, including linkages to the energy, transport and industry sectors, and (viii) focusing on green finance standards to support energy efficient, low-carbon buildings.

Overall, the TE found the PSC to be effective in performing its functions and the Committee was also instrumental in providing strategic guidance to the project.

Project Management Office: According to the design in the ProDoc, the staffing of the PMO included a Project Manager, a Chief Technical Advisor (CTA), three component coordinators, and administrative staff. However, during implementation the composition was revised to include:

- A national program director (MOHURD);
- A deputy national program director (MOHURD);
- A director for operational management (Center of Science and Technology Industrialization Development, (CSTID));
- A deputy director for operational management (CSTID);
- A technical assistant;
- An administrative assistant;
- A finance assistant; and,
- A procurement assistant

Generally, the PMO team was found to be proactive in managing the PSBEE project through partnership management, work planning, procurement, monitoring, and reporting, etc. In particular, the PMO's coordination with nearly 60 institutional stakeholders and sub-contractors, which proved to be a complicated task, was key to the project's success.

On the other hand, the MTR found that the lack of the CTA prescribed in the ProDoc resulted in knowledge gaps at the PMO on technical issues, as evidenced by the shortcomings in the procurement and monitoring of demonstration projects[18]. Nevertheless, as a result of feedback from the MTR, a CTA was hired in the first quarter of 2022 and his services were retained until the Project end in December 2023. The TE learned that the assignment of the CTA substantially augmented the PMO capacity in resolving issues with monitoring and reporting of demonstration units as well as gathering and reporting progress for project indicators at the goal, objective, and outcome levels.

Technical Advisory Committee: The TAC was established at the start of project in 2019, with representation from key project stakeholders, including government ministries, standards institutes, research and academia, and private sector. Over the course of project implementation, in line with the project needs, new members were appointed by the PMO and PSC to TAC. Some of the recommendations produced by the TAC included: (i) identifying relevant project experiences that could be replicated in developing countries, (ii) expanding work on the renovation of existing buildings to improve energy performance, (iii) exploring opportunities to improve energy efficiency beyond individual buildings, (iv) seeking opportunities linked to major international events (e.g. Winter Olympics), (v) focusing building renovation efforts at the sector level in key sector such as health and hotels, (vi) exploring opportunities on demand-side management in cities, (vii) emphasizing the work on removing financial barriers, and (viii) continue focusing on energy efficient operation and management of public buildings, including by introducing the ISO 50001 international standards on energy management systems

The TE found learned that while TAC meetings are on need basis, members of TAC also attended PSC meetings to provide technical advice to the Committee. Nevertheless, the TE played a significant role in ensuring the project's progress from a technical viewpoint.

UNDP: The TE found that UNDP Office in China with guidance from the Bangkok Regional Office has been involved with the PSBEE project since its start, including project preparation and design, inception, and implementation. During implementation, UNDP carried out its supervisory role and strategic guidance by remaining actively involved in the PSC. In addition, the UNDP provided guidance on UNDP-GEF project monitoring and reporting guidelines and also supported the project M&E by review of APRs, PIRs, and commissioning the mandatory MTR and TE.

However, as pointed out by the MTR, the UNDP was unable to detect gaps in planning, monitoring, and reporting of the demonstration projects. Nevertheless, this situation was eventually rectified as the UNDP linked the PMO to a highly experienced technical expert with a good understanding of UNDP-GEF processes to be recruited as CTA.

In summary, the PMO proactively managed the PSBEE project with supervision and guidance from the UNDP, PSC, and TAC. However, not hiring a CTA as was proposed in the ProDoc resulted in gaps in

[18] Details of these challenges are provided in the section on Effectiveness of Outcomes 3.1 and 3.2

planning and monitoring data from demonstrations. These challenges were eventually overcome and resulted in the project meeting or overachieving most of its key targets at the goal, objective, and outcome levels.

Timeliness

The PSBEE project got a slow start, mostly due to the change in IP from the NGOA to MOHURD. While the CEO endorsement was received in June 2017 the project was not signed until November 2018, while the Inception workshop was held the following year, in June 2019. The pace of activities further suffered due to COVID-19 in 2020. For instance, outputs 1.4 and 1.5 were started with significant delay as coordination with other provinces was challenging initially due to COVID-19. Activities across other outcomes also faced delays due to similar reasons. Consequently, the Project was granted a one year no-cost extension, with the revised closing date as December 2023.

The TE found that the PMO put substantial effort into stakeholder coordination and follow up to ensure that progress did not suffer significantly. This and the allotment of one extra year for implementation allowed all planned project activities to be implemented by the End of Project, albeit with some modifications[19].

Financial Management[20]

The project was allocated GEF resources of USD 8.9 Million. In addition, at the time of ProDoc several stakeholders had committed co-financing of USD 59.38 million.

Table 8: Total GEF Fund Allocation and Expenditure at TE

	Allocation in ProDoc (US$)	Expenditure at Time of TE (US$)	Percentage Expenditure at Time of TE	Expected Expenditure at EOP
GEF	8,932,420.00	8,379,785.640	93.81%	97.17%

The TE found that as of November 30, the Project had spent 93.81% of the GEF-allocated budget and with additional foreseen expenses of USD 300,000, it is anticipated that 97% of GEF grant will be disbursed by the EOP on 31 December 2023.

[19] For instance, the development of a new financing scheme was replaced with utilization of existing financing schemes in the market.

[20] All expense figures are as of November 30, 2023

Table 9: Component Wise Allocation (GEF Fund) at time of TE

Outcome	Allocation in ProDoc (US$)	Revised Allocation (Inception) (US$)	Percent Change in Allocation at Inception	Total Budget Committed at TE	Percent Expenditure at TE of Revised Allocation
Component 1 (Public Sector EC&EE Policy and Regulatory Frameworks)	924,600.00	962,100.00	+4%	954,373.40	99%
Component 2 (Energy Performance Monitoring and Evaluation System for Public Buildings)	1,905,100.00	1,682,950.00	-12%	1,607,052.96	95%
Component 3 (EC&EE Improvement Promotion and Demo Programs for Public Sector Buildings)	3,095,500.00	3,945,100.00	+27%	3,704,744.14	94%
Component 4 (Public Sector EC&EE Capacity and Awareness Enhancement Program)	2,581,900.00	1,916,950.00	-26%	1,805,157.79	94%
Project Management Cost (PMC)	425,320.00	425,320.00	0%	332,559.14	78%
Foreign exchange gain/loss				-24,101.79	
Total (US$)	**8,932,420.00**	**8,932,420.00**	**-**	**8,379,785.64**	**94%**

A component-wise analysis revealed that at the time of Project Inception in 2019, GEF fund was reallocated among various components. In particular, funding was reduced for Component 2 (-12%) and Component 4 (-26%). Conversely, funding was increased for Component 1 (+4%) and Component 3 (+27%). However, the total allocation remained the same at USD 8,932,420.

As of November 30, the highest expenditure was recorded under Outcome 1 (99.2%); whereas expenditure for the other three outcomes was between 94% and 95%.

Table 10: Project Annual Delivery Rate (ADR) (GEF Fund)

	2019	2020	2021	2022	2023
AWP Budget (US$)	***1,835,150.00***	***2,231,806.00***	***3,072,992.64***	***1,747,291.96***	***821,546.60***
Total Expenditure (USS)	1,751,322.67	1,985,797.27	2,812,828.80	1,559,136.78	270,700.12

Percentage Delivery (% of total)	95.43%	88.98%	91.53%	89.23%	32.95%

Furthermore, a review of the project's annual budget delivery against the AWP budget showed that average annual budget delivery between 2019 to 2022 was 91.29%. This rate of delivery is in line with acceptable expenditure rates for similar projects. However, in its final year (2023), the project has thus far reported an ADR of only 32.97%. This delivery rate will improve to approximately 70% once the project's final disbursements of about USD 300,000 are made by 31 December 2023.

Table 11: Co-financing Budget Details

Sources of Co-Financing	Name of Co-financier	Type of Co-financing	Co-Financing Committed at ProDoc	Investment Mobilized	Actual Co-financing Amount (US$)
Recipient Country Govt	National Government Offices Administration (NGOA)	Grant	-	-	0.00
		In-Kind	-	-	0.00
	Provincial Government (Jilin, Jiangxi, Gansu)	Grant	23,190,000	-	0.00
	Ministry of Housing and Urban-Rural Development (MOHURD) (in replacement of NGOA)	Grant	25,810,000	-	0.00
		In-kind	5,000,000	-	0.00
	Provincial Government (Qingdao Municipality)	Grant		Investment mobilized	975,200.00
	Provincial Government (Guilin Municipality)	Grant		Investment mobilized	232,200.00
Private Sector	Private Sector	Grant	16,000,000	Investment mobilized	58,176,900.00
Donor Agency	UNDP	Grant	100,000	-	0.00
Total Co-Financing	-	-	70,100,000	-	59,384,300.00

Furthermore, against a total commitment of USD 70.10 million commitment at the time of ProDoc, the project was able to mobilize financing of USD 59.38 million or 85% of the committed co-financing. This co-financing was received from three sources, including private sector, and the counties of Qingdao and Guilin (mostly as investment in demos). On the other hand, no co-financing was reported to be provided by the MOHURD and UNDP. In the case of MOHURD, as it practices zero balance account management, it was decided that the project's co-financing requirement could be basically met through other stakeholders, including the investments by local pilot provinces/cities, ESCOs and owners, etc.

In conclusion, while the PSBEE project's PMO worked efficiently, a CTA and a monitoring framework were not put in place until after the MTR. Also, due to a slow start and COVID-19 related delays, the project was granted a no-cost extension. Finally, the materialized co-financing fell 15% short of the commitments at the time of ProDoc. In view of these findings, the TE found the Project's efficiency to be ***Moderately Satisfactory.***

3.3.5 Overall Project Outcome

Based on the evaluative assessment of the PSBEE project's performance, the TE provided the following ratings in accordance with UNDP-GEF Evaluation guidelines. Overall, the project was found to be ***Satisfactory.***

Table 12: Project Outcome Ratings

Assessment of Outcomes	Rating
Relevance	Satisfactory
Effectiveness	Satisfactory
Efficiency	Moderately Satisfactory
Overall Project Outcome Rating	Satisfactory

Table 13: M&E Ratings

Monitoring and Evaluation (M&E)	Rating
M&E design at entry	Satisfactory
M&E Plan Implementation	Satisfactory
Overall Quality of M&E	Satisfactory

Table 14: Implementing Partner Ratings

UNDP Implementation/Oversight & Implementing Partner Execution	Rating
Quality of UNDP Implementation/Oversight	Satisfactory
Quality of Implementing Partner Execution	Satisfactory
Overall quality of Implementation/Oversight and Execution	Satisfactory

Table 15: Sustainability Ratings

Sustainability	Rating
Financial Resources	Moderately Likely
Socio-political	Likely
Institutional framework and governance	Likely
Environmental	Likely
Overall Likelihood of Sustainability	Moderately Likely

3.3.6 Sustainability

The PSBEE project design took the sustainability of its outcomes into account from the very inception. Outcome 1 included the development of policies and standards that have gone on to be implemented at different levels in the country. Outcome 2 allowed stakeholders to monitor their energy usage and establish quantitative goals for themselves while also aiding data collection to inform government policy and strategy development on EE. Outcome 3 led to significant ownership of local stakeholders of EE policies and was a basis for future replication of project activities. Finally, Outcome 4 established the capacity of thousands of government employees in EC&EE out of which 2,462 have been certified; and 5 dedicated training centres have been established for EC&EE that continue to train employees. The project findings and results were disseminated to 239,000 people through five workshops conducted mainly online in 2022. These activities promise long-term sustainability for the project's outcomes.

Financial Sustainability

A project's financial sustainability is one of the most crucial aspects of establishing a long-term sustainability of results and outcomes. After a thorough review of the PSBEE project's finances and partnerships, it is apparent to the TE team that many local stakeholders both public and private will continue to work towards enabling the EC&EE of public buildings even after the project end. In particular, the fact that the GOC has adopted the policies and standards developed by the PSBEE project suggests that a level of enforcement will be followed which will require financial investment from various government agencies. Moreover, project demonstrations were supported by various leading private sector entities such as banks, insurance companies, and ESCOs and were implemented in numerous kinds of buildings such as schools, hospitals, airports, and data centres etc. The TE team believes that at least some of these businesses will continue piloting and refining the proof of concept for these products and market them to a wider range of clientele.

However, the TE interviews also revealed that significant gaps continue to remain with respect to availability and access to finance for EC&EE/LC continues to be a major challenge for building owners. Key gaps in this regard include the economically feasible financing mechanisms, diversity of range of products, and consumer awareness about the existence of mechanisms that are presently available in the country. For instance, key informants who had taken part in the PSBEE demonstrations claimed that other building managers were interested in taking up EE activities but due to lack of finances available to them for upfront investments and/or the lack of economically feasible financial mechanisms, they were reluctant/unable to proceed. Overcoming these issues will require continued support to developing, refining, and marketing new products as well as awareness raising and

collaboration between the numerous diverse entities involved in the development and utilization of such schemes.

