United Nations Development Programme

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Terminal Evaluation of UNDP/GEF Project: Turkey: Promoting Energy Efficiency in Buildings

(GEF Project ID: 2942; UNDP PIMS ID: 3646)

Terminal Evaluation Report

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SYNOPSIS

Title of UNDP supported GEF financed project: Turkey: Promoting Energy Efficiency in Buildings (PEEB)

UNDP Project ID: PIMS 3646

GEF Project ID: 2942

Evaluation time frame: July 2010 to February 2017

CEO endorsement date: July 30, 2010

Project implementation start date: July 30, 2010

Project end date: April 30, 2017

Date of evaluation report: April 28, 2017

Region and Countries included in the project: Turkey

GEF Focal Area Objective: SP-1 (for GEF-4): Promoting energy efficient technologies and practices in the appliance and building sectors

Implementing partner and other strategic partners: Implementing partner: Directorate General of Renewable Energy of the Ministry of Energy and Natural Resources (MoNRE)

Evaluation team members: Mr Roland Wong, International Consultant

Acknowledgements:
The Evaluators wish to acknowledge with gratitude the time and effort expended by all project participants and stakeholders during the course of the PEEB Project Terminal Evaluation. In particular, I wish to thank the UNDP Turkey, the Directorate General of Renewable Energy, the Ministry of Environment and Urbanization, the Ekodenge design team, Dr. Celal Abdi Guzer of the Middle East Technical University as well as other former Project managers and former Project personnel for making the efforts to recall details of their time participating on the Buildings Project. Thank you again to all those I met during the mission for your hospitality and insights. I sincerely hope that this report contributes towards a lower carbon and energy efficient future for buildings in Turkey.

EXECUTIVE SUMMARY

This report summarizes the findings of the Terminal Evaluation Mission conducted during the February 20 - March 1, 2017 period for the GEF project: "*Turkey: Promoting Energy Efficiency in Buildings*" (hereby referred to as PEEB or the Project), where UNDP received a US$2.62 million grant from the Global Environmental Facility (GEF) in July 30, 2010.

Project Summary Table

Project Title:	*Promoting Energy Efficiency in Buildings* (PEEB)			
GEF Project ID:	2942		*at endorsement (Million US$)*	*at completion (Million US$)*
UNDP Project ID:	3646	GEF financing:	2.620	2.620
Country:	Turkey	IA/EA own:	0.060	0.060
Region:	Europe and CIS	Government:	14.900	16.291
Focal Area:	Climate Change	Other:	0	0.
FA Objectives, (OP/SP):	SP1 for GEF 4: Promoting energy efficient technologies and practices in the appliance and building sectors	Total co-financing:	14.960	16.351
Executing Agency:	Directorate General of Renewable Energy (DGRE) under the Ministry of Energy and Natural Resources (MoNRE)	Total Project Cost:	17.580	18.971
Other Partners involved:		ProDoc Signature (date project began):		30 July 2010
		(Operational) Closing Date:	Proposed: 30 July 2015	Actual: 30 April 2017

Project Description

The Project "Promoting Energy Efficiency in Buildings" (PEEB) in Turkey seeks to reduce the carbon footprint of building stock in Turkey. Turkey's building stock grew by 10% between 2000 and 2008 with the total number of buildings of 8.6 million and the total floor area of 1.7 billion m² that does not include informal or unregistered building construction. As of 2016, Turkey's building stock now totals over 9.1 million buildings, a growth rate of 1.5%.

With Turkey's annual consumption of electricity tripling since 1990 and reaching 198 TWh in 2008, the country's greenhouse gas (GHG) emissions have also experienced a similar rise. Electricity consumption within the residential sector and commercial sector had reached at 40 TWh and 23 TWh respectively in 2008[1]. As of 2016, electricity consumption has risen to 217 TWh, an annual rise from 2008 of 1.1%. Turkey's average heating requirements for its buildings was in the order of a 110 kWh/m²/yr in

[1] State Planning Organization and MENR

comparison to Denmark at 23 kWh/m^2/yr and the United Kingdom at 35 kWh/m^2/yr. These comparative figures provided indications that Turkey's building codes and standards would need to be updated to encourage energy efficiency as well as strengthening of its enforcement regime.

Despite the creation of a supportive and enabling regulatory environment to encourage investment in EE buildings in 2009, there were still a number of barriers obstructing progress in the development of EE buildings in Turkey. The design of the PEEB Project sought to address the removal of these barriers that would catalyze investments into EE buildings in Turkey including:

- Insufficient scope and ambition of EE regulations in 2008 and 2009;
- Inadequate compliance to EE regulations. This has been exacerbated by systemic issues related to enforcement;
- Low awareness of cost effective opportunities for improving energy performance in the buildings;
- No demonstrated models for developing EE buildings; and
- Weak energy management. Building energy managers do not have access to training courses that sufficiently update their knowledge on rapidly changing requirements to new building codes that address higher standards of energy efficiency.

Project Results

Actual outcomes of the PEEB Project are summarized on Table A in comparison with intended outcomes.

Table A: Comparison of Intended Project Outcomes from the Inception Report to Actual Outcomes

Intended Outcomes in revised Project Results Framework of October 2013	Actual Outcomes as of March 2017
Objective: To reduce energy consumption and associated GHG emissions in buildings in Turkey by raising building energy performance standards, improving enforcement of building codes, enhancing building energy management and introducing the use of an integrated building design approach. Targets of: • 193 kWh/m²/year for buildings built with IBDA as the average total energy consumption (for heating, cooling, ventilation and lighting) in new non-residential buildings; and • 2 million tCO_2 of cumulative CO_2 emission reductions from new buildings to be built during project lifetime (2010-2015) against the baseline	**Actual achievement toward objective**: The Project has introduced and demonstrated an integrated building design approach. It has also assisted the Government of Turkey in raising building energy performance standards, and has commenced the process of improving enforcement of these building codes and disseminating knowledge of building energy management to local managers of publicly owned building assets. In the context of objective level targets, the PEEB Project has achieved the following: • Project resources were used to design and construct 4 IBDA buildings with an average total energy consumption ranging from 37.4 - 47.6 kWh/m²/year owned by the Ministry of National Education; • 25,400 tCO_2 of lifetime direct CO_2 emission reductions from these IBDA designed buildings will be generated while an estimated 27.23 million tCO_2 of indirect CO_2 emission reductions will be generated from a combination of new approaches for reducing energy consumption in buildings that includes reductions from the use of IBDA for non-residential buildings, reductions due to building MEPS for non-residential buildings, and building MEPS for residential buildings.

Intended Outcomes in revised Project Results Framework of October 2013	Actual Outcomes as of March 2017
Outcome 1: Improved energy efficiency in new and existing buildings through stronger regulations, institutions and implementers	**Actual Outcome 1**: The potential for improved energy efficiency in new and existing buildings has been significantly improved through stronger policies and regulations on building MEPS, stronger institutions (such as DGRE on its role in oversight in building EE programs, and MoEU on its implementing role in providing building energy certificates under BEP-TR2 that includes credits for renewable energy installations, and improved capacities of its building inspectorates).
Outcome 2: Cost-effective energy efficiency solutions showcased and promoted through Integrated Building Design Approach (IBDA) and trainings	**Actual Outcome 2**: Cost-effective energy efficiency solutions for buildings are being showcased and promoted through the dissemination and training of an Integrated Building Design Approach (IBDA) to a wide cross-section of building professionals in Turkey, and through the completion of an IBDA-designed demonstration building.
Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards.	**Actual Outcome 3**: New tools such as the MIV toolkit for building inspectors, and the RET-EAT software module for including RETs in buildings, are available to facilitate compliance with higher energy efficiency standards have been developed and introduced to relevant government stakeholders and building professionals.
Outcome 4: Building energy consumption, energy savings, and other results of the project monitored, evaluated, reported and disseminated .	**Actual Outcome 4**: Methodologies to calculate building energy consumption and savings have been developed and disseminated; however, due to delays in completing IBDA designed demonstration buildings and the late rollout of the BEP-TR2 certification system, no results of actual energy saved from the demonstration buildings and the new certification system have been generated, and thus no such results have been reported or disseminated during the PEEB Project.

Summary of Conclusions, Recommendations and Lessons

The PEEB Project was designed to lower the carbon footprint of the building sector by formulating newer approaches to building construction. This was to be done through numerous activities such as raising building energy performance standards, introducing and demonstrating an integrated building design approach, improving building energy management through the setting up of institutionalized building energy monitoring systems within DGRE and MoEU, and disseminating information on building energy efficiency, all within a period of 5 years. Notwithstanding that Project management teams performed admirably to achieve some of these outcomes and outputs, the US$2.6 million for the PEEB Project was simply insufficient to achieve the target for GHG emission reductions. However, the PEEB Project has positioned the Government and building professionals in Turkey for further growth and scale up of energy efficiency projects for buildings in Turkey.

The key outputs of the PEEB Project were the issuance of the IBDA guidebooks and the near completion of the MoNE IBDA-designed demonstration Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara. Looking forward, these 2 critical results will serve as foundations for sustaining building energy efficiency programs in Turkey. The Project also provided valuable assistance to DGRE in the setting of new building MEPS and secondary legislation for higher energy efficiency standards for buildings, setting up database systems to collect building-related energy

performance data, and training to building energy managers and energy auditors on best international practices. The Project has also provided valuable assistance to MoEU in developing software tools to integrate renewable energy generation as a credit to building owners with BEP certificates.

However, with these positive outcomes from the PEEB Project, the work to transform the building sector to a lower carbon print is far from over:

- Enforcement and compliance surveillance to BEP-TR certifications still remains weak considering the building stock of Turkey which is over 550,000 registered buildings out of an estimated total stock of 9.1 million buildings in Turkey;
- The overall knowledge of building energy management in Turkey still requires strengthening, both in the public and private sectors, and especially the need for structuring energy consumption reporting that is responsive to the requirements of the Government's EnVer energy efficiency portal;
- There is a need to accelerate adoption of IBDA approaches to developing low carbon buildings in Turkey by scaling up knowledge transfer and capacity building for other engineering and architectural companies and contractors on IBDA-related activities. This is important if Turkey is to scale up its development of low carbon buildings towards reaching its national goal of 20% reduction in energy intensity by 2023.

Corrective actions for the design, implementation, monitoring and evaluation of the project:

Action 1 (to UNDP and GEF): Projects should be designed for the delivery of outputs that are proportionate to funding amounts. In the case of the PEEB Project, US$2.62 million over a period of 5 years to reduce GHG emissions from the building sector by 2 million tonnes of CO_2 through completion of several intensive activities related mainly to adoption of an integrated building approach that included formulating the approach as well as completing the design and construction of the demonstration building, was simply insufficient. Most importantly, the Project design underestimated the level of effort necessary to design, construct and commission an IBDA-designed building within the public sector. Furthermore, the time required for the formulation and adoption of IBDA within the engineering and architectural professions was severely underestimated.

Action 2 (to UNDP): For projects that involve significant effort to manage capital cost projects, there should be appropriate implementation planning for the preparing the Terms of References, design, tendering, construction planning and management, and commissioning. This was absent on the PEEB Project. If such capital cost implementation planning had taken place, more realistic targets could have been set for this project.

Actions to follow up or reinforce initial benefits from the project*:*

Action 3 (to UNDP and DGRE): Expend remaining resources and efforts to raise the profile of IBDA benefits to higher government officials who can more effectively disseminate the integrated building design approach to a wider spectrum of stakeholders including:

- a high profile event at the opening of the MoNE's Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara;
- re-engagement of TOKI to respond to their interest in IBDA practices and their investment in mass housing projects throughout Turkey;

- linkages to projects under the Government of Turkey's "Urban Transformation Program";
- a high profile terminal workshop for the PEEB Project with government and donors to commit funding to sustain improvements in building energy efficiency in Turkey; and
- sustained linkages to priority educational institutions for the purposes of providing training for trainers on IBDA and other building energy efficiency issues.

Proposals for future directions underlining main objectives of the PEEB project:

Action 4 (to DGRE): Increase dialogue with other ministries, programs and stakeholders who are involved with large building projects for adoption of IBDA including*:*

- TOKI (see Action 3);
- Government of Turkey's "Urban Transformation Program" (see Action 3). One of this program's large projects includes the reconstruction of the Kadikoy district in Istanbul[2] where there could be an opportunity to include IBDA approaches for reconstructed buildings;
- Ministry of National Education whose positive experience with their own IBDA-designed demonstration building in Ankara has led to their expressions of interest in increasing their low carbon building stock.

Action 5 (to DGRE): Continued development of EMIS will require a strategic approach considering the large and diverse building stock that exists in Turkey. This strategic approach would include defining the objectives of data collection, defining the work required to collect building information from other ministries, action plans, human resources required to carry out this work, and defined milestones.

Best and worst practices in addressing issues relating to relevance, performance and success:

Best practice: the PEEB Project has focused on activities that are within the control of the Project. As such, the PMU has managed to:

- facilitate good progress on the preparations of ToRs (for design consultants, software developers, etc.), tender awards, and the completion of consultant work in an efficient manner; and
- continue dialogue with multiple partners to sustain their engagement and interest in the PEEB Project.

Scope for improved practice: Beneficiary agencies of GEF project funds would prefer if there were consistency of personnel between the project preparation phase and implementation of the project. Such an arrangement would increase the likelihood of project success.

Best practice: Project management personnel need to set up vendor shortlists through good networking and discussions with preferred vendors. This was done on MoNE's pilot IBDA-designed Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara, and reduced or minimized the risks of contracting a substandard or insolvent contractor. Moreover, these actions were particularly important in the procurement of services that are innovative or new (such as IBDA construction) and knowing that there would be very few competent vendors to provide innovative services or goods.

[2] Kadikoy project is with Istanbul Housing Master Plan Enterprise (KIPTAS) and ILBANK

Worst practice: Projects with a high level of ambition need an appropriate level of funding and time to meet intended objectives. On the PEEB Project, additional time and funds could have been used to achieve all intended targets.

Worst practice: UNDP and GEF-supported projects should try to fairly reimburse vendors for increases in project scope. In the case of the PEEB Project, the contract for services from the Ekodenge Consortium was raised 33% for an overall increase in scope by a factor of 5. This practice should be avoided at all costs by UNDP in future, as an implementing agency such as UNDP would only get a bad reputation if these business practices persist.

Evaluation Ratings[3]

1. Monitoring and Evaluation	*Rating*	2. IA & EA Execution	*Rating*
M&E design at entry	5	Quality of Implementation Agency - UNDP	5
M&E Plan Implementation	4	Quality of Execution - Executing Entity (MoENR)	5
Overall quality of M&E	4	Overall quality of Implementation / Execution	5
3. Assessment of Outcomes	**Rating**	**4. Sustainability[4]**	**Rating**
Relevance[5]	2	Financial resources	4
Effectiveness	6	Socio-political	4
Efficiency	6	Institutional framework and governance	4
Overall Project Outcome Rating	5	Environmental	4
		Overall likelihood of sustainability	4

[3] Evaluation rating indices (except sustainability – see Footnote 2, and relevance – see Footnote 3): 6=*Highly Satisfactory (HS)*: The project has no shortcomings in the achievement of its objectives; 5=*Satisfactory (S)*: The project has minor shortcomings in the achievement of its objectives; 4=*Moderately Satisfactory (MS)*: The project has moderate shortcomings in the achievement of its objectives; 3=*Moderately Unsatisfactory (MU):* The project has significant shortcomings in the achievement of its objectives; 2=*Unsatisfactory (U)* The project has major shortcomings in the achievement of its objectives; 1=*Highly Unsatisfactory (HU):* The project has severe shortcomings in the achievement of its objectives.

[4] Sustainability Dimension Indices: *4 = Likely (L):* negligible risks to sustainability; *3 = Moderately Likely (ML):* moderate risks to sustainability; *2 = Moderately Unlikely (MU):* significant risks to sustainability; and *1 = Unlikely (U):* severe risks to sustainability. *Overall rating is equivalent to the lowest sustainability ranking score of the 4 dimensions.*

[5] Relevance is evaluated as follows: 2 = Relevant (R); 1 = Not relevant (NR)

ABBREVIATIONS

Acronym	Meaning
APR	Annual Progress Report
BEP-TR	Building Energy Performance - Turkish Regulations
CAD	Computer assisted drafting
CO	Country Office
CPAP	Country Programme Action Plan
DGRE	Directorate General of Renewable Energy (formerly EIE)
EBPD	EU's Energy Performance for Buildings Directive
EE	Energy efficiency
EED	MoEU's Energy Efficiency Department
EESP	Energy Efficiency Strategy Paper
EIE	General Directorate of Electrical Resources Survey and Development Administration
EMIS	Energy management information system
EnVer	Energy Efficiency Portal
EOP	End of Project
EPC	Energy Performance Contracting
ESCO	Energy service company
EVD	Local energy efficiency consultants (as referred to in legislation)
EU	European Union
FSP	Full Sized Project
GDP	Gross domestic product
GEF	Global Environment Facility
GEFSEC	Global Environment Facility Secretariat
GHG	greenhouse gas
IBDA	Integrated Building Design Approach
KOSGEB	Small and Medium Enterprises Development Organization of Turkish Republic, a public organization affiliated with the Ministry of Science, Industry and Trade
kWh	Kilowatt-hour
LCCA	Lifecycle cost analyses
MBEPS	Minimum building energy performance standards
MEPS	Minimum Energy Performance Standard
MIV	Monitoring, Inspection and Verification
MoENR	Ministry of Energy and Natural Resources
MoEU	Ministry of Environment and Urbanization (formerly MoPWS)
MoNE	Ministry of National Education
MoPWS	Ministry of Public Works and Settlement
MTE	Midterm evaluation
M&E	Monitoring and evaluation
MWh	Megawatt hour
NEEAP	National Energy Efficiency Action Plan
NPD	National Project Director
nZEB	Nearly-zero energy buildings
ODA	Overseas development assistance
PEEB	UNDP-GEF Project "Promoting Energy Efficiency in Buildings"
PIF	Project Identification Form
PIR	GEF Project Implementation Report
PMU	Project Management Unit
PPG	Project Preparation Grant

Acronym	Meaning
PRF	Project results framework
ProDoc	UNDP Project Document
PSC	Project Steering Committee
PV	Photovoltaic
RET-EAT	Renewable energy technologies-economic analysis tool
SEC	Specific energy consumption
SMART	Specific, Measurable, Attainable, Relevant and Time-bound
SP	Strategical Purposes
STAP	GEF Scientific Technical Advisory Panel
TE	Terminal Evaluation
TOKI	Housing Development Administration
ToR	Terms of Reference
TurkStat	Turkish Statistical Institute
TWh	Terawatt-hours
UNDCS	United Nations Development Cooperation Strategy
UNDP	United Nations Development Programme
UNDP-GEF	UNDP Global Environmental Finance
UNFCCC	United Nations Framework Convention on Climate Change
YEGM	Turkish acronym for Directorate General of Renewable Energy

1. INTRODUCTION

1. This report summarizes the findings of the Terminal Evaluation Mission conducted during the February 20 - March 1, 2017 period for the GEF-financed Project entitled: "**Turkey: Promoting Energy Efficiency in Buildings**" (herein referred to as the "PEEB Project" or the "Project") where UNDP received a USD 2.62 million grant from the Global Environmental Facility (GEF).

2. The PEEB Project has the objective of reducing the energy consumption and associated GHG emissions in public buildings in Turkey. The Project was designed to achieve this objective by raising energy performance standards of buildings, improving the enforcement of building codes, enhancing building energy management, and introducing an integrated building design approach. This terminal evaluation covers these activities managed by UNDP Turkey.

1.1 Purpose of the Evaluation

3. The Terminal Evaluation (TE) for the PEEB Project is to *evaluate the progress towards the attainment of global environmental objectives, project objectives and outcomes, capture lessons learned and suggest recommendations on major improvements.* The TE is to serve as an agent of change and play a critical role in supporting accountability. As such, the TE will serve to:

- promote accountability and transparency, and to assess and disclose levels of project accomplishments;
- synthesize lessons that may help improve the selection, design and implementation of future GEF activities;
- provide feedback on issues that are recurrent across the portfolio and need attention, and on improvements regarding previously identified issues; and
- contribute to the GEF Evaluation Office databases for aggregation, analysis and reporting on effectiveness of GEF operations in achieving global environmental benefits and on the quality of monitoring and evaluation across the GEF system.

4. Outputs from this TE will provide an outlook and guidance in charting future directions on sustaining current efforts by UNDP, the Government of Turkey, their donor partners, and the private sector, to sustain the capacities of relevant Turkish government institutions to promote and regulate improved energy efficiency in the building sector throughout Turkey.

1.2 Scope and Methodology

5. The scope of the TE for the PEEB Project was to include all activities funded by GEF and activities from parallel-financing. The Terms of Reference (ToRs) for the TE are contained in Appendix A. Key issues addressed on this TE include:

- the extent that Project activities have led to improved new legislation including the adoption of minimum building energy performance standards (MBEPs);
- the extent that Project activities have led to improvement in legislation including the adoption of nearly Zero Energy Buildings approach in the public sector in Turkey;

- the extent that Project activities have led to improve the legislation and regulations facilitate the introduction and implementation of an energy management information system (EMIS) for public buildings across Turkey;
- the extent that Project activities have led to full adoption of the integrated building design approach (IBDA) for all new public buildings in Turkey;
- the usefulness of new tools developed by the Project in facilitating compliance with higher energy efficient standards, and to what extent are they being used in assisting the Turkish government compliance with higher energy efficiency standards;
- the extent to which the Project has managed to successfully replicate and implement the EMIS and national buildings database from Croatia.

6. Outputs from this TE will provide an outlook and guidance in charting future directions on sustaining current efforts by UNDP and the Government of Turkey on building institutional capacity for managing a national program to improve energy efficiency of building stock in Turkey, and strengthening working relationships with academia and private sector stakeholders involved with building energy efficiency in Turkey.

7. The methodology adopted for this evaluation includes:

   - Review of project documentation (i.e. APR/PIRs, meeting minutes of Project Steering Committee or multipartite meetings) and pertinent background information;
   - Interviews with key project personnel including the current and former Project Managers, technical advisors (domestic and international), and Project developers;
   - Interviews with relevant stakeholders including other government agencies, engineering and architectural professionals and academic institutions; and
   - Field visits to selected Project sites and interviews with beneficiaries.

   A detailed itinerary of the Mission is shown in Appendix B. A full list of people interviewed and documents reviewed are given in Appendix C and Appendix D respectively. The Evaluation Mission for the UNDP-GEF project was comprised of one lead international expert and one international expert on greenhouse gas emission estimates.

8. The Project was evaluated for overall results in the context of:

   - *Relevance* – the extent to which the outcome is suited to local and national development priorities and organizational policies, including changes over time;
   - *Effectiveness* – the extent to which an objective was achieved or how likely it is to be achieved;
   - *Efficiency* – the extent to which results were delivered with the least costly resources possible; and
   - *Sustainability* - The likely ability of an intervention to continue to deliver benefits for an extended period of time after completion.

9. All possible efforts have been made to minimize the limitations of this independent evaluation. Notwithstanding that 10 days were spent in Ankara and Istanbul by the evaluator to collect and triangulated as much information as possible, follow-up interviews and Skype conversations by the evaluator were also made after the terminal evaluation mission to fill in information gaps.

1.3 Structure of the Evaluation

10. This evaluation report is presented as follows:

- An overview of Project activities from commencement of operations in July 2010 to the present activities of the PEEB Project;
- An assessment of results based on Project objectives and outcomes through relevance, effectiveness and efficiency criteria;
- Assessment of sustainability of Project outcomes;
- Assessment of monitoring and evaluation systems;
- Assessment of progress that affected Project outcomes and sustainability; and
- Lessons learned and recommendations.

11. This evaluation report is designed to meet GEF's "Guidelines for GEF Agencies in Conducting Terminal Evaluations, Evaluation Document No. 3" of 2008:

http://www.thegef.org/gef/sites/thegef.org/files/documents/Policies-TEguidelines7-31.pdf

12. The Evaluation also meets conditions set by:

- the UNDP Document of 2012 entitled "UNDP GEF – Terminal Evaluation Guideline": http://web.undp.org/evaluation/documents/guidance/GEF/UNDP-GEF-TE-Guide.pdf;
- the UNDP Document entitled "Handbook on Planning, Monitoring and Evaluating for Development Results", 2009: http://www.undp.org/evaluation/handbook/documents/english/pme-handbook.pdf; and
- the "Addendum June 2011 Evaluation": http://www.undp.org/evaluation/documents/HandBook/addendum/Evaluation-Addendum-June-2011.pdf

2. PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

2.1 Project Start and Duration

13. The "Promoting Energy Efficiency in Buildings" Project officially commenced implementation on July 30, 2010, the date when the Turkish government signature for the Project document (ProDoc) was obtained. The Project duration originally was planned for 4 years ending in July 2014. In May 2013, the Mid-Term evaluation recommended that an extension for the Project be considered to May 2016. Two more additional requests for Project extensions were made in late 2015 and late 2016 to bring the final terminal date of the PEEB project to April 30, 2017.

2.2 Problems that PEEB Project Sought to Address

14. The PEEB ProDoc provides details on the problems that the Project sought to address. During the period when the Project was being prepared (in 2009), the growth projections for Turkey's economy provided indications that the country would experience rapid growth in urbanization associated with rising energy consumption. Turkey's building stock grew by 10% between 2000 and 2008 with the total number of buildings of 8.6 million and the total floor area of 1.7 billion m^2 that does not include informal or unregistered building construction. As of 2016, Turkey's building stock now totals over 9.1 million buildings, a growth rate of 1.5%.

15. With Turkey's annual consumption of electricity tripling since 1990 and reaching 198 TWh in 2008, the country's greenhouse gas (GHG) emissions have also experienced a similar rise. Electricity consumption within the residential sector and commercial sector had reached at 40 TWh and 23 TWh respectively in 2008[6]. As of 2016, electricity consumption had risen to 217 TWh, a rise of 1.1% annually from 2008.

