REQUEST FOR CEO ENDORSEMENT/APPROVAL

PROJECT TYPE: FULL-SIZED PROJECT
THE GEF TRUST FUND

GEF

Submission Date: March 01, 2010
Re-submission Date: March 31, 2010

PART I: PROJECT INFORMATION

GEFSEC PROJECT ID: 2942
GEF AGENCY PROJECT ID: 3646
COUNTRY(IES): Turkey
PROJECT TITLE: Promoting Energy Efficiency in Buildings
GEF AGENCY(IES): UNDP
OTHER EXECUTING PARTNER(S): EIE (General Directorate of Electrical Power Resources Survey, Turkey)
GEF FOCAL AREA(s): Climate Change
GEF-4 STRATEGIC PROGRAM(s): CC-SP1-Building EE
NAME OF PARENT PROGRAM/UMBRELLA PROJECT: Global Framework for Promoting Low Greenhouse Gas Emission Buildings

Expected Calendar	
Milestones	**Dates**
Work Program (for FSPs only)	Apr 2008
Agency Approval date	July 2010
Implementation Start	July 2010
Mid-term Evaluation (if planned)	Aug 2012
Project Closing Date	May 2015

A. PROJECT FRAMEWORK (Expand table as necessary)

Project 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

Project Components	Indicate whether Investment, TA, or STA[2]	Expected Outcomes	Expected Outputs	GEF Financing[1] ($) a	%	Co-Financing[1] ($) b	%	Total ($) c=a+ b
1. Revise and enforce building energy performance standards	TA	Improved energy efficiency in new and existing buildings through stronger regulations, institutions and implementers	1.1 Institutional mechanism for regular revision of building energy performance, including EE program and roadmap; 1.2 Two existing building energy performance codes and other relevant norms and standards revised and implemented; 1.3 Enhanced capacity for compliance with the new regulations, including energy performance certificate scheme; 1.4 Financial mechanisms (including incentives and support for the building sector) developed and presented to EECB.	867,000	40	1,322,000	60	2,189,000
2. Introduce integrated building design approach in Turkey	TA	Cost-effective energy efficiency solutions showcased through integrated building design approach application in two demo buildings	2.1 IBDA developed for Turkish climatic conditions, including implementation strategy and plan; 2.2 IBDA promoted to building sector professionals and key stakeholders; 2.3 Two demonstration buildings commissioned, showcasing IBDA and compliance with new energy codes;	772,450	6	12,010,000	94	12,782,450
3. Promote best energy practices in the building sector	TA	New tools developed and introduced to facilitate compliance	3.1 New calculation tools that architects, engineers, and constructors can use for compliance with the laws; 3.2 Standardized procedures for data	536,600	68	247,000	32	783,600

		with higher energy efficiency standards and application of integrated building design approach in buildings	collection, measurements, and collation of building energy performance; 3.3 Facility for online support services for key stakeholders.					
4. Monitoring, learning, adaptive feedback and evaluation	TA	Building energy consumption, energy savings, and other results of the project monitored, evaluated, and reported	4.1 Methodology for monitoring and measuring project savings from IBDA, the demonstration buildings, and improved implementation of the regulations devised and implemented; 4.2 Evaluation of project results and knowledge sharing	181,950	52	169,000	48	350,950
5. Project management				262,000	18	1,212,000	82	1,474,000
Total Project Costs				2,620,000	15	14,960,000	85	17,580,000

B. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT (expand the table line items as necessary)

Name of Co-financier (source)	*Classification*	*Type*	*Project*	*%**
EIE	Nat'l Gov't	In-kind	700,000	4.68%
EIE	Nat'l Gov't	Cash	7,600,000	50.80%
MoPWS	Nat'l Gov't	In-kind	3,000,000	20.05%
TOKI	Nat'l Gov't	In-kind	3,600,000	24.06%
UNDP Turkey		Cash	60,000	0.40%
Total Co-financing			14,960,000	100%

C. FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	Project Preparation a	*Project b*	*Total c = a + b*	*Agency Fee*	*For comparison: GEF and Co-financing at PIF*
GEF financing	100,000	2,620,000	2,720,000	272,000	2,720,000
Co-financing	150,000	14,960,000	15,110,000*		18,850,000
Total	250,000	17,580,000	17,830,00	272,000	21,570,000

* The total co-financing has been re-estimated downward based on PPG analysis of project costs and re-allocation of co-financing between components. Also refer to Part IV for further details.