Overall, the TE believe that financial sustainability of the project's outcomes to be ***Moderately Likely.***

Socio-Political

China has confirmed its commitments to reducing its carbon emissions to net zero by 2060. These commitments suggest that project outcomes will be continued to be worked on at a significant scale in the long-term in China. Interviews with various stakeholders from multiple public offices and private sector representatives revealed that almost all were looking to implement EC&EE projects in their offices in the future due to the fact that the government had pledged to achieve carbon neutrality by 2060. Accordingly, the socio-political sustainability of the PSBEE project's outcomes were found to be ***Likely.***

Institutional Framework and Governance

China's political steadfastness towards net zero emissions has resulted in it creating various agencies and policies focused on improving EC&EE in the country. One agency that is highly relevant to improving the EC&EE of public buildings is the CABEE, which is responsible for ensuring that buildings are operating at efficient levels. China regularly provides targets and broad policy goals in its Five-Year Plans as well that target improving energy efficiency in China, including that of public buildings. The PSBEE's outputs under component 1 of the project have been incorporated into the public policy of China, which include energy efficiency policies and standards. Specifically, the two standards that have been set regarding energy efficiency are the "*EE Assessment Standards of Public Buildings*" and "*Technical Standard for EE retrofitting of Public Buildings*". The addition of PSBEE's policies and standards in Chinese public policy on energy efficiency suggest that sustainability of the project's results through replication and scaling up are highly likely, as public buildings across China will be required to operate at energy efficient standards. However, as mentioned above, such transition will be to EC&EE/LC will be subject to the availability of suitable financing mechanisms.

To add to these achievements, the trainings conducted under outcome 4 and the demonstrations enacted under outcome 3 have also resulted in building managers and public building administrators generating greater knowledge on EE standards and GHG emission reduction goals. The addition of these policies in China's institutional framework and the increased capacity of public sector officials in improving EE are highly positive signs for the project's sustainability of results. Consequently, the TE found that due to the institutional framework and governance mechanisms that are in place the sustainability of project's outcome will be ***Likely.***

Environmental

The project is focused on achieving overall environmental benefits therefore the project has a low risk in terms of its impact on the environment. The results achieved by the project have successfully resulted in a high return in terms of GHG reductions and energy savings that are expected to increase or stay constant year on year.

Ultimately, the TE found that the project's incorporation of sustainability in its design and implementation, the strong level of ownership shown by Chinese stakeholders, both public and private, and the long-term nature of project results in demonstrations and capacity building suggest that the project's **sustainability** of outcomes is ***Likely***.

3.3.7 Catalytic/Replication Effect

The catalytic/replication effect refers to the extent to which the project has demonstrated scaling up, replication, demonstration, and/or production of public good. A review of the project documents and TE interviews provided little evidence of actual replication and upscaling during the project life. Possible reasons for this could be the recent completion of numerous activities and/or slow uptake due to economic constraints/access to finance, etc. Nevertheless, there are considerable chances of such replication/upscaling in the coming years. For instance, the Qingdao Energy Thermoelectric Group Co, Ltd. reported that after the successful demonstration in collaboration with the PSBEE project at the Olympic Sailing Center, they are now planning to apply these lessons to the zero-carbon port city and the clean energy demonstration projects in Jiaozhou, Laixi and Chengyang. Similarly, as elaborated in the section on Sustainability, the approved standards are likely to be applied industry wide. Similarly, the People's Insurance Company of China that piloted its green insurance mechanism shared the intention to continue developing and promoting this product to a broader market.

A TE analysis of the range of project demos also ascertained that projects undertaken in hospitals and educational institutions will be relatively easier to replicate, mostly due to the homogenous nature of each. In addition, projects featuring technologies more aligned with the carbon peaking and carbon neutrality strategy, building-integrated luminous PV-storage technology applied in the Shenzhen Future building and at the Xiong'an High Speed Railway Station.

In brief, while there has been little evidence of replication/upscaling during the project life, the TE found that the chances of replication are likely but will be subject to the availability of EE financing and consumer awareness.

3.3.8 Country ownership

As mentioned in more detail in the section on sustainability, the ownership shown from various public offices in China at the national and local levels has been a highlight for the project. The key implementing partner for this project was China's MOHURD. In addition, a very large number of different agencies, research bodies, local government offices, municipal departments, local banks, and private sector representatives were involved in various outputs and demonstrations of the project. The TE considers this one of the project's strengths that not only allowed the project to achieve its target indicators and outcomes but also improves the likelihood that project results and outcomes will be sustained in the long-term.

3.3.9 Gender equality and women's empowerment/ Cross-cutting Issues

The PSBEE has demonstrated its commitment to gender equality within its outcomes at various points. In the ProDoc, the project primarily targeted women through trainings to develop their capacity in terms of EC&EE. During implementation, the project ensured the inclusion of women in training programs. For instance, the PPR of 2023 mentions that "in this reporting period, 13 training sessions have been organized both online and offline. In total 2,364 participants attended training, among which 865 are women, accounting for 37%"[21]. This is a critical measure for promoting gender inclusion, especially considering that male dominance of the building construction/management/maintenance sector. At the same time, the TE found that the project's efforts at gender equality and women's empowerment were rather narrowly focused on training and ignored other aspects, such as the linkage between energy efficiency and women's access/utilization of public buildings. For instance, well-lit buildings promote a sense of safety especially among women and girls.

The TE did not find any other cross-cutting issues in terms of human rights, equality, or safety that were at risk due to the PSBEE project. Similarly, disability issues were also not included in the Project design. The TE team also did not find any specific efforts that the project focused on people with disabilities. Although it is possible that the beneficiaries of the project included people with disabilities, there is no mention of them in project documentation.

3.3.10 Progress to Impact

The project's monitoring data reported impact in terms of GHG reductions, fossil fuel savings, and job creation, as detailed in the section on *Progress Towards Objective and Expected Outcomes.* In addition, TE interviews revealed that the project has improved communication between different stakeholders and has also increased the professional capacity of certified trainees.

3.5.11 GEF Additionality

The TE found that the project demonstrated positive signs in terms of GEF's impact. To assess GEF additionality, the TE has dissected the impact GEF has had on the project's environmental benefits and the project's sustainability. When assessing environmental benefits, it is clear that positive results were seen. The public building demonstrations contributed to a reduction of 9,739.9 tCO2. The total incremental cost of the demos is assessed to be USD 6,475,324 out of which GEF provided over 47%. Although it could not be accurately estimated as to how much additional environmental benefit was provided by GEF's contributions, as each demonstration installed different infrastructures, the TE team believes that the additional funding provided significantly increased environmental benefits.

The project has also seen significant impacts in terms of the country's legal/regulatory system as significantly improved energy efficiency standards have been placed on public sector buildings throughout the country. Institutionally, the project has promoted MOHURD to focus on sustainability

[21] Project Progress Report 2023, *UNDP China*, p 23.

and reducing energy costs in the long run. The trainings provided by the project have contributed to greater awareness of public sector officials of energy efficiency and sustainable technology. These results combined, contributed towards socio-economic benefits in terms of lower energy costs and reduced GHG emissions. The TE found that GEF's additionality was, therefore, highly effective.

3.4 Main Findings, Conclusions, Recommendations, Lessons Learned

3.4.1 Conclusions and Key Findings

The thorough assessment of the performance of the PSBEE project yielded the following key findings.

1. The PSBEE project was found to be relevant to the priorities and needs of all key stakeholders, including GEF, UNDP, and the Government and People of China.

2. Although, the Project design was highly ambitious, the project has met or exceeded its key targets. Against an End of Project (EOP) target of 55.7 $ktCO_2$, Project activities have resulted in GHG reduction of 73.0 $ktCO_2$; and against an EOP target of 1.8%, 1.4% annual growth rate of GHG emissions was achieved through the Project's contributions. At the objective-level, the project reported to have resulted in cumulative fossil fuel savings due to project interventions as 31,249 tce, nearly 5 fold higher than the EOP target of 6,523 tce. In addition, against a PRF target of at least 700 jobs to be created through the project, a total of 7,397 jobs were created.

3. Furthermore, the Project has resulted in the development of policies and standards, demonstration of EC&EE/LC technologies, piloting new financing approaches in public and private buildings in five provinces across different climatic zones, comparative analysis of existing EE financing in the country, establishment of a functional EMIS and audit system for tracking energy efficiency in buildings, generated research studies on comparative EE policies, guidelines, and approaches in China and abroad, disseminated information to 239,000 individuals mostly through online communication, and also certified 2,462 public sector personnel in EE methods and approaches.

4. However, the project strategy was modified from the original design in some areas. Among these, a key change was supporting demonstrations in both public and private owned buildings instead of the ProDoc focus on only public sector buildings. Also, in the place of developing an EE financing mechanism from scratch, existing financing mechanisms or new/novel financial instruments developed by financial institutes, such as insurance companies, etc. were used in demonstrations.

5. The PMO has efficiently coordinated at least 60 stakeholders engaged in project implementation, fostering collaboration and buy in, a key element for the PSBEE project's success. On the other hand, the recruitment of a CTA specified in the ProDoc did not take place until after the MTR and the project's monitoring system also needed an overhaul upon recommendations from the MTR. Due to delays caused by COVID-19 and a slow start, the Project received a no-cost extension of 14 months.

6. The project has worked towards gender equality by ensuring that a significant number of women have been involved in component 4, which is focused on capacity building public sector building workers. At the same time, the TE found that the project's efforts at gender equality and women's empowerment were rather narrowly focused on training and ignored other aspects, such as the linkage between energy efficiency and women's access/utilization of public buildings. The project has not focused on other cross-cutting issues; however, the TE team found no significant risk to human rights, disabled people, or minority groups as a result of the project activities.

7. The PSBEE project's exit strategy included the engagement of key relevant organizations in the public and private sectors, development and revision of EE standards, data collection mechanisms through EMIS, demonstration of benefits of EE technologies and approaches in buildings, awareness raising about EC&EE/LC, and capacity building of technical professionals.

8. Overall, the TE found the performance of PSBEE project to be ***Satisfactory.***

3.4.2 Lessons Learned

Major lessons learned from the design and implementation of the PSBEE project are:

1. Demonstration of EC&EE/LC technologies and financing requires significant collaboration and negotiation among a variety of stakeholders, such as technology providers, building managers, and financial institutions.

2. Non-availability and/or economic feasibility of EE financing mechanisms continues to be the major hurdle for buildings to transition to EC&EE/LC technologies. However, engagement with key financial services institutions and support to piloting their products can help fill this gap.

3. Among the EC&EE/LC technologies and approaches demonstrated by the project, hospitals and educational buildings have high potential for replication; whereas, among the technologies piloted with the project support, those aligned with carbon peaking-carbon neutrality strategy are likely to have significant support.

4. It is essential for projects of a highly technical nature such as the PSBEE to recruit technical experts at the very onset.

3.4.3 Recommendations

Based on its in-depth analysis of the PSBEE project, the TE provides the following recommendations. These recommendations once achieved are expected to further contribute to the country programme outcomes mentioned in the Country Programme Document (CPD) for China that include outputs 2.1 and 2.2, under outcome 2.

#	Recommendation	Relevant Agency	Timeframe
A.	**Financial**		
A1.	Considering the high demand for EC/EE&LC projects in China as well as the rapidly evolving nature of technology in this area, it will be important to continue providing technical support to this sector. In particular, financial barriers are the largest deterrents to continued improvement in EE in China and must be overcome if large-scale replication is to occur. It is therefore highly recommended that future GOC and development sector initiatives primarily focus on overcoming this gap. These initiatives should work on exploring/developing economically feasible financing mechanisms, incentive schemes, and consumer awareness about the existence of such mechanisms, and promotion of linkages between different sectors, etc. For instance, fFinancial investment being the key practical hurdle to EC&EE/LC in buildings, it is recommended that the GOC may devises incentive mechanisms for various stakeholders in this industry, including building owners/managers and financial institutions, etc.	UNDP, GEF, GoC	Ongoing
A2.	MOHURD and NDRC should continue to disseminate energy efficiency information to relevant stakeholder such as building owners, construction companies, and financial service providers.	MOHURD, NDRC	Ongoing
B.	**Design**		
B1.	Increase time for demonstration projects to plan and pilot activities and also disseminate information to relevant audiences for greater chance at upscaling and replication.	UNDP, GEF, GoC	Ongoing
B2.	The concept of building energy efficiency must be extended to other associated sectors, such as construction materials and techniques.	UNDP, GEF, GoC	Short to Medium Term
B3.	Future projects should have a greater focus on gender-equality and cross-cutting issues.	UNDP	Ongoing
C.	**Policy**		
C1.	GoC should incentivize mechanisms that push building owners, managers, financial institutions, and construction companies to adopt more EE production processes.	GoC	Short to Medium Term

#	Recommendation	Relevant Agency	Timeframe
C2.	Promote easy to replicate EC&EE technologies in public and private buildings.	GoC	Ongoing
D.	**Project Management**		
D1.	Projects of a highly technical nature should include the hiring of relevant technical staff in its design.	MOHURD	Ongoing
D2.	UNDP must ensure that changes in strategy are formally approved and well-documented.	UNDP	Ongoing