16. A survey undertaken by the General Directorate of Electrical Resources Survey and Development Administration (EIE) in 2002 revealed energy consumption of Turkey's new buildings were much higher than buildings in EU countries. Turkey's average heating requirements for its buildings was in the order of a 110 $kWh/m^2/yr$ in comparison to Denmark at 23 $kWh/m^2/yr$ and the United Kingdom at 35 $kWh/m^2/yr$. This comparison provided indications that Turkey's building codes and standards would need to be updated to encourage energy efficiency as well as strengthening of its enforcement regime.

17. The Turkish government sought to address its energy efficiency through drafting an Energy Efficiency Strategy in 2004 followed by the Energy Efficiency Law 5627 that came into force in October 2008. Law 5627 provided a supportive institutional framework for EE measures that included an EE Coordination Board and support for the establishment of ESCOs (also known as EVDs in Turkey). The Law also included training, audits, monitoring activities, and other supportive activities to encourage energy efficiency.

18. With regards to regulating energy performance in buildings, the Government of Turkey adopted a national mandatory "Standard of Thermal Insulation Requirements for Buildings TS 825" in June 2000 to limit the heat loss through building envelopes[7]. This standard also defined rules for calculating

[6] State Planning Organization and MENR

[7] Compliant with international standards ISO 9164 and EN832

heat energy requirements for buildings, and divides Turkey into for climatic zones that define permissible heat losses from buildings in those regions (depending on average degree-days). With this standard in place, the Ministry of Public Works and Settlement (now known as the Ministry of Environment and Urbanization or MoEU) developed and adopted a Building Energy Performance (BEP) Regulation in December 2009 that falls in line with the EU's Energy Performance for Buildings Directive (EPBD). The BEP regulation sought to:

- take into consideration outdoor climatic conditions of a buildings location;
- define calculation methods in evaluating overall energy use of a building;
- classify buildings with respect to primary energy utilization and CO_2 emissions;
- determine minimum energy performance (MEPs) of retrofits for existing buildings;
- encourage the use of renewable energy resources; and
- enforce the need for periodic inspections of heating and cooling systems.

19. With regards to the use of renewable energy resources, the Government of Turkey gazetted Law 5346 in May 2005 on "Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy". Essentially, this Law was designed to encourage renewable energy production for power supply to individual buildings as a means to improve return on RE investments and reduce GHG emissions.

20. Despite the creation of a supportive and enabling regulatory environment to encourage investment in EE buildings, there were still a number of barriers obstructing progress in the development of EE buildings in Turkey as of 2009. At that time, the design of the PEEB Project sought to address the removal of these barriers that would catalyze investments into EE buildings in Turkey. Barriers included:

- Insufficient scope and ambition of EE regulations. In particular, the Turkish building energy performance (BEP) regulations and the building standard TS825 and its implementing regulations only address *heating energy conservation* while overlooking other measures to reduce building specific energy consumption such as cooling, ventilation, and the use of renewable energy. Turkish BEP regulations in 2008 and 2009 at that time only addressed thermal insulation requirements for buildings as energy efficient measures which led to 50% more energy consumption for heating in comparison with comparable EU buildings;
- Inadequate compliance to EE regulations. This has been exacerbated by systemic issues related to enforcement. In 2009, compliance to the installation of required thermal insulation was well below 50%. This was often due to falsely labelled insulation materials on the market that do not meet BEP criteria, and poor quality installation of insulation being done by untrained labourers with substandard mounting of the insulation materials;
- Low awareness of cost effective opportunities for improving energy performance in the buildings. The process for building designs would typically be initiated by architects, then handed over to engineers for detailed design and preparation of construction drawings. This process did not include multidisciplinary teams to consider integrated aspects of building design that would include bioclimatic features, building orientation, and the use of passive or active energies that would include the use of renewable energy;
- No demonstrated models for developing EE buildings. While there have been a few demonstration green buildings in Turkey, few if any had demonstrated financial attractiveness

and short payback periods for the investments. This has resulted in poor uptake in adoption of any Green building implementation schemes;

- Weak energy management. Current regulations in Turkey require that buildings using over 500 tonnes of oil equivalent (toe)[8] or have more than 20,000 m² of floor space shall employ an energy manager. These energy managers, however, do not have access to training courses that sufficiently update their knowledge on rapidly changing requirements to new building codes that address higher standards of energy efficiency.

2.3 Immediate and Development Objective of PEEB Project

21. The objective of the PEEB Project was to "reduce energy consumption and associated GHG emissions in public buildings in Turkey by raising building energy performance standards, improving enforcement of building codes, enhancing building energy management, and introducing the use of an integrated building design approach". The project results framework (PRF) for the PEEB Project was amended as per recommendations of the MTE of May 2013. This revised PRF is contained in Appendix F.

2.4 Baseline Indicators Established

22. PEEB Project objective-level baseline indicators based on the revised PRF of May 2013 includes:

- Non-residential energy consumption of 193 kWh/m²/year for buildings built with IBDA against a baseline value of 321 kWh/m²/year;
- Cumulative CO_2 emission reductions from new buildings to be built during Project lifetime (2010-2015) of 2 million tonnes CO_2 against a baseline value of 0 tonnes CO_2.

23. Outcome-level baseline indicators and targets from the revised PEEB PRF includes:

- the target for Outcome 1 is "new legal and regulatory provisions, strengthened institutions, and better supporting compliance checking, enforcement and outreach programs adopted for enhanced EE in buildings";
- the targets for Outcome 2 are "cost effective energy efficiency solutions are demonstrated through IBDA demonstration buildings" and "IBDA is promoted through trainings and awareness raising activities";
- the targets for Outcome 3 are "new tools are developed for analysis and monitoring purposes, financial mechanisms", "training materials revised/developed", and "existing websites and tools updated";
- the target for Outcome 4 is "Project recommendations to ensure institutional sustainability adopted".

24. Output level baseline indicators and targets from the revised PEEB PRF includes:

- Output 1.1 targets are "BEP Regulation analysed and compared to other relevant international codes (e.g. EU EPBD, etc.) and revisions proposed", "reference building approach under the

[8] Equivalent to 5,815 MWh of energy (electricity and primary fuel use)

Building Energy Performance (BEP) Regulation analysed and revisions proposed" and "Minimum Energy Performance Standards (MEPS) for new buildings developed and proposed";

- Output 1.2 targets are "Methodology, indicators and benchmarks for framework developed", "Pilot database for sample buildings developed", and "Feasibility study on potentials for sample buildings refurbishment to improve energy performance developed";
- Output 1.3 target is "Implementation support programme and action plan for improvement of EE strategy for buildings sector developed";
- Output 1.4 targets are "Building inspection regulation and relevant energy efficiency codes analyzed and reported", "Recommendations proposed including energy efficiency checklists for new private buildings", "Guide booklet for building inspectors prepared and disseminated" and "Trainings delivered to trainers of building inspectors";
- Output 2.1 targets are "IBDA guidebook prepared", "IBDA implementation strategy and action plan developed", and "IBDA proposed for use in all new public buildings as of 2015";
- Output 2.2 targets are "IBDA incorporated into architectural and engineering curricula in at least one pilot university", and "Trainings for architects, engineers and building sector professionals (*e.g. ministries, municipalities, chambers of architects/engineers, private firms*) delivered;
- Output 2.3 targets are "Submitted designs meet and exceed the total energy requirements for school/office buildings", and "5 IBDA demonstration buildings of approx. 30,000 m² commissioned and received A-class energy performance certificates in line with BEP regulation";
- Output 3.1 target is "Methodology and toolkit for MIV system developed and proposed";
- Output 3.2 targets are "Existing training materials for energy managers updated", "Training materials for energy auditors developed", and "Trainings delivered";
- Output 3.3 targets are "Review on financing mechanisms available for EE Buildings in Turkey", "Appropriate finance mechanisms showcased (e.g. standardized Energy Performance Contracting schemes developed)", and "Software tool for economic assessment of use of renewable energy in new buildings developed";
- Output 3.4 targets are "New bep.gov.tr website developed", "Software module for central heating cost sharing system developed", "Online discussion platform for Energy Performance Certificate users developed Integration of bep.gov.tr website with BEP-TR software and database created", and "bep.gov.tr website administrators trained";
- Output 4.1 target is "An accepted monitoring and assessment methodology for key stakeholders";
- Output 4.2 target is "Mid-term and Final project reports consolidating the results and lesson learned from the implementation of the project";
- Output 4.3 targets are "Project communication strategy developed and implemented", "Project website developed", "IBDA website developed", and "Dissemination material produced for awareness raising".

The baseline value for all these indicators of the PEEB Project can be found in the May PRF in Appendix F.

2.5 Main Stakeholders

25. The key stakeholders of the PEEB Project are the Directorate General of Renewable Energy (DGRE) under the Ministry of Energy and Natural Resources (MoNRE) who serve as the Project's implementing partner, the Ministry of Environment and Urbanization (MoEU), the Ministry of National Education (MoNE), and the Government's Housing Development Administration, TOKI. A

complete listing of stakeholders who have participated on the PEEB Project is provided in Section 3.2.2 (Paras 46-47).

2.6 Expected Results

26. To achieve the specific PEEB objective of "reducing energy consumption and associated GHG emissions in public buildings", the PEEB Project was designed with the following expected **Project outcomes** (from the 2013 PRF):

- Outcome 1: Improved energy efficiency in new and existing buildings through stronger regulations, institutions and implementers;
- Outcome 2: Cost-effective energy efficiency solutions showcased and promoted through Integrated Building Design Approach (IBDA) and trainings;
- Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards;
- Outcome 4: Building energy consumption, energy savings, and other results of the project monitored, evaluated, reported and disseminated.

3. FINDINGS

3.1 Project Design and Formulation

27. Design of the PEEB Project was first conceived in 2005 after Turkey had drafted its 2004 Energy Strategy coupled with the development of regulations in building energy performance. During project preparations between 2007 and 2009, the PEEB Project was designed to build institutional capacities to regulate and periodically review these building energy performance standards and regulations, and to improve the capacities of inspectorates responsible for enforcement. The Project was also designed for showcasing demonstration buildings using an integrated building design approach (IBDA) that would lead to catalysed interest of low carbon buildings in the Turkish market, and augmenting of its legislative and institutional framework related to building energy efficiency.

28. The PEEB ProDoc packaged these designs into a GEF climate change mitigation project that would support the country's efforts to reduce energy consumption and associated GHG emissions in the building sector. The ProDoc identified a number of barriers to mainstreaming the adoption of energy efficient practices and measures in building construction and operations as mentioned in Para 20.

29. The strategy of the PEEB Project to overcome these barriers included implementing Project activities divided into 4 components. Due to poor progress of the PEEB Project at the time of the midterm evaluation (MTE) in early 2013, the strategy of the PEEB Project was revised with the purposes of resetting targets that were relevant to achieving the Project's objectives. The revised strategy of the PEEB Project that is being evaluated in this terminal evaluation includes:

- The original ProDoc objective level target for energy savings of 66 kWh/m^2/yr was based on rough estimates a specific heat consumption of buildings in Turkey. This target was revised during the MTE to 193 kWh/m^2/yr for non-residential buildings in comparison with the baseline value of 321 kWh/m^2/yr to reflect the availability of improved baseline energy consumption information on different types of buildings in Turkey. No targets were set for residential buildings since the Project wanted to re-focus on non-commercial buildings;
- The Project objective level target for GHG emission reductions was worded as cumulative CO_2 emission reductions from new buildings to be built during the Project lifetime. The target of 2.0 million tonnes CO_2 was based on estimated direct GHG emission reductions from the demonstration EE buildings being developed by the Project (estimated at 1,076 tonnes CO_2 per year), and the expectation of *2,000 EE buildings being developed during the Project duration* (from the MTE date of May 2013 to 2016). *The evaluator finds this target to be unattainable* given that the new IBDA approaches represent a paradigm shift in how buildings are developed that would require time for the architectural and building professions to adopt. As such, 2,000 EE buildings similar to the one being developed by the Project is not reasonable for the Project to develop within a period of 3 years or less (which was the time remaining on the Project in 2013);
- Component 1 to overcome the barriers of incomplete regulations to cover all aspects of building energy efficiency, and weak enforcement capacities. This component would work towards improving existing legislative frameworks on building energy efficiency, providing tools for regulators to improve their ability to monitor building energy consumption through information systems focused on building energy consumption, preparing strategic plans to improve building energy efficiency implementation, and providing training courses for building inspectorates to improve compliance to new building energy efficiency regulations;

- Component 2 to support the development of IBDA guidelines, training and raised awareness of relevant stakeholders to the availability of IBDA guidelines, and the development of energy efficient buildings using IBDA design and construction principles;
- Component 3 focusing on the development of tools to facilitate improved compliance to higher energy efficiency standards and buildings. These tools would include methodologies for monitoring, inspection and verification, training materials on energy management and energy auditing for buildings, financial tools to assess the viability of renewable energy technologies to be applied on new buildings, and a government website to support building owners and managers on compliance with new BEP standards and regulations; and
- Component 4 dedicated to the dissemination of information related to the benefits of energy efficient investments in buildings using it principles advocated in IBDA.

Given the remaining time on the Project of 3 years at the time of the MTE, the work to be done was clear. However, the targets to mark the completion of the components was not as clear for reasons discussed in the following section.

3.1.1 Analysis of Project Planning Matrix

30. The Project Results Framework (PRF) for the PEEB Project was revised after the mid-term evaluation (MTE) of the Project in May 2013 in response to a recommendation for the need to update the PRF and remove some of the targets that had become irrelevant or unattainable due to shortage of Project budget. The updated PRF (as provided in Appendix F) provides 40 indicators (7 outcome level and 33 output level) as well as 2 objective level indicators and targets to guide implementation of the Project towards its objective of "reducing energy consumption and associated GHG emissions in public buildings in Turkey". The wording of *the indicators and targets are poorly formulated and do not meet SMART criteria*[9]. While numerous specific comments can be made on the new PRF, some general comments are made in this report to demonstrate that the new PRF from 2013 was not prepared according to best practices:

- all outcome indicators and targets are not specific and lack a time frame. While it is assumed that these targets would be achieved by the EOP, for many of the specifics of the targets are open to interpretation. For example, on Outcome 4, "Project recommendations to ensure institutional sustainability adopted" lacks specificity and is open to several interpretations making this indicator hard to measure what aspect of institutional sustainability is being measured. On Outcome 1, "enforcement and outreach programs adopted for enhanced EE in buildings" does not specify the content of these enforcement and outreach programs that <u>will</u> enhance EE in buildings;
- most output indicators are not worded as measurable indicators. However, the targets described provide project implementers adequate descriptions of the outcomes (not outputs) expected;
- numerical targets for many of the output indicators are missing such as Output 1.4 on the "number of trainers trained", Output 2.2 on the "number of architects and engineers trained……", and Output 3.2 on the "number of trainees" on energy management and energy auditing;
- Output 3.3 has an indicator of "number of funding agencies, banks and ODA donors……" which is not reflected as a numerical figure in the target description. Instead, the targets are

[9] Specific, Measurable, Attainable, Relevant and Time-bound

descriptions of the desired outcomes including a "review on financing mechanisms….", "appropriate financing mechanisms showcased….", and software tool…. developed" without specifying the types of financing mechanism being reviewed or showcased;
- Output 2.1 only has one indicator with 3 targets all of which are described as outcomes.

The shortcomings of this PRF add to the difficulties of properly evaluating progress made during the PEEB Project to meeting its intended objective, outcomes and outputs.

31. In calculating the expected GHG emission reductions from the PEEB Project, the target of 2 million tonnes CO_2 (generated mainly from replication EE buildings that emulate the demonstration EE building developed with the assistance of the PEEB Project as explained in Para 29) does not appear to be reasonable nor attainable. It is unfortunate that this could not be reset during the PEEB Inception Workshop to a more reasonable emissions reduction target.

3.1.2 Risks and Assumptions

32. A number of risks were identified in the PRF from 2011 as well as the revised PRF in May 2013 as potential obstacles to the achievement of PEEB Project objectives. This included:

- enabling policy framework secondary regulations are not implemented efficiently;
- international economic crises may lead to an overall slowdown of building construction activity;
- uptake of IBDA is not sufficient due to lack of understanding of its application; and
- lack of effective enforcement of building codes.

33. A number of assumptions were made in the revised 2013 PRF as being conditions to meet PEEB Project objectives including:
    - increases in the costs of EE and RE technologies and materials do not affect overall costs of new building construction;
    - adoption of IBDA will provide substantial GHG savings for building owners;
    - continued commitment of key public authorities and government entities to implement effective building practices;
    - acceptance and cooperation of all government agencies in the development and use of a universal buildings database as well as action plan to support an EE strategy for the building sector and a building inspections regime;

    However, there were risks that were overlooked such as risks of implementation delays in the construction of EE buildings. As new Project activities have emerged with a focus on the construction of EE public buildings, no risks were identified in the amount of time required to design, engineer, tender and construct and commission these buildings through a public procurement system. If such an analysis were carried out, Project designers would have found that the PEEB Project would not be able to complete the planning, design, tendering, construction and commissioning of a demonstration EE building and monitor 12 months of its energy consumption within a 5-year period.

3.1.3 Lessons from Other Relevant Projects Incorporated into PEEB Project Design

34. The ProDoc of the PEEB Project does not list any other relevant Projects into its design.

3.1.4 Planned Stakeholder Participation

35. One of the primary purposes of PEEB Project was to increase the knowledge and build the capacity of the DGRE (under the MoNRE), the MoEU, the Ministry of National Education (MoNE), the Housing Development Administration (TOKI) and associated building development professional personnel to plan, implement and adopt energy efficient measures and activities related to increasing the energy efficiency of new and existing public buildings in Turkey. Though the Project had only planned to engage stakeholders within these key ministries, the engagement of other stakeholders was an important aspect of sustaining continued growth of the awareness and knowledge of building energy efficiency across a wide spectrum of Turkish society. This would also include the other government ministries with plans for lowering the carbon footprint of their building stock; architects and engineers involved with the planning, design and implementation of new building construction; and the involvement of universities and professional associations in the development of new integrated design approaches for low carbon buildings.

36. The stakeholder involvement approach in the PEEB ProDoc, however, appears overly ambitious. It involves the formation of 2 working groups within the PEEB Project:

- an EE working group comprised of all levels of government, universities, and professional associations to focus on planning, designing and implementing EE buildings; and
- a financial working group comprised of government finance agencies, banks, international donor agencies, universities and professional associations focusing on the means to encourage key stakeholders and implementing EE buildings.

In reviewing the intended outcomes of the PEEB Project, this level of stakeholder involvement appears reasonable provided that the Project had sufficient time to involve such a wide range of stakeholders. With only 5 years in the design to implement the PEEB Project, the Project design could have focused only on the engagement of stakeholders involved in formulating an IBDA approach, and develop a demonstration EE buildings, both extremely important outputs to the PEEB Project. The successes of developing a demonstration EE building and an IBDA manual have generated considerable interest from a wide range of stakeholders, albeit at a fairly late stage of the PEEB Project. If the PEEB Project had another 2 years of implementation, it is likely that most of the stakeholders listed in the ProDoc would have been drawn into the Project.

3.1.5 Replication Approach

37. The Project design envisaged a replication approach by improving minimum energy performance standards (MEPS) in the process for approvals for new buildings and building retrofits. Replication would be bolstered through the design and construction of high profile “green” buildings using the Integrated Building Design Approach (IBDA) through the Project. These pilots would demonstrate tangible energy savings and GHG emission reductions from an energy efficient building employing an IBDA in its design, and provide lessons learned on implementing energy efficient buildings in other regions within Turkey.

3.1.6 UNDP Comparative Advantage

38. UNDPs comparative advantage to other donor agencies is its focus on policy-based and cross-sectoral approaches as well as building local capacities through effective collaboration with a wide range of

local stakeholders, ranging from the public and private sectors to technical experts, civil society and grassroots level organizations. These approaches are strongly applicable on energy efficiency projects such as this PEEB Project. Given UNDP's long track record on a wide variety of projects within the energy sector, UNDP is suited as an implementing agency for this Project.

3.1.7 Linkages between PEEB Project and Other Interventions within the Sector

39. The PEEB Project was intended to be linked with other energy sector related initiatives within the Government of Turkey including:

- an Energy Information and Technology Management Facility Project under DGRE to compile and process data related to sectoral energy use. Assistance to build this facility was being provided by the GEF funded project "Improving Energy Efficiency in Industry" (GEF ID 3747);
- the GEF funded project "Market Transformation of Energy Efficiency Appliances in Turkey" (GEF ID 4014), a project that would provide the PEEB Project with insights into energy labelling requirements relevant to building equipment;
- the GIZ-supported "Project of Efficient Utilization of Energy in the Building Sector of the Turkey Pilot Region Erzurum", a programme that launched and implemented two-week training programs for the certification of energy managers and buildings, implemented with the cooperation of private sector and universities;
- the EU funded "Project on Building Energy Performance", a project that aimed to set up new test laboratories for building products, assistance to align building practices with EPBD, and establishing building MEPS.

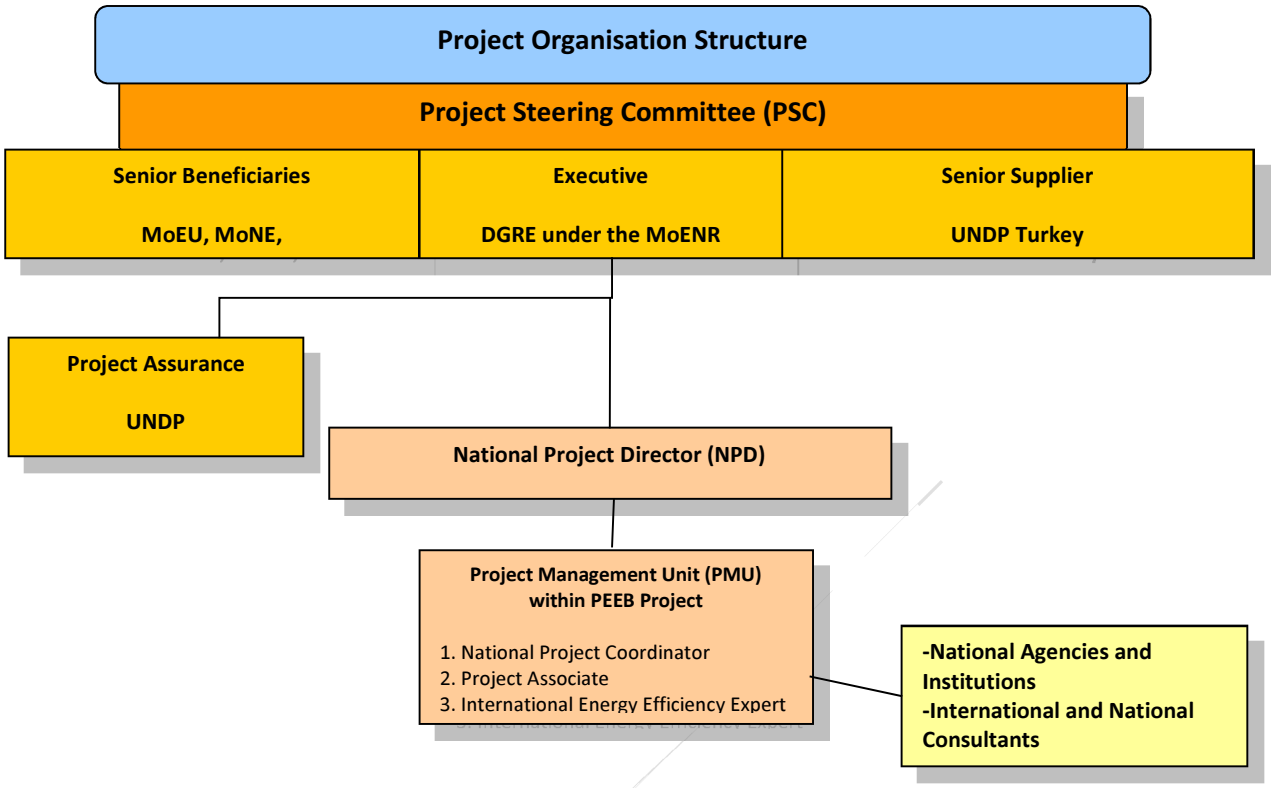
3.1.8 Management Arrangements

40. The implementing partner of the PEEB Project is the Directorate General of Renewable Energy (DGRE or the Turkish acronym of YEGM) under the Ministry of Energy and Natural Resources (MoENR), a department that was formerly known as the General Directorate of Electrical Power Resources Survey and Development Administration (EIE). The PEEB Project was to be implemented in accordance with UNDPs National Implementation Modality (now referred to as National Execution or NEX modality). NEX modality tasks YEGM with responsibility for certifying work plans and approved budgets, reporting on procurement, coordinating and tracking co-financing, terms of reference for contractors and tender documentation, and chairing the Project Steering Committee (PSC). The Chair of the PSC was to be the National Project Director (NPD) from DGRE.