Annexes

Annex 1 – Evaluation Matrix

Evaluative Criteria Questions	Indicators	Sources	Methodology
Relevance: How does the project relate to the main objectives of the GEF Focal area, and to the environment and development priorities a the local, regional and national level?			
To what extent was the project design relevant to the needs and underlying problems it sought to address?	Validity of problem analysis, barrier analysis, and assumptions in the ProDoc	Project Documents Government Stakeholders	Desk Review Key Informant Interviews
How well was the project aligned with the national development objectives broadly and energy efficiency and energy conservation priorities specifically?	Project's contribution to attainment of country development objectives and priorities	Project Documents Government Stakeholders	Desk Review Key Informant Interviews
To what extent was the project designed based on a consultative and participatory approach with relevant stakeholders?	The stakeholder mapping and associated engagement plan includes all relevant stakeholders and appropriate modalities for engagement.	Project Documents PMO and UNDP China Government Stakeholders Private Sector Stakeholders Academic Institutions	Desk Review Key Informant Interviews
To what extent were lessons learned from other similar projects incorporated into the project's design?	Evidence of lessons from other projects in project design	Project Documents PMO and UNDP China	Desk Review Key Informant Interviews
Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved?			
To what extent has the project achieved its output and	Project Results Framework indicators targets have been met or exceeded	Project Documents	Desk Review

outcome level targets?			
Have there been any unexpected outcome-level results achieved beyond the planned outcome?	Presence of achievement of unanticipated outcomes beyond the planned results	Project Documents PMO and UNDP China Government Stakeholders Private Sector Stakeholders Academic Institutions Beneficiaries of Trainings	Desk Review Key Informant Interviews Focus Group Discussions
What were the major challenges faced by the project and what measures were implemented to overcome them? To what extent were those measures successful?	Extent to which challenges were identified proactively Assessment of extent to which mitigation measures have been effective in overcoming identified	Project Documents PMO and UNDP China Government Stakeholders Private Sector Stakeholders Academic Institutions Beneficiaries of Trainings	Desk Review Key Informant Interviews Focus Group Discussions
Efficiency: Was the project implemented efficiently, in line with international and national norms and standards?			
To what extent have the project outputs resulted from economic use of resources?	Achievement of planned results in a cost effective and timely manner Presence of sufficient staffing resources	Project Documents PMO and UNDP China	Desk Review Key Informant Interviews
To what extent was the M&E plan well-formulated at the time of design, and how has it served as an effective tool to support project implementation?	Presence of an effective M&E plan at the time of project design Findings from monitoring have been used to improve/adjust project planning and implementation	Project Documents PMO and UNDP China	Desk Review Key Informant Interviews
To what extent did the partnership arrangements under the project contribute to	Evidence of resources committed by partners to project activities Evidence of commitment by partners to	PMO and UNDP China Government Stakeholders	Key Informant Interviews

achievements of the project results?	take over project activities after project end	Private Sector Stakeholders Academic Institutions	
How well did the project undertake effective stakeholder engagement and management?	Extent of involvement of stakeholders and stakeholder level of satisfaction with the project at design and implementation	PMO and UNDP China Government Stakeholders Private Sector Stakeholders Academic Institutions	Key Informant Interviews
Sustainability: To what extent are there financial, institutional, socio-political, and/or environmental risks to sustaining long-term project results?			
To what extent did the project identify financial, institutional, socio-political, and/or environmental risks to sustaining the long-term project results?	Evidence of commitment/interest by public or private institutions to provide financial resources to sustain or build on project results Evidence of commitment/interest by public or private institutions to maintain services or products developed by the project Evidence of ownership by stakeholders of the project's strategy and results. Potential of future environmental threats	Project Documents Government Stakeholders Private Sector Stakeholders Academic Institutions	Key Informant Interviews
What measures aimed at mitigating and minimizing risks to sustainability were implemented over the course of the project duration?			
To what extent are the mitigating measures effective in promoting the long-term sustainability of the results achieved?			
Gender equality and women's empowerment: How did the project contribute to gender equality and women's empowerment?			
How well were gender considerations incorporated into the overall design of the project?	Levels of participation of women in project implementation Incorporation of gender considerations in the planning and execution of project activities	Project Documents PMO and UNDP China Government Stakeholders	Desk Review Key Informant Interviews Focus Group Discussions
To what extent was gender			

mainstreaming promoted over the course of the project's implementation?		Private Sector Stakeholders Beneficiaries of Trainings	
Impact: Are there indications that the project has contributed to, or enabled progress toward reduced environmental stress and/or improved ecological status?			
Were the results achieved likely to produce long term effects? What actions or mechanisms did the Project set-up to ensure achievement of long-term effects?	Assessment of the most significant change(s) achieved by the projects and the mechanisms used to ensure them	Project Documents PMO and UNDP China Government Stakeholders Private Sector Stakeholders Beneficiaries of Trainings	Desk Review Key Informant Interviews Focus Group Discussions
What promising practices and lessons learned can be identified from the implementation of this project that can guide similar future projects?	Identification of lessons learned from the design and implementation of the project Identification of good practices with the potential for replication	Project Documents PMO and UNDP China	Desk Review Key Informant Interviews

Annex 2 – List of Documents

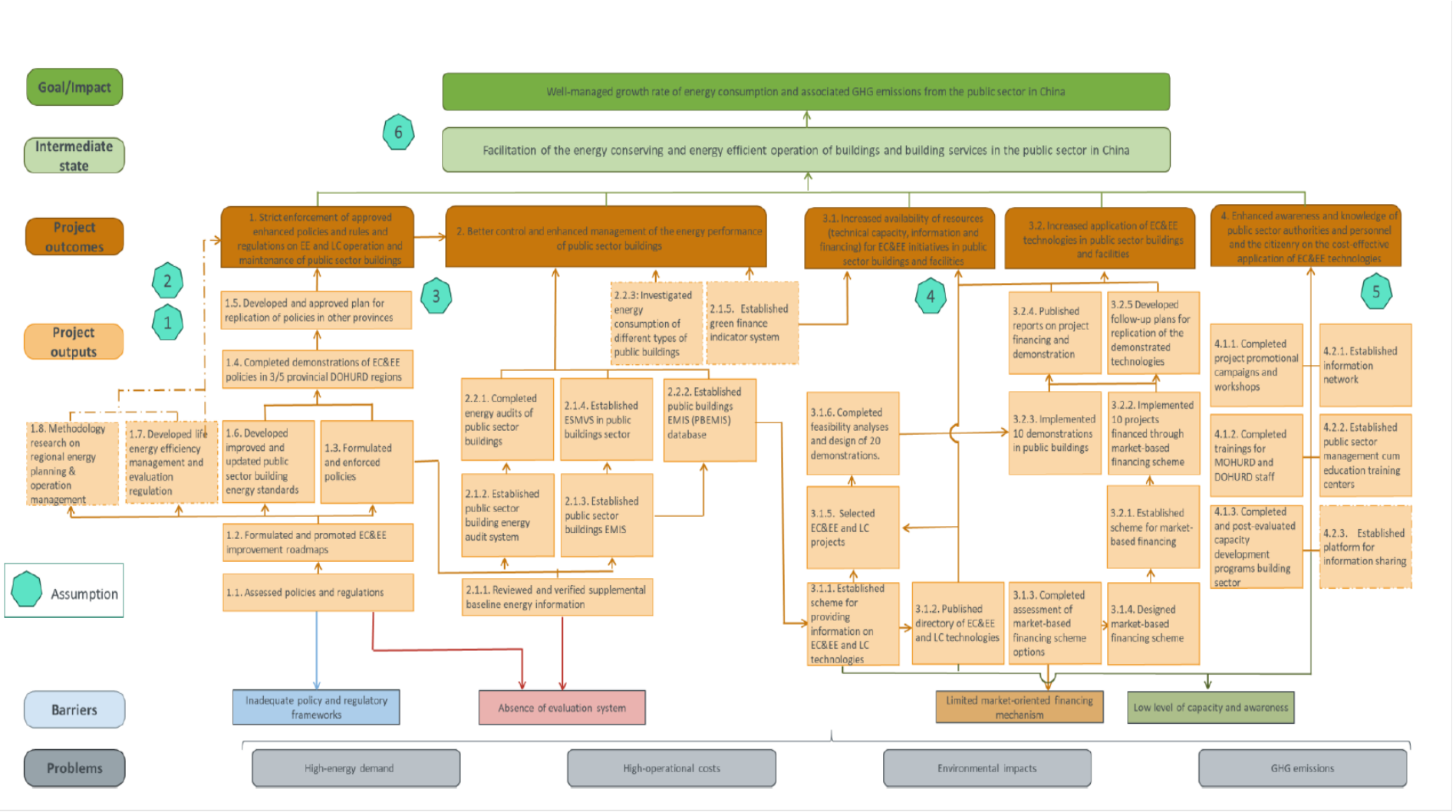
#	Project Documentation Reviewed	Year
1	PIF and PPG Approval – PSBEE	2015
2	GEF Secretariat Review for Full/Medium-Sized Projects - PSBEE	2015
3	Responses to Council Members Comments	2015
4	Signed Project Initiation Plan	2015
5	GEF CEO Endorsement	2017
6	Signed DOA CHN PSBEE	2017
7	PSBEE Project Document	2017
8	PSBEE Total Budget and Work Plan	2017
9	UNDP Social and Environmental and Social Screening Template (SESP)	2017
10	Inception Report of PSBEE	2019
11	PSBEE Revised Budget (Inception Report)	2019
12	Revised Work Plan (Inception Report)	2019
13	Annual Work Plan 2019-2020	2019
14	Annual Work Plan 2020-2021	2020
15	Annual Work Plan 2021-2022	2021
16	Annual Work Plan 2022-2023	2022
17	Annual Work Plan 2023	2023
18	Annual Progress Report 2019	2020
19	Annual Progress Report 2020	2021
20	Annual Progress Report 2021	2022
21	Annual Progress Report 2022	2023
22	Annual Progress Report 2023	2023
23	GEF Project Implementation Report 2020	2021
24	GEF Project Implementation Report 2021	2022
25	GEF Project Implementation Report 2022	2023
26	GEF Project Implementation Report 2023	2023
27	Project Steering Committee Meeting Minutes 2020	2020
28	Project Steering Committee Meeting Minutes 2021	2021
29	Project Steering Committee Meeting Minutes 2022	2022
30	Project Steering Committee Meeting Minutes 2023	2023
31	PAC Meeting Minutes	2017
32	Log Framework Workshop Meeting Minutes	2019
33	PSBEE Midterm Review	2021
34	Midterm Review Management Response	2022
35	Combined Delivery Report 2019	2020
36	Combined Delivery Report 2020	2021
37	Combined Delivery Report 2021	2022
38	Combined Delivery Report 2022	2023
39	Baker Tilly Spot Check - MOHURD	2020
40	Chief Technical Advisor Report 2022	2022
41	Chief Technical Advisor Report 2023	2023

Annex 3 – List of KIIs

S. No.	Type of Stakeholder	Organization	Name
1	**PMO & UNDP China**	Ministry of Housing and Urban-Rural Development CTA, M&E Officer, UNDP China	
2	**PSC Members**	Ministry of Finance, PRC	Hu Yiding
3		China Banking and Insurance Regulatory Commission	Li Xiaowen
4		The People's Bank of China	Yang Ping
5		Ministry of Science and Technology, PRC	Xiao Yaowen
6	**Local Government**	Development and Reform Commission of Huangpu District, Shanghai	Bao Linjun
7		Government Offices Administration of Guilin City	Liang Zhongjie
8	**Academia**	China Association of Building Energy Efficiency (CABEE)	Fu Yu
9		Guangzhou University	Xu Tao
10		China Energy Conservation Association (CECA)	Wang Jeumin
11		Suzhou Institute of Building Science Group Corporation Limited	Wang Feng
12		Shenzhen Institute of Building Research Co., Ltd (IBR)	Li Yutong
13	**Pilot Projects (Output 3.2.2 & 3.2.3)**	Beijing Bayi School	Guoli Mao
14		Capital Airports Holding Company, Beijing Daxing International Airport	Chunhua Kang
15		Huashan Hospital	Mei Jiachen
16		Tianjin Experimental Middle School Binhai School	Shen Shikai
17		People's Hospital of Leshan City	Zhang Min
18	**Private Sector**	China Mobile Corporation, Guangzhou Branch / Guangzhou i-MEC Technology Co. Ltd.	He Guangluo
19		Guangzhou Yuanzheng Intelligent Technology Co.,	He Min
20		Beijing Taihor Energy Tech Co. Ltd.	Lin Hui
21		Nanjing Tiansu Automatic Control System Co. Ltd.	Liu Yangyang
22		Qingdao Lixinda Energy Service Co. Ltd.	Hu Changzi
23		Qingdao Energy and Thermal power co., Ltd.	Chen Xiadong
24		PICC Property and Casualty Company Limited, Beijing branch	Yang Xinshuo
25		Beijing City Sub-centre Investment and Construction Group	Zhang Manhua
26	**Training Centres**	China Architectural Design and Research Institute Co.	Wen Yuyang
27		China Architectural Design and Research Institute	Gao Wei
28		Tianjin Academy of Fine Arts	Yuan Jinling

29		Tianjin Vocational University	Zhu Xiaoming
TOTAL		**29**	

Annex 4 – Theory of Change



Annex 5 – Project Stakeholders[22]

#	Name of partner	Type	Relationship with PSBEE	Contact person
1	Ministry of Finance (MOF), PRC	*Central government*	PSC member	Hu Yiding
2	China Banking and Insurance Regulatory Commission	*Central government*	PSC member	Li Xiaowen
3	Ministry of Science and Technology (MOST), PRC	*Central government*	PSC member	Xiao Yaowen
4	The People's Bank of China	*Central government*	PSC member	Yang ping
5	Center of Science and Technology Industrialization Development (CSTID)	*Academia*	PSC member	Peng Mengyue
6	Development and Reform Commission of Huangpu District, Shanghai	*Local government*	Sub-project outsourcing institute	Bao Linjun
7	Government Offices Administration of Guilin City	*Local government*	Sub-project outsourcing institute	Wu Xiujuan
8	China Association of Building Energy Efficiency (CABEE)	*Academia*	Sub-project outsourcing institute	Fu Yu
9	China Energy Conservation Association (CECA)	*Academia*	Sub-project outsourcing institute	Wang Juemin
10	China Academy of Building Research	*Academia*	Sub-project outsourcing institute	Zhang Ruixue
11	China Construction Engineering Design Group Co. Ltd. (CSCEC)	*Academia*	Sub-project outsourcing institute	Sun Pengcheng
12	China Building Technique Group Co. Ltd.(CBTGC)	*Academia*	Sub-project outsourcing institute	Zhao Chen
13	China Institute of Building Standard Design & Research	*Academia*	Sub-project outsourcing institute	Liu Jiebin

[22] Please note that some individuals may be representing multiple stakeholders.