41. In the ProDoc, UNDP would provide Project implementation support to DGRE by managing the budget and project expenditures, contracting project personnel, executing actions for procurement, and implementing the day-to-day management and monitoring of the project operations. The

42. An organogram of the PEEB Project implementation arrangements is provided on Figure 1.

Figure 1: Current Management Arrangements for the UNDP-GEF Project "Promoting Energy Efficiency in Buildings" (PEEB)



3.2 Project Implementation

43. The following is a compilation of critical path events and issues of PEEB Project implementation in chronological order:

- The PEEB Project was approved by the GEF CEO on March 31, 2010;
- The ProDoc was signed on July 30, 2010, marking the official start of the Project;
- The Project Management Unit (PMU) for the PEEB Project was only established in March 2011, nearly 8 months after the official start of the project. This coincided with the hiring of the first National Project Coordinator and International Energy Efficiency Expert for the PEEB Project;
- The Project's Inception Workshop was conducted June 8-9, 2011;
- The process for promoting IBDA on a national scale started in 2012 with the hiring of a national buildings expert from the Middle East Technical University in Ankara;
- Commencement of the tendering process for the design works of the demonstration buildings on September 9, 2011 with the contract being awarded on December 12, 2011 to a consortium led by Ekodenge based in Ankara;
- Commencement on August 1, 2012 of the contract to prepare a complete design and construction and tendering documents for 3 demonstration buildings to be built in Ankara using IBDA, with a proposed completion date of November 1, 2014, a period of 27 months;

- The mid-term evaluation (MTE) for the PEEB Project was conducted in February 2013 that resulted in adaptive management recommendations for implementation by the PMU including an extension of the Project to May 2016;
- Design and tender documents for the demonstration buildings were approved by MoNE and MoEU in November 2014;
- In late 2014, the Project developed and issued a tender on the development of a "renewable energy technologies economic analysis tool" for use in Turkey to promote the use of renewable energy resources and buildings (Output 3.3). The proposed completion date of this work was late 2016;
- The Project coordinator resigned in January 2015 resulting in the promotion of the Project Associate to Project Manager. Fortunately, this only had a negligible impact on Project operations which resulted in the slowdown of only a few activities;
- An official request for the extension to the Project was made in mid-2014 to extend the Project from April 2015 to December 2016. This extension was approved in late 2014;
- After completion of the tendering process, construction of the MoNE and MoEU demonstration buildings was commenced in January 2015;
- A formal request was made in October 2016 to extend the project for 4 months to April 30, 2017. This request was granted in late 2016;
- As of January 2017, completion of the MoNE school buildings is expected by mid-2017. The MoEU service building, however, will not be completed until mid-2018.

3.2.1 Adaptive Management

44. Adaptive management is discussed in GEF terminal evaluations to gauge the project performance in its ability to adapt to changing regulatory and environmental conditions, common occurrences that afflict the majority of GEF projects. Without adaptive management, GEF investments would not be effective in achieving their intended outcomes, outputs and targets. For the PEEB Project, there are several examples of adaptive management that were required to navigate the progress of the Project during its 7-year duration and through numerous changing circumstances during the course of the Project:

- The PMU was constantly adaptively managing its activities in its best efforts to implement numerous activities within the 5-year period of the Project. This led to a number of adaptive management actions including the concurrent development of the IBDA for Turkey and the tendering of IBDA-designed demonstration buildings as *a measure to increase the likelihood of achieving project objectives*. Intuitively, the manual for IBDA should have been completed first followed by its application on the first demonstration building. However, without knowing the required time to develop IBDA and the availability of originally only 5 years on the Project, the PMU wisely chose to undertake these 2 activities concurrently;
- Frequent changes with senior management of MoEU (i.e. Head of Department, Deputy General Director, General Director or higher) forced PMU staff on several occasions to undertake activities to familiarize newly appointed government staff on Project activities. Unfortunately, this had an adverse impact of slowing the overall pace of implementation and placing additional burdens on the workloads of the PMU;
- Under the DGRE's directive for 4 regional workshops in May 2014 for training of building inspectors for energy efficiency, the PMU was required to organize these workshops for over 600 participants. Due to intense coordination efforts required to organize these workshops, UNDP,

DGRE, the PMU and various experts provided significant support resulting in workshops being conducted without delays or issues;

- With the issuance of the Government's Energy Efficiency Strategy Paper (EESP) in February 2012 during the implementation of the PEEB Project, a national strategy framework was outlined to achieve a 20% decrease of energy intensity consumed per GDP unit by 2023. The Project has made adjustments to its implementation plan and range of support activities to increase the likelihood of achieving this target within the building sector-related sections of EESP;
- In an international context, the Project made adjustments and its activities to adapt the recast EPBD of 2010 (Directive 2010/31/EU) to Turkish conditions. EU Member States then faced tough challenges in implementing this directive, foremost amongst them, moving towards new and retrofitted nearly-zero energy buildings (nZEB) by 2020 (2018 in the case of public buildings), and the application of a cost-optimal methodology for setting minimum requirements for both the envelope and the technical systems. However, with Turkey committed to adoption of EU legislation, the Project adjusted its activities to ensure adaptation of this Directive under Turkish conditions including efforts to formulate an nZEB strategy along with new building MEPS;
- the Project MTE recommendations to refocus PEEB activities on priority actions was fully adopted by the PMU. This included Project cooperation with TurkStat to improve collection of building statistics, focus on capacity building to strengthen enforcement capacities, streamline the PRF with more focus on outputs, and commence scale-up of awareness-raising measures on EE in buildings including a public outreach strategy. The only action not implemented was cooperation with TurkStat due to lack of time and resources.

45. In conclusion, UNDP's efforts to adaptively manage this Project were sincere and ***satisfactory*** in consideration of the successful outcomes of this Project.

3.2.2 Partnership Arrangements

46. The National Implementing partner of the PEEB Project is the General Directorate of Renewable Energy (DGRE) under the Ministry of Energy and Natural Resources (MoENR). Other key partners of the Project included the Ministry of Environment and Urbanisation (MoEU) and the Ministry of National Education (MoNE), both of whom participated on the Project in the financing of construction of demonstration buildings. MoEU's partnership on the Project was also to assist in the upgrading of their building certification system by updating the energy performance standards under their Building Energy Performance (BEP) Regulation of December 2009 that falls in line with the EU's EPBD. The Project financed the design of both demonstration buildings as well as the construction monitoring of these facilities.

47. The ProDoc lists a number of other partners that the PMU were to engage on the Project (see Para 35-36). A number of these partners, however, were not engaged during the Project including:

- TOKI. While their involvement would have been beneficial for the Project at large, the PMU did not have the resources for their engagement especially when their headquarters moved from Ankara to Istanbul in 2012. They have indicated interest in adopting IBDA for their housing projects although the PMU has had few resources to follow-up on this partnership;
- Financing agencies, banks and international donor agencies. Without the completion of demonstration buildings and dissemination of energy savings that would enhance the business case for IBDA designed buildings, partnerships with these financial stakeholders was going to be difficult.

3.2.3 Feedback from M&E Activities Used for Adaptive Management

48. Feedback for M&E activities was provided primarily through *PIRs from 2012 to 2016* providing details of activities for adaptively managing the Project. In evaluating the quality of feedback provided by these reports, the evaluator notes that reporting on implementation activities for each outcome was not divided into separate activities or outputs. As such, the evaluator had to distinguish reported activities to intended outputs, and had some difficulty with reporting achievements against some of the targets such as "feasibility study on potentials for sample buildings refurbishment…….developed" from Output 1.2, "IBDA proposed for use in all public buildings as of 2015 from Output 2.1, "review on financing mechanisms available for EE buildings in Turkey" from Output 3.3, and "Project communication strategy developed and implemented" from Output 4.3. The evaluator received progress on these targets through interviews with the PMU and stakeholders instead of the PIRs.

49. While the overall outcomes of the Project appear to be satisfactory, the feedback provided by these PIRs to monitor progress of meeting set targets of the project is **moderately satisfactory**. One reason is the poorly worded PRF and the various indicators and targets, as explained in detail in Para 30. A second reason is detailed in Para 48, where by not reporting progress according to specific outputs and their targets, the Project would not have provided feedback mechanisms required to adjust its activities to achieve all targets set in the May 2013 PRF.

3.2.4 Project Finance

50. The PEEB Project had a GEF budget of USD 2.62 million that was disbursed over a 7-year duration, managed by the PMU under the direction of DGRE. These tables reveal:

- deviations of original ProDoc Outcome expenditures including:
  - 20% less expended on improved regulatory framework for building EE (Outcome 1) ProDoc budget of USD 867,000;
  - Expenditures for IBDA and demo buildings (Outcome 2) were 10% higher than ProDoc budget of USD 772,450;
  - Expenditures for the dissemination of Project results (Outcome 4) were 36% higher than the ProDoc budget of USD 181,950
- expenditures peaked at USD 421,597 in 2013 at the start of the design phase of the demonstration buildings as reflected in Outcome 2;
- the development of software tools, notably the RET-EAT software for the MoEU in 2015, contributed to steady expenditures of Project resources after 2013.

51. Considering the average annual Project expenditure of the 7 year duration of the PEEB Project was USD 370,000, financial efficiency of the PEEB Project was **highly satisfactory** in achieving the intended outcomes considering this level of available resources. This is a reflection of the effectiveness of the Project in its engagement of stakeholders, and the contribution of the stakeholders to the overall outcomes of the Project.

52. Project co-financing was USD 16.35 million which is more than the ProDoc estimate of USD 14.96 million. Co-financing details can be found on Table 2. The level of co-financing on the PEEB Project is reflective of the commitments of all stakeholders, namely DGRE, MoEU and MoNE, and their commitments towards promoting and implementing development of building energy efficiency. This

Table 1: GEF Project Budget and Expenditures for Turkey's PEEB Project (in USD as of December 31, 2016)

IEEIRS Outcomes	Budget (from Inception Report)	2010[22]	2011	2012	2013	2014	2015	2016[23]	Total Disbursed	Total to be expended in 2017[24]
OUTCOME 1: Improved energy efficiency in new and existing buildings through stronger regulations, institutions and implementers	867,000	6,585	82,721	19,209	119,247	116,129	12,601	107,210	463,703	232,872
OUTCOME 2: Cost-effective energy efficiency solutions showcased and promoted through Integrated Building Design Approach (IBDA) and trainings	772,450	2,000	88,746	146,905	164,691	87,106	160,514	66,554	716,516	131,176
OUTCOME 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards	536,600	3,369	33,719	29,298	48,640	81,728	123,255	126,849	446,859	124,566
OUTCOME 4: Building energy consumption, energy savings, and other results of the project monitored, evaluated, reported and disseminated	181,950	382	34,222	41,981	31,719	21,923	18,507	30,946	179,680	67,901
Project Management	262,000	27,798	48,278	58,969	57,300	32,534	17,564	11,539	253,982	2,746
Total (Actual)	2,620,000	40,134	287,687	296,363	421,597	339,420	332,440	343,097	2,060,739	559,261
Total (Cumulative Actual)	2,620,000	40,134	327,821	624,184	1,045,782	1,385,202	1,717,642	1,728,299		
Annual Planned Disbursement (from ProDoc)[25]		347,995	814,150	629,650	488,270	339,935	0	0		
% Expended of Planned Disbursement		**12%**	**35%**	**47%**	**86%**	**100%**				

[22] Commencing July 30, 2010 - the Project Document signed by the Government of Turkey on July 30, 2010
[23] Up to December 31, 2016
[24] Up to terminal date of project of April 30, 2017
[25] From planned ProDoc disbursements

Table 2: Co-Financing for Turkey PEEB Project (as of December 31, 2016)

Co-financing (type/source)	UNDP own financing (million USD)		Government (million USD)		Partner Agency (million USD)		Private Sector (million USD)		Total (million USD)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants [26]	60,000	60,000	7,600,000	13,900,000[27]		240,000			7,660,000	14,705,000
Loans/Concessions									0	0
• In-kind support			700,000	745,000[28]	6,600,000	565,000[29]		841,860[30]	7,300,000	1,586,860
• Other									0	0
Totals	60,000	60,000	8,300,000	14,645,000	6,600,000	805,000	0	841,860	14,960,000	16,351,860

[26] Includes all cash contributions
[27] Capital cost from MoNE and MoEU for pilot IBDA buildings
[28] MoEU contribution to BEP-TR2 system
[29] DGRE contribution to the integration of EMIS with its EnVER database for buildings
[30] Contribution from Ekodenge for design and construction supervision of MoNE IBDA building

also includes the contribution of the IBDA-design consultant, Ekodenge and their consortium of international companies from the United Kingdom and Germany whose contract was only raised 30% while their scope of work deliver designs on IBDA pilot buildings was increased 3-fold. While this resulted in a good outcome for the Project, this practice of asking for more work from a contractor part way through their contract without proper remuneration is not encouraged. This is not good business practice for which the evaluator strongly disagrees with in terms of future contractual arrangements of this type. Otherwise, the cost effectiveness of the PEEB Project has been **highly satisfactory** in consideration of the significant impacts of the PEEB Project as further detailed in Sections 3.3.8 and 3.3.9.

3.2.5 M&E Design at Entry and Implementation

53. The M&E design as covered in Section IV (Pgs 29-34) in the PEEB Project ProDoc is robust and thorough. The design thoroughly covers all M&E activities including:
    - the Project inception phase;
    - monitoring responsibilities and advance;
    - monitoring reporting requirements including annual Project reviews and Project implementation reports (APRs/PIRs);
    - independent evaluations that includes the Midterm Evaluation as well as the Final Evaluation;
    - project audits; and
    - dissemination of Project results to encourage learning and knowledge sharing.

    As such, *the M&E design is rated as **satisfactory***.

54. Implementation of the M&E plan was affected by issues raised in Para 30 in Section 3.2.3 over the lack of clarity in the amended Project Results Framework from May 2013. This lack of clarity makes it difficult to monitor progress since the targets for each indicator were not clear nor were they quantified. The PMU were able to overcome some of the deficiencies in the PRF by focusing on the achievement of specific outputs (as recommended in the MTE). However, as previously mentioned, the amount of work required by the PMU to achieve all these outputs far exceeded the available Project resources. As such, *M&E plan implementation is rated as **moderately satisfactory***. Ratings according to the GEF Monitoring and Evaluation system[31] are as follows:

    - *M&E design at entry - 5;*
    - *M&E plan implementation - 4;*
    - *Overall quality of M&E - 4.*

[31] 6 = HS or Highly Satisfactory: There were no shortcomings;
5 = S or Satisfactory: There were minor shortcomings,
4 = MS or Moderately Satisfactory: There were moderate shortcomings;
3 = MU or Moderately Unsatisfactory: There were significant shortcomings;
2 = U or Unsatisfactory: There were major shortcomings;
1 = HU or Highly Unsatisfactory
U/A = Unable to assess
N/A = Not applicable.

3.2.6 Performance of Implementing and Executing Entities

55. The performance of the implementing partner (formerly known as an Executing Agency), the Directorate General of Renewable Energy, can be characterized as follows:

- Early stages of the Project were marked by DGRE requiring time to become familiar with how best to use GEF project resources to advance building energy efficiency in Turkey, resulting in slow administrative approvals of Project expenditures. As a result, progress between the 2010-2013 period of the Project was only marginally satisfactory;
- Strong leadership in connecting the PMU with MoEU and MoNE to facilitate the development of the IBDA designed demonstration buildings, and amendments to the BEP certification systems within MoEU;
- Strong leadership after 2015 in the advocacy and promotion of building energy efficiency, IBDA designed buildings, and the continuation of the development of the EnVER energy efficiency portal with the inclusion of building energy performance data from energy audits;
- Overall performance is rated as **satisfactory**.

56. The performance of UNDP (the Implementing Agency) can be characterized as follows:

- Adaptive management of the PEEB Project, much of which was required due to numerous changes of senior personnel within counterpart government agencies, and to some extent, UNDP streamlining administrative approvals of Project expenditures (as recommended by the MTE) to create less the administrative work within the Project, and improve progress;
- Highly effective PMU engaged in facilitating several effective project partnerships with MoEU and MoNE as well as universities, technical schools and the engineering and architectural professions in Turkey;
- Excellent engagement of PMU with design and construction teams of the IBDA-designed demonstration buildings;
- Efforts to create a higher profile for IBDA an IBDA designed buildings through appearances at several conferences and media events;
- Overall performance of UNDP on the PEEB Project is rated as **satisfactory**.

57. A summary of ratings of the implementing and executing entities of the PEEB Project are as follows:

- *Implementing Partner (DGRE)* – 5;
- *Implementing Entity (UNDP)* – 5;
- *Overall quality of implementation/execution (UNDP/DGRE)* – 5.

3.3 Project Results

58. This section provides an overview of the overall results of the PEEB Project and assessment of the relevance, effectiveness and efficiency, country ownership, mainstreaming, sustainability, and impact of the PEEB Project. In addition, evaluation ratings for overall results, effectiveness, efficiency and sustainability are also provided against the revised May 2013 PRF (as provided in Appendix F)[32].

[32] Evaluation ratings are on a scale of 1 to 6 as defined in Footnote 24.

For Tables 3 to 7, the "status of target achieved" is color-coded according to the following color coding scheme:

Green: Completed, indicator shows successful achievements	Yellow: Indicator shows expected completion by the EOP	Red: Indicator shows poor achievement – unlikely to be completed by project closure

3.3.1 Overall Results

59. A summary of the achievements of PEEB Project at the Project Objective level with evaluation ratings are provided on Table 3.

Table 3: Project-level achievements against PEEB Project targets

Project Strategy	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating [33]
Project objective: ***Reduction of energy consumption and associated GHG emissions in buildings in Turkey by raising building energy performance standards, improving enforcement of building codes, enhancing building energy management, and introducing the use of an integrated building design approach***	Average total energy consumption (for heating, cooling, ventilation and lighting) in new residential and non-residential buildings (in kWh/m²/year)	Residential: 200 Non-residential: 321	193 for buildings built with IBDA	Two non-residential IBDA buildings were built during the Project. Building #1[34] has a modelled total specific energy consumption of 37.4 kWh/m²/year that will not be commissioned until mid-2018. Building #2[35] has a modelled total specific energy consumption of 47.63 kWh/m²/year that will not be fully completed by mid-2017.	See Paras 60-61	6
	Cumulative CO_2 emission reductions from new buildings to be built during the project lifetime (2010 to 2015) against the baseline (in million tonnes CO_2)	0	2.0	The cumulative emission reductions from these IBDA-designed buildings will be 25,400 tonnes CO_2 over the 20-year lifetime of these 2 new public buildings.	See Paras 60-61	4
Overall Rating – Project-Level Targets						**5**

60. The PEEB Project objective level targets for reduced energy consumption have been successfully reached with two IBDA-designed demonstration buildings. However, the target for GHG emission reductions have been determined to be unattainable for reasons explained in Para 29. As such, the Project had no opportunity during its 7-year duration to come close to completing this quantity of

[33] Ibid 31

[34] Sincan-Etimesgut Directorate of Land Registry and Cadastre Service Building in Ankara under the MoEU

[35] Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara under the Ministry of National Education.

buildings during the Project period that were using IBDA to generate 2.0 million tonnes CO_2 emission reductions cumulative over the 20-year lifetime of the buildings. While it is unfortunate that the MTE was unable to change the GHG emission reduction target, the evaluator believes that the Project placed its best efforts forward by focusing its efforts on the critical path of this Project, being the planning, design, implementation and commissioning of the 2 IBDA-designed buildings. Lifetime direct GHG emission reductions of the Project were determined to be 25,400 tonnes CO_2 from the actual operations of these 2 public buildings.

61. Moreover, the successes of the PEEB Project in its development of the IBDA as well as the future legislation of MEPS for buildings will result in the generation of indirect GHG emission reductions totaling 27.23 million tonnes CO_2. This emission reduction amount is cumulative over the 10-year influence period of the GEF project which is 2018 to 2027, and includes conservatively the use of IBDA for nonresidential buildings as well as MEPS for nonresidential and residential buildings. The causality factor of 0.8 was applied to nonresidential buildings due to the influence of public procurement and stronger enforcement in the construction of these buildings. For the residential sector, a causality factor of 0.4 was applied due to weaker enforcement of MEPS in the design and construction of these buildings.

62. For these reasons, the evaluator has determined that the overall rating for these objective level targets is **satisfactory**. Details of the determination of direct and indirect GHG emission reductions from the PEEB Project are provided in the GHG emission reductions report on Appendix E, and summarized on the GEF Tracking Tool as provided in Appendix F.

3.3.2 Outcome 1: Improved energy efficiency in new and existing buildings through stronger regulations, institutions and implementers

63. To achieve Outcome 1, Project resources would be used to:

- improve the existing legislative framework for building energy efficiency;
- develop a framework for an information system on building energy consumption;
- support implementation of an energy efficiency strategy for the building sector; and
- strengthen the capacity of building inspectorates to enforce energy efficiency regulations.

A summary of the actual achievements of the Outcome 1 with evaluation ratings are provided on Table 4.

64. Prior to 2010, approvals for new building and building retrofits were under the regulatory oversight of the Ministry of Public Works which was renamed the Ministry of Environment and Urbanization (MoEU) in 2012. The PEEB ProDoc had identified that the MoEU's "Building Energy Performance" (BEP) and the TS 825 (National Insulation Standard for ensuring proper insulation and thermal properties for a building) were separate elements within the approval process. In 2010, the BEP was updated to include all the requirements for heat insulation under TS 825 within the BEP approval process.

Table 4: Outcome 1 achievements against targets

Project Strategy	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating[36]
Outcome 1: Improved energy efficiency in new and existing buildings through stronger regulations, institutions and implementers	The content and status of new policies, programs, and implementers supporting implementation of EE and RE in buildings	Legislation, institutions, and implementers to support enhancement of building energy efficiency needs to be strengthened	New legal and regulatory provisions, strengthened institutions, and better supporting compliance checking, enforcement and outreach programs adopted for enhanced EE in buildings	*New legal and regulatory provisions for BEP are being developed now for completion by April 2017. However, programs to improve checking and enforcement of the BEP-TR2 regulations have not yet been developed*	See Paras 64-67	4
Output 1.1: Existing legislative framework on building energy efficiency improved	Analyses and recommendations reports	Existing "Building Energy Performance (BEP)" Regulation is not in line with international best practices	BEP Regulation analyzed and compared to other relevant international codes (e.g. EU EPB Directive, etc.) and revisions proposed	*Since February 2016, BEP regulations were analysed and compared with EU EPB Directives by an Italian consulting firm (Steget) with completion of their work with proposed revisions in April 2017*	See Para 65	5
	Content, acceptance, and status of the Certification Systems	No MEPS exist for buildings	Reference building approach under the Building Energy Performance (BEP) Regulation analyzed and revisions proposed Minimum Energy Performance Standards (MEPS) for new buildings developed and proposed	*Steget also targeted upgrades to MBEPS including nearly-Zero Energy buildings (nZEB) requirements for new buildings and the buildings that require retrofitting for all provinces in Turkey.* *Programme for implementing building MEPS and nZEB completed by Steget*	See Para 65	5
Output 1.2: Framework for an Information System on Building Energy Consumption developed	The availability and the reliability of the required data	Existing databases under relevant public authorities are not comprehensive with respect to building data and energy consumption data	Methodology, indicators and benchmarks for framework developed	*A building energy management information system (EMIS) has been introduced by UNDP Croatia to this Project. Ongoing activities by the Project includes DGRE personnel*	See Paras 68-70	5

[36] Ibid 31

Project Strategy	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating[36]
				entering available energy data from public buildings into EMIS software. This will strengthen the methodology for energy data entry with indicators and benchmarks. DGRE are also planning to finance the development of EMIS as a module within a revamped EnVer energy efficiency database for buildings that is being developed under the sister UNDP-GEF "Improving EE for Industries" Project.		
	No. of buildings for sample to be improved	No single database covers all the required indicators for evaluation of building energy performance & building energy consumption	Pilot database for sample buildings developed	*A pilot database for EMIS is being developed on the basis of 166 energy audits of public buildings. Data entry into EMIS is being performed by DGRE personnel who currently require strategic guidance regarding the long-term development of this database*	See Paras 68-69	4
	Energy savings and GHG emission reduction potentials identified	There is no similar feasibility study which relies upon factual data identifying the real energy saving data	Feasibility study on potentials for sample buildings refurbishment to improve energy performance developed	*There is insufficient data generated from the EMIS that can be used for a feasibility study of sample buildings refurbishments to improve energy performance*	See Para 69	3
Output 1.3: Supporting the implementation of Energy Efficiency Strategy for the building sector	Analysis and recommendations report Implementation support programme and action plan	Existing EE Strategy does not have any action plan and/or implementation programme	Implementation support programme and action plan for improvement of EE strategy for buildings sector developed	*A programme for implementing upgraded MBEPS and nZEB has been prepared by Steget*	See Para 65	5

Project Strategy	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating[36]
Output 1.4: Capacity of building inspectorates in regard to energy efficiency regulations and enforcement strengthened	Analysis and recommendations report	Existing legislation do only consider heat insulation issues regarding energy performance of new private buildings	Building inspection regulation and relevant energy efficiency codes analyzed and reported Recommendations proposed including energy efficiency checklists for new private buildings	*Energy Efficiency in New Buildings Checklist (for construction phase) and its Guidebook were prepared in accordance to updated EE codes in 2014 and approved by all project partners. These will need to be updated with the new MEPS being developed under Output 1.1.*	See Para 66	5
	Guide booklet prepared and disseminated		Guide booklet for building inspectors prepared and disseminated	*An online training module was developed and uploaded to the website of the Ministry of Environment and Urbanization under Building Inspection System (www.yds.gov.tr). The Ministry is currently working to integrate the checklist into the legislation.*	See Para 67	5
	Number of trainers trained		Trainings delivered to trainers of building inspectors	*More than 600 participants have attended training sessions on inspection of buildings and their compliance to new EE regulations. However, they will need additional training with new MBEPS and the BEP-TR2 system.*	See Para 66	5
Overall Rating – Component 1						**5**

65. Activities undertaken during the PEEB Project to strengthen building EE regulations under MoEU for new and existing buildings had begun in earnest in 2012. The Project supported the preparation of analysis reports and consultations with stakeholders in 2014 on existing BEP regulations and in early 2016, improvements to the existing legislative framework on building energy efficiency through the development of new Minimum Building Energy Performance Standards (MBEPS) and a Nearly Zero Energy Building (nZEB) Approach (using Steget, an Italian consulting firm)[37]. These revisions for proposed improvements were compared to EPB Directives and other similar international codes, and as of early 2017, are being included in a strategy, roadmap and implementation plan for scaling up nZEBs in Turkey that is being prepared by an international firm, Steget, for completion in April 2017.