14	China Quality Certification Centre (CQC)	*Academia*	Sub-project outsourcing institute	Jiang Yingjin
15	National Academy for Mayors of China	*CSO/NGO*	Sub-project outsourcing institute	Zhang Yan
16	Chongqing Green Building and Architectural Industrialization Association	*CSO/NGO*	Sub-project outsourcing institute	Zhang Shiyong
17	Tianjin Building Energy Efficiency Promotion and Training Centre	*CSO/NGO*	Sub-project outsourcing institute	Huo Jing
18	Shanghai Research Institute of Building Science Co. Ltd.	*Academia*	Sub-project outsourcing institute	Zhi Jianjie
19	Suzhou Institute of Building Science Group Corporation Limited	*Academia*	Sub-project outsourcing institute	Ma Sicong
20	Shenzhen Institute of Builidng Research Co., Ltd (IBR)	*Academia*	Sub-project outsourcing institute	Li Wanyi
21	Guangdong Provincial Academy of Building Research Group Co. Ltd.	*Academia*	Sub-project outsourcing institute	Zou xiaorui
22	Tsinghua University Planning and Design Institute(THUPDI)	*Academia*	Sub-project outsourcing institute	Lin Hui
23	Tongji Architectural Design (Group) Co., Ltd. (TJAD)	*Academia*	Sub-project outsourcing institute	Jin Haikui
24	Tsinghua University	*Academia*	Sub-project outsourcing institute	Wei Qingpeng
25	Beijing Jiaotong university	*Academia*	Sub-project outsourcing institute	Liu Jing
26	Tianjin University	*Academia*	Sub-project outsourcing institute	Xie Baichen
27	Tongji University	*Academia*	Sub-project outsourcing institute	Ruan Yingjun
28	Sichuan University	*Academia*	Sub-project outsourcing institute	Wang Jun
29	Chongqing University	*Academia*	Sub-project outsourcing institute	Ding Yong

30	Nankai University	*Academia*	Sub-project outsourcing institute	Li Dongyan
31	Zhejiang University	*Academia*	Sub-project outsourcing institute	He Guoqing
32	Guangzhou University	*Academia*	Sub-project outsourcing institute	Xu Tao
33	Capital University of Physical Education and Sports	*Other*	Sub-project outsourcing institute	Lin Hui
34	The Aerospace City School of RDFZ	*Other*	Sub-project outsourcing institute	Lin Hui
35	Beijing Bayi School	*Other*	Sub-project outsourcing institute	Wang Juemin
36	Huashan Hospital affiliated to Fudan University	*Other*	Sub-project outsourcing institute	Zhao Chen
37	Huadong Hospital affiliated to Fudan University	*Other*	Sub-project outsourcing institute	Jiang Yingjin
38	People's Hospital of Leshan City	*Private sector*	Sub-project outsourcing institute	Zhang Qiulei
39	Beijing Taihor Energy Tech Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Lin Hui
40	Beijing Zhongcai Green Finance Consulting Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Hu Nan
41	China Green Index (Beijing) Consulting Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Liang Nannan
42	Energy Internet Research Institute (Beijing)	*Private sector*	Sub-project outsourcing institute	Lin Hui
43	Beijing Green Built Environment Technology Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Wang Juemin
44	Beijing Building Technology Development Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Gong Jinchao
45	Shanghai Tengtian Energy Efficiency Technology Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Liu Xiaochun

46	Guangzhou i-MEC Technology Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Wu Xiujuan
47	Tianjin Huanke Environment Consulting Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Huo Jing
48	Tianjin Building Science Energy Efficiency Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Huo Jing
49	Qingdao Lixinda Energy Service Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Gang Chen
50	Qingdao Energy and thermal power co., LTD	*Private sector*	Sub-project outsourcing institute	Huang Jin
51	The Third Construction Group Co. Ltd. Of Nantong, Jiangsu Province	*Private sector*	Sub-project outsourcing institute	Lu Xingyu
52	Nanjing Tiansu Automatic Control System Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Zhang Qiulei
53	Jianke Environment and Energy (Beijing) Technology Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Liu Yimin
54	Beijing Investment Group Co.,Ltd	*Private sector*	Sub-project outsourcing institute	Gong Jinchao
55	PICC Property and Casualty Company Limited, Beijing branch	*Private sector*	Sub-project outsourcing institute	Gong Jinchao
56	Capital Airports Holding Company, Beijing Daxing International Airport	*Private sector*	Sub-project outsourcing institute	Qin Rong
57	CECEP Valeen Technology Co. Ltd.	*Private sector*	Sub-project outsourcing institute	Li Chen
58	Chongqing CECEP Yuelai Energy Management Co., Ltd.	*Private sector*	Sub-project outsourcing institute	Zhang Jie
59	China Mobile Corporation, Guangzhou Brunch	*Private sector*	Sub-project outsourcing institute	Wu Xiujuan
60	China Mobile Tietong Corporation, Guangzhou Brunch	*Private sector*	Sub-project outsourcing institute	Wu Xiujuan

Annex 6 – List of Project Demonstrations

#	Demonstration
1	Demo #1: Application of a Centralized Energy Management Platform to Updated HVAC, LED, and Hot Water Systems, with Supplementary Solar PV System, of the **West Coast Hospital**
2	Demo #2: Application of Improved Building Envelope Thermal Insulation, HVAC, and Lighting Systems, with Supplementary Solar PV System, to the **Haimen Cultural Center Library**
3	Demo #3: Application of a DC Power Distribution System and a Demand/Response System, and Upgrade of HVAC and LED Systems, with Supplementary Solar PV System with Storage, to the **IBR Future Complex**
4	Demo #4: Application of Improved Building Envelope Thermal Insulation, Upgrade of Hot Water, HVAC and Lighting Systems, and Installation of an EMS, with Supplementary Solar PV System with Storage, to the **Capital University of Physical Education and Sports**
5	Demo #5: Application of Ground and Air Source Heat Pumps for Cooling and Heating, Solar Thermal Water Heaters, LED Lighting, and an integrated EMS to the **Aerospace City High School**
6	Demo #6: Application of Waste Heat Recovery Units, LED Lighting System, and Integrated Energy Control and Management System, with Supplementary Solar PV Power, to the **Huashan Hospital**
7	Demo #7: Application of an Improved Control System for the A/C System, and Centralized Energy Control System to the **Joy City Shopping Mall in Beijing**
8	Demo #8: Implementation of a Smart Lighting Control System Augmented by a Constant-Illumination Control System at the **Beijing Daxing International Airport**
9	Demo #9: Implementation of an Improved Cooling and Heating System and a Centralized Smart Energy Management Platform in **Chongqing Yuelai Eco-city**
10	Demo #10: Application of Upgraded HVAC and LED Systems, and Implementation of an Integrated Energy Management Platform, Supplemented by a PV System, to the **Qingdao Olympic Sailing Center**

11	Demo #11: Improved Building Envelope Thermal Insulation, Upgrade of HVAC System, and Installation of a Centralized Energy Control System, with Supplementary Solar PV Power, in the **Suzhou Tus-Design Building**
12	Demo #12: Application of High EE Electric Equipment, Installation of LED System, and Implementation of an ECMS, Supplemented with PV System, to the **Xiong'an Railway Station**
13	Demo #13: Application of High EE Water Pumps and Frequency Control to the Heating System, Smart Heat Network Monitoring System, Improved Building Envelope Thermal Insulation, and Testing a Benefits Sharing Financing Mechanism in the **Beijing Bayi School**
14	Demo #14: Application of an Integrated Smart EMS, Centralized Group Control System for A/C, LED System with Control, and Testing an Energy Cost Trusteeship FM in the **People's Hospital of Leshan**
15	Demo #15: Application of a HVAC System with Control, Transmission and Distribution System, and Testing a Demand-Side Incentive Mechanism in **Five Public Buildings in Ningbo**
16	Demo #16: Application of Ground Source Heat Pumps for HVAC System, LED System, Frequency Control for Water Pumps and Fans, with Supplementary Solar PV, and **Testing a Green Insurance FM**
17	Demo #17: Implementation of a Virtual Power Plant for Demand/Response Complete of Ancillary Equipment, and Testing a Demand/Response Incentive Mechanism for a **Network of 73 Buildings**
18	Demo #18: Application of Centralized HVAC and LED Control Systems, Integrated Energy Consumption Management System, and Testing of a Green Equipment Leasing FM in the **Guilin Chuangye Building**
19	Demo #19: Implementation of an A/C Control System, LED and Related Control System, Solar PV System, and Testing a Carbon Emissions Trading Mechanism in **Selected Public Buildings in Tianjin**
20	Demo #20: Application of an A/C Control System, an Optimized Temperature and Humidity Monitoring System, an Energy Supervision Platform, and Testing a Green Loan FM to the **Nansha Data Center**

21	Demo #21: Application of Improved Building Envelope Thermal Insulation, HVAC and Lighting Control Systems, Solar Thermal Energy System, Smart Energy Control System, and Testing a Green Bond FM in the T2 Tower of the **Quindao Haitian Center**
22	Demo #22: Application of an A/C and Frequency Control System, a LED and Control System, an Integrated Energy Management Platform, and Testing a Green Credit + Green Insurance FM in the **Shanghai Huadong Hospital**

Annex 7 – Demonstrations Selected to Display Financial Mechanisms of EC&EE

Demo Name	Incremental Project Cost (USD)	GEF Contribution (USD)	Remaining Contributor	Annual Energy Savings (tce)	Annual Fossil Fuel Savings (tce)	Annual GHG Emissions Reduction (tCO2)	Annual Energy Cost Savings (USD)
Demo #1:	300,000	300,000	N/A	297.9	702.4	703.4	99,367
Demo #2:	361,950	240,000	Owner	90.8	119.5	262.7	45,799
Demo #3:	284,154	200,000	Owner	164.9	164.9	361.7	57,470
Demo #4:	250,769	200,000	Owner	288.6	288.6	728.6	80,903
Demo #5:	207,538	200,000	local Education Commission	111.5	111.5	164.1	34,691
Demo #6:	200,000	200,000	N/A	274.5	274.5	466.9	123,458
Demo #7:	69,400	69,400	N/A	60.6	60.6	156.7	29,154
Demo #8:	200,000	200,000	N/A	135.4	135.4	349.8	48,808
Demo #9:	198,000	198,000	N/A	290.8	290.8	277.5	52,815
Demo #10:	1,513,846	198,785	ESCO	1156.6	1156.6	2510.1	392,409
Demo #11:	198,000	198,000	N/A	61.6	61.6	-	23,631
Demo #12:	1,464,593	199,000	N/A	392	392	1130	178,696

Demo #13:	76,923	66,000	ESCO	75.7	75.7	135.3	23,349
Demo #14:	66,000	66,000	N/A	63.6	63.6	176.9	21,363
Demo #15:	66,000	66,000	N/A	67.6	67.6	148.7	21,265
Demo #16:	311,538	66,000	Owner	330.5	330.5	473.3	48,884
Demo #17:	66,000	66,000	N/A			-	
Demo #18:	97,801	65,826	ESCO	68.3	68.3	171.6	23,010
Demo #19:	253,846	66,000	Owner	194.7	194.7	546.7	60,390
Demo #20:	158,966	66,000	ESCO	305.9	305.9	768.7	107,174
Demo #21:	64,000	64,000	N/A	23.8	23.8	61.6	9,172
Demo #22:	66,000	66,000	N/A	67.4	67.4	145.6	23,008
Total	**6,475,324**	**3,061,011**				9,739.9	

Terminal Evaluation Terms of Reference (ToR) for UNDP-supported GEF-financed projects

1. INTRODUCTION

In accordance with UNDP and GEF M&E policies and procedures, all full- and medium-sized UNDP-supported GEF-financed projects are required to undergo a Terminal Evaluation (TE) at the end of the project. This Terms of Reference (ToR) sets out the expectations for the TE of the *full-sized* project titled ***Energy Efficiency Improvement in Public Sector Buildings in China (PSBEE) (PIMS 5395)*** implemented through the *Ministry of Housing and Urban-Rural Development (MOHURD)*. The project started on the *20 November 2018* and is in its *5th* year of implementation. The TE process must follow the guidance outlined in the document 'Guidance for Conducting Terminal Evaluations of UNDP-Supported, GEF-Financed Projects' (*https://erc.undp.org/pdf/TE_GuidanceforUNDP-supportedGEF-financedProjects.pdf*).

2. PROJECT BACKGROUND AND CONTEXT

Energy Efficiency Improvement in Public Sector Buildings in China (PSBEE) is the GEF project implemented by Ministry of Housing and Urban-Rural Development (MOHURD). The objective of the project is to facilitate the energy-conserving and energy-efficient operation of public buildings and building services in China. The ultimate goal of the project is to manage the increase in energy consumption and related greenhouse gas emissions from the public sector in China.

The project's strategy consists of a barriers removal approach to address the major obstacles for the adoption of energy conservation and energy efficiency (EC&EE) and low-carbon (LC) initiatives. The main barriers stated in the project document (ProDoc) are:

- Inadequate policy and regulatory frameworks that promote and support EC&EE improvement initiatives in the public sector;
- Absence of an overall evaluation system for reviewing and analyzing the existing energy management procedures and practices in public sector entities and their facilities;
- Limited market-oriented financing mechanism for funding EC&EE technologies/products in the public sector; and,
- Low level of capacity and awareness of public sector technical and management personnel on the application of EC&EE and LC technologies.

The project's interventions are organized in four components on: (1) public sector EC&EE policy and regulatory frameworks, (2) energy performance monitoring and evaluation system for public sector buildings, (3) EC&EE improvement promotion and demonstration programs for public sector buildings, and (4) public sector EC&EE capacity and awareness enhancement program.
The outcomes of the project are as follows:

- Outcome 1. Strict enforcement of approved enhanced policies and rules and regulations on energy efficiency and low-carbon operation and maintenance of public sector buildings;
- Outcome 2. Better control and enhanced management of the energy performance of public sector buildings;
- Outcome 3.1. Increased availability of resources (technical capacity, information, and financing) for EC&EE initiatives in public sector buildings and facilities;
- Outcome 3.2. Increased application of EC&EE technologies in public sector buildings and facilities; and,
- Outcome 4. Enhanced awareness and knowledge of public sector authorities and personnel and the citizenry on the cost-effective application of EC&EE technologies.

The Project's budget from GEF Trust Fund is USD8,932,420. Its Co-financing is USD70,100,000, including funds from UNDP, central and provincial governments, and private sectors.

Project started in November 2018 and was planned to end in October 2022, and project is extended until 31 December 2023.

3. TE PURPOSE

The TE report will assess the achievement of project results against what was expected to be achieved, and draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming. The TE report promotes accountability and transparency, and assesses the extent of project accomplishments.

The PSBEE Project is scheduled to be closed in December 2023. Since most of the project activities will be completed by end of 2023, it is the time to undertake a comprehensive review of all the project activities and adjustments, analyze and assess the project outcomes and results, evaluate the actions that address the risks, summarize the learnings, best practices, and reflections, and make preparation for the project transition.

The terminal evaluation process will begin at least three months before operational closure of the project allowing the evaluation mission to proceed while the project team is still in place, ensuring the project is close enough to completion for the evaluation team to reach conclusions on key aspects such as project sustainability.

The stakeholders will be involved and consulted during the terminal evaluation process. The final TE report will be cleared by the UNDP Country Office and the UNDP-GEF Regional Technical Adviser, and will be approved by the PSC.

The final TE will be included in the UNDP Country Office evaluation plan by the UNDP Country Office.

4. TE APPROACH & METHODOLOGY

The TE report must provide evidence-based information that is credible, reliable and useful. The evaluator and TE team are expected to frame the evaluation effort using the criteria of relevance,

effectiveness, efficiency, sustainability, and impact as defined and explained on the UNDP evaluation guidelines and UNDP evaluation guidance for GEF-financed projects. The evaluator is supposed to review and define the evaluation questions cover all these dimensions, detailed in Annex D.

On gender and cross-cutting issues, the evaluation shall also evaluate the project's impact on diverse groups and to identify any unintended consequences or gaps in programming. This may involve collecting and analyzing data on project outcomes disaggregated by gender and other relevant factors, as well as conducting stakeholder consultations and/or engaging with local communities.

The TE team will review all relevant sources of information including documents prepared during the preparation phase (i.e. PIF, UNDP Initiation Plan, UNDP Social and Environmental Screening Procedure/SESP) the Project Document, project reports including annual PIRs, project budget revisions, lesson learned reports, national strategic and legal documents, and any other materials that the team considers useful for this evidence-based evaluation. The TE team will review the baseline and midterm GEF focal area Core Indicators/Tracking Tools submitted to the GEF at the CEO endorsement and midterm stages and the terminal Core Indicators/Tracking Tools that must be completed before the TE field mission begins.

The TE team is expected to follow a participatory and consultative approach ensuring close engagement with the Project Team, government counterparts (the GEF Operational Focal Point), Implementing Partners, the UNDP Country Office(s), the Regional Technical Advisor, direct beneficiaries and other stakeholders.

Engagement of stakeholders is vital to a successful TE. Stakeholder involvement should include interviews with stakeholders who have project responsibilities, including but not limited to Project Management Office, the Implementing Partner, UNDP China, executing agencies, senior officials and task team/component leaders, key experts and consultants in the subject area, Project Board, project beneficiaries, academia, local government and CSOs, etc. Field mission might be expected once the implementing partner confirm the process.

The specific design and methodology for the TE should emerge from consultations between the TE team and the above-mentioned parties regarding what is appropriate and feasible for meeting the TE purpose and objectives and answering the evaluation questions, given limitations of budget, time and data. The TE team must use gender-responsive methodologies and tools and ensure that gender equality and women's empowerment, as well as other cross-cutting issues and SDGs are incorporated into the TE report.

The final methodological approach including interview schedule, field visits and data to be used in the evaluation must be clearly outlined in the TE Inception Report and be fully discussed and agreed between UNDP, stakeholders and the TE team.

The final report must describe the full TE approach taken and the rationale for the approach making explicit the underlying assumptions, challenges, strengths and weaknesses about the methods and approach of the evaluation.

5. DETAILED SCOPE OF THE TE

The TE will assess project performance against expectations set out in the project's Logical Framework/Results Framework (see ToR Annex A). The TE will assess results according to the criteria outlined in the Guidance for TEs of UNDP-supported GEF-financed Projects (*https://erc.undp.org/pdf/TE_GuidanceforUNDP-supportedGEF-financedProjects.pdf)*.
The Findings section of the TE report will cover the topics listed below. A full outline of the TE report's content is provided in ToR Annex C.

The asterisk "(*)" indicates criteria for which a rating is required.

Findings

i. Project Design/Formulation

- National priorities and country driven-ness
- Theory of Change
- Gender equality and women's empowerment
- Social and Environmental Standards (Safeguards)
- Analysis of Results Framework: project logic and strategy, indicators
- Assumptions and Risks
- Lessons from other relevant projects (e.g. same focal area) incorporated into project design
- Planned stakeholder participation
- Linkages between project and other interventions within the sector
- Management arrangements

ii. Project Implementation

- Adaptive management (changes to the project design and project outputs during implementation)
- Actual stakeholder participation and partnership arrangements
- Project Finance and Co-finance
- Monitoring & Evaluation: design at entry (*), implementation (*), and overall assessment of M&E (*)
- Implementing Agency (UNDP) (*) and Executing Agency (*), overall project oversight/implementation and execution (*)
- Risk Management, including Social and Environmental Standards (Safeguards)

iii. Project Results

- Assess the achievement of outcomes against indicators by reporting on the level of progress for each objective and outcome indicator at the time of the TE and noting final achievements
- Relevance (*), Effectiveness (*), Efficiency (*) and overall project outcome (*)
- Sustainability: financial (*) , socio-political (*), institutional framework and governance (*), environmental (*), overall likelihood of sustainability (*)
- Country ownership

- Gender equality and women's empowerment
- Cross-cutting issues (poverty alleviation, improved governance, climate change mitigation and adaptation, disaster prevention and recovery, human rights, capacity development, South-South cooperation, knowledge management, volunteerism, etc., as relevant)
- GEF Additionality
- Catalytic Role / Replication Effect
- Progress to impact

Main Findings, Conclusions, Recommendations and Lessons Learned

- The TE team will include a summary of the main findings of the TE report. Findings should be presented as statements of fact that are based on analysis of the data.
- The section on conclusions will be written in light of the findings. Conclusions should be comprehensive and balanced statements that are well substantiated by evidence and logically connected to the TE findings. They should highlight the strengths, weaknesses and results of the project, respond to key evaluation questions and provide insights into the identification of and/or solutions to important problems or issues pertinent to project beneficiaries, UNDP and the GEF, including issues in relation to gender equality and women's empowerment.
- Recommendations should provide concrete, practical, feasible and targeted recommendations directed to the intended users of the evaluation about what actions to take and decisions to make. The recommendations should be specifically supported by the evidence and linked to the findings and conclusions around key questions addressed by the evaluation.
- The TE report should also include lessons that can be taken from the evaluation, including best practices in addressing issues relating to relevance, performance and success that can provide knowledge gained from the particular circumstance (programmatic and evaluation methods used, partnerships, financial leveraging, etc.) that are applicable to other GEF and UNDP interventions. When possible, the TE team should include examples of good practices in project design and implementation.
- It is important for the conclusions, recommendations and lessons learned of the TE report to incorporate gender equality and empowerment of women.

The TE report will include an Evaluation Ratings Table, as shown below:

ToR Table 2: Evaluation Ratings Table for Energy Efficiency Improvement in Public Sector Buildings in China (PSBEE)

Monitoring & Evaluation (M&E)	Rating[23]

[23] Outcomes, Effectiveness, Efficiency, M&E, Implementation/Oversight & Execution, Relevance are rated on a 6-point scale: 6=Highly Satisfactory (HS), 5=Satisfactory (S), 4=Moderately Satisfactory (MS), 3=Moderately Unsatisfactory (MU), 2=Unsatisfactory (U), 1=Highly Unsatisfactory (HU). Sustainability is rated on a 4-point scale: 4=Likely (L), 3=Moderately Likely (ML), 2=Moderately Unlikely (MU), 1=Unlikely (U)

M&E design at entry	
M&E Plan Implementation	
Overall Quality of M&E	
Implementation & Execution	Rating
Quality of UNDP Implementation/Oversight	
Quality of Implementing Partner Execution	
Overall quality of Implementation/Execution	
Assessment of Outcomes	Rating
Relevance	
Effectiveness	
Efficiency	
Overall Project Outcome Rating	
Sustainability	Rating
Financial resources	
Socio-political/economic	
Institutional framework and governance	
Environmental	
Overall Likelihood of Sustainability	

6. TIMEFRAME

The contract date will be from 1 September 2023 to 27 November 2023. The total duration of the TE will be approximately *25 working days*. The tentative TE timeframe is as follows:

Timeframe	Activity
15 August	Application closes
16 August-1 September	Selection of TE team
2 September-10 September	Preparation period for TE team (handover of documentation)
18 October-20 October (3 days)	Document review and preparation of TE Inception Report
23 October (1 day)	Finalization and Validation of TE Inception Report; latest start of TE mission
24 October-31 October (6 days)	TE mission: stakeholder meetings, interviews, field visits, etc.
1 November (1 day)	Mission wrap-up meeting & presentation of initial findings; earliest end of TE mission
2 November-10 November (7 days)	Preparation of draft TE report
10 November	Circulation of draft TE report for comments
13 November- 21 November (7 days)	Incorporation of comments on draft TE report into Audit Trail & finalization of TE report

21 November- 24 November	Preparation and Issuance of Management Response
27 November	Expected date of full TE completion

Options for site visits should be provided in the TE Inception Report.

7. TE DELIVERABLES

#	Deliverable	Description	Timing	Responsibilities
1	TE Inception Report	TE team clarifies objectives, methodology and timing of the TE	20 October, 2023	TE team submits Inception Report to Commissioning Unit and project management
2	Presentation	Initial Findings	1 November, 2023	TE team presents to Commissioning Unit and project management
3	Draft TE Report	Full draft report *(using guidelines on report content in ToR Annex C)* with annexes	10 November, 2023	TE team submits to Commissioning Unit; reviewed by RTA, Project Coordinating Unit, GEF OFP
4	Final TE Report* + Audit Trail	Revised final report and TE Audit trail in which the TE details how all received comments have (and have not) been addressed in the final TE report *(See template in ToR Annex H)*	21 November, 2023	TE team submits both documents to the Commissioning Unit

*All final TE reports will be quality assessed by the UNDP Independent Evaluation Office (IEO). Details of the IEO's quality assessment of decentralized evaluations can be found in Section 6 of the UNDP Evaluation Guidelines.[24]

8. TE ARRANGEMENTS

[24] Access at: http://web.undp.org/evaluation/guideline/section-6.shtml

The principal responsibility for managing the TE resides with the Commissioning Unit. The Commissioning Unit for this project's TE is UNDP China Country Office.