66. By 2014, MoEU had developed an online system for approvals for construction of new buildings or retrofits to existing buildings to demonstrate compliance to a new BEP-TR standard (www.yds.gov.tr). In addition, MoEU also developed an energy efficiency checklist to assist building owners and designers in their efforts to comply with these regulations. Training was provided to a wide range of over 600 stakeholders on the use of a guidebook on "Energy Efficiency in New Buildings Checklist" in June 2014. During these consultations, however, stakeholders had complaints over the BEP-TR online approval system, claiming that the system did not allow for inclusion of renewable energy systems in building applications, and that the system did not have the ability to allow the uploading of auto CAD drawings of new buildings or retrofits.

67. By late 2014, the Project was assisting MoEU in the development of a new system to address these complaints into a BEP-TR2, and to integrate the checklist into new "building inspection legislation" that made application of the checklist for new private building project designs and retrofits mandatory. By February 2016, activities for the formulation and adoption of new MBEPS for new buildings and retrofitted buildings in 81 provinces of Turkey and 8 different climate zones were commenced. The current MoEU online approval system under the management of MoEU's Energy Efficiency Department (EED) under the General Directorate of Professional Services was updated in April 2017 to incorporate the MBEPS in a newer BEP-TR2. The on-line version of BEP-TR2 still has a few issues to resolve including the calculation of renewable energy into buildings that should improve the energy rating of that building. In addition, according to the EED, they do not yet have any enforcement staff required for the follow-up of compliance to these new regulations for new building construction and building retrofits.

68. Further capacity building activities included DGRE who was provided by the Project in early 2016 an Energy Management Information System (EMIS) that was developed under the UNDP-GEF Energy Efficiency Project in Croatia. The EMIS was a logical extension to PEEB Project technical assistance to build the capacity of DGRE (who are responsible for energy consumption of buildings) to analyse, record, and monitor energy and water consumption in buildings. Project support (with the assistance of an effective international consultant from UNDP Croatia) was required to guide the Project purchase of the required server and Microsoft and Oracle licenses. Project resources were also used to translate the software into Turkish. The DGRE has established an EMIS administrative team that have received initial training for EMIS operation.

[37] This is in line with the development of the Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings to promote distributed generation based on renewable energy in buildings and zero emission buildings

69. While an implementation plan for integrating EMIS into DGRE's operations was prepared, data entry for a public buildings database was conducted. In 2017, data entry progress had slowed due to the lack of DGRE personnel familiarity on the full capabilities of EMIS, and how it could be used for strategic planning of energy efficiency improvements for public building stock in Turkey. The current state of the public buildings database at the time of writing of this report in April 2017 is that the database is insufficient in size to be able to identify potential buildings for sample retrofits for energy efficiency improvements.

70. An added complexity to this issue was the need for DGRE personnel to integrate the outputs of EMIS into the EnVer Energy portal developed by the UNDP-GEF "Improving Energy Efficiency in Industry" Project, also being implemented by DGRE. While the EnVer portal only reports on annual energy consumption, the EMIS requires monthly inputs for its calculations but with the capacity to generate reports to whatever is required by the user (i.e. it can generate annual electricity or energy consumption of a building if the data is good) to a reasonable degree of accuracy. As such, the EMIS reports could then be used as inputs into the EnVer portal as a means of building an energy performance database.

71. In conclusion, the results of Outcome 1 are rated as **satisfactory** with the following rationale:

- The completion of the development of MBEPS and the nZEB approach and its proposed adoption by DGRE into their EMIS, and by MoEU into their BEP-TR2 system for certificates for building energy performance;
- ongoing efforts by the Project and DGRE personnel to use EMIS to develop a database for building energy efficiency using 166 energy audits of public buildings, and to integrate these efforts with the country's national energy efficiency database, EnVer (whose development is being managed by DGRE). However, progress of data entry into the EMIS database is not yet at the stage where potential projects for building EE improvements can be identified;
- plans for implementation support for a program for EE building improvement has been developed by an international consulting firm that is under consideration for adoption by DGRE;
- training delivered by the Project on the use of the guidebook on "Energy Efficiency in New Buildings Checklist" for over 600 building inspectors under MoEU.

3.3.3 Outcome 2: Cost-effective energy efficiency solutions showcased and promoted through Integrated Building Design Approach (IBDA) and trainings

72. Activities under Outcome 2 were intended to "showcase and promote cost-effective energy solutions that were developed through an Integrated Building Design Approach" or IBDA. Project resources would be utilized to:
    - Develop an IBDA approach for Turkish climatic conditions that would be used in the design of new public buildings;
    - Dissemination and promotion of IBDA to building sector professionals and key stakeholders; and
    - Design and construct demonstration buildings according to IBDA design and construction principles.

    A summary of the actual achievements of Outcome 2 with evaluation ratings are provided on Table 5.

Table 5: Outcome 2 achievements against targets

Project Strategy	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating[38]
Outcome 2: Cost-effective energy efficiency solutions showcased and promoted through Integrated Building Design Approach (IBDA) and trainings	Adoption and diffusion level of IBDA	Limited knowledge and application of IBDA	Cost effective energy efficiency solutions are demonstrated through IBDA demonstration buildings	*4 out of 5 IBDA demonstration buildings are expected to be completed by mid-2017 to demonstrate cost-effective energy efficiency solutions*	See Paras 75-76	4
	Implementation of IBDA demonstration constructions		IBDA is promoted through trainings and awareness raising activities	*IBDA has been promoted through several trainings, awareness raising activities, informal requests for further information, and awareness raising information available on the web*	-	5
Output 2.1 IBDA for Turkish climatic conditions developed and followed in design of new public buildings	Adoption and use of IBDA for new constructions in different sectors	Limited application of IBDA	IBDA guidebook prepared	*3 high quality IBDA guidebooks prepared*	See Para 73-75	5
			IBDA implementation strategy and action plan developed	*No IBDA implementation strategy or action plan has yet been developed due to the time required by all stakeholders to absorb the approaches advocated by IBDA in building design, and the results of public demonstration buildings using IBDA (under Output 2.3)*		
			IBDA proposed for use in all new public buildings as of 2015	*Only verbal commitments to utilizing IBDA for all new public buildings have been made*		
Output 2.2 IBDA promoted to building sector professionals and key stakeholders	Universities adopting IBDA into curricula	No comprehensive design approach like IBDA in existing curricula	IBDA incorporated into architectural and engineering curricula in at least one pilot university	*IBDA has been incorporated into several architectural and engineering curricula in Turkey.*	See Para 74	5
	Number of architects and engineers trained according to IBDA principles to make use of available material (guidebook, etc.)	Limited knowledge or use of IBDA	Trainings for architects, engineers and building sector professionals (*e.g. ministries, municipalities,*	*Numerous training sessions for engineers and architects have been conducted to transfer knowledge on IBDA principles. There are demands for additional training to be provided to other institutes and ministries including*	See Para 74	5

[38] Ibid 31.

Project Strategy	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating[38]
			chambers of architects/engineers, private firms) delivered	*TOKI, many of which have not yet been fulfilled.*		
Output 2.3 Demonstration buildings implemented according to IBDA design and construction principles	Energy performance of IBDA enhanced demo buildings	New school/office buildings (whose average total energy consumption figure is around 321 kWh/m²/yr) are neither designed and built with IBDA nor enhanced with EE and RE technics	Submitted designs meet and exceed the total energy requirements for school/office buildings	*Designs of IBDA buildings were submitted in August 2014 with a specific energy consumption of 37.4 kWh/m²/year, an improvement over existing school and office buildings*	See Paras 75-76	5
			Five IBDA demonstration buildings of approx. 30,000 m² commissioned and received A-class energy performance certificates in line with BEP regulation	*4 out of 5 IBDA demo buildings received A-class performance certificates in line with BEP regulations. The 5th IBDA building will not be completed until 2018 as it is currently being retendered at this time for completion.*		
Overall Rating – Component 2						**5**

73. The Project commenced development of the IBDA in late 2012 with the formation of an expert team comprised of various professions related to energy efficiency in buildings including architects and engineers. The Project approach to developing IBDA was methodical[39], first to adapt the approach to Turkish conditions and then to set the implementation guidelines with experts, followed by the preparation of a number of IBDA guidebooks by a team of 15 experts including an "Adaptation Report", "Implementation Guidebook" and a guidebook on “IBDA Priorities and Targets on Building Performance”. The documents had estimated that the operation and maintenance-repair costs of this building would be 70% lower than a similar public building, designed and built with conventional approaches, materials and systems. Envisaged energy costs were estimated to decrease by 80% compared with the traditional buildings, and water consumption reduced by 65%. These guidebooks were issued for training activities and courses with selected universities in May 2016.

74. The issuance of these IBDA guidebooks in May 2016 has generated considerable interest within the architectural and engineering professions in Turkey. This has resulted in numerous requests for these guidebooks, where several engineering and architectural universities and technical colleges have been using the IBDA guidebooks as course material including Van Yüzüncü Yıl University, which was the first to adapt. Since late 2015, the PEEB Project has organized and supported several training sessions for engineers and architects from the public sector (i.e. municipalities, ministries) and the private sector (including members of the various chambers of architects and engineers). However, as of April 2017, no national IBDA implementation strategy and action plan has yet been developed. One reason for this is the lack of energy performance results from demonstration IBDA-designed buildings from Output 2.3 which would provide tangible evidence of energy savings from an IBDA-designed building. Another reason is the recent issuance of the IBDA guidebooks (11 months ago) which is likely insufficient time for building professionals to absorb and adopt all IBDA technicalities, and the analysis required to formulate a national IBDA implementation strategy and action plan. However, given the positive response to the IBDA guidebooks, there is a strong likelihood that this could be formulated within the next 2 years.

75. The Project also commenced the process for the design, construction and showcasing of IBDA-designed government-financed demonstration buildings as early as 2012. The implementation of these first IBDA-designed public buildings were very important for Turkey since their implementation through the procurement of services would be tendered under Public Procurement Law. As such, the lessons learned from such a process would be important to other government institutions wanting to replicate this program. These activities also had to be considered as the critical path for the entire PEEB Project in consideration of the time and effort required by the Project to undertake the process of completing IBDA-designed demonstration buildings: a service building for MoEU, and a technical school campus with 4 buildings with MoNE. A chronology of key events in the development of the demonstration buildings (as first mentioned in Para 43) is provided here to also depict implementation issues and time consumption of this process:

- September 9, 2011 - Commencement of tendering process for the design works of the demonstration buildings;

[39] This process was led by Professor Dr. Celal Abdi Guzer of the Faculty of Architecture of the Middle East Technical University in Ankara.

- December 12, 2011 - Contract award approved. Unfortunately, the land allocated by MoEU for their demonstration building was cancelled requiring another 6 months of negotiations to approve another site in Ankara[40];
- August 1, 2012 - Commencement of the contract to a consortium led by Ekodenge (with international partners Atelier Ten from the U.K. and Willen and Associates from Germany) to prepare a complete IBDA design and construction and tendering documents for 3 demonstration buildings to be built in Ankara. During the course of the contract, UNDP requested Ekodenge to increase its designs from 1,600 m^2 to 9,000 m^2 for the MoEU building and 6,000 m^2 to 27,000 m^2 for the MoNE technical school, an increase of 470% in work area with only a 33% raise in fees. Fortunately, for the Project and UNDP, Ekodenge accepted this. However, this is not good business practice, and should never be done again if UNDP wants to maintain a good reputation for fair contracting;
- August 1, 2014 – Completion of draft designs for the demonstration buildings by Ekodenge, and submitted for approval by MoEU and MoNE;
- November 1, 2014 – Demonstration designs by Ekodenge were approved by MoEU and MoNE and delivered according to Ekodenge's original schedule of 27 months. Buildings received an A-class certificate from the BEP-TR certification system[41]. However, further delays to project implementation of Output 2.3 were identified at this time when it was estimated that the public tendering processes for a contractor to construct the demonstration buildings would take up to 12 months, prompting a request for a Project extension up to the end of December 2016;
- December 2014 to June 2015 – Two public tenders for the construction of the demonstration buildings for MoEU and MoNE were issued;
- January 2016 – Mobilization of two contactors for the MoEU demo building and MoNE demo building;
- August 2016 - Contractor for MoEU demo building abandons site, leaving MoEU to re-tender the remaining works in 2017 for completion of the building in 2018;
- March 2017 – Works on MoNE technical school campus comprising of 4 buildings nearing completion, and being prepared for a closing event in late April 2017 and also an opening ceremony which will be held on September, 2017 with the participation of two Ministers of MoNE and MOENR.

76. The delivery of the MoNE IBDA-designed technical school campus buildings will provide an opportunity for showcasing a functional green building in Turkey that will serve as a tangible example of energy efficient buildings in Turkey, to senior Turkish Government officials that will help ensure the replication of the IBDA approach for designing energy efficient buildings in Turkey. Unique features of this building includes several technologies integrated in the school complex showcasing renewable energy applications, energy efficient measures and sustainable resource utilization including wind turbines, PV systems (for electricity generation and hot water production, with sun trackers), cogeneration/trigeneration systems, heat pumps, grey water systems, rainwater harvesting and storage systems, floor heating systems, solar chimneys, wastewater treatment system, different ventilation systems for several parts of the building for demonstration purposes.

[40] For the Sincan-Etimesgut Directorate of Land Registry and Cadastre Service Building in Ankara

[41] This is based on simulations of the building energy performances of the 4 demonstration buildings (a school campus and a service building), which were designed by utilizing IBDA, and SEC values of 37 kWh/m^2/yr for the service building and 23 kWh/m^2/yr for school campus.

77. In addition, the Ministry of National Education had indicated that the specific energy consumption of their IBDA-designed demonstration building is impressive. Given the incremental costs and time required to implement an IBDA-designed building, MoNE personnel have expressed interest in implementing IBDA-designed buildings and retrofits for its future construction programs. However, fulfilment of such a commitment will take a bit longer to allow the construction industry to adapt to new designs and practices for IBDA buildings, especially in consideration of changing from current the traditional public building production process that is geared for quick design and turnover.

78. In conclusion, the results of Outcome 2 can be rated **satisfactory** with the following rationale:
    - the near-completion of 4 IBDA demonstration buildings through MoNE financing to demonstrate the efforts required for planning, designing, public tendering, construction and commissioning of an IBDA-designed building in Turkey;
    - development of well-researched IBDA guidebooks to inform Turkish building development professionals of the requirements for developing green buildings using a multidisciplinary approach involving several professions working together in the design of buildings and who are during design activities, in constant interaction with each other. This is a paradigm shift from the old "stovepipe" approaches the integrated building design approach model passing the designs from one disciplinary team to another;
    - adoption of IBDA with several universities and technical colleges in Turkey as well as the engineering and architectural professions.

3.3.4 Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards

79. Activities under Outcome 3 were intended to "develop new tools to facilitate compliance with higher energy efficiency standards". Project resources were to be utilized to:

    - develop Monitoring, Inspection and Verification (MIV) methodology and tools for regulating building energy performance;
    - provide training to building practitioners on building energy management and energy auditing;
    - develop financial mechanisms and tools that would promote energy efficiency and renewable energy in survey buildings;
    - improving the Building Energy Performance website infrastructure.

    A summary of the actual achievements of Outcome 3 with evaluation ratings are provided on Table 6.

80. To support the Turkish government on the promotion of the use of renewable energy technologies in buildings, a renewable energy technologies-economic analysis tool (RET-EAT) was developed commencing in June 2015 with the development of the tool algorithm and development of the software, which has been launched in April 2016. The software was designed for the public domain and has been run through the servers of MoEU. Training on the use of the RET-EAT has been provided. However, the importance of training for the use of RET-EAT lies in the use of the EMIS, which can be considered as a newer more comprehensive tool for the promotion of building energy-efficiency by energy managers, by which the analyses of the RET-EAT can be incorporated into the EMIS as a means to measure the reduced carbon footprint of a building with RETs.

Table 6: Outcome 3 achievements against targets

Intended Outcome	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating[42]
Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards	Monitoring and verification processes are in place and disseminated effectively among key stakeholders	No monitoring system for building energy performance No analysis tool for RE in new buildings	New tools are developed for analysis and monitoring purposes, financial mechanisms	*New tools have been developed for analysis and monitoring purposes*	-	5
		Training materials need significant upgrading	Training materials revised/developed	Training materials have been developed for energy managers for public buildings, and other building development practitioners	-	5
		Financial mechanism for EE in buildings is limited Existing website and tools for bep.gov.tr and BEP-TR systems need upgrading	Existing websites and tools updated	Existing websites and tools have been updated	-	5
Output 3.1 "Monitoring, Inspection and Verification (MIV)" methodology and tools for Building Energy Performance regulation developed	Availability of required data for evaluation of building energy performance	No monitoring, inspection and verification system	Methodology and toolkit for MIV system developed and proposed	Toolkit for MIV system was developed	-	5
	Level of compliance with BEP legislation in practice	Limited compliance with BEP regulation				
Output 3.2 Training materials on energy management and energy auditing for buildings developed and trainings delivered.	Training materials	Existing training materials for energy managers need comprehensive revision	Existing training materials for energy managers updated Training materials for energy auditors developed	Training materials for both energy managers and energy auditors	-	5
	Number of trainees	No training materials for energy auditors	Trainings delivered	Training sessions for energy auditors and energy managers in public	-	5

[42] Ibid 31

Intended Outcome	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating[42]
				buildings was delivered in February 28 to March 3, 2017		
Output 3.3 Financial mechanisms/tools to promote "Energy Efficiency and Renewable Energy" in buildings surveyed and/or developed	Number of funding agencies, banks, and ODA donors seek to support EE buildings in Turkey	No or limited market growth of EE buildings due to reality and perception of cost-to-benefits inequity	Review on financing mechanisms available for EE Buildings in Turkey	No evidence of any review on financing mechanisms conducted by the Project for EE buildings in Turkey	-	3
			Appropriate finance mechanisms showcased (e.g. standardized Energy Performance Contracting schemes developed)	EPC secondary legislation from the energy renovation of public buildings in Croatia has been showcased to DGRE who were seeking similar EPC models from other countries for replication in Turkey.	See Para 81	5
			Software tool for economic assessment of use of renewable energy in new buildings developed	An economic analysis (feasibility) tool for the use of renewable energy technologies (RET-EAT) during the design of new buildings	See Para 80	5
Output 3.4 Building Energy Performance website infrastructure improved	New website with support modules Number of visitors using new website	Poor bep.gov.tr website	New bep.gov.tr website developed	A new www.bep.gov.tr website has been developed under MoEU	-	5
		No software module for central heating cost sharing system	Software module for central heating cost sharing system developed	A software module for central heating cost sharing system has been developed and integrated into this website with the additional database modules	-	5
		No online discussion platform for Energy Performance Certificate users	Online discussion platform for Energy Performance Certificate users developed	Online discussion platform consists of link certificate users with MoEU personnel to answer certificate-related issues.	-	5
		No integration of bep.gov.tr website and BEP-TR software and database	Integration of bep.gov.tr website with BEP-TR software and database created bep.gov.tr website administrators trained	BEP-TR software as well as its database has been posted on the new bep.gov.tr website. bep.gov.tr website administrators trained	-	5
Overall Rating – Component 3						**5**

81. The Project has only recently commenced assistance to DGRE in the promotion of ESCOs and energy performance contracting. While this request for ESCO secondary legislation was made near the end of the Project in March 2017, the PEEB Project has not yet made substantial progress in this important issue; moreover, the PEEB Project has expanded much of its resources and efforts into the development of the IBDA design demonstration buildings. Looking forward, the efforts for the proper promotion of the ESCO market is likely a project solely focused on this issue. ESCOs will definitely play an important role in overcoming the financing barrier for energy efficiency investments in residential buildings projects.

82. In conclusion, the results of Outcome 3 can be rated **satisfactory** with the following rationale:
    - Delivery of an MIV system for use by building managers and inspector to determine the energy performance of a building;
    - Delivery of training to energy managers and energy auditors to strengthen their capacities for energy efficiency in buildings;
    - Delivery of financial tools to assess the feasibility of using RE technologies in the design of new buildings; and
    - Improvements made on the bep.gov.tr website that contains software modules for central heating cost sharing systems and online platforms that link certificate users with government personnel to answer certificate-related issues.

3.3.5 Outcome 4: Building energy consumption, energy savings, and other results of the project monitored, evaluated, reported and disseminated

83. Activities under Outcome 4 were intended to "evaluate, report and disseminate results of monitored building energy consumption and savings". Project resources would be utilized to:

    - develop a methodology for monitoring and measuring energy savings due to revised regulations and IBDA implementation; and
    - effectively disseminate project results, outputs and lessons learned for the purposes of raising awareness of key measures in energy efficiency in buildings.

    A summary of the actual achievements of Outcome 4 with evaluation ratings are provided on Table 7.

84. In 2013, a study was completed for MoEU on setting up a new model for issuing Energy Performance Certificates including the monitoring energy consumption in old and new buildings, creation of a database, and on new protocols for calculating CO_2 and energy savings. In 2014, MoEU prepared draft regulations for MIV of these Certificates with the Project providing assistance in the formation of MIV tools to implement these regulations. While the results of residential and non-residential buildings under the new BEP-TR certification system were to be fed into these models, no such information was available for these models due to delays in adopting a new BEP-TR system (which was subsequently updated to a newer BEP-TR2 system in 2016), and delays in the completion of the demonstration IBDA-designed buildings.

Table 7: Outcome 4 achievements against targets

Project Strategy	Performance Indicator	Baseline	Target	Status of Target Achieved	Evaluation Comments	Rating[43]
Outcome 4: Building energy consumption, energy savings, and other results of the project monitored, evaluated, reported and disseminated	The status of recommendations contributing to institutional sustainability	Insufficient institutional mechanisms in place to ensure sustainability of project results	Project recommendations to ensure institutional sustainability adopted	*With the near completion of the MoNE demo building, the project is making efforts in 2017 to raise the profile of this accomplishment which is very impressive considering the SEC of the demonstration buildings is more than 70% below the average existing buildings in Turkey.*	-	4
Output 4.1 Methodology for monitoring and measuring project savings due to revised regulations, IBDA implementation and promotion, and newly developed new tools	Acceptance and reliability of the methodology and tools for monitoring and measuring the project impacts	No baseline information on the market, energy, GHG or financial impacts of EE, BEP compliance, or IBDA	An accepted monitoring and assessment methodology for key stakeholders	*A monitoring and assessment methodology formulated that measures the energy, GHG and financial impacts of a building has been proposed. However, development of tools to implement this methodology have not yet been completed.*	See Para 84	4
Output 4.2 Preparing "Mid-term" and "Final" project reports; Calculating and sharing energy savings and GHG emission reductions achieved through the project	Mid-term and final evaluation reports provided with quantified and qualified results and impacts	No consolidation of the results and lessons learned	Mid-term and Final project reports consolidating the results and lesson learned from the implementation of the project	*Midterm evaluation has been completed, and the final evaluation is now underway*	-	5
Output 4.3 Project results, outputs and lessons learned are effectively disseminated along with key awareness-raising measures on energy efficiency in buildings	Number of users visiting websites	No specific communication and outreach strategy formed	Project communication strategy developed and implemented	*Project communication strategy developed through UNDP with inputs from DGRE on its application to the PEEB Project.*	See Para 85	5
	Websites developed		Project website developed	*Project website developed*	See Para 85	5
	Target groups reached		IBDA website developed	*IBDA website not yet developed*	See Para 86	3
	Information and dissemination material produced		Dissemination material produced for awareness raising	*Information disseminated on IBDA although not yet by website. After the issuance of IBDA guidebooks in 2015, strong demand for IBDA information has been generated through attendance at numerous conferences and events and through various media outlets in Turkey.*	See Para 85	4
Overall Rating – Component 4						**4**

[43] Ibid 31

85. Despite the shortfalls in achieving the completion of demonstration IBDA designed buildings (Output 2.3), and delays in the delivery of energy performance certificates under the BEP-TR2 system, the PMU continued to implement its communication strategy in 2016 to effectively disseminate information on the progress of these important activities of the PEEB Project as well as the issuance of the IBDA guidebooks. In fact, the IBDA guidebooks not only generated considerable interest amongst the professional community and academic institutions, there were also a number of media articles on the activities of completion of MoNE's Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara under the Ministry of National Education and its low carbon footprint amongst other buildings in Turkey[44].

86. Many of these articles explained that MoNE's building is the first example of a green and energy efficient public building that serves as an excellent investment opportunity for any building investor, especially when considering the excellent payback periods as determined by lifecycle cost analyses (LCCA) of these buildings. The PEEB Project is proposing for its terminal workshop a large unveiling of this IBDA-designed building in late April 2017 with several senior Turkish Government officials in attendance. In addition, new brochures for the IBDA approach have been prepared and distributed by MoEU in training sessions for their building inspectors. Despite the large amount of publicity on these IBDA-designed demonstration buildings, the Project has not yet put in place a website on the IBDA approach to developing low carbon buildings.

87. In 2016, the Project addressed a need to collect data in Turkey on the distribution of the energy usage in the households. This data was collected through 30 selected households where energy consumption monitoring devices were installed for 6 months, providing DGRE an example of the level of effort to collect robust baseline energy consumption information that they will need to manage and regulate energy efficiency programs for buildings. This practice enabled the DGRE to build their capacity to implement larger scale monitoring programmes nationwide and presented an example of synergy between GEF projects as this was transferred from previously completed UNDP/GEF EE Appliances Project (PIMS 4014).