The Commissioning Unit will contract the evaluators and ensure the timely provision of per diems and travel arrangements within the country for the TE team. The Project Team will be responsible for liaising with the TE team to provide all relevant documents, set up stakeholder interviews, and arrange field visits.

9. TE TEAM COMPOSITION

A team of *independent evaluators* will conduct the TE – *one team leader (international consultant with experience and exposure to projects and evaluations in other regions) and national consultants, usually from the country of the project*. The team leader will be responsible for the overall design of TE process, assessment of the project results, evaluating the sustainability of project gains, leading the TE mission, supervising the national consultant, and writing the TE report, etc. The national consultants will support and report to the Team Leader, assess emerging trends with respect to regulatory frameworks, budget allocations, capacity building, and work with the Project Team in formulating TE report.

The evaluator(s) cannot have participated in the project preparation, formulation and/or implementation (including the writing of the project document), must not have conducted this project's Mid-Term Review and should not have a conflict of interest with the project's related activities.

The selection of evaluators will be aimed at maximizing the overall "team" qualities in the following areas:

International Lead Consultant （one person）

Education

- Master's degree in *social science* or other closely related field;

Experience

- Experience in relevant technical areas for at least *10 years;*
- Experience in evaluating projects with demonstrated understanding of issues related to climate change;
- Relevant experience with results-based management evaluation methodologies;
- Experience applying SMART indicators and reconstructing or validating baseline scenarios;
- Competence in adaptive management and demonstrable analytical skills;
- Experience in gender responsive evaluation and analysis;
-

Language

- Fluency in written and spoken English.

Responsibilities

- Defining the evaluation methodology and schedule, and report to the PMO;
- Documentation of the review data gathering;
- Leading the TE Team in planning, conducting and reporting on the evaluation;
- Deciding on division of labor within the team and ensuring timeliness of reports;
- Use of best practice evaluation methodologies in conducting the evaluation;
- Leading presentation of the draft evaluation findings and recommendations in-country;
- Conducting the debriefing for the UNDP China Office and the TNC PMO;
- Leading the drafting and finalization of the TE report.

10. EVALUATOR ETHICS

The TE team will be held to the highest ethical standards and is required to sign a code of conduct upon acceptance of the assignment. This evaluation will be conducted in accordance with the principles outlined in the UNEG 'Ethical Guidelines for Evaluation'. The evaluator must safeguard the rights and confidentiality of information providers, interviewees and stakeholders through measures to ensure compliance with legal and other relevant codes governing collection of data and reporting on data. The evaluator must also ensure security of collected information before and after the evaluation and protocols to ensure anonymity and confidentiality of sources of information where that is expected. The information knowledge and data gathered in the evaluation process must also be solely used for the evaluation and not for other uses without the express authorization of UNDP and partners.

11. PAYMENT SCHEDULE

- 40% payment upon satisfactory delivery of the Deliverable 1 final TE Inception Report and approval by the Commissioning Unit
- 60% payment upon satisfactory delivery of Deliverable 2, 3 & 4, including initial findings, TE report draft, and the final TE report, and approval by the Commissioning Unit and RTA (via signatures on the TE Report Clearance Form) and delivery of completed TE Audit Trail

  Criteria for issuing the final payment of 60%:
  - The final TE report includes all requirements outlined in the TE TOR and is in accordance with the TE guidance.
  - The final TE report is clearly written, logically organized, and is specific for this project (i.e. text has not been cut & pasted from other TE reports).
  - The Audit Trail includes responses to and justification for each comment listed.

12. APPLICATION PROCESS[25]

[25] Engagement of evaluators should be done in line with guidelines for hiring consultants in the POPP https://popp.undp.org/SitePages/POPPRoot.aspx

Please submit your offer and the below documents directly in the UNDP supplier system following this link: http://supplier.quantum.partneragencies.org

a) **CV** or **Personal History Form** (P11 form[26]);
b) Brief description **of approach to work/technical proposal** of why the individual considers him/herself as the most suitable for the assignment, and a proposed methodology on how they will approach and complete the assignment; (max 1 page)
c) **Financial Proposal** that indicates the all-inclusive fixed total contract price and all other travel related costs (such as flight ticket, per diem, etc), supported by a breakdown of costs, as per template. If an applicant is employed by an organization/company/institution, and he/she expects his/her employer to charge a management fee in the process of releasing him/her to UNDP under Reimbursable Loan Agreement (RLA), the applicant must indicate at this point, and ensure that all such costs are duly incorporated in the financial proposal submitted to UNDP.

Criteria for Evaluation of Proposal: Only those applications which are responsive and compliant will be evaluated. Offers will be evaluated according to the Combined Scoring method – where the educational background and experience on similar assignments will be weighted at 70% and the price proposal will weigh as 30% of the total scoring. The applicant receiving the Highest Combined Score that has also accepted UNDP's General Terms and Conditions will be awarded the contract.

13. TOR ANNEXES

(Add the following annexes to the final ToR)

- ToR Annex A: Project Logical/Results Framework
- ToR Annex B: Project Information Package to be reviewed by TE team
- ToR Annex C: Content of the TE report
- ToR Annex D: Evaluation Criteria Matrix template
- ToR Annex E: UNEG Code of Conduct for Evaluators
- ToR Annex F: TE Rating Scales
- ToR Annex G: TE Report Clearance Form
- ToR Annex H: TE Audit Trail

[26] http://www.undp.org/content/dam/undp/library/corporate/Careers/P11_Personal_history_form.doc

Annex 9 – Project Questionnaires

Assessment Tools	Respondent(s)
KII	PMO Staff

Date	
Name(s) of Staff	
Position(s) in Project	
Contact Info	
Name of Interviewer	

I. Project Design and Adaptive Management

1. What major lessons learned from previous projects were integrated into the design of this project?
2. Have the project design and logframe been relevant across the project duration? If no, why not?
3. Have there been any changes to the original project design/Log Frame? If yes, why?
4. What have been challenges and opportunities with the project's design? What were the implications for implementation and adaptive management as a result of these challenges and opportunities?
5. How were these changes approved? E.g. recommendations of MTR, PMO's recommendations to the PSC Meetings, etc.
6. Has the logframe/project document been reviewed to reflect these changes?
7. What led to the early achievement or over achievement of the project results? E.g. unambitious project design, industry trends, govt. regulations, etc.
8. Also, if these goals were exceeded, were the funds transferred to other activities and/or were new activities added to the project?

II. Timeliness

1. How many extensions has the project received thus far?
2. When were these extensions granted and what were the reasons for these extensions?
3. What was the process for obtaining these extensions?

4. Were these extensions no-cost or were additional funds provided by GEF or the Government for implementation during the extension? If yes, what was the amount of additional funds?
5. What has been the impact of these extensions on project implementation and progress?
6. How has COVID-19 impacted project activities and outcomes? And what have been the mitigation measures employed?

III. Project Management and Planning

1. What were the major challenges faced by the PMO during the course of the implementation?
2. To what extent has the Project Steering Committee convened regularly and carried out its functions throughout the project's implementation?
3. What process is utilized to develop the project work plans? And what are the advantages and potential disadvantages of this approach?

IV. Personnel and Staffing

1. What is the organogram of the PMO?
2. Has the project faced any HR challenges, e.g. insufficient or under qualified staff, high turnover, non-availability on in country technical knowhow, etc?
3. If yes, how have these been resolved? E.g. through hiring of ICs or subcontractors, providing training to existing staff, etc.
4. Did the delays in implementation have any impact on staffing numbers? E.g. some staff were laid off, etc. Please elaborate.

V. Subcontracts and Consultancies

1. How many subcontracts and consultancies have been issued under each project component (year, topic, and budget)?
2. Have all subcontracts been completed? If no, which ones are outstanding? When are they expected to complete? What have been the reasons in implementation delay of these subcontracts?
3. What was the general process of selecting the sub-contractors and consultants?
4. What problems were faced in engaging contractors, e.g. limited capacity, delayed delivery by contractor, etc. How were these mitigated?
5. What problems were faced in managing the contractors, e.g. limited budgets, large volume of contracts, etc.
6. Which of the contracts have contributed most positively to the project's outcomes/goals?

VI. Technical Advisory Committee (TAC)

1. Which of the contracts had the least contribution or were ineffective? Why?
2. What are the main functions of the TAC?
3. How many members does TAC have? And what industries do they belong to?
4. What have been some of the major inputs of TAC that have contributed to the project's success?
5. What have been the significant challenges faced by the TAC in performing its role? E.g. coordination, lack of data, etc.

VII. M&E

1. Did the project using the project logical framework to track progress against targets?
2. What were the methods and process of tracking progress against project goal, outcome, and outputs?
3. Did the project have a Monitoring database? If yes, please provide details, e.g. what information is recorded in the database? Who updates the database? And how often is the database updated/
4. What were some of the challenges faced in tracking progress against the logical framework? E.g. indicators were not SMART or information was difficult to track, etc.
5. How were these challenges overcome?

VIII. Steering Committee

1. Has the PSC met regularly? If no, what have been the reasons?
2. Who are members of the PSC? And have these members changed during the course of the project? If yes, please provide details.
3. What key role did the PSC play in guiding / facilitating the project implementation? Please provide examples?
4. How can the role of PSC be strengthened during future projects?

IX. Progress and Outputs and Activities

1. Are any there any outstanding project outputs or activities at this time?
2. If yes, what are the reasons?
3. When will these activities close out?

X. Training and Capacity Building

1. List of various training and outreach activities (including budget, and people reached) under Component 4 of the project
2. What was the process of trainee selection?
3. Has the training/outreach impact been assessed? If yes, what have been the outcomes?
4. How can the trainings contribute to project impact and sustainability?
5. What key challenges were faced in the training program? E.g. availability of local technical knowhow, interest by trainees, etc.
6. How were these challenges mitigated?

XI. Communications and Outreach

1. Does the project have a communications and outreach strategy? If yes, what are the major elements of this strategy?
2. How have the experiences and lessons from the project been recorded and saved so that they are easily accessible to any stakeholder who wishes to build on the project's success in the future? E.g. a website, library of NDRC, etc.

XII. Partnerships

1. Which stakeholders under each component have made the most productive contribution towards the project goal? Which stakeholders have made the least productive contribution?
2. What is the liaison mechanism between PMO and other institutional stakeholders? (e.g. UNDP, MOHURD, sub-project outsourcing institutions, etc.)
3. What is the liaison mechanism between the PMO and beneficiaries, e.g. private sector and academic institutions?
4. What challenges have been faced with managing the partnerships? E.g. procurement, reporting, delivery of outputs, understanding the project concept, coordination and communication, etc.
5. How do the various stakeholders and partners interact to ensure communication and linkages between their respective activities?
6. What are some of the other major government and development sector initiatives focused on EC&EE and LC in public sector buildings that were active during this project? How has the project collaborated/coordinated activities with these? And what have been the challenges and opportunities during this cooperation?
7. How has this cooperation contributed to the project achieving its targets and outcomes?

XIII. Stakeholder Collaboration

1. What role has the UNDP China played in project implementation? How can this role be further improved?
2. What support has been provided by the MOHURD/GoChina? How has this support ensured effective project outcomes? Also, what have been some of the challenges with support from the MOHURD/GOC? E.g. frequent changes of officials, etc.
3. How has the collaboration between the various stakeholders leveraged the project performance?
4. What key challenges have been faced by the key stakeholders in collaborating with each other? How were some of these challenges mitigated?

XIV. Financing and Co-Financing

1. Have there been any delays or problems faced with the project's financial disbursements from the different stakeholders?
2. If yes, how did these impact project implementation?
3. How were these problems resolved?
4. Have regular project financial audits been undertaken? Were these audits satisfactory?
5. If not, what were the reasons and how were these issues resolved?
6. How was the project co-financing data tracked? What were the challenges in tracking co-financing?

XV. Effectiveness

1. What have been some of the project's key successes?
2. What factors have been critical for the success of the project to achieve its goals and objectives? E.g. GOC policies, trade environment, stakeholder collaboration, etc.
3. What have been some of the project's key challenges?
4. To what extent has the project contributed to the transformation of EE&EC in public sector buildings in China as compared to other projects and initiatives active during this time?
5. What have been the implications of the changes in the project's design and approach to implementation in terms of effectiveness of results achieved? (e.g, switch from designing market-based financial mechanisms to showcasing existing financial mechanism, change in the originally selected project demonstration to new ones, expansion of focus from public sector buildings to include private sector and non-governmental sector, etc.)

XVI. Gender

1. What efforts has the project made to improve/ensure the engagement of women in the EE&EC in the buildings sectors?
2. What have been the challenges and opportunities faced by the project for the engagement of women?
3. How many women have been engaged as a result of the project? Also, as a result of the project support, what proportion of women have been engaged at senior levels?
4. What are the major aspects in which women are engaged?