88. In conclusion, the results of Outcome 4 can be rated **moderately satisfactory** with the following rationale:

- Inability of the PMU to fully deliver all outputs related to the benefits of energy efficiency in buildings due to delayed delivery of critical outputs such as building MEPS and completed IBDA designed demonstration buildings;
- Despite these delays, the PMU has still managed to generate considerable interest in IBDA and the near completion of the IBDA-designed buildings amongst building professionals and the general public;
- Undertaking relevant efforts to initiate the collection of household electricity consumption information that will be useful to GDRE in managing programs of energy efficiency for buildings.

[44] Some of the internet articles can be accessed at the following links: http://aa.com.tr/tr/turkiye/ilk-yesil-kamu-binasi-yapiminda-sona-yaklasildi/651730,http://www.haberturk.com/ekonomi/emlak/haber/1301031-ilk-yesil-kamu-binasi-yapiminda-sona-yaklasildi, http://www.bik.gov.tr/ilk-yesil-kamu-binasi-yapiminda-sona-yaklasildi/, http://www.konyaninsesi.com.tr/ilk-yesil-kamu-binasi-yapiminda-sona-yaklasildi-92202h.htm, http://enerjicihaber.com/news.php?id=1791, http://www.hurriyet.com.tr/ilk-yesil-kamu-binasi-bitiyor-40230584, http://www.trthaber.com/haber/turkiye/ilk-yesil-kamu-binasinda-sona-gelindi-273251.html,

3.3.6 Relevance

89. The PEEB Project is **relevant** to the development priorities of Turkey, namely its Energy Efficiency Strategy of 2012-2023 that is to be coordinated by DGRE. To achieve the Strategy's goal of reducing at least 20% of the amount of energy consumed per GDP in Turkey by 2023, three "strategical purposes" (or SP's) are targeting decreased emissions from the building sector:

- SP-01: this forces owners of buildings consuming more than 5,000 TOE annually or having space of more than 20,000 m² for commercial or service purposes must conduct energy audits to determine necessary measures to reduce energy intensity;
- SP-02 is decreasing energy demand in carbon emissions of buildings; and to promote sustainable environment friendly buildings using renewable energy sources; and
- SP-06: is using energy effectively and efficiently in the public sector (this would primarily include public sector buildings).

3.3.7 Effectiveness and Efficiency

90. The effectiveness of the PEEB Project has been **highly satisfactory**, despite the Project not reaching its GHG emission reduction targets. The PEEB Project has been effective in its formulation of IBDA as well as its assistance in planning, design, tendering, construction and commissioning of IBDA-designed demonstration buildings, assistance to deliver software on economic assessment of renewable energy for buildings, and in delivering drafts of amended legislation and financial mechanisms such as ESCOs to catalyze and sustain development of EE buildings.

91. The efficiency of the PEEB Project has been rated as **highly satisfactory**. As had been mentioned in Para 51, the Project design seemed a bit ambitious for a 5-year period that ran a high risk of not achieving all of its objectives. However, the majority of this work was done within a 7-year span and with USD 2.62 million, under which the management and implementation performance of the PEEB Project team was sincere and efficient.

92. The design phase of the IBDA-designed demonstration buildings was fraught with risks and delays for 2 reasons:

- first, there is a paradigm difference in the approach of multidisciplinary design teams for an IBDA-designed building in the public sector that would have required more time for local professionals to adopt; and
- second, there was the added difficulties and effort required to prepare tender documents for IBDA-designed demonstration buildings in line with public procurement law.

Despite the design risks, the MoNE demonstration buildings were uniquely designed with innovative materials and equipment with the design consultant, Ekodenge, smartly teaming with a UK-based and German-based Green building designers. This partnership has provided immense capacity building benefits to Ekodenge in its IBDA approach to low carbon buildings in Turkey.

93. During the construction phase of the demonstration buildings, the Project team also incurred another risk in the selection of contractors to construct an IBDA-designed building, a skill set few if any contractors in Turkey had possessed. While the Project provided assistance in the tendering of construction packages for the IBDA-designed buildings through Ekodenge, one for MoNE and the

other for MoEU, the Project experienced a bit of luck in the selection of a competent contractor (through a public tendering process) for the MoNE demonstration buildings on a school campus. Conversely, the contractor for the MoEU 6,000 m^2 demonstration building was unable to carry on with their work after mid-2016, subsequently abandoning their contract, necessitating retendering of the outstanding works to complete the MoEU demonstration building. The works by the MoNE contractor appeared satisfactory with quality control bolstered by the regular presence and supervision of Ekodenge architects and engineers. This building was nearly completed at the time of writing of this evaluation, a very good achievement for the PEEB Project. It is of the opinion of the evaluator that significant efforts by the PEEB Project were placed into ensuring a functional IBDA-designed demonstration building that could be showcased. This effort is completely justifiable.

3.3.8 Country Ownership and Drivenness

94. The drivenness of the Government of Turkey to lower its carbon intensity is reflected in:
    - its 2004 Energy Efficiency Strategy that was followed by the Energy Efficiency Law 5627 in May 2007, and an updated Energy Efficiency Strategy of 2012-2023;
    - its recognition to update its Building Energy Performance (BEP) regulations of December 2008 (that came from its Regulation on Heat Insulation in Buildings for New Buildings of May 2008) through its adaptation to the EU's Energy Performance for Buildings Directive (EPBD);
    - its Energy Efficiency Law 5627 of May 2007 that allows the generation of renewable electricity without an electricity production license (up to 500 kW installed power) that makes electricity production for individual buildings more attractive;
    - its 2015 adoption of the National Energy Efficiency Action Plan (NEEAP) that is in line with Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency. Actions include energy efficiency in buildings (Action 3.2 that includes building renovation strategies, and other energy efficiencies in the building sector), and energy efficiency in public bodies (Action 3.3 that includes central government buildings and buildings of other public bodies).

3.3.9 Mainstreaming

95. The PEEB Project has made efforts for the successful mainstreaming of the UNDCS for Turkey (2011 to 2015)[45]. This includes Project activities that work towards the UNDCS's Priority Area 1: Democratic and Environmental Governance, specifically Outcome 3, "strengthened policy formulation and implementation capacity for the protection of the environment and cultural heritage in line with sustainable development principles, taking into consideration climate change including disaster management with a special focus on gender perspective". To this end, the contribution of the PEEB Project includes the enabling and subsequent strengthening of the relevant ministries within the Government of Turkey, DGRE (within MoNRE) and MoEU, to introduce and implement energy efficiency technologies and measures applicable to improving the energy performance of Turkey's building stock. Moreover, the Project has contributed towards the strengthening of the capacity of these ministries to disseminate best practices for energy efficiency in buildings.

96. The PEEB Project has also contributed to the successful mainstreaming of the updated version of the UNDCS for Turkey (2016 to 2020)[46], notably Result 3 (Outcome 1.3), "by 2020, improved

[45] http://www.un.org.tr/wp-content/uploads/UNDCS.pdf
[46] http://www.un.org.tr/wp-content/uploads/UNDCS-FInal-_2016_-1.pdf

implementation of more effective policies and practices for all men and women on sustainable environment, climate change, biodiversity by national, local authorities and stakeholders including resilience of the systems and communities to disasters". In particular, the PEEB Project has contributed to the introduction of IBDA as a means to design and construct new buildings that would contribute to a lower carbon footprint of buildings in Turkey, addressing climate change, and implementing more effective policies on a sustainable environment.

3.3.10 Sustainability of Project Outcomes

97. In assessing sustainability of the PEEB Project, the evaluators asked "how likely will the Project outcomes be sustained beyond Project termination?" Sustainability of these objectives was evaluated in the dimensions of financial resources, socio-political risks, institutional framework and governance, and environmental factors, using a simple ranking scheme:

- *4 = Likely (L):* negligible risks to sustainability;
- *3 = Moderately Likely (ML):* moderate risks to sustainability;
- *2 = Moderately Unlikely (MU):* significant risks to sustainability; and
- *1 = Unlikely (U):* severe risks to sustainability; and
- *U/A = unable to assess*.

Overall rating is equivalent to the lowest sustainability ranking score of the 4 dimensions.

98. *The overall PEEB Project sustainability rating is likely (L).* This is primarily due to:

- Availability of funds for personnel to continue management of building energy efficiency programs in Turkey, sustained training of these personnel, and adopt and implement IBDA-designed public buildings;
- Strong commitments from both DGRE and MoEU to continue its efforts to enforce compliance with new standards as set by BEP-TR2 and for the collection of energy performance data from large public buildings as a means of building baseline information of energy consumption existing buildings in Turkey;
- the strong impact of the MoNE demonstration building with several government ministries and their statements concerning their desire to replicate IBDA-designed buildings within their own ministries.

Details of sustainability ratings for the IEEIRS Project are provided on Table 8.

3.3.11 Impacts

99. The Project has made significant impacts within the engineering and architectural professions as well as with building developers in Turkey:

- the issuance of the IBDA guidebook, performance issues handbook and adaptation report in 2015 and 2016 was met with demands for more issues of these guidebooks to building engineering and architectural practitioners in Turkey, and to numerous universities and technical colleges throughout the country;

- media articles on MoNE's Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara have created considerable buzz in Turkey especially with respect to the specific energy consumption figures of the building in comparison with existing buildings in Turkey, and the unique green features of the building that reduces its energy consumption. No doubt, this has attracted the attention of several governmental institutions many of whom are willing to adopt the same approach and construct energy efficient buildings. With the opening of this building in late April, the evaluator was informed that senior Turkish Government officials will attend the opening, which will further raise the profile and impact of the PEEB Project; and
- with new MEPS proposed for buildings in Turkey, the Government will then be able to embed the standards into the BEP-TR 2 certification system, forcing building owners and constructors to comply with higher energy efficiency standards for buildings. This will also generate significant impacts from the PEEB Project.

Table 8: Assessment of Sustainability of Outcomes

Actual Outcomes (as of March 2017)	Assessment of Sustainability	Dimensions of Sustainability
Actual Outcome 1: The potential for improved energy efficiency in new and existing buildings has been significantly improved through stronger policies and regulations on building MEPS, stronger institutions (such as DGRE on its role in oversight in building EE programs, and MoEU on its implementing role in providing building energy certificates under BEP-TR2 that includes credits for renewable energy installations, and improved capacities of its building inspectorates).	• *Financial Resources:* DGRE has a large budget in place to continue the integration of buildings EMIS with the EnVer energy efficiency portal. MoEU have budgets in place for its building inspectorates and management of the BEP-TR2 certification system; • *Socio-Political Risks:* Implementation of the Energy Efficiency Strategy of 2012 to 2023 (a large proportion of which is related to building energy efficiency) is strongly backed by the Government of Turkey and is viewed to be of national importance; • *Institutional Framework and Governance:* Both DGRE and MoEU are committed to implementing the Energy Efficiency Strategy within the current arrangement; • *Environmental Factors:* There are no environmental factors that would hinder management of legislation and institutions to improve the performance of energy efficiency of buildings. ***Overall Rating***	4 4 4 4 **4**
Actual Outcome 2: Cost-effective energy efficiency solutions for buildings are being showcased and promoted through the dissemination and training of an Integrated Building Design Approach (IBDA) to a wide cross-section of building professionals in Turkey, and through the completion of an IBDA-designed demonstration building.	• *Financial Resources:* MoNE, based on their experience in the construction of their demonstration building, will avail funds for the construction of new IBDA designed buildings, and retrofitting existing buildings to a higher energy efficiency standard; • *Socio-Political Risks:* Several universities and technical colleges have adopted project produced IBDA design guidebooks for their courses in building designs. IBDA-designed demonstration buildings contribute to the Implementation of the Energy Efficiency Strategy of 2012 to 2023 that is strongly backed by the Government of Turkey and is viewed to be of national importance; • *Institutional Framework and Governance:* Both DGRE and MoEU are strongly engaged in disseminating knowledge to all building professionals on IBDA and the benefits of building energy efficiency; • *Environmental Factors:* There are no environmental factors that would hinder sustained development of IBDA designed demonstration buildings to improve the performance of energy efficiency of buildings. ***Overall Rating***	4 4 4 4 **4**
Actual Outcome 3: New tools such as the MIV toolkit for building inspectors, and the RET-EAT software module for including RETs in buildings, are available to facilitate compliance with higher energy efficiency standards have been developed and introduced to relevant government	• *Financial Resources:* DGRE and MoEU have the budgets to continue the training of its officers in the use of these tools to check compliance to new energy efficiency standards for buildings. This includes continued funding for the maintenance of the bep.gov.tr website that keeps all relevant stakeholders informed of new standards and these tools; • *Socio-Political Risks:* New tools that can facilitate compliance with higher energy efficiency standards only contribute to the implementation of the Energy Efficiency	4 4

Table 8: Assessment of Sustainability of Outcomes

Actual Outcomes (as of March 2017)	Assessment of Sustainability	Dimensions of Sustainability
stakeholders and building professionals .	Strategy of 2012 to 2023 that is strongly backed by the Government of Turkey and is viewed to be of national importance; • *Institutional Framework and Governance:* both DGRE and MoEU are strongly engaged in the integration of these tools with their respective roles on building energy efficiency in Turkey. This includes DGRE oversight in the training of government officers and building professionals in energy management and energy auditing for buildings, and its lead role amending legislation to facilitate energy performance contracting as a means to increase energy efficiency in buildings. This also includes MoEU oversight in the use of the MIV toolkit to evaluate building energy performance, and the integration of RET-EAT software into the BEP-TR2 certification system; • *Environmental Factors:* There are no environmental factors that would hinder sustained use of these tools to improve the performance of energy efficiency of buildings. ***Overall Rating***	4 4 **4**
Actual Outcome 4: Methodologies to calculate building energy consumption and savings have been developed and disseminated; however, due to delays in completing IBDA designed demonstration buildings and the late rollout of the BEP-TR2 certification system, no results of actual energy saved from the demonstration buildings and the new certification system have been generated, and thus no such results have been reported or disseminated during the PEEB Project.	• *Financial Resources:* DGRE has financial resources in place to monitor and calculate energy savings from the IBDA designed demonstration buildings, and from large buildings using over 5000 TOE annually, as a start to what is expected to be a very large buildings energy database. MoEU have funds for building inspectors to monitor construction of new buildings and building retrofits with BEP-TR2 certificates to ensure certificate compliance; • *Socio-Political Risks:* DGRE has a commitment to continued monitoring of building energy consumption (especially for large buildings using over 5000 TOE annually) that require energy audits, through the use of the EMIS and entry onto the EnVer energy efficiency portal; • *Institutional Framework and Governance:* DGRE have personnel in place to carry on with the monitoring of building energy performance that includes personnel managing EMIS and continued training for energy managers and energy auditors. MoEU has over 600 building inspection personnel to monitor compliance of BEP certificate owners to the certificates; • *Environmental Factors:* There are no environmental factors that would hinder sustained monitoring of energy performance of buildings. ***Overall Rating***	4 4 4 4 **4**
	Overall Rating of Project Sustainability:	**4**

4. CONCLUSIONS, RECOMMENDATIONS AND LESSONS

100. The PEEB Project was designed to lower the carbon footprint of the building sector by formulating newer approaches to building construction. This was to be done by raising building energy performance standards through amended legislation, and introducing and demonstrating an integrated building design approach, improving building energy management through the setting up institutionalized building energy monitoring systems within DGRE and MoEU, and disseminating information on building energy efficiency, all within a period of 5 years. Notwithstanding that Project management teams performed admirably to achieve some of these outcomes and outputs, allocated time and budgets for the PEEB Project were simply insufficient to achieve all intended objectives, outcomes and outputs. However, the PEEB Project has positioned the Government and building professionals in Turkey for further growth and scale up of energy efficiency projects for buildings in Turkey.

101. The multitude of tasks to undertake to achieve all objectives of the PEEB Project were fairly daunting likely causing the Project during its early stages to struggle in terms of prioritizing activities for implementation within a compressed schedule of 5 years. Regardless, the performance of the Project team and implementing partner was satisfactory considering the impacts of the achievements of Outcome 3 of the PEEB Project, notably the issuance of the IBDA guidebooks and the near completion of the MoNE demonstration Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara. Looking forward, these 2 critical results will serve as foundations for sustaining building energy efficiency programs in Turkey.

102. In addition, the Project has also provided valuable assistance to the Government of Turkey in the setting of new building MEPS and secondary legislation for higher energy efficiency standards for buildings under Outcome 1. The Project has also provided assistance in developing software tools to integrate renewable energy generation as a credit to building owners with BEP certificates (under Outcome 3), database systems to collect building-related energy performance data (under Outcome 1), and training to building energy managers and energy auditors on best international practices. This has set into motion new requirements for permits for new building construction as well as building retrofits that will affect the energy performance of new building construction for years to come.

103. However, with these positive outcomes from the PEEB Project, the work to transform the building sector to a lower carbon print is far from over:
- Enforcement and compliance surveillance to BEP certifications still remains weak considering the building stock of Turkey which is over 9 million buildings;
- The overall knowledge of building energy management in Turkey still requires strengthening, both in the public and private sectors, and especially the need for structuring energy consumption reporting that is responsive to the requirements of the EnVer energy efficiency portal as well as the EMIS within DGRE that is to be fed into the EnVer portal;
- There is a need to accelerate adoption of IBDA approaches to developing low carbon buildings in Turkey. The PEEB Project has successfully demonstrated the completion of an IBDA-designed building that includes one consortium of engineering and design companies, and one contractor who has successfully constructed and commissioned an IBDA-designed building. If Turkey is to scale up its development of low carbon buildings towards its national goal of 20% reduction in energy intensity by 2023, it will be essential to scale up IBDA related activities for knowledge transfer and capacity building for other engineering and architectural companies and

contractors. In addition, profile of IBDA designed buildings needs to be raised with the public throughout Turkey.

4.1 Corrective actions for the design, implementation, monitoring and evaluation of the project

104. *Action 1 (to UNDP and GEF): Projects should be designed for the delivery of outputs that are proportionate to funding amounts.* For a number of recently completed GEF projects during the period of 2009-2010, poorly planned projects often experience problems in implementation due to incorrect assumptions. In the case of the PEEB Project, the resources required to reduce GHG emissions from the building sector by 2 million tonnes of CO_2 by the EOP (that required the completion of activities related to higher energy efficiency standards for buildings, adoption of an integrated building approach that included formulating the approach as well as completing the design and construction of the demonstration building, improved and institutionalized building energy management, and reporting tangible energy savings from demonstrations and amended legislation) were disproportionate to the availability of US$2.62 million over a period of 5 years. Most importantly, the Project design underestimated the level of effort necessary to design, construct and commission an IBDA-designed building within the public sector. Furthermore, the time required for the formulation and adoption of IBDA within the engineering and architectural professions was severely underestimated.

105. *Action 2 (to UNDP): For projects that involve significant effort to manage capital cost projects, there should be appropriate implementation planning for the preparing the Terms of References, design, tendering, construction planning and management, and commissioning.* For the PEEB Project, this breakdown in planning within Output 2.3 was absent. Furthermore, the Project did not include the time required for the planning of the demonstration buildings that was to have taken place prior to the design of these buildings, and its completion one year before the EOP to obtain one year of energy consumption data. Such planning would have revealed that a significant amount of the Project budget and time would have been expended on these activities, thus providing a more realistic estimate of achievable targets by the EOP. This issue, however, could have been resolved if the project had a proportionate amount of funding for proper project preparation, and support to meet its targets (see Action 1).

4.2 Actions to follow up or reinforce initial benefits from the project

106. *Action 3 (to UNDP and DGRE): Expend remaining resources and efforts to raise the profile of IBDA benefits to higher government officials can more effectively disseminate the integrated building design approach is to a wider spectrum of stakeholders.* This can be accomplished (if not already considered by the PMU and DGRE) through:
    - a high profile event at the opening of the MoNE's Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara. The completion of this IBDA-designed building is an excellent achievement of the PEEB Project that should be exposed to senior government officials as well as several media outlets. Most importantly, this high profile event should disseminate the message that this building has achieve 70% energy savings over similar buildings throughout Turkey at a very attractive capital cost that over the long term, is less expensive than traditional buildings when considering annual energy costs;

- re-engagement of TOKI to respond to their interest in IBDA practices and their investment in mass housing projects throughout Turkey;
- linkages to projects under the Government of Turkey's "Urban Transformation Program". In addition to renewal of Turkey's urban areas through the seismic upgrading of all building stock, this program is also a unique opportunity to ensure that higher energy efficiency standards for the new buildings constructed from this program;
- a high profile terminal workshop for the PEEB Project with government and donors to commit funding to sustain improvements in building energy efficiency in Turkey. In particular, there are needs for continued knowledge transfer and capacity building of government personnel in public building energy management, strengthening enforcement and compliance to BEP certificates, sustained training programs that provide Turkey with best international practices for the design and construction of low carbon buildings, and strengthening institutions in the system for reporting building energy performance amongst public building stock and eventually private building stock;
- sustained linkages to priority educational institutions for the purposes of providing training for trainers on IBDA and other building energy efficiency issues. This would include the involvement of universities and the engineering and architectural professional chambers. The training would include training for energy managers for other ministries and managing energy consumption of public building assets who can then transfer this knowledge to personnel within their own ministries.

4.3 Proposals for future directions underlining main objectives

107. *Action 4 (to DGRE): Increase dialogue with other ministries, programs and stakeholders who are involved with large building projects for adoption of IBDA* including*:*
    - TOKI (see Action 3);
    - Government of Turkey's "Urban Transformation Program" (see Action 3). One of this program's large projects includes the reconstruction of the Kadikoy district in Istanbul[35] where there could be an opportunity to include IBDA approaches for reconstructed buildings;
    - Ministry of National Education whose positive experience with their own IBDA-designed demonstration building in Ankara has led to their expressions of interest in increasing their low carbon building stock. This includes over 9,000 schools in the country all of which could be retrofitted to meet and exceed new building MEPS through an IBDA approach.

108. *Action 5 (to DGRE): Continued development of EMIS will require a strategic approach considering the large and diverse building stock that exists in Turkey. This strategic approach would include defining the objectives of data collection, defining the work required to collect building information from other ministries, action plans, human resources required to carry out this work, and defined milestones. Specifics for a strategic approach may include*:
    - identification of priority sectors from where to obtain building data for EMIS. This may include Public buildings from the existing 166 energy audits of public buildings currently in the possession of DGRE;
    - defining the linkages of EMIS with the EnVer energy portal. Information within the EMIS for building energy can be obtained from most energy audits, and is detailed to the extent that only certain EMIS outputs are required on the EnVer energy portal. As such, EMIS can be used as an

[35] Kadikoy project is with Istanbul Housing Master Plan Enterprise (KIPTAS) and ILBANK

input component into the EnVer energy portal providing the energy portal with complete and accurate information;

- identification of priority ministries to work with on collecting energy information on their building stock. Considering that the total public building energy stock is in the hundreds of thousands of buildings in Turkey (unofficial), DGRE may choose to work with a few ministries such as MoNE given their positive experience with an IBDA-designed building and perceived benefits to MoNE of retrofitting all their buildings to meet new MEPS throughout the country; and
- having a well-defined strategic plan within a 3-year horizon for the sustained development of EMIS and the EnVer energy portal that would facilitate identification of an entity (such as UNDP Croatia) to undertake technical assistance on EMIS after the EOP of the PEEB Project.

4.4 Best and worst practices in addressing issues relating to relevance, performance and success

109. *Best practice: the PEEB Project has focused on activities that are within the control of the Project*. As such, the PMU has managed to:
    - facilitate good progress on the preparations of ToRs (for design consultants, software developers, etc.), tender awards, and the completion of consultant work in an efficient manner; and
    - continue dialogue with multiple partners to sustain their engagement and interest in the PEEB Project.

    The Project assisted, as requested by DGRE and MoEU, in the amendments of the regulatory framework.

110. *Scope for improved practice: Beneficiary agencies of GEF project funds would prefer if there were consistency of personnel between the project preparation phase and implementation of the project. Such an arrangement would increase the likelihood of project success.* In the case of the PEEB Project, personnel new to the PEEB Project during its implementation were required to become familiar with the project design and how it was to be implemented. This familiarity phase would not be required if the same person preparing the project were to implement it.

111. *Best practice: Project management personnel need to set up vendor shortlists through good networking and discussions with preferred vendors*:
    - this would reduce or minimize the risks of contracting a substandard or insolvent contractor;
    - this would be particularly important in the procurement of services that are innovative or new and knowing that there would be very few competent vendors to provide innovative services or goods;
    - PMU should have staff with a good international network of professionals to minimize risks; and
    - PMU personnel should recognize that hiring contractors for smaller contracts carries higher risks that are very difficult to mitigate. Smaller contractors inherently have higher risks of defaulting a contract. As such, PMU personnel should try to avoid smaller contracts, and bundle such work in the hopes of attracting a larger more solvent contractor.

112. *Worst practice: Projects with a high level of ambition need an appropriate level of funding and time to meet intended objectives*. On the PEEB Project, additional time and funds could have been used to:
    - Further strengthen BEP enforcement regimes within MoEU to strengthen compliance after energy certification with guidance from DGRE on stronger penalties for noncompliance;
    - Provide additional energy manager training for other ministries;
    - Strengthen reporting of energy information from other ministries as a pilot to EMIS and the EnVer energy portal;
    - Continue support of the completion of construction and commissioning of the IBDA-designed demonstration buildings. These activities clearly needed more time; and
    - Support the monitoring of energy consumption for one year and disseminate this information.

113. *Worst practice: Projects should try to fairly reimburse vendors for increases in project scope*. In the case of the PEEB Project, the contract for services from the Ekodenge Consortium was raised 33% for an overall increase in scope by a factor of 5. While the project was very fortunate to have had Ekodenge accept these changes in terms of reference, it is definitely very poor business practice to impose these conditions on a private sector company. This practice should be avoided at all costs by UNDP in future, as the institution would only get a bad reputation if these business practices persist. The result of such practices would only reduce the trust of innovative vendors such as Ekodenge from bidding on innovative projects such as the PEEB Project which would only impede the progress of UNDP's innovative development projects.

APPENDIX A – MISSION TERMS OF REFERENCE FOR PEEB PROJECT TERMINAL EVALUATION

1. Introduction

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP support GEF financed projects are required to undergo a terminal evaluation upon completion of implementation. These terms of reference (TOR) sets out the expectations for a Terminal Evaluation (TE) of the *"Promoting Energy Efficiency in Buildings in Turkey (EE Buildings)"* (PIMS 3646).

The essentials of the project to be evaluated are as follows:

Project Summary Table

<table>
<tr><td>Project Title:</td><td colspan="4">Promoting Energy Efficiency in Buildings (EE Buildings)</td></tr>
<tr><td>GEF Project ID:</td><td>3646 (PMIS#)</td><td></td><td>at endorsement (US$)</td><td>at completion (US$)</td></tr>
<tr><td>UNDP Project ID:</td><td>3646 (PIMS#)
00059262 (Atlas ID)</td><td>GEF financing:</td><td>2,620,000</td><td>2,620,000</td></tr>
<tr><td>Country:</td><td>Turkey</td><td>IA/EA own:</td><td>60,000</td><td>60,000</td></tr>
<tr><td>Region:</td><td>RBEC</td><td>Government:</td><td>7,600,000</td><td>7,600,000</td></tr>
<tr><td>Focal Area:</td><td>CCM</td><td>Other:</td><td></td><td></td></tr>
<tr><td>FA Objectives, (OP/SP):</td><td>CC-SP1</td><td>Total co-financing:</td><td>7,300,000</td><td>7,300,000</td></tr>
<tr><td>Executing Agency:</td><td>DG for Renewable Energy under the Ministry of Energy and Natural Resources</td><td>Total Project Cost:</td><td>17,580,000</td><td>17,580,000</td></tr>
<tr><td rowspan="2">Other Partners involved:</td><td rowspan="2">Ministry of Environment and Urbanisation (MoEU)
Ministry of National Education (MoNE)</td><td colspan="2">ProDoc Signature (date project began):</td><td>30 July 2010</td></tr>
<tr><td>(Operational) Closing Date:</td><td>Proposed: May 2014</td><td>Actual: December 2016</td></tr>
</table>

2. Objective and Scope

The project was designed to reduce energy consumption and associated GHG emissions in public buildings in Turkey by raising building energy performance standards, improving enforcement of building codes, enhancing building energy management and introducing the use of an integrated building design approach.

This is envisioned to be achieved by 1) Revising and enforcing building energy performance standards 2) Introducing integrated building design approach in Turkey 3) Promoting best energy practices in the building sector and 4) Monitoring, learning, adaptive feedback and evaluation.

This objective is envisioned to be achieved by four outcomes:

Outcome 1: Improved energy efficiency in new and existing buildings through stronger regulations, institutions and implementers;

Key Questions include:

- To what extent have the activities of the project led to improved new legislation, including the adoption of Minimum Building Energy Performance Standards (MBEPs)
- To what extent have the activities of the project led to improvement in legislation, including the adoption of nearly Zero Energy Buildings approach in the public sector in Turkey
- To what extent have the activities of the project led to improved legislation and regulations to facilitate the introduction and implementation of an energy management information system (EMIS) for public buildings across all Turkey
- To what extent have the activities of the project led to capacity improvement of the building inspectors

Outcome 2: Cost-effective energy efficiency solutions showcased and promoted through "Integrated Building Design Approach (IBDA)" approach;

Key Questions include:

To what extent have the activities of the project lead to full adoption of Integrated Building Design Approach (IBDA) for all new public buildings in Turkey

Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards; and

Key Questions include:

- What new tools have been developed by the project to facilitate compliance with higher energy efficient standards (e.g – renewable energy technologies tool, others) and how useful are these tools? To what extent are they being used and helping the government of Turkey with compliance with higher energy-efficiency standards?
- To what extent the infrastructure of the website (bep.gov.tr) has been developed

Outcome 4: Building energy consumption, energy savings, and other results of the project monitored, evaluated, reported and disseminated.

Key Questions include:

- To what extent has the project managed to successfully replicate and implement the energy management information system (EMIS) and national buildings database from Croatia?

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

The objectives of the evaluation are to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

3. Evaluation approach and method

An overall approach and method[36] for conducting project terminal evaluations of UNDP supported GEF financed projects have developed over time. The evaluator is expected to frame the evaluation effort using the criteria of **relevance, effectiveness, efficiency, sustainability, and impact,** as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. A set of questions covering each of these criteria have been drafted and are included with this TOR (*Annex C*) The evaluator is expected to amend, complete and submit this matrix as part of an evaluation inception report, and shall include it as an annex to the final report.

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluator is expected to follow a participatory and consultative approach ensuring close engagement with government counterparts, in particular the GEF operational focal point, UNDP Country Office, project team, UNDP GEF Technical Adviser based in the region and key stakeholders. The evaluator is required to conduct a field mission to Ankara and/or İstanbul for a minimum of 10 full working days (not including travel days) to meet as many project partners and stakeholders as possible. Interviews will be held with the following organizations and individuals at a minimum:

- Ministry of Energy and Natural Resources, DG for Renewable Energy (Executing Agency),
- Ministry of Environment and Urbanisation (MoEU)
- Ministry of National Education (MoNE)
- UNDP Turkey Country Office
- UNDP Project Manager and Project Team
- Project Managers of other UNDP GEF EE projects in Turkey,
- UNDP Istanbul Regional Centre – Regional Technical Advisor on Climate Change
- Ministry of Development
- Ministry of Finance
- Ministry of Forestry and Water Affairs (GEF OFP)

In the event that a second 1-2 day mission to Ankara is required at the end of the assignment to present the final findings and report, this should be by mutual agreement and the additional cost of this mission will be covered by the UNDP CO in case it is required. The days for this mission will be as part of the original 28 days. The evaluator will review all relevant sources of information, such as the project document, project reports including Annual APR/PIR, project budget revisions, midterm review, progress reports, GEF focal area tracking tools, project files, national strategic and legal documents, and final lessons learned study and any other materials that the evaluator considers useful for this evidence-based

[36] [2] For additional information on methods, see the Handbook on Planning, Monitoring and Evaluating for Development Results, Chapter 7, pg. 163

assessment. A list of documents that the project team will provide to the evaluator for review is included in Annex B of this Terms of Reference.

4. Evaluation Criteria & Ratings

An assessment of project performance will be carried out, based against expectations set out in the Project Logical Framework/Results Framework (see Annex A), which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: **relevance, effectiveness, efficiency, sustainability and impact.** Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary. The obligatory rating scales are included in Annex D.

Evaluation Ratings:			
1. Monitoring and Evaluation	***rating***	**2. IA& EA Execution**	***rating***
M&E design at entry		Quality of UNDP Implementation	
M&E Plan Implementation		Quality of Execution - Executing Agency	
Overall quality of M&E		Overall quality of Implementation / Execution	
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental:	
		Overall likelihood of sustainability:	

5. Project finance / cofinance

The Evaluation will assess the key financial aspects of the project, including the extent of co-financing planned and realized. Project cost and funding data will be required, including annual expenditures. Variances between planned and actual expenditures will need to be assessed and explained. Results from recent financial audits, as available, should be taken into consideration. The evaluator will receive assistance from the Country Office (CO) and Project Team to obtain financial data in order to complete the co-financing table below, which will be included in the terminal evaluation report.

Co-financing (type/source)	UNDP own financing (mill. US$)		Government (mill. US$)		Partner Agency (mill. US$)		Total (mill. US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants								
Loans/Concessions								
○ In-kind support								
○ Other								
Totals								

6. Mainstreaming

UNDP supported GEF financed projects are key components in UNDP country programming, as well as regional and global programmes. The evaluation will assess the extent to which the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

7. Impact

The evaluators will assess the extent to which the project is achieving impacts or progressing towards the achievement of impacts. Key findings that should be brought out in the evaluations include whether the project has demonstrated: a) improvements in ecological status as measured through the achievement of significant greenhouse gas emission reductions, b) verifiable reductions in stress on ecological systems, and/or c) demonstrated progress towards these impact achievements[37].

8. Conclusions, Recommendations and Lessons

The evaluation report must include a chapter providing a set of **conclusions**, **recommendations** and **lessons**.

9. Implementation Arrangements

The principal responsibility for managing this evaluation resides with the UNDP CO in Turkey with the advice and support of the UNDP Istanbul Regional Centre. The UNDP CO will contract the evaluator and ensure the timely provision of per diems and travel arrangements within the country for the evaluator. The Project Team will be responsible for liaising with the evaluator to set up stakeholder interviews, arrange field visits, coordinate with the Government etc.

10. Evaluation Timeframe

The total duration of the evaluation will be 28 working days (of which a minimum of 10 working days will take place in Turkey) according to the following plan:

[37] A useful tool for gauging progress to impact is the Review of Outcomes to Impacts (ROtI) method developed by the GEF Evaluation Office: ROTI Handbook 2009

Activity	Timing	Estimated Completion Date
Preparation	*3* working days	*October 2016*
Evaluation Mission	*10* working days	*November 2016*
Draft Evaluation Report	13 working days	*End of November 2016*
Final Report	*2* working days	*15 December 2016*

11. Evaluation Deliverables

The evaluation team is expected to deliver the following:

Deliverable	Content	Timing	Responsibilities
Inception Report	Evaluator provides clarifications on timing and method	No later than 2 weeks before the evaluation mission.	Evaluator submits to UNDP CO
Mission to Turkey	Travel to Turkey for meetings with all project stakeholders	October 2016	UNDP CO to arrange travel and accommodation for the Evaluator
Presentation	Initial Findings	End of evaluation mission	To project management, UNDP CO
Draft Final Report	Full report, (per annexed template) with annexes	Within 2 weeks of the evaluation mission	Sent to CO, reviewed by RTA, PCU, GEF OFPs
Final Report[38]	Revised report	Within 1 week of receiving UNDP comments on draft	Sent to CO for uploading to UNDP ERC.

12. Place of Work

The assignment is home-based with minimum one travel to Turkey depending on the project needs, as well as, the duties and responsibilities of the consultant. It is estimated that one mission of up to ten working days will be needed to Ankara and/or Istanbul. Ten working days in Ankara and/or Istanbul do not include travel days which should be outside of the 10 full working days to be spent in Ankara and/or Istanbul. The timing and duration of all missions are subject to the pre-approval of UNDP.

The costs of missions will be borne by UNDP. The costs of these missions may either be;

- Arranged and covered by UNDP CO from the respective project budget without making any reimbursements to the consultant or
- Reimbursed to the consultant upon the submission of the receipts/invoices of the expenses by the consultant and approval of the UNDP. The reimbursement of each cost item is subject

[38] When submitting the final evaluation report, the evaluator is required also to provide an 'audit trail', detailing how all received comments have (and have not) been addressed in the final evaluation report.

to the following constraints/conditions provided in below table;

- covered by the combination of both options

Cost item	Constraints	Conditions of Reimbursement
Travel (intercity transportation)	full-fare economy class tickets	1- Approval by UNDP of the cost items before the initiation of travel 2- Submission of the invoices/receipts, etc. by the consultant with the UNDP's F-10 Form 3- Acceptance and Approval by UNDP of the invoices and F-10 Form.
Accommodation	Up to 50% of the effective DSA rate of UNDP for the respective location	
Breakfast	Up to 6% of the effective DSA rate of UNDP for the respective location	
Lunch	Up to 12% of the effective DSA rate of UNDP for the respective location	
Dinner	Up to 12% of the effective DSA rate of UNDP for the respective location	
Other Expenses (intra city transportations, transfer cost from /to terminals, etc.)	Up to 20% of effective DSA rate of UNDP for the respective location	

13. Team Composition

The evaluation team will be composed of 1 international evaluator. The evaluator shall have prior experience in evaluating similar projects. Experience with GEF financed projects is an advantage. The International Evaluator will be responsible for finalizing the report following comments from UNDP and other stakeholders. The International Evaluator selected should not have participated in the project preparation and/or implementation of the project and should not have conflict of interest with project related activities.

The evaluator must present the following qualifications:

- At least a first degree in science or engineering with minimum six years of relevant energy related M&E professional experience or related field
- Demonstrated technical knowledge in energy efficiency, in particular of buildings and experience working on technical assistance projects related to energy efficiency
- Previous experience in evaluating technical assistance projects for international organizations, including GEF projects
- Demonstrated ability to assess complex situations, succinctly distils critical issues, and draw forward-looking conclusions and recommendations;
- Excellent in human relations, coordination, planning and team work.
- Have exemplary written and oral communication skills in English, be fully IT literate
- Previous experience with results-based monitoring and evaluation methodologies;
- Proven track record of application of results-based approaches to evaluation of projects

focusing on energy efficiency;
- Knowledge of and recent experience in applying UNDP and GEF M&E policies and procedures is an asset.
- Fluent in English both written and spoken.

14. Evaluator Ethics

The International Evaluation Consultant will be held to the highest ethical standards and are required to sign a Code of Conduct (Annex E) upon acceptance of the assignment. UNDP evaluations are conducted in accordance with the principles outlined in the UNEG 'Ethical Guidelines for Evaluations'.

15. Payment Modalities and Specifications

%	Milestone
20%	Approval of Inception Report by UNDP Turkey
50%	Approval of the 1st draft terminal evaluation report
30%	Approval (UNDP-CO and UNDP RTA) of the final terminal evaluation report

APPENDIX B – MISSION ITINERARY (FOR FEBRUARY 2017)

#	Activity	Stakeholder involved	Place
***February 19, 2017** (Sunday)*			
	Arrival of Roland Wong in Ankara		
February 20, 2017 (Monday)			
1	Briefing meeting with Ms. Asli Karabacak of the PMU of PEEB Project	UNDP	Ankara
2	Briefing meeting with NPD, Mr. Erdal Çalıkoğlu, Project Director, DGRE	DGRE	Ankara
February 21, 2017 (Tuesday)			
3	Meeting with Mr. Murat Akinbingo, General Director, MoEU	MoEU	Ankara
4	Meeting with Mr. Korkmaz Gul and Mr. Oguz Kabakci, DGRE	DGRE	Ankara
February 22, 2017 (Wednesday)			
5	Meeting with Mr. Serhat Ünaldı, Division Director, Ministry of National Education (Ankara Province)	MoNE	Ankara
6	Meeting with Dr. Celal Abdi Guzer, Middle East Technical University	Middle East Technical University	Ankara
7	Ms. Esra Tombak, Branch Chief Architect of MoEU	MoEU	Ankara
February 23, 2017 (Thursday)			
8	Meeting with Ekodenge staff, design consultants for IBDA buildings	Ekodenge	Ankara
	Site visit to MoNE's Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building in Ankara	MoNE	Ankara
February 24, 2017 (Friday)			
9	Meeting with Ms. Denise Tapan, UNDP Turkey Communications Administrator	UNDP Turkey	Ankara
10	Meeting with Mr. Goran Cacic, UNDP Croatia	UNDP Croatia	Ankara
11	Meeting with Mr. Korkmaz Gul and Mr. Oguz Kabakci, DGRE	DGRE	Ankara
February 25-26, 2017 (Saturday and Sunday)			
	Work on report		

#	Activity	Stakeholder involved	Place
February 27, 2017 (Monday)			
12	Meeting with Necmettin Tokur, UNDP Energy Efficiency Advisor	UNDP Turkey	Ankara
13	Meeting with Mr. Kubilay Kavak, Coordinator of UNDP-GEF-DGRE Project "Improving Energy Efficiency in Industry"	DGRE	Ankara
14	Evaluation De-Briefing with Mr. Mr. Erdal Çalıkoğlu, Project Director, DGRE, Ms. Pelin Redoplu, Head of Energy and Environment Cluster for UNDP Turkey, Ms. Asli Karabacak of the PMU of PEEB Project	UNDP Turkey, DGRE	Ankara
February 28, 2017 (Tuesday)			
	Travel from Ankara to Istanbul		
15	Meeting with Mr. John O'Brien, RTA, Istanbul Regional Hub	UNDP Regional	Istanbul
March 1, 2017 (Wednesday)			
	Departure from Istanbul	UNDP	
April 14, 2017 (Friday)			
16	Skype call with Mr. Tolga Yakar	UNDP	Vancouver, Canada

Total number of meetings conducted: 16

APPENDIX C – LIST OF PERSONS INTERVIEWED

This Draft is a listing of persons contacted in Ankara and Istanbul (unless otherwise noted) during the Terminal Evaluation Period only. The Evaluator regrets any omissions to this list.

1. Mr. John O'Brien, UNDP Regional Technical Advisor for CCM, Istanbul Regional Hub;
2. Ms. Pelin Rodoplu, Portfolio Manager, UNDP Turkey;
3. Mr. Necmettin Tokur, Energy Efficiency Advisor, UNDP Turkey;
4. Ms. Asli Karabacak, Project Manager, UNDP-PEEB, Ankara;
5. Ms. Denise Tapan, UNDP Communications Administrator, Ankara;
6. Mr. Kubilay Kavak, Coordinator of UNDP-GEF-DGRE Project "Improving Energy Efficiency in Industry";
7. Dr. Muhyettin Sirer, Project Manager, "Integrated Resource Efficiency in Agriculture and Agro Industries in Southeast Anatolia, Sanliurfa, Turkey;
8. Mr. Goran Cacic, UNDP Croatia;
9. Mr. Tolga Yakar, former Project Manager for PEEB, Islamic Development Bank;
10. Mr. Erdal Çalıkoğlu, National Project Director and Deputy General Director of DGRE;
11. Mr. Korkmaz Gul, Mechanical Engineer, Dept of Energy Efficiency, DGRE;
12. Mr. Oguz Kabakci, Assistant Expert, DGRE;
13. Ms. Esra Tombak, DG for Professional Services and Branch Chief Architect, MoEU;
14. Mr. Murat Akinbingo, Deputy General Director, Gernal Directorate of Construction Works, MoEU;
15. Mr. Serhat Ünaldı – Division Director, the Ministry of National Education, Ankara Province;
16. Prof. Celal Abdi Guzer, Faculty of Architecture, Middle East University, Ankara;
17. Ms. Seda Yontem, Architect Group Manager, Ekodenge, Ankara;
18. Mr. Emre Yontem, Electrical Engineer, Member of Board, CTO, Ekodenge, Ankara;
19. Ms. Duygu Basoglu, Architect, Urban Planner, Architecture Group, Ekodenge, Ankara;
20. Dr. Ibrahim Cakmanus, Board Chairman, Mech, Eng., Fan Filter Technologies, Ankara.

APPENDIX D – LIST OF DOCUMENTS REVIEWED

1. UNDP Project Document for the "Promoting Energy Efficiency in Buildings in Turkey" (PEEB Project);
2. Background Report for the Project: Promoting Energy Efficiency in Buildings in Turkey (PIMS 3646) by Lisa Suprenant, 2011;
3. UNDP-TUR-RFP-PROJ (EEB) 2011/02, Inception Report, October 9, 2012;
4. PIRs from 2012 to 2016;
5. Midterm Evaluation of the UNDP-GEF Project "Promoting Energy Efficiency in Buildings in Turkey (EE Buildings) by Andreas Karner, May 2013;
6. PEEB Project Training Materials for Energy Managers (sections A to Y), 2017;
7. Promoting Energy Efficiency in Buildings in Turkey (Baseline Study Update) by Suleyman M. Bulut, 2011;
8. Promoting Energy Efficiency in Buildings in Turkey (Baseline Study Update) by Suleyman M. Bulut, September 2012;
9. Ministry of Energy and Natural Resources, General Directorate of Renewable Energy, "Integrated Building Design Approach (IBDA), Report on Adapting IBDA to the Context and Conditions in Turkey" (ISBN: 9786055310905), May 2016 (English translation);
10. Ministry of Energy and Natural Resources, General Directorate of Renewable Energy, "IBDA - Implementation Guide for Developing Projects" (ISBN: 978-605-5310-91-2), May 2016 (English translation);
11. Steget Work Presentation on the "Provision of Services for Developing Minimum Building Energy Performance Standards (MBEPS) and Nearly Zero Energy Buildings (nZEB) Approach for Turkey, February 22, 2017;
12. Ministry of Energy and Natural Resources, General Directorate of Renewable Energy, "Energy Efficiency Strategy Paper, 2012 to 2023;
13. Awareness raising material that included press clippings, videos and Web media.

APPENDIX E – GHG EMISSION REDUCTION REPORT

1. Introduction

The objective of the project, 'Promoting Energy Efficiency in Buildings' in Turkey (EE Buildings) was to reduce energy consumption and associated GHG emissions in public buildings in Turkey by

- Demonstration the use of Integrated Building Design approach
- Raising building energy performance standards
- Improving enforcement of building code
- Enhancing building energy management
- Introducing the use of an integrated building design approach.

The targeted reduction[39] in the emission of GHG were as given below.

Indicator	Baseline	Targets
Average total energy consumption (for heating, cooling, ventilation and lighting) in new residential and non-residential buildings	Residential: 200 kWh/m^2/year Non-residential: 321 kWh/m^2/year	Non-residential: 193 kWh/m^2/year for buildings built using Integrated Building Design Approach (IBDA)
Cumulative CO_2 emission reductions from new buildings to be built during project lifetime against the baseline		2 million tCO_2

With the project coming to an end a 'Terminal Evaluation' of the project is being carried out. One of the aspects to be evaluated during the 'Terminal Evaluation' is the GHG emission reductions delivered through project activities over the lifetime of the project and over the lifetime of the measures implemented through the project.

UNDP CO Turkey has retained the services of an international consultant, Dinesh Aggarwal (India) to carryout this specific task. It is considered that the work of the international consultant for GHG monitoring will provide the inputs for the 'Terminal Evaluation' of the project (for which UNDP CO has retained the services of a separate International Consultant).

This report provides the details of the projected GHG emission reductions due to the project. In accordance with the GEF Methodology for GHG emission reductions, the assessment of the GHG emission reduction due to the project has been carried out under three categories as follows:

- Direct GHG emission reductions during the project
- Direct GHG emission reductions – Post project
- Indirect GHG emission reduction

[39] As per revised log-frame of the project

2. EE Buildings Project and GHG emission reduction

The EE buildings project at Turkey, was aimed at reducing the energy consumption and associated GHG emissions in the public buildings in Turkey. The objective of the project is, 'to reduce energy consumption and associated GHG emissions in buildings in Turkey by raising building energy performance standards, improving enforcement of building codes, enhancing building energy management and introducing the use of an integrated building design approach'. The project is organized into four components as follows:

Outcome 1: Improved energy efficiency in new and existing buildings through stronger regulations, institutions and implementers
Output 1.1 Existing legislative framework on building energy efficiency improved **Output 1.2** Framework for an Information System on Building Energy Consumption developed **Output 1.3** Supporting the implementation of Energy Efficiency Strategy for the building sector **Output 1.4** Capacity of building inspectorates in regard to energy efficiency regulations and enforcement strengthened
Outcome 2: Cost-effective energy efficiency solutions showcased and promoted through Integrated Building Design Approach (IBDA) and trainings
Output 2.1 IBDA for Turkish climatic conditions developed and followed in design of new public buildings **Output 2.2** IBDA promoted to building sector professionals and key stakeholders **Output 2.3** Demonstration buildings implemented according to IBDA design and construction principles
Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards
Output 3.1 "Monitoring, Inspection and Verification (MIV)" methodology and tools for Building Energy Performance regulation developed **Output 3.2** Training materials on energy management and energy auditing for buildings developed and trainings delivered. **Output 3.3**.Financial mechanisms/tools to promote "Energy Efficiency and Renewable Energy" in buildings surveyed and/or developed **Output 3.4** Building Energy Performance website infrastructure improved
Outcome 4: Building energy consumption, energy savings, and other results of the project monitored, evaluated, reported and disseminated
Output 4.1 Methodology for monitoring and measuring project savings due to revised regulations, IBDA implementation and promotion, and newly developed new tools **Output 4.2** Preparing "Mid-term" and "Final" project reports; Calculating and sharing energy savings and GHG emission reductions achieved through the project **Output 4.3** Project results, outputs and lessons learned are effectively disseminated along with key awareness-raising measures on energy efficiency in buildings

Direct GHG emission reduction due to the project will happen due to implementation of the demonstration buildings, using IBDA under Output 2.3 of the project. Promotion of IBDA would led to its replication for other buildings leading to indirect GHG emission reductions. Indirect GHG emission reductions would also happen due to improvement in the legislative framework for building energy efficiency (Output 1.1), wherein it is proposed to replace the Building Reference Approach (in the Baseline) for approval of new buildings with the Minimum Energy Performance Standards (MEPS) (to be worked

out and implemented under the project). Indirect GHG emission reductions due to MEPS would happen only for the new buildings constructed after implementation of MEPS becomes mandatory. New buildings would get constructed due to increase in the demand or for demolishing and reconstruction of the old buildings. In case of any regulation (or policy for promotion) regarding retrofitting of the old buildings with the insulations, there will be indirect GHG emission reductions due to such an activity. However, it is to be noted that promotion of retrofitting of the old buildings with insulations etc. is not a part of the present GEF project.