XVII. Impact

1. Has the PMO undertaken an impact assessment of improved total electricity saving reduced GHG and CO2 emissions, and fossil fuel savings (among others) as a result of the project intervention?
2. Similarly, has the project calculated impact towards improving the widespread application of EE&EC initiatives and enforcement of policies and regulations in the public sector buildings in China?
3. If yes, how were these calculated and what are the results?
4. How do the results compare with the change anticipated in the ProDoc?
5. To what extent is this impact the result of the GEF project and to what extent have other ongoing projects focused on EE&EC in public sector buildings contributed to these results?

XVIII. Sustainability

1. What have been the key measures of sustainability/replicability embedded in the project design and delivery?
2. Which elements/results of the project are particularly sustainable? Why?
3. Which elements/results of the project are least sustainable? Why?
4. Are there any plans of the UNDP or GoChina to design future similar projects for further development of the EE&EC in public buildings sector? If yes, what are the major elements of these projects and when will these project be implemented?

XIX. Lessons Learned and Recommendations

1. What have been some of the project's key lessons learnt?
2. What are your recommendations for the sustainability of project interventions?
3. What are you recommendations for design of similar future projects?

Assessment Tool	Respondent(s)
KII	**Government Stakeholders** (MOHURD, MOF, MOST, China Banking and Insurance Regulatory Commission, etc.)

Date	
Name of Interviewee	
Title	
Name of Interviewer	
Organization Name	
Contact Info	

I. Background

1. Since when has your organization been collaborating with the PSBEE project?
2. How does the project fit into the strategic priorities and current programming of your organization?
3. What particular role does your organization perform in relation to the project?
4. In your opinion, what have been the key successes of the project?
5. How has your organization contributed to some of these project successes?
6. In your opinion, what have been the key challenges faced by the project?
7. How could these challenges have been mitigated?

II. Project Design and Adaptive Management

1. Was your organization involved in the design of the project? If yes, please provide details of your organization's role in the design.
2. Has the project design and logframe remained relevant over the course of the project? E.g. due to the various developments in the policy, technology, and demand since the project design.

3. If no, what key factors were irrelevant and how were these redundancies addressed during the course of implementation?
4. What factors have led to the project surpassing its targets? E.g. GOC Policy ,country ownership, market demand, etc.
5. Also, if these goals were exceeded, could/should the funds have been transferred to other/additional activities or should other activities have been added to the project?

III. Project Results

1. In addition to this project, what other EE&EC programs in public buildings sector has your agency been involved in? Also, have there been any linkage between this project and other EE&EC programs being implemented by your organization?
2. How would you rate the comparative contributions and challenges of this project with the other such programs?
3. What were the challenges encountered with the originally proposed demonstration projects? What necessitated the identification of new portfolio of demonstration projects?
4. What has your organization's role been in the selection of demonstration projects?
5. What was the criteria for the selection of project demonstration sites?
6. How were personnel from the government departments selected for participation in/benefitting from the project's trainings on EC&EE and LC initiatives?
7. How did your organization/department ensure that a wide and representative group of participants were capacitated under the trainings implemented by the current project?

IV. Project Management

1. What were the key opportunities for establishing the PMO at the MOHURD? How were these opportunities utilized?
2. What have been the challenges associated with the selection of MOHURD as the implementing agency? What measures were implemented to overcome those challenges and to what extent were they effective?
3. Have there been any key delays in project implementation? f yes, what caused these delays? What has been the impact of these on project implementation and progress?
4. What measures were taken by key stakeholders to avoid any further delays?

V. Monitoring

1. How are the project activities implemented by your organization monitored and reported?
2. Have there been any challenges with monitoring and reporting? E.g. availability of data, reporting format, reporting frequency, etc.
3. How have these challenges been mitigated?

VI. Steering Committee

1. What key role has the PSC played in guiding / facilitating the project implementation? Please provide examples?
2. What challenges and opportunities has the PSC faced in overseeing the project activities? E.g. policy, stakeholder buy in, etc?
3. How can the role of the PSC be further strengthened in future projects?

VII. Replication and Up Scaling

1. How can/will the project's successes/activities feed into future programming/strategy of your organization?
2. Have the positive results of the project been replicated or plan to be replicated by other key stakeholders? e.g. provincial governments, ESCOs, certification and verification centers, etc. If yes, How?
3. What are the challenges to replication or upscaling? E.g. policy, market, or technical, etc. How can these challenges be overcome?

VIII. Stakeholder Collaboration

1. Which project stakeholders/beneficiaries do you deal with directly?
2. What is the mechanism for collaboration with the project? E.g. quarterly meetings, etc.
3. In your opinion, which stakeholders have played a key role in ensuring the project's success?
4. What have been some of the opportunities/positive outcomes of the stakeholder collaboration under this project? E.g. funding leverage, policy support, higher outreach, etc.
5. What have been some of the challenges in regard to collaboration among stakeholders? E.g. difference in organizational priorities, delay in reporting, etc.
6. Have these issues been resolved? How?

7. Will there be opportunity for the project stakeholders from the business and/or public sector to continue collaboration after project end? How
8. What measures have been undertaken to institutionalize such collaboration platforms before it closes?
9. In your opinion, to what extent has the project effectively mainstreaming gender equality and gender considerations into the project's activities?
10. How has the project benefitted women through its intervention? (e.g., incorporation of gender considerations in the development of policies and regulatory frameworks, active involvement of women throughout project's implementation, delivery of capacity building for women, etc.)

IX. Lessons Learned and Recommendations

1. In your opinion, what are the key lessons learned from the project design and implementation?
2. Based on these lessons, what are your suggestions for improvement in future projects?

Assessment Tool	Respondent(s)
KII	**Sub-project Outsourcing Institutes** **(e.g.** academic institutes and private sector)

Date	
Name of Interviewee	
Title	
Name of Interviewer	
Organization Name	
Contact Info	

I. Background

1. Since when has your organization been involved in the PSBEE Project?
2. What particular role does your organization perform in relation to the project?
3. How does the project fit into the strategic priorities and current programming of your organization?
4. In your opinion, what have been the key successes of the project?
5. In your opinion, what have been the key challenges faced by the project?
6. How could these challenges have been mitigated?

II. Project Results

1. In your opinion, what have been the key successes of the project's demonstrations? And what are the underlying reasons for these successes?
2. How has your organization contributed to some of these project successes?
3. In your opinion, what have been the key challenges faced by the project? How could these challenges have been mitigated?
4. How has the PSBEE project benefitted your organization?

III. Capacity Building and Support

1. What support has the project provided to your organization for the promotion of EE&EC in the buildings sector? Please provide details.
2. Are you satisfied with the level of administrative, financial, and technical support provided by the project to your organization or to other stakeholders? If yes, why? If no, why not?
3. How have the project activities contributed to building the capacity of your organization? (e.g. training of personnel, technology transfer, policy support, market mapping, etc.)
4. What were the key problems faced by your organization in receiving support from the project? E.g. funding delays, outdated or advanced technology transfer, etc.
5. How were these problems resolved?

IV. Replication and Up Scaling

1. How can/will the project's successes/activities feed into future programming/strategy of your organization?
2. Have the positive results of the project been replicated by other stakeholders? If yes, How?
3. What are the potential opportunities and challenges for such replication? E.g. finance, policy, market demand, etc.

V. Monitoring

1. How are the project activities implemented by your organization monitored and reported?
2. Have there been any challenges with monitoring and reporting? E.g. availability of data, reporting format, reporting frequency, etc.
3. How have these challenges been mitigated?

VI. Stakeholder Collaboration

1. Which project stakeholders/beneficiaries do you deal with directly in relation to the PSBEE project?
2. What is the mechanism for collaboration with the project? E.g. quarterly meetings, etc.

3. What have been some of the opportunities/positive outcomes of the stakeholder collaboration under this project? E.g. funding leverage, policy support, higher outreach, etc.
4. What have been some of the challenges in regard to collaboration among stakeholders? E.g. difference in organizational priorities, lack of time, etc.
5. Will there be opportunity for the project stakeholders from the business and/or public sector to continue collaboration after project end? How
6. What can the project do to institutionalize such collaboration platforms before it closes?

VII. Lessons Learned and Recommendations

1. In your opinion, what are the key lessons learned from the project?
2. Based on the project implementation experience, what are your suggestions for improvement in similar future projects?

Assessment Tool	Respondent(s)
FGD	**Beneficiaries of Trainings**

Date	
Name of Interviewee	
Job Title	
Average Number of Years of Experience	
Name of Interviewer	
Organization Name	
Contact Info	

1. What training activities have you participated in?
2. To what extent were the trainings organized by the project relevant to you?
3. Were the trainings and the curriculum well-developed and well-designed?
4. To what extent were the trainings well-organized and efficiently undertaken?
5. How have the trainings improved your knowledge and skills in the areas of EE&EC and low-carbon initiatives?
6. In your opinion, what were the key strengths and weaknesses of the training you participated in?
7. What have been the major benefits to you as a result of participating in the trainings conducted by the project?
8. What were the shortcomings or challenges, if any, with regards to the trainings conducted by the project?
9. In your opinion, what could the project have done to overcome some of these challenges or shortcomings?
10. To what extent are you likely to utilize the knowledge and skills gained through the trainings in your professional capacity?
11. Based on your experience, what are your suggestions for improvement in similar future projects?

Main findings from Assessment Tools

(No. 1)

Main Challenges: As a super-large city in the country, Shanghai has the characteristics of intensive load, rapid development of new energy, and insufficient resource endowment. The virtual power plant not only makes full use of electricity, bringing a win-win situation to both enterprises and users, but also has a very high net profit rate. Traditional thermal power generation needs to invest 400 billion yuan to achieve peak reduction and valley filling, while virtual power plants only require 50 billion to 60 billion yuan. The cost is less than one sixth of thermal power. However, the current policies for virtual power plants are not yet complete, and the construction entities, participants, regulators, cost sharing mechanisms, market rules and trading mechanisms of virtual power plants all need to be continuously studied. In this context, the willingness of user-side active load management is not high. Since electricity prices are generally low, small and medium-sized users are less sensitive to electricity prices and are less likely to proactively reduce loads on the demand side.

2. (No.2, No.14 and No.15)

Key Success The project is fully financed by the energy-saving service company, which greatly increases the enthusiasm of the owners to carry out energy-saving renovations and promote building energy efficiency improvements and gives full play to the role of green finance in the contract energy management market mechanism.

Main Challenge The main challenge facing this project is how to ensure the energy-saving operation of the system after the project is implemented.

During the energy-saving benefit sharing period, the project established a monitoring team to be responsible for remote status monitoring of the project, real-time monitoring of the project operation, regular energy-saving rate analysis and remote diagnosis and solution of technical problems. Short-term economic benefits: This project adopts the investment implementation of the contract energy management model. After the project construction is completed, after both parties jointly confirm the energy savings, the two parties will share the energy-saving benefits according to the proportion agreed in the contract.

Demonstration application value that can be replicated and promoted in the long term: Give full play to the role of green finance in the contract energy management market mechanism, increase the enthusiasm of owners to carry out energy-saving renovations, and promote building energy efficiency improvements. At the same time, in order to reduce the dependence of public building energy efficiency improvements on fiscal subsidies, under the background that China's fiscal subsidies are gradually withdrawing from the energy efficiency improvement market, accelerating the construction of market mechanisms and giving full play to the initiative of owners, energy-saving service companies, and financial institutions will play a certain role. promotion effect.

(No.3)

Main Role The institution is responsible for organizing the implementation of demand assessment, outcome promotion, and effect evaluation in this

project. For example: convening five demand assessment meetings in advance and sorting out the promotion needs through questionnaires and interviews; based on these needs, formulating the Public Building Energy Efficiency Effect Investigation Questionnaire using the Kirkpatrick Model, convening five outcome promotion meetings, and writing the promotion summary report; based on the feedback from the demand and promotion meetings, finally writing the publicity activity outcome evaluation report to evaluate the effect of the activities.

Main Challenges The main challenges are how to identify the real needs of the target audience for public building energy efficiency improvement, and how to evaluate the improvement effect obtained by the target audience through implementation of this project.

These challenges are mitigated by strengthening expert guidance, strengthen research on the demands of the industry and professionals, organize effective conference activities to grasp demands and promotion, adopt scientific methods to evaluate the final promotion effect.

(No. 6)

Main Role The main role the institution performed in the project was research project related contents in China's hot summer and cold winter regions, including assessment of urban potential, construction standards, operation plans and trial operation of public building energy conservation training centers in hot summer and cold winter regions.

The main challenges were the followings:

For theoretical research, there is currently less energy conservation training education centers and corresponding materials in hot

summer and cold winter regions. At the same time, due to privacy issues such as training center privacy and student privacy, it is impossible to obtain training related data. Therefore, there is less actual data available for analyzing urban training potential and formulating training center operation plans.

The main challenge faced in the trial operation is the difficulty in student recruitment, which is mainly caused by two aspects: firstly, the downturn in the construction industry has led to fewer students intending to enter the construction industry and related industries. Secondly, due to the lack of leverage in the industry, related practitioners are also unwilling to spend time and money on building energy conservation training without clear benefits.