The other Outputs (other than 1.1 and 2.3) of the project would facilitate implementation of the regulations and replication of the IBDA, thus facilitating indirect GHG emission reductions. The extent of energy savings and hence the indirect GHG emission reductions would depend upon the success of the enabling activities carried out under the these Outputs of the project

3. Approach and Methodology

GHG emission reductions has been determined in accordance with the guidelines provided in the latest version[40] of the Manual describing GEF methodology for calculating greenhouse gas (GHG) benefits for the energy efficiency (EE) projects. Within the GEF methodology for determination of GHG benefits of the EE projects, the module specific to the 'Building Codes' has been used. Accordingly, the GHG emission reductions due to the projects has been determined in the following three categories;

- Direct GHG emission reduction: These estimates has highest level of accuracy and certainties
- Direct GHG emission reduction – post project: These estimates has reasonable level of accuracy and medium level of certainties
- Indirect GHG emission reduction (Top Down Approach): These estimate has low level of accuracy and certainties

Direct GHG emission reductions has been computed as those achieved by project investments (e.g. demonstration projects and discrete investments financed or leveraged during the GEF project implementation) from the project start to the project closure. Direct post-project emission reductions has been computed as those GHG emission reductions, which are likely to be achieved (after the project but determined ex-post) due to the support under the project which is available post project (e.g. finance due to revolving funds created under the project). As there are no activities under the project which would provide the support for mitigation activities post project, there will be no direct-post project GHG emission reductions due to the project. Indirect GHG emission reductions has been determined as those which are likely to happen due to market facilitation and development through project-supported policy and institutional frameworks, capacity building, information gathering, and replication effects of demonstration activities. In accordance with the GEF methodology for GHG emission reductions, CO2 is he only GHG which has been covered.

Baseline emissions has been determined using the base year data given in the Project Document and the revised baseline study for the project (carried out in the year 2013). For the purpose of determining the baseline emissions a dynamic baseline has been used. Dynamic baseline takes take into account the likelihood that some improvements will occur in the absence of GEF intervention. The project emissions has been computed based on the likely reduction in the specific energy consumption (kWh/m^2/ year) of

[40] In 2008, the GEF published a Manual describing its methodology for calculating greenhouse gas (GHG) benefits for its energy efficiency (EE), renewable energy (RE), and clean energy technology projects. In the year 2013 the GEF Scientific and Technical Advisory Panel (STAP) developed a revised methodology/algorithm for calculating GHG benefits of GEF EE projects.

the new buildings and the number of new buildings likely to be constructed. Secondary data and projections by different government agencies as provided in the baseline study has been used to determine the new buildings (and the floor area) which are likely to be constructed during the projection period.

The indirect GHG emission reduction estimates has been determined by first determining the total GHG emission reduction potential (tCO_2) and discounting it using the Causality factor (CF). The Causality Factor indicates the level of attribution of the GEF intervention to full market. This is to take into account the fact that some or all the potential may be achieved without a GEF intervention due to market forces or government policies beyond those created by the project. The level and value of the GEF Causality Factor has been determined after reviewing the Project Document and in consultation with the project team / UNDP. Estimates of direct and indirect GHG emission reductions has been computed separately applying the numerical values for uncertainties that are appropriate to each of the computations.

In accordance with the TOR the potential GHG emission reductions has been determined specifically for the following conditions:

- If IBDA is applied to the new buildings.
- Minimum Building Energy Performance Standards (MBEPS) are adapted and replaces the Reference Building Approach for approval of new buildings (as used in the Baseline case).
- Renewable Energy Technologies- Economical Analysis Tool (RET-EAT) software is run by MoEU effectively and RET is promoted by the Government.

Apart from the above specific conditions the indirect GHG emission reduction has been determined based on the assessment regarding the likely replication of the IBDA and the extent of the implementation of MBEPS.

The assignment has been carried out based on the review of the documents and interviews with the project team, consultation with the international consultant for Terminal Evaluation, interviews with selected key stakeholders. The assignment involve a four day mission to Turkey. The four day mission was carried out starting 20 Feb 2017. The mission overlapped with the mission by the international consultant for Terminal Evaluation.

During the mission consultation were carried out with the project team, UNDP CO at Turkey, The consultants for the Terminal Evaluation and a couple of other stakeholders. A visit to the site of the pilot projects was also carried out.

4. Direct GHG emission reductions

As stipulated before, direct GHG emission reductions are those which are likely to the achieved by project investments (e.g. demonstration projects and discrete investments financed or leveraged during the project implementation) from the project start to the project closure. Direct post-project emission reductions are those GHG emission reductions, which are likely to be achieved (after the project but determined ex-post) due to the support under the project made available after the closure of the GEF project (e.g. funds and other support made available from the revolving funds created as a part of the project).

The EE Buildings Project at Turkey has supported implementation of two demonstration projects using IDBA (Output 2.3). Details of the two demonstration projects are as follows;

Building -1- Sincan-Etimesgut Directorate of Land Registry and Cadastre Service Building	
Building Use Type	Office
Area (m^2)	5986
Baseline Sp. Energy Consumption (kWh /m^2/yr)	237.58
IBDA Specific Energy Consumption (kWh /m^2/yr)	37.32
Savings (MWh / Yr.)	1199
Expected Yr. of Commissioning of Building	2019

Building -2 - Etimesgut-Eryaman Cezeri Green Technology Technical and Industrial Vocational High School Building	
Building Use Type	School
Area (Sq. M)	21940
Baseline Sp. Energy Consumption (kWh /m^2/yr)	282.45
IBDA Specific Energy Consumption (kWh /m^2/yr)	47.63
Savings (MWh / Yr.)	5152
Expected Yr. of Commissioning of Building	2017

Building 1, comprises of one single building block, whereas Building 2 comprises of 4 individual building blocks within a building complex. Baseline specific energy consumption for the two buildings has been taken as those which were projected by the designers of the building as those for the buildings which would have been constructed in the business as usual scenario. It may be noted that against the values of the baseline specific energy consumption considered the values as per the prevailing rules for approval of the new buildings (Building Reference Approach[41]) is much more (300 and 285 for building one and two respectively considering class C buildings in climate zone 3). Thus, the values of specific energy consumption in the baseline would lead to a conservative estimate of the GHG emission reduction due to the project. The specific energy consumption which would be achieved for the two buildings due to use of IBDA has been determined by the designers of the buildings using 'Building Energy Simulation Software'.

None of the two demonstration buildings has been commissioned during the implementation phase of the project. However, the project would lead to Direct GHG emission reductions, over the lifetime of the buildings once the two demonstration buildings are commissioned. Construction of demonstration building 1 has suffered some technical problems and its completion and commissioning would be significantly delayed. At the time of Terminal Evaluation only the RCC frame of the building was ready. Based on the discussions with the project team it is estimated that building 1 is expected to be completed by the end of the year 2018. Thus it would be possible to commission this building in the year 2019. At the time of Terminal Evaluation Building 2 was almost ready for commissioning.

Considering the operational life of the buildings as 20 years the two buildings would lead to the savings of 127020 MWh ((1199+5152)*20) over there operational lifetime. GHG emission factor has been considered as 0.20 tons of CO2 /MWh. This is the emission factor for natural gas[42]. The use of the emission factor for natural gas has been considered as most appropriate in the present case, firstly because it is the

[41] Details regarding the Building Reference Approach as is being used at Turkey are provided as Annexure 1

[42] 2006 IPCC Guidelines for National Greenhouse Gas Inventories specifies the default emission factor for stationery combustion for natural gas as 56100 Kg CO2/ TJ

fossil fuel with least emission factor leading to computations of GHG emission reduction on the conservative side and secondly because most of the energy demand in the buildings is for heating for which natural gas is generally used. *Based on this the direct GHG emission reductions due to the project is estimated as 25,400 tons of CO_2*.

As has been mentioned before there are no Direct – Post project GHG emission reductions due to the project.

5. Indirect GHG emission reductions

Indirect GHG emission reductions are those which are achieved as a result of market facilitation and development through project-supported policy and institutional frameworks, capacity building, information gathering, and replication effects of demonstration activities.

Under the present project two demonstration projects, demonstrating the use of IDBA has been implemented. Promotion of IBDA would led to its replication for other buildings leading to indirect GHG emission reductions. Indirect GHG emission reductions would also happen due to improvement in the legislative framework for building energy efficiency (Output 1.1), wherein it is proposed to replace the Building Reference Approach (in the Baseline) for approval of new buildings with the Minimum Energy Performance Standards (MEPS) (to be worked out and implemented under the project). Indirect GHG emission reductions due to MEPS would happen only for the new buildings constructed after implementation of MEPS comes into force. The extent of indirect GHG emission reductions due to MEPS will also depend upon the level of compliance with the new regulation.

New buildings would get constructed either due to increase in the demand or demolishing and reconstruction of the old buildings. The other Outputs (other than 1.1 and 2.3) of the project would facilitate implementation of the regulations and replication of the IBDA, thus facilitating indirect GHG emission reductions. The extent of energy savings and hence, the indirect GHG emission reductions would depend upon the success of the enabling activities carried out under these other Outputs (other than 1.1 and 2.3) of the project. It is to be noted that for a given new building the GHG emission reduction should be computed either due to implementation of IBDA or due to MEPS (to avoid double counting of buildings). Considering that use of IBDA leads to much more improvement in the energy efficiency, it is likely that the buildings constructed using IBDA would be compliant with the MEPS.

In order to determine extent of indirect GHG emission reductions, which is possible the computations has been done separately to account for reductions due to IBDA and due to MEPS:

IDBA (Output 2.3)		It is considered that the penetration level of IBDA would increase from 2% in the year 2020 to 16 % for the year 2027 both for residential and for non-residential buildings
	A	New residential buildings follow IBDA
	B	New Non-residential buildings follow IBDA
MEPS (Output 1.1)		It is considered that the compliance level of MEPS would increase from 5% in the year 2020 to 100 % for the year 2025 both for residential and for non-residential buildings
	A	New residential buildings follow MEPS
	B	New Non-residential buildings follow MEPS

These scenarios present the maximum possible extent of achievement of GHG emission reduction due to IBDA and MEPS for different categories of buildings. The extent of achievement would depend upon the success of the outcomes of the project pertaining to enabling activities (Output 1.2, 1.3, 1.4, 2.2, 3.2, 3.3, 3.4 and 4.3).

The GEF methodology, top-down approach for estimation of indirect GHG emission reductions allows computations for 10 years after the project's lifetime. The top-down method involves multiplying total market potential for CO2 emission reductions by a causality factor (CF). Market potential combines technical and economic market potential for the technology within the 10 years after the project's lifetime. Thus, the approach to determine indirect GHG emission reductions due to the project is the top-down approach as suggested in the GEF methodology for GHG emission reduction computations

Computation of indirect GHG emission reductions due to the project under (Scenario 1 and Scenario 2 above) would require following parameters;

- Energy consumption in the buildings in baseline scenario
- Energy consumption in the buildings under MEPS
- Timelines for implementation of MEPS
- Expected level of compliance with the MEPS
- New residential and non-residential buildings which would get constructed during 10 years after the completion of the GEF project
- Expected energy performance of the buildings constructed using IBDA

Following paragraphs provides a deliberation on these parameters.

Energy Consumption in Baseline

No reliable information is available regarding the specific energy consumption in the buildings at Turkey. Based on the assessment carried out at the time of project design the baseline energy consumption for the buildings at Turkey was determined to be 200 and 321 kWh/m^2/yr for residential and non-residential buildings respectively. One of the other basis to determine the baseline energy consumption could be the 'Building Energy Performance Regulations' (please see Annexure 1) which were in force at the time of project design. On that basis the range of baseline energy consumption for heating zone 3 residential buildings would be 285-300 kWh/m^2/yr. Whereas, the range of baseline energy consumption for non-residential buildings in heating zone 3 would be 300-360 kWh/m^2/yr (excluding hotels, hospitals and shopping malls). In the past a survey regarding energy consumption in some of the public buildings at Turkey was carried out. Energy consumption of the buildings surveyed is given in **Annexure 2**. As can be seen from the Annexure there is a very wide variation in the specific energy consumption of the buildings. The reason for such a wide variation in the energy consumption pattern is not known. Some of the reasons could be the variation in the number of hours of use during a day; number of days of use in a year; different climatic zones; limited provision/ use of heating in the buildings etc. However, it can be seen that except in one case the specific energy consumption in the sample buildings of the survey has been much lower then what was considered in the project design. The lower consumption of energy in the existing buildings could be a case of suppressed demand[43] as well. Further, for the buildings like schools, the use of the

[43] A suppressed demand is a situation when a minimum service level to meet basic human needs is unavailable to the end user of the service due to a variety of reasons (economic, fuel cost, lack of access, shortage of supply etc.)A baseline may include a

buildings in a day may be limited to only few hours and only for part of the year (due to holidays and vacations). In view of this the baseline energy consumption for the residential and non-residential buildings has been kept at the level which was considered in the project document (200 and 321 kWh/m^2/yr for residential and non-residential buildings respectively).

Energy Consumption after MEPS

At the time of the terminal evaluation of the project, the work against Outcome 1.1 was still in progress. The consultants working for Outcome 1.1, have worked out minimum energy performance standards for buildings in different cities within the five climatic zones of Turkey (the consultants have suggested to increase the number of climatic zones from four to five). The minimum energy performance as worked out by the consultants for heating energy varies from 40 to 110 kWh/m^2/yr. This seems to be quite low, (e.g. when compared to the specific energy consumption for the two demonstration buildings designed using IDBA. Deliberations on the proposed MEPS are still ongoing and the values of specific energy consumption for different types of buildings in different climatic zones under the MEPS for buildings is still not certain. The project document has considered a reduction of 40% in the specific energy consumption due to MEPS both for the residential and non-residential buildings, which seems reasonable enough. Accordingly, a reduction of 40 percent in the specific energy consumption (from the base level of 200 and 321 kWh/m^2/yr for residential and non-residential buildings respectively), has been taken as the specific energy consumption under the proposed MEPS. Thus, for computing the indirect GHG emission reductions due to the project the specific energy consumptions under the MEPS has been considered as 120 and 193 kWh/m^2/yr for residential and non-residential buildings respectively.

Timelines for Implementation of MEPS

As stipulated before the deliberations on the proposed MEPS are still ongoing, thus, at best MEPS may be be mandated by end of the year 2017. As per the consultants working on the MEPS for buildings at Turkey, the implementation of MEPS would require about six months of training and dissemination, followed by warm up schemes for another two years. Thus, any real impact of GHG emission reduction due to MEPS would not be realized before the year end of the year 2019.

Expected level of adoption with the MEPS

The adoption of the newly introduced MEPS in the initial years would not be that significant. For the present purpose it has been considered that the adoption of MEPS would improve gradually from 5% in the year 2020 to 100% from the year 2025 for all the new buildings constructed.

Buildings Construction Activity

The revised baseline study for the project which was carried out in February 2013, has projected the likely number of residential and non-residential buildings likely to be constructed for different years from 2014 to 2021. The revised baseline study also projected the likely built per area per buildings for different years. For the present assessment the projects has been extrapolated up to the year 2027 to determine the floor area likely to be added during different years for the two categories of the buildings. Details are provided as **Annexure 3**.

scenario where future anthropogenic emissions by sources are projected to rise above current levels, due to the specific circumstances. This issue is also commonly referred to as “suppressed demand”.

Energy performance of the buildings constructed using IBDA

Under the project two demonstration buildings using IBDA have been built. The specific energy consumption which would be achieved for these two buildings due to use of IBDA has been determined by the designers of the buildings using 'Building Energy Simulation Software'. For determining the indirect GHG emission reduction due to the use of IBDA the specific energy consumption for the new buildings (which use IBDA) has been considered as an average of the specific energy consumption of the two demonstration buildings. Thus, it has been considered that the specific energy consumption for the buildings using IBDA would be 42.47 kWh/m^2/yr.

Based on these parameters indirect GHG emissions for different Scenarios has been determined as follows:

Table 2: Potential Indirect GHG Emission reduction potential of the Project

IDBA (Output 2.3)		It is considered that the penetration level of IBDA would increase from 2% in the year 2020 to 16 % for the year 2027 both for residential and for non-residential buildings	*(for details please see Annexure 4)*
	A	New residential buildings follow IBDA	7.8 million tons of CO_2
	B	New Non-residential buildings follow IBDA	6.3 million tons of CO_2
		Total	**14.1 million tons of CO_2**
MEPS (Output 1.1)		It is considered that the adoption level of MEPS would increase from 5% in the year 2020 to 100 % for the year 2025 both for residential and for non-residential buildings	*(for details please see Annexure 5)*
	A	New residential buildings follow MEPS	27.31 million tons of CO_2
	B	New Non-residential buildings follow MEPS	20.03 million tons of CO_2
		Total	**47.34 million tons of CO_2**
Total		***Total potential has been determined considering 100% of IDBA + 84% of MEPS. This is to avoid double counting considering that new building would either use IDBA or MEPS. In any case a building using IDBA is likely to comply with MEPS***	**53.87 million tons of CO_2**

The total **potential** for indirect GHG emission reductions due to the project is has been estimated to be 53.87 million tons of CO_2. However, all of this potential is not realizable due to a variety of reasons. For example, the compliance with the regulations regarding the energy performance of the buildings is not 100% in most part of the world. Given the size of individual construction and other parameters like the topography, site conditions etc. in most of the cases it would not be possible to use IBDA for residential buildings.

Apart from this the GEF methodology requires the use of a dynamic baseline to account for improvement in the EE over a period of time due to market forces. The GEF methodology for GHG emission reduction computation also requires to account for the improvements in the energy efficiency which would happen due to factors other than the GEF project. For this purpose the methodology requires the use of a causality factor (CF). CF is the percentage of a realized market potential that can be reasonably attributed to the

long-term effect of the project as the result of overcoming market barriers. GEF causality factor is used to correct the 10-year potential of GHG emission reductions by the "baseline shift," i.e., that part of the potential that would have been tapped by the market without a GEF intervention.

In the case of EE in buildings at Turkey apart from the GEF project which are driving the EE efforts include the increasing energy price, 'Green Building Certification' by independent bodies. During interactions with the stakeholders it was learnt that in Turkey presently there are already about 250 LEED certified buildings and there are many new buildings under construction which are aiming to get the LEED certification. Apart fro LEED certification there are BREEAM certified green buildings as well. Most of these certified green buildings are in the private sector. Nevertheless, the contribution of the GEF projects in adoption of IDBA for future buildings would be significant this is considering that the demonstration projects would encourage construction of more government building using IBDA approach. Also the GEF project has successfully developed the curricular for education and training of the future architects and engineers on the the use of IBDA. The GEF causality factor describes how much of the emission reduction can be attributed to the GEF intervention, and how much would have happened in the business-as-usual scenario in the long-term. In the case of the project, GEF causality factor at level 4 has been considered. The value of causality factor corresponding to level 4 is 80%. Causality factor at level 4 seems to be most appropriate considering that in Turkey there are some other strong factors (e.g. Green Building Certification, increase in the energy cost) leading to improvement in EE in the buildings.

The indirect GHG emission due to the project has been determined considering the following:

- IBDA would not get used to a significant extent for the residential buildings
- The compliance level with the MEPS for residential buildings would be of the order of 40% whereas the compliance in case of non-residential buildings would be 100%
- GEF Causality factor of 80%

Accordingly, the indirect GHG emission reductions due to the project has been determined as follows:

Indirect GHG emission reductions = **80% of**
((Reduction due to use of IBDA for non-residential buildings)[44]
+
(0.84* Reductions due to MEPS for non-residential buildings)[45]
+
(0.4* Reductions due to MEPS for residential buildings))
= 0.8*(6.3+(0.84*20.03) +(0.4*27.31))
= 0.8*(6.3+16.82+10.92)
= 27.23 million tons of CO_2

[44] Causality factor of 80%
[45] To avoid double counting of non-residential buildings both in IBDA and in MEPS

- *Annexure 1: Building Energy Performance Regulation - Turkey*

In the baseline the construction norms and standards for buildings are mandated by two key regulatory mechanisms (BEP and TS 825). TS 825-Thermal Insulation Requirements for Buildings, has divided Turkey into 4 climate zones and establishes minimum performance targets for the building envelopes in the four zones. This standard covers only the heating energy. However, heating is only one of the components of energy consumption Factors like cooling, ventilation, hot water and lighting are also important consumers' o energy in a building. In Turkey the Regulation on Energy Performance for Buildings (BEP - Building Energy Performance Regulation) entered into force in 2009. According to the Regulation, buildings are categorized as A, B, C, D, E, F, G as per their energy consumption. For this purpose, the following tables were given in the first version of Regulation published in the Official Gazette of 05 December 2008.

Table: Reference Indicator (RI) in terms of primary energy use (kWh/ sq. m/year)

BUILDING TYPES	INTENDED USE	Heating Zone 1	Heating Zone 2	Heating Zone 3	Heating Zone 4
Dwellings	Single and double family houses	165	240	285	420
	Apartment blocks	180	255	300	435
Service Buildings	Office and Bureau Buildings	240	300	360	495
	Education Buildings (Schools, Dorms, Sports Facilities etc.)	180	255	300	450
	Health Service Buildings (Hospitals, retirement homes, orphanages, health care centers etc.)			600	
Commercial Buildings	Hotel, Motel, Restaurants etc.			540	
	Shopping Malls and Trade Centers			750	

Table: Energy Classes Based on Primary Energy Performance (EP) in kWh/m²/yr

Building Energy Class	Energy Class Index
A	EP < 0.4*RI
B	0.4*RI ≤ EP <0.8*RI
C	0.8*RI ≤ EP < RI
D	RI≤ EP < 1.20*RG
E	1.20*RI ≤ EP < 1.40*RI
F	1.40*RI ≤ EP < 1.75*RI
G	1.75*RI ≤ EP

"Building Energy Simulation models are used to project the energy performances of new buildings. Carrier HAP, Energy Plus, EDSL TAS, E-quest, Design Builder programs can be given as examples of such simulation programs. "ASHRAE 90.12007 Energy Standard for Non-Residential Building" standard describes how this simulation will be made. In Turkey, a program called BEPTR was developed in order to determine the classes of buildings and buildings' compliance with the BEP Regulation. As per the regulation all new buildings are required to comply with the requirements for 'Building Energy Class C'.

- *Annexure 2: Energy consumption in some of the buildings at Turkey*

Sl. No	Building type	Construction Area (m^2)	Construction Year	Insulation	Energy Consumption - 2013 (ToE)	Energy Consumption - 2013 (kWh)	Sp. Energy Consumption ($kWh/m^2/yr$)
1	hospital	143928	2010	exist	2,804	32,610,520	227
2	hospital	116108	2011	not exist	1,673	19,456,990	168
3	hospital	53143	1970	exist	1,343	15,619,090	294
4	hospital	65927	1914-2013	partly exist	2,809	32,668,670	496
5	office	5496	1993	partly exist	112	1,302,560	237
6	prison	28156	1995	partly exist	752	8,745,760	311
7	high school	14028	1997	exist	80	930,400	66
8	dormitory	17000	2002	not exist	193	2,244,590	132
9	office	27500	1985-1989	exist	193	2,245,172	82
10	hospital	14140	1993	not exist	170	1,977,100	140
11	high school	17000	1982	not exist	10	111,183	7
12	office	25975	1990-1995	partly exist	176	2,051,067	79
13	high school	12178	2003	not exist	20	227,832	19
14	high school	22469	1983	not exist	106	1,237,199	55
15	high school	24515	2005	not exist	73	846,664	35
16	high school	14076	1968	not exist	76	879,344	62
17	dormitory	37506	2007-2011	exist	424	4,932,865	132
18	dormitory	19367	2009	exist	189	2,196,442	113
19	primary school	13200	2008	not exist	84	981,688	74
20	high school	16900	1946-1968	not exist	90	1,049,956	62
21	high school	15000	2006	exist	53	621,624	41
22	high school	17391	1983	not exist	126	1,464,333	84
23	high school	15207	1951 - 1999	partly exist	92	1,067,401	70
24	high school	18000	1996	partly exist	61	710,360	39
25	high school	12677	1984	partly exist	50	586,850	46
26	service	13500	2005	exist	97	1,125,086	83

- *Annexure 3: Projected Construction of Buildings at Turkey*

Year	Construction of Residential Buildings (Numbers)	Construction of Non-Residential Buildings (Numbers)	Non-Residential Building Unit Area (m^2/Building)	Residential Building Unit Area (m^2/Building)	New Construction Non-Residential Building (Million m^2)	New Construction Residential Building (Million m^2)
2011	64,450	12,450	967	1954	62.33	24.32
2012	64,900	12,700	1009	2059	65.48	26.14
2013	65,325	12,925	1051	2163	68.65	27.96
2014	65,725	13,125	1093	2268	71.83	29.77
2015	66,125	13,300	1135	2373	75.04	31.56
2016	66,500	13,440	1177	2478	78.25	33.31
2017	66,850	13,580	1219	2583	81.47	35.08
2018	67,180	13,705	1261	2688	84.69	36.84
2019	67,500	13,800	1303	2793	87.92	38.54
2020	67,840	13,900	1344	2898	91.21	40.28
2021	68,138	14,000	1386	3002	94.47	42.03
2022*	68,580	14,223	1428	3107	97.95	44.19
2023*	68,938	14,364	1470	3212	101.36	46.14
2024*	69,296	14,505	1512	3317	104.79	48.11
2025*	69,655	14,645	1554	3422	108.25	50.12
2026*	70,013	14,786	1596	3527	111.74	52.15
2027*	70,372	14,927	1638	3632	115.27	54.21

Source: Revised baseline study for the project

* Extrapolated

- *Annexure 4: Indirect GHG Mitigation Potential Due to IDBA*

A. Indirect GHG Mitigation Potential Due to Residential Buildings

Year	New Construction Residential Building (Million $m^{2)}$	Baseline Sp. Energy Consumption (kWh/m^2/yr)	Sp. Energy consump-tion -IBDA (kWh/m2 /yr)	Penetra-tion level of IDBA	Annual Energy Savings (Million kWh)	No of years for Energy savings	Energy Savings (Million MWh)	Emission Factor (Tons CO_2 /MWh)	GHG Emission Reductions (Million Tons CO_2)
2018	84.69	200	42.47	0%	0	10	0.00	0.2	0.00
2019	87.92	200	42.47	0%	0	9	0.00	0.2	0.00
2020	91.21	200	42.47	2%	287	8	2.30	0.2	0.46
2021	94.47	200	42.47	4%	595	7	4.17	0.2	0.83
2022	97.95	200	42.47	6%	926	6	5.56	0.2	1.11
2023	101.36	200	42.47	8%	1277	5	6.39	0.2	1.28
2024	104.79	200	42.47	10%	1651	4	6.60	0.2	1.32
2025	108.25	200	42.47	12%	2046	3	6.14	0.2	1.23
2026	111.74	200	42.47	14%	2464	2	4.93	0.2	0.99
2027	115.27	200	42.47	16%	2905	1	2.91	0.2	0.58
									7.80

B. Indirect GHG Mitigation Potential Due to Non-Residential Buildings

Year	New Construction Non-Residential Building (Million m^2)	Baseline Sp. Energy Consumption (kWh/m^2/yr)	Sp. Energy consumpt ion - IBDA (kWh/m^2/ yr)	Penetra-tion level of IDBA	Annual Energy Savings (Million kWh)	No of years for Energy savings	Energy Savings (Million MWh)	Emission Factor (Tons CO_2/ MWh)	GHG Emission Reductions (Million Tons CO_2)
2018	36.84	321	42.47	0%	0	10	0.00	0.2	0.00
2019	38.54	321	42.47	0%	0	9	0.00	0.2	0.00
2020	40.28	321	42.47	2%	224	8	1.79	0.2	0.36
2021	42.03	321	42.47	4%	468	7	3.28	0.2	0.66
2022	44.19	321	42.47	6%	739	6	4.43	0.2	0.89
2023	46.14	321	42.47	8%	1028	5	5.14	0.2	1.03
2024	48.11	321	42.47	10%	1340	4	5.36	0.2	1.07
2025	50.12	321	42.47	12%	1675	3	5.03	0.2	1.01
2026	52.15	321	42.47	14%	2033	2	4.07	0.2	0.81
2027	54.21	321	42.47	16%	2416	1	2.42	0.2	0.48
									6.30

- *Annexure 5: Indirect GHG Mitigation Potential Due to MEPS*

A. Indirect GHG Mitigation Potential Due to Residential Buildings

Year	New Construction Residential Building (Million m^2)	Baseline Sp. Energy Consumption ($kWh/m^2/yr$)	Sp. Energy consumption - IBDA ($kWh/m^2/yr$)	Compliance Level	Annual Energy Savings (mill. kWh)	No of years for Energy savings	Energy Savings (million MWh)	Emission Factor (Tons CO_2/MWh)	GHG Emission Reductions (Million Tons CO_2)
2018	84.69	200	120		0	10	0.00	0.2	0.00
2019	87.92	200	120		0	9	0.00	0.2	0.00
2020	91.21	200	120	5%	365	8	2.92	0.2	0.58
2021	94.47	200	120	20%	1511	7	10.58	0.2	2.12
2022	97.95	200	120	40%	3135	6	18.81	0.2	3.76
2023	101.36	200	120	60%	4865	5	24.33	0.2	4.87
2024	104.79	200	120	80%	6706	4	26.83	0.2	5.37
2025	108.25	200	120	100%	8660	3	25.98	0.2	5.20
2026	111.74	200	120	100%	8940	2	17.88	0.2	3.58
2027	115.27	200	120	100%	9221	1	9.22	0.2	1.84
									27.31

B. Indirect GHG Mitigation Potential Due to Non-Residential Buildings

Year	New Construction Non-Residential Building (Million m^2)	Baseline Sp. Energy Consumption ($kWh/m^2/yr$)	Sp. Energy consumption - IBDA ($kWh/m^2/yr$)	Compliance Level	Annual Energy Savings (Million kWh)	No of years for Energy savings	Energy Savings (Million MWh)	Emission Factor (Tons CO_2/MWh)	GHG Emission Reductions (Million Tons CO_2)
2018	36.84	321	193		0	10	0.00	0.2	0.00
2019	38.54	321	193		0	9	0.00	0.2	0.00
2020	40.28	321	193	5%	258	8	2.06	0.2	0.41
2021	42.03	321	193	20%	1076	7	7.53	0.2	1.51
2022	44.19	321	193	40%	2263	6	13.58	0.2	2.72
2023	46.14	321	193	60%	3543	5	17.72	0.2	3.54
2024	48.11	321	193	80%	4927	4	19.71	0.2	3.94
2025	50.12	321	193	100%	6415	3	19.24	0.2	3.85
2026	52.15	321	193	100%	6675	2	13.35	0.2	2.67
2027	54.21	321	193	100%	6939	1	6.94	0.2	1.39
									20.03

APPENDIX E – COMPLETED TRACKING TOOL

Tracking Tool for Climate Change Mitigation Projects (For Terminal Evaluation)

Special Notes: reporting on lifetime emissions avoided

Lifetime direct GHG emissions avoided: Lifetime direct GHG emissions avoided are the emissions reductions attributable to the investments made **during the project's supervised implementation period**, totaled over the respective lifetime of the investments.
Lifetime direct post-project emissions avoided: Lifetime direct post-project emissions avoided are the emissions reductions attributable to the investments made outside the project's supervised implementation period, but supported by financial facilities put in place by the GEF project, totaled over the respective lifetime of the investments. These financial facilities will still be operational after the project ends, such as partial credit guarantee facilities, risk mitigation facilities, or revolving funds.
Lifetime indirect GHG emissions avoided (top-down and bottom-up): indirect emissions reductions are those attributable to the long-term outcomes of the GEF activities that remove barriers, such as capacity building, innovation, catalytic action for replication.
Please refer to the Manual for Calculating GHG Benefits of GEF Projects.

Manual for Energy Efficiency and Renewable Energy Projects
Manual for Transportation Projects

For LULUCF projects, the definitions of "lifetime direct and indirect" apply. Lifetime length is defined to be 20 years, unless a different number of years is deemed appropriate. For emission or removal factors (tonnes of CO_2eq per hectare per year), use IPCC defaults or country specific factors.

General Data	Results at Terminal Evaluation	Notes
Project Title	Promoting Energy Efficiency in Buildings in Turkey	
GEF ID	2942	
Agency Project ID	3646	
Country	Turkey	
Region	ECA	
GEF Agency	UNDP	
Date of Council/CEO Approval	May 3, 2010	**Month DD, YYYY (e.g., May 12, 2010)**
GEF Grant (US$)	2,620,000	
Date of submission of the tracking tool	May 31, 2017	**Month DD, YYYY (e.g., May 12, 2010)**
Is the project consistent with the priorities identified in National Communications, Technology Needs Assessment, or other Enabling Activities under the UNFCCC?	1	**Yes = 1, No = 0**
Is the project linked to carbon finance?	0	**Yes = 1, No = 0**
Cumulative cofinancing realized (US$)	14,960,000	
Cumulative additional resources mobilized (US$)	1,391,000	**additional resources means beyond the cofinancing committed at CEO endorsement**

Objective 1: Transfer of Innovative Technologies		
Please specify the type of enabling environment created for technology transfer through this project		
National innovation and technology transfer policy	1	Yes = 1, No = 0
Innovation and technology centre and network	1	Yes = 1, No = 0
Applied R&D support	1	Yes = 1, No = 0
South-South technology cooperation	0	Yes = 1, No = 0
North-South technology cooperation	1	Yes = 1, No = 0
Intellectual property rights (IPR)	1	Yes = 1, No = 0
Information dissemination	1	Yes = 1, No = 0
Institutional and technical capacity building	1	Yes = 1, No = 0
Other (please specify)		
Number of innovative technologies demonstrated or deployed	4	
Please specify three key technologies for demonstration or deployment		
Area of technology 1	Energy_Efficiency	
Type of technology 1		specify type of technology
Area of technology 2	Renewable_Energy	
Type of technology 2		specify type of technology
Area of technology 3	Energy_Efficiency	
Type of technology 3		specify type of technology
Status of technology demonstration/deployment	2	0: no suitable technologies are in place 1: technologies have been identified and assessed 2: technologies have been demonstrated on a pilot basis 3: technologies have been deployed 4: technologies have been diffused widely with investments 5: technologies have reached market potential
Lifetime direct GHG emissions avoided	25,400	tonnes CO2eq (see Special Notes above)
Lifetime direct post-project GHG emissions avoided		tonnes CO2eq (see Special Notes above)
Lifetime indirect GHG emissions avoided (bottom-up)		tonnes CO2eq (see Special Notes above)
Lifetime indirect GHG emissions avoided (top-down)	27,230,000	tonnes CO2eq (see Special Notes above)

Objective 2: Energy Efficiency		
Please specify if the project targets any of the following areas		
Lighting	0	Yes = 1, No = 0
Appliances (white goods)	0	Yes = 1, No = 0
Equipment	0	Yes = 1, No = 0
Cook stoves	0	Yes = 1, No = 0
Existing building	1	Yes = 1, No = 0
New building	1	Yes = 1, No = 0
Industrial processes	0	Yes = 1, No = 0
Synergy with phase-out of ozone depleting substances	0	Yes = 1, No = 0
Other (please specify)		
Policy and regulatory framework	4	0: not an objective/component 1: no policy/regulation/strategy in place 2: policy/regulation/strategy discussed and proposed 3: policy/regulation/strategy proposed but not adopted 4: policy/regulation/strategy adopted but not enforced 5: policy/regulation/strategy enforced
Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)	2	0: not an objective/component 1: no facility in place 2: facilities discussed and proposed 3: facilities proposed but not operationalized/funded 4: facilities operationalized/funded but have no demand 5: facilities operationalized/funded and have sufficient demand
Capacity building	3	0: not an objective/component 1: no capacity built 2: information disseminated/awareness raised 3: training delivered 4: institutional/human capacity strengthened 5: institutional/human capacity utilized and sustained
Lifetime energy saved		MJ (Million Joule, IEA unit converter: http://www.iea.org/stats/unit.asp) Fuel savings should be converted to energy savings by using the net calorific value of the specific fuel. End-use electricity savings should be converted to energy savings by using the conversion factor for the specific supply and distribution system. These energy savings are then totaled over the respective lifetime of the investments.
Lifetime direct GHG emissions avoided		tonnes CO2eq (see Special Notes above)
Lifetime direct post-project GHG emissions avoided		tonnes CO2eq (see Special Notes above)
Lifetime indirect GHG emissions avoided (bottom-up)		tonnes CO2eq (see Special Notes above)
Lifetime indirect GHG emissions avoided (top-down)		tonnes CO2eq (see Special Notes above)

APPENDIX F – PROJECT RESULTS FRAMEWORK FOR TURKEY'S PEEB PROJECT (AMENDED AND APPROVED ON OCTOBER 7, 2013)

Project Goal: Contribute to reduction of GHG emissions in Turkey through improving energy efficiency in buildings

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
Objective of the Project: To reduce energy consumption and associated GHG emissions in buildings in Turkey by raising building energy performance standards, improving enforcement of building codes, enhancing building energy management and introducing the use of an integrated building design approach	Average total energy consumption (for heating, cooling, ventilation and lighting) in new residential and non-residential buildings	Residential: 200 kWh/m²/year Non-residential: 321 kWh/m²/year	Non-residential: 193 kWh/m²/year for buildings built with IBDA	National energy statistics and project GHG monitoring system	Costs of EE and RE technology and materials do not cause to considerable increases in the overall costs of new building constructions Dynamics of construction of new buildings remain within the forecast range Integration of IBDA principles for new public buildings is achieved Integration of IBDA into urban transformation can hugely increase the GHG savings
	Cumulative CO_2 emission reductions from new buildings to be built during project lifetime (2010-2015) against the baseline	0 tCO_2	2 million tCO_2		
Outcome 1: Improved energy efficiency in new and existing buildings through stronger regulations,	The content and status of new policies, programs, and implementers supporting implementation of	Legislation, institutions, and implementers to support enhancement of building energy efficiency needs to be strengthened	New legal and regulatory provisions, strengthened institutions, and better supporting compliance checking, enforcement and outreach programs	Official publications and project's Mid-Term and Final evaluations	Continuing commitment of the key public authorities and government entities to develop and implement effective EE buildings policies and practices Adequate data will be available from the market

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
institutions and implementers	EE and RE in buildings		adopted for enhanced EE in buildings		
Output 1.1 Existing legislative framework on building energy efficiency improved	Analyses and recommendations reports Content, acceptance, and status of the Certification Systems	Existing "Building Energy Performance (BEP)" Regulation is not in line with international best practices No MEPS exist for buildings	BEP Regulation analyzed and compared to other relevant international codes (e.g. EU EPB Directive, etc.) and revisions proposed Reference building approach under the Building Energy Performance (BEP) Regulation analyzed and revisions proposed Minimum Energy Performance Standards (MEPS) for new buildings developed and proposed	Updated legislation and regulation documents referencing to new standards and framework system for building energy performance Project reports	Studies and activities welcomed by relevant institutions, other stakeholders and EECB
Output 1.2 Framework for an Information System on Building Energy Consumption developed	The availability and the reliability of the required data No. of buildings for sample to be improved Energy savings and GHG emission	Existing databases under relevant public authorities are not comprehensive with respect to building data and energy consumption data No single database covers all the required	Methodology, indicators and benchmarks for framework developed Pilot database for sample buildings developed Feasibility study on potentials for sample	Monitoring reports and continuous evaluation of the impact of the information system Relevant public authorities internalize and integrate the proposed framework approach	Acceptance and cooperation on the part of the various government agencies to use a universal database Willingness of the targeted public authorities, and implementers to benefit from the training and the supporting studies

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
	reduction potentials identified	indicators for evaluation of building energy performance & building energy consumption There is no similar feasibility study which relies upon factual data identifying the real energy saving data	buildings refurbishment to improve energy performance developed	Benchmarks on building energy efficiency available through database and from other countries/ programmes	Reliable and adequate amount of data collected
Output 1.3 Supporting the implementation of Energy Efficiency Strategy for the building sector	Analysis and recommendations report Implementation support programme and action plan	Existing EE Strategy does not have any action plan and/or implementation programme	Implementation support programme and action plan for improvement of EE strategy for buildings sector developed	Project Progress Reports Submission of plans and programmes to the relevant public bodies	Acceptance and cooperation on the part of the various government agencies to develop implementation support programme and action plan for the EE Strategy for buildings sector
Output 1.4 Capacity of building inspectorates in regard to energy efficiency regulations and enforcement strengthened	Analysis and recommendations report Guide booklet prepared and disseminated Number of trainers trained	Existing legislation do only consider heat insulation issues regarding energy performance of new private buildings	Building inspection regulation and relevant energy efficiency codes analyzed and reported Recommendations proposed including energy efficiency checklists for new private buildings Guide booklet for building inspectors prepared and disseminated	Project Reports including trainings reports. Issued certificates	Acceptance and cooperation on the part of the Ministry of Environment and Urbanism to integrate energy efficiency aspects to building inspection system. Willingness of the targeted public authorities and inspectorates to benefit from the training and the supporting studies

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
			Trainings delivered to trainers of building inspectors		
Outcome 2: Cost-effective energy efficiency solutions showcased and promoted through Integrated Building Design Approach (IBDA) and trainings	Adoption and diffusion level of IBDA Implementation of IBDA demonstration constructions	Limited knowledge and application of IBDA	Cost effective energy efficiency solutions are demonstrated through IBDA demonstration buildings IBDA is promoted through trainings and awareness raising activities	Issued Building Energy Performance Certificates for new buildings Calculations on the basis of the assumed baseline development Official energy stats Issued Building Energy Performance Certificates for demonstration buildings	Continuing commitment of the key public authorities and government entities to adopt and integrate IBDA into policies and practices for new buildings designs and construction
Output 2.1 IBDA for Turkish climatic conditions developed and followed in design of new public buildings	Adoption and use of IBDA for new constructions in different sectors	Limited application of IBDA	IBDA guidebook prepared IBDA implementation strategy and action plan developed IBDA proposed for use in all new public buildings as of 2015	Strategy and implementation plan for IBDA endorsed by stakeholders; Decision of the government on use of IBDA in public buildings	Willingness of the government to accept and implement the IBDA strategy
Output 2.2 IBDA promoted to building sector professionals and key stakeholders	Universities adopting IBDA into curricula	No comprehensive design approach like IBDA in existing curricula	IBDA incorporated into architectural and engineering curricula in at least one pilot university	Incorporation of IBDA into curricula	Interest of the universities to cooperate in the development, organization and dissemination of IBDA and EE principles

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
	Number of architects and engineers trained according to IBDA principles to make use of available material (guidebook, etc.)	Limited knowledge or use of IBDA	Trainings for architects, engineers and building sector professionals (*e.g. ministries, municipalities, chambers of architects/engineers, private firms*) delivered	Guidebook on IBDA for architects and engineers Delivery of trainings	
Output 2.3 Demonstration buildings implemented according to IBDA design and construction principles	Energy performance of IBDA enhanced demo buildings	New school/office buildings (whose average total energy consumption figure is around 321 kWh/m²/yr) are neither designed and built with IBDA nor enhanced with EE and RE technics	Submitted designs meet and exceed the total energy requirements for school/office buildings Five IBDA demonstration buildings of approx. 30,000 m² commissioned and received A-class energy performance certificates in line with BEP regulation	Demonstration buildings' planning and construction documentation Review of prototype energy efficient designs Project reports, Monitoring reports for energy consumption of the five demonstration buildings	Demonstration buildings are built as designed User behavior does not cause a significant deviation from energy performance targets for demonstration buildings
Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards	Monitoring and verification processes are in place and disseminated effectively among key stakeholders	No monitoring system for building energy performance No analysis tool for RE in new buildings Training materials need significant upgrading	New tools are developed for analysis and monitoring purposes, financial mechanisms Training materials revised/developed Existing websites and tools updated	Project progress reports	Continuing commitment of the key public authorities and government entities to disseminate and provide training in use of new tools for RE and EE in buildings

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
		Financial mechanism for EE in buildings is limited Existing website and tools for bep.gov.tr and BEP-TR systems need upgrading			
Output 3.1 "Monitoring, Inspection and Verification (MIV)" methodology and tools for Building Energy Performance regulation developed	Availability of required data for evaluation of building energy performance Level of compliance with BEP legislation in practice	No monitoring, inspection and verification system Limited compliance with BEP regulation	Methodology and toolkit for MIV system developed and proposed	Project progress reports Written Verification Procedure, sample test reports	MIV methodology and tools for building energy performance is consistent and well-understood by key stakeholders
Output 3.2 Training materials on energy management and energy auditing for buildings developed and trainings delivered.	Training materials Number of trainees	Existing training materials for energy managers need comprehensive revision No training materials for energy auditors	Existing training materials for energy managers updated Training materials for energy auditors developed Trainings delivered	Project progress reports Training reports	Continuing commitment of the key public authority to disseminate and deliver trainings for energy management and energy auditing in buildings
Output 3.3.Financial mechanisms/tools to promote "Energy Efficiency and Renewable Energy" in buildings surveyed and/or developed	Number of funding agencies, banks, and ODA donors seek to support EE buildings in Turkey	No or limited market growth of EE buildings due to reality and perception of cost-to-benefits inequity	Review on financing mechanisms available for EE Buildings in Turkey Appropriate finance mechanisms showcased (e.g. standardized	Anecdotal information received through surveys of banks, lenders, and funders	Key funding institutions and/or government of Turkey agree on financing mechanisms

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
			Energy Performance Contracting schemes developed) Software tool for economic assessment of use of renewable energy in new buildings developed		
Output 3.4 Building Energy Performance website infrastructure improved	New website with support modules Number of visitors using new website	Poor bep.gov.tr website No software module for central heating cost sharing system No online discussion platform for Energy Performance Certificate users No integration of bep.gov.tr website and BEP-TR software and database	New bep.gov.tr website developed Software module for central heating cost sharing system developed Online discussion platform for Energy Performance Certificate users developed Integration of bep.gov.tr website with BEP-TR software and database created bep.gov.tr website administrators trained	Project progress reports Training reports	
Outcome 4: Building energy consumption, energy savings, and	The status of recommendations contributing to	Insufficient institutional mechanisms in place to	Project recommendations to ensure institutional sustainability adopted	Project mid-term and final evaluation reports Annual project progress reports	Successful completion of the project activities

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
other results of the project monitored, evaluated, reported and disseminated	institutional sustainability	ensure sustainability of project results		GHG assessment reports	Adequate data will be available from the stakeholders and the market
Output 4.1 Methodology for monitoring and measuring project savings due to revised regulations, IBDA implementation and promotion, and newly developed new tools	Acceptance and reliability of the methodology and tools for monitoring and measuring the project impacts	No baseline information on the market, energy, GHG or financial impacts of EE, BEP compliance, or IBDA	An accepted monitoring and assessment methodology for key stakeholders	Monitoring methodology and plan Project progress & monitoring reports including GHG assessment analyses	Ongoing monitoring and recording of the impact of the project and barriers faced
Output 4.2 Preparing "Mid-term" and "Final" project reports; Calculating and sharing energy savings and GHG emission reductions achieved through the project	Mid-term and final evaluation reports provided with quantified and qualified results and impacts	No consolidation of the results and lessons learned	Mid-term and Final project reports consolidating the results and lesson learned from the implementation of the project	Project progress reports; mid-term and final evaluation reports	Ongoing monitoring and recording of the impact of the project and barriers faced
Output 4.3 Project results, outputs and lessons learned are effectively disseminated along with key awareness-raising measures on	Websites developed Information and dissemination material produced Target groups reached	No specific communication and outreach strategy formed	Project communication strategy developed and implemented Project website developed IBDA website developed	Project outreach report	Key messages for the target groups are effectively communicated and diffused Key messages internalized by the target groups

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
energy efficiency in buildings	Number of users visiting websites		Dissemination material produced for awareness raising		

APPENDIX G: EVALUATION QUESTIOANNAIRE

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 at the local, regional and national levels?			
• Does the project's objective fit within the priorities of the government?	• Project alignment with National Environmental Action Plan of Turkey	• ProDoc	• Document review
• Does the project's objective fit within Turkey's national energy conservation strategies?	• Project alignment with Turkey's national energy efficiency strategy	• ProDoc	• Document review
• Does the project's objective fit GEF strategic priorities and operational principles?	• Project alignment with GEF 5 Operational Programs	• ProDoc	• Document review
Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved?			
• Is the project objective likely to be met? To what extent and in what timeframe?	• Average energy consumption of new buildings by EOP	• IBDA architects and designers • Energy design reports • Monitored energy savings	• Document review • Stakeholder discussions
• What are the key factors contributing to project success or underachievement?	• Supportive legislation promulgated • Adoption by building profession of IBDA Guidebook • Demonstration IBDA-designed buildings • Energy saved in IBDA buildings	• Legislative documents • PIRs • IBDA Guidebooks • IBDA authors and users • Government building owners	• Document review • Stakeholder discussions
• Is adaptive management being applied to ensure effectiveness?	• Number of adaptive management changes during project	• PIRs • IBDA designers	• Document review • Stakeholder discussions
• Is monitoring and evaluation used to ensure effective decision-making?	• Number of issues identified in PIRs	• PIRs • PSC meeting minutes	• Document review • Stakeholder discussions
Efficiency: Was the project implemented efficiently, in-line with international and national norms and standards?			
• Is the project cost-effective?	• Financial disbursements • Outputs delivered	• Financial reports • PIRs	• Document review • Stakeholder discussions
• Are expenditures in line with international standards and norms for development projects?	• Financial disbursements • Outputs delivered	• Financial reports • PIRs	• Document review • Stakeholder discussions
Efficiency: Was the project implemented efficiently, in-line with international and national norms and standards?			

Evaluative Criteria Questions	Indicators	Sources	Methodology
• Are management and implementation arrangements efficient in delivering the outputs necessary to achieve outcomes?	• PMU personnel expenditures	• Financial reports • PIRs	• Document review • Stakeholder discussions
• Was the project implementation delayed? If so, did that affect cost-effectiveness?	• Timing of delivery of outputs • Disbursements versus outputs	• Financial reports • PIRs	• Document review • Stakeholder discussions
• What is the contribution of cash and in-kind co-financing to project implementation?	• Co-financing amounts and details	• Financial reports • PIRs	• Document review • Stakeholder discussions
• To what extent is the project leveraging additional resources?	• Co-financing amounts and details	• Financial reports • PIRs	• Document review • Stakeholder discussions
Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?			
• To what extent are project results likely to be dependent on continued financial support? What is the likelihood that any required financial resources will be available to sustain the project results once the GEF assistance ends?	• Co-financing amounts and details	• Financial reports • PIRs	• Document review • Stakeholder discussions
• Do relevant stakeholders have or are likely to achieve an adequate level of "ownership" of results, to have the interest in ensuring that project benefits are maintained? Do relevant stakeholders have the necessary technical capacity to ensure that project benefits are maintained?	• Knowledge of building owners of IBDA • Knowledge of architects and designers of IBDA buildings	• IBDA building owners • IBDA architects and designers	• Stakeholder discussions
• To what extent are the project results dependent on socio-political factors?	• Public awareness of IBDA and EE buildings	• Public opinion surveys of IBDA and EE buildings	• Stakeholder discussions
• To what extent are the project results dependent on issues relating to institutional frameworks and governance?	• MBEPS and nZEBs that are adopted • Public official knowledge of these standards and their enforcement tools	• Gazetted standards • Public officials managing building assets	• Document review • Stakeholder discussions
• Are there any environmental risks that can undermine the future flow of project impacts and Global Environmental Benefits?	• Energy savings of IBDA buildings • GHG emission reductions from IBDA buildings	• IBDA design reports • Public officials managing building assets	• Document review • Stakeholder discussions
Impact: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and/or improved ecological status?			
	• Public opinions on IBDA and EE buildings • Opinions and knowledge of public officials	• Public opinion surveys of IBDA and EE buildings • Public officials managing building assets	• Stakeholder discussions

APPENDIX H - EVALUATION CONSULTANT AGREEMENT FORM

Evaluators:

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.

Evaluation Consultant Agreement Form[58]

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

Name of Consultant: Roland Wong

Name of Consultancy Organization (where relevant)**:** _____

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

Signed at *Surrey, BC , Canada* on *June 8, 2017*

[58] www.unevaluation.org/unegcodeofconduct