Approaches to overcome difficulties: When conducting theoretical research, use indirect data for substitution if direct data is difficult to obtain. For example, when evaluating urban potential, we selected relatively easy-to-obtain indicators such as per capita GDP, per capita energy consumption, number of construction industry practitioners, number of ordinary colleges and universities, etc., to replace some difficult-to-count indicators such as number of building energy conservation practitioners and output value of the building energy conservation industry. For the student recruitment issue, questionnaires or telephone surveys will be mainly adopted internally to inquire the building energy conservation needs, willingness to participate in training, and costs willing to invest for the training of companies in the industry. Promote to companies instead of directly to practitioners. Formulate appropriate training content and tuition fees to improve companies' willingness and efforts to participate, so that companies can encourage their employees to participate. Externally mainly use popular science

videos, reports and other means to increase social attention to public building energy conservation, thereby increasing new entrants' willingness to enter the industry.

(No.7)

The demonstration of this sub-project relies on the future building construction project. The institution is a body of investment, construction and operation of the project.

Key success The energy saving and emission reduction of a building in the Future Building Demonstration Project is limited, but the demonstration of this project has verified the feasibility of PEDF technology in the project, laying the foundation for future large-scale promotion and large-scale energy saving and emission reduction benefits.

Main Challenges The Future Building project mainly uses PEDF technology. As a new technology application, it will inevitably face challenges in various aspects. Its engineering feasibility has been verified through the demonstration of this project. It will continue to operate in the future, combined with my country's electricity market reform process to verify the economical operation of PEDF.

Shenzhen Institute of Building Research face up to the problems and challenges that arise during operation, did not avoid problems or took shortcuts, used solid data to analyze the causes of problems, and explored possible solutions.

(No. 5 & 8)

Main Roles: In the energy performance contracting demonstration sub-project, the institution served as the lead party. The main responsibilities include coordinating project parties to advance demonstration projects as planned, promoting building owners to carry out energy-saving technical retrofits, summarizing project

implementation results, especially experience and lessons of the energy performance contracting energy-saving benefit sharing model, and promoting it among similar institutions.

Beijing Bayi School is the building owner unit of the Public Building Energy Efficiency Improvement Market Mechanism Demonstration Sub-project (Energy Performance Contracting).

Main Challenges: Overall, the project has progressed smoothly. The main challenge is how to replicate the project experience in more primary and secondary schools. Because Beijing Bayi School is a top national model school with strong energy conservation awareness and technical screening capabilities, as well as relatively strong funding support. But for most other schools, how to help them connect with appropriate energy conservation technologies and service companies is a topic worthy of long-term exploration.

On the basis of this project, China Association of Energy Conservation has submitted related policy recommendations and promoted the implementation of energy performance contracting in public institutions. We will continue to work tirelessly in areas like energy conservation publicity, capacity building and technology promotion.

(No.10)

Key success First, the financial support provided by UNDP and GEF for this project effectively promoted the implementation and implementation of this energy-saving renovation project; second, a number of special exchange meetings organized by the Ministry of Housing and Urban-Rural Development promoted the project results. Played an important role; third, Huashan Hospital Affiliated to Fudan University upgraded the air conditioning, lighting, boiler, energy management and other systems in 5 demonstration

buildings, with a comprehensive energy saving rate of 22.3% and a carbon dioxide emission reduction of 2161.9t/a, promoting construction of green hospitals.

No. 11)

Main Role: As the user unit of photovoltaic power generation projects.

Main Challenges: The investment is relatively large and requires regular maintenance and inspection to ensure the stable operation of the equipment.

How to mitigate challenges: Optimize the efficiency of fund use, rationally arrange the flow of funds, strengthen project management and risk control, ensure the smooth progress of the project and the rational use of funds, strengthen cooperation with the government and financial institutions, understand policy trends and changes in the financial market, and adjust financing strategies in a timely manner and how funds are used.

(No. 13 &17)

Main Role for institution: As the logistics management representative of the owner, communicate and coordinate with technical support units and energy-saving service companies to ensure the applicability and feasibility of the energy-saving transformation plan, and cooperate with the energy-saving service company to implement energy system transformation and operation and maintenance.

Main Role for institution: Responsible for the review of the transformation plan of the energy cost trusteeship project, the implementation of technical transformation, and the on-site operation and maintenance during the trusteeship period.

Main challenges: The rationality of the energy cost trusteeship benchmark, and how to consider the impact of extreme weather, increase or decrease in energy-consuming equipment, damage to equipment and facilities, changes in energy prices, etc. on energy saving and energy cost effects during the trusteeship period.

How to mitigate challenges To confirm the energy cost custody benchmark, first entrust a third-party energy audit agency recognized by both parties to the contract to conduct testing and diagnosis, issue a diagnostic report, and give the hospital's energy consumption benchmark in recent years. The energy-saving service company and the hospital will then further communicate and negotiate.

In terms of renovation financing, our unit cooperates with Sichuan State Grid, and they contribute capital and earn a certain amount of income during the custody period. The reason why State Grid was chosen is that the source of funds is reliable and State Grid does not overly pursue economic benefits. As a large energy user, the hospital's energy conservation and carbon reduction work is conducive to the realization of State Grid's own regional energy conservation and carbon reduction goals

(No. 20 &21)

Main role for institution: It was the construction unit of the demonstration project and the leading unit of the consortium. We mainly provide demonstration projects and promote project implementation, and implement insurance services in the process.

Main role for institution: As the insurance service provider of the project, our company is responsible for innovating insurance products in a targeted manner based on the content of the project research, and providing specific insurance protection service support.

Key Success China currently has a large number of existing buildings, and energy consumption problems need to be solved. In the previous implementation process, various problems were encountered, such as poor energy-saving effects in investment and renovation, etc. By participating in the research work of this green insurance demonstration project, we can have a more comprehensive understanding of the implementation process, and through the intervention of insurance It provides a solution to the effect of investment and energy-saving transformation, which is the success of the project.

Main Challenges Many problems were encountered during the completion of the project, the main challenge being how to fit green insurance with building renovations. Between the two different industries, many ideas and solutions to problems are different.

How to mitigate challenges During the project implementation process, they integrated the construction unit, insurance company, and building energy-saving technical service company into the project team. Through communication, negotiation, and actual experiments, we analyzed and studied the service content and role of green insurance in each stage of the project. The role of insurance, as well as various aspects that affect building energy consumption, comprehensive judgment on whether insurance can solve the problems in the process, and whether the determination of insurance underwriting energy consumption targets is reasonable, this process takes up most of our project research time.

All participants mentioned there is good interaction and collaboration between these stakeholders. The PSBEE project brings together multiple key stakeholders in the construction industry, including government departments, university research institutions, enterprises and industry

associations. For example, by holding regular project meetings and developing clear communication mechanisms. Multi-stakeholder collaboration has brought positive results, such as information sharing, policy support, financial leverage, etc.

Annex 11 – TE UNEG Code of Conduct

Evaluators/Consultants:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.

2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.

3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.

4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.

5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.

6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study imitations, findings and recommendations.

7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

8. Must ensure that independence of judgement is maintained, and that evaluation findings and recommendations are independently presented.

9. Must confirm that they have not been involved in designing, executing or advising on the project being evaluated and did not carry out the project's Mid-Term Review.

Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Evaluator: Ms Umme Zia Kulsoom

Name of Consultancy Organization (where relevant): N/A

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Islamabad (Place) on 22nd September 2023 (Date)

Signature: 

ToR Annex E: UNEG Code of Conduct for Evaluators

Independence entails the ability to evaluate without undue influence or pressure by any party (including the hiring unit) and providing evaluators with free access to information on the evaluation subject. Independence provides legitimacy to and ensures an objective perspective on evaluations. An independent evaluation reduces the potential for conflicts of interest which might arise with self-reported ratings by those involved in the management of the project being evaluated. Independence is one of ten general principles for evaluations (together with internationally agreed principles, goals and targets: utility, credibility, impartiality, ethics, transparency, human rights and gender equality, national evaluation capacities, and professionalism).

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9. Must confirm that they have not been involved in designing, executing or advising on the project being evaluated and did not carry out the project's Mid-Term Review.

Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Evaluator: Cheng Jianhong

Name of Consultancy Organization (where relevant): China National Institute of Standardization

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Beijing (Place) on 20/12/2023 (Date)

Signature: Cheng Jianhong

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Independence entails the ability to evaluate without undue influence or pressure by any party (including the hiring unit) and providing evaluators with free access to information on the evaluation subject. Independence provides legitimacy to and ensures an objective perspective on evaluations. An independent evaluation reduces the potential for conflicts of interest which might arise with self-reported ratings by those involved in the management of the project being evaluated. Independence is one of ten general principles for evaluations (together with internationally agreed principles, goals and targets: utility, credibility, impartiality, ethics, transparency, human rights and gender equality, national evaluation capacities, and professionalism).

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9. Must confirm that they have not been involved in designing, executing or advising on the project being evaluated and did not carry out the project's Mid-Term Review.

Evaluation Consultant Agreement Form

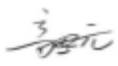
Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Evaluator: Gao Enyuan

Name of Consultancy Organization (where relevant): Chinese Association of Refrigeration

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Beijing (Place) on 20/12/2023 (Date)



Signature: _____

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9. Must confirm that they have not been involved in designing, executing or advising on the project being evaluated and did not carry out the project's Mid-Term Review.

Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Evaluator: Wang Gen

Name of Consultancy Organization (where relevant): International Copper Association (China)

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Shanghai (Place) on 20/12/2023 (Date)

Signature: _____

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9. Must confirm that they have not been involved in designing, executing or advising on the project being evaluated and did not carry out the project's Mid-Term Review.

Evaluation Consultant Agreement Form

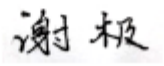
Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Evaluator: Xie Ji

Name of Consultancy Organization (where relevant): China Association of Small and Medium Enterprises

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Beijing (Place) on 20/12/2023 (Date)



Signature: _____

Annex 12 – TE Rating Scales

Outcome Ratings Scale - Relevance, Effectiveness, Efficiency

6 = Highly Satisfactory (HS)	Level of outcomes achieved clearly exceeds expectations and/or there were no shortcomings
5 = Satisfactory (S)	Level of outcomes achieved was as expected and/or there were no or minor shortcomings
4 = Moderately Satisfactory (MS)	Level of outcomes achieved more or less as expected and/or there were moderate shortcomings.
3 = Moderately Unsatisfactory (MU)	Level of outcomes achieved somewhat lower than expected and/or there were significant shortcomings
2 = Unsatisfactory (U)	Level of outcomes achieved substantially lower than expected and/or there were major shortcomings.
1 = Highly Unsatisfactory (HU)	Only a negligible level of outcomes achieved and/or there were severe shortcomings
Unable to Assess (UA)	The available information does not allow an assessment

Monitoring & Evaluation Ratings Scale

6 = Highly Satisfactory (HS)	There were no short comings; quality of M&E design/implementation exceeded expectations
5 = Satisfactory (S)	There were minor shortcomings; quality of M&E design/implementation met expectations
4 = Moderately Satisfactory (MS)	There were moderate shortcomings; quality of M&E design/implementation more or less met expectations
3 = Moderately Unsatisfactory (MU)	There were significant shortcomings; quality of M&E design/implementation was somewhat lower than expected
2 = Unsatisfactory (U)	There were major shortcomings; quality of M&E design/implementation was substantially lower than expected
1 = Highly Unsatisfactory (HU)	There were severe shortcomings in M&E design/implementation
Unable to Assess (UA)	The available information does not allow an assessment

Implementation/Oversight and Execution Ratings Scale

6 = Highly Satisfactory (HS)	There were no shortcomings; quality of implementation/execution exceeded expectations
5 = Satisfactory (S)	There were no or minor shortcomings; quality of implementation/execution met expectations.
4 = Moderately Satisfactory (MS)	There were some shortcomings; quality of implementation/execution more or less met expectations.
3 = Moderately Unsatisfactory (MU)	There were significant shortcomings; quality of implementation/execution was somewhat lower than expected
2 = Unsatisfactory (U)	There were major shortcomings; quality of implementation/execution was substantially lower than expected
1 = Highly Unsatisfactory (HU)	There were severe shortcomings in quality of implementation/execution
Unable to Assess (UA)	The available information does not allow an assessment of the quality of implementation and execution

Sustainability Ratings Scale

4 = Likely (L)	There are little or no risks to sustainability
3 = Moderately Likely (ML)	There are moderate risks to sustainability
2 = Moderately Unlikely (MU)	There are significant risks to sustainability
1 = Unlikely (U)	There are severe risks to sustainability
Unable to Assess (UA)	Unable to assess the expected incidence and magnitude of risks to sustainability

Annex 13 – Audit Trail (attached as a separate file)

Annex 14 – GEF Core Indicator Worksheet (attached as a separate file)

Annex 15 – Signed TE Report Clearance Form

Terminal Evaluation Report for Energy Efficiency Improvement in Public Sector Buildings in China (PSBEE) Project, UNDP PIMS 5395, Reviewed and Cleared By:

Commissioning Unit (M&E Focal Point)

Name: Qian Sun

Signature: DocuSigned by: B510E356B66F44F... Date: 01-Feb-2024

Regional Technical Advisor (Nature, Climate and Energy)

Name: Bahtiyar Kurt

Signature: DocuSigned by: 8CD90396275549F... Date: 01-Feb-2024