D. GEF RESOURCES REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES)[1]: N/A

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	*Estimated person weeks*	*GEF amount ($)*	*Co-financing ($)*	*Project total ($)*
Local consultants*	841	841,000	800,000	1,641,000
International consultants*	343	771,750		771,750
Total	1,303	1,612,750	800,000	2,412,750

* Details are provided in Annex C. Person weeks apply to GEF-funded components only.

F. PROJECT MANAGEMENT BUDGET/COST

Cost Items	*Total Estimated person weeks/months*	*GEF amount ($)*	*Co-financing ($)*	*Project total ($)*

Cost Items	*Total Estimated person weeks/months*	*GEF amount ($)*	*Co-financing ($)*	*Project total ($)*
Local consultants*	347	222,200	1,027,887	1,250,087
International consultants*	0	0	0	0
Office facilities, equipment and communications*		25,800	119,349	145,149
Travel*		14,000	64,764	78,764
Total		262,000	1,212,000	1,474,000

* Details are provided in Annex C. Person weeks apply to GEF-funded components only.

G. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? yes ☐ no ☒

H. DESCRIBE THE BUDGETED MONITORING AND EVALUATION (M&E) PLAN:

Project monitoring and evaluation (M&E) will be conducted in accordance with established UNDP and GEF procedures. The Logical Framework Matrix in Annex A provides performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis, on which the project's M&E Plan will be built. Implementation of the M&E Plan will be undertaken by the project team and UNDP Turkey Country Office (UNDP CO) with support from UNDP/GEF Regional Coordination Unit in Bratislava (UNDP RCU).

The M&E Plan includes the following key milestones and activities: inception report, project implementation reviews, quarterly operational reports, a mid-term and a final evaluation. The indicative M&E budget is provided in the table below and a detailed draft M&E Plan is presented in Section I Part IV of the Project Document. It will be finalized at the Project Inception Meeting following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities.

Type of M&E Activity	Responsible Parties	Budget US$	Time Frame
Inception Workshop and Report	• EIE, Project Manager (PM) • UNDP CO • UNDP/GEF RCU • Int. Project Adviser (IPA)	10,000	Within first two months of project start up
Design of a methodology to measure building energy performance and associated GHG emission reductions	• PM (with inputs by an international expert)	7,000	Immediately following IW
Measurement of indicators' values	• PM with inputs by required experts to conduct the studies • Oversight by UNDP CO and RCU	90,000	Baseline measurements to be finalized immediately following IW; Subsequently on an annual basis prior to APR/PIR
APR and PIR	• Project Manager • UNDP CO and RCU • UNDP-GEF	None	Annually
Annual meetings	• EIE • UNDP CO • Project Manager	None	Every year, upon receipt of APR
Project Steering Committee Meetings	• EIE, UNDP CO • Project Manager	None	Biannually, following the inception workshop
Periodic status reports	• Project team	None	To be determined by Project team and UNDP CO at the outset project operations
Technical reports	• Project team • Hired consultants as needed	t.b.d	To be determined by Project Team and UNDP-CO during implementation

Type of M&E Activity	Responsible Parties	Budget US$	Time Frame
Mid-term External Evaluation	• External evaluation team supported by the EIE, PMU and UNDP- CO	34,000	At the mid-point of project implementation.
Final External Evaluation	• External evaluation team supported by the EIE, PMU and UNDP- CO	34,000	At the end of project implementation
Terminal Report	• Project team • UNDP-CO	None	At least one month before the end of the project
Lessons learned	• Project team	None	Yearly
Audit	• UNDP-CO • Project team	4,000	Yearly
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	• UNDP Country Office • UNDP-GEF RCU (as appl.) • Government representatives	Paid from IA fees and operational budget	Yearly
TOTAL INDICATIVE COST (*excluding project team staff time and UNDP staff and travel expenses)*		US$ 179,000	

PART II: PROJECT JUSTIFICATION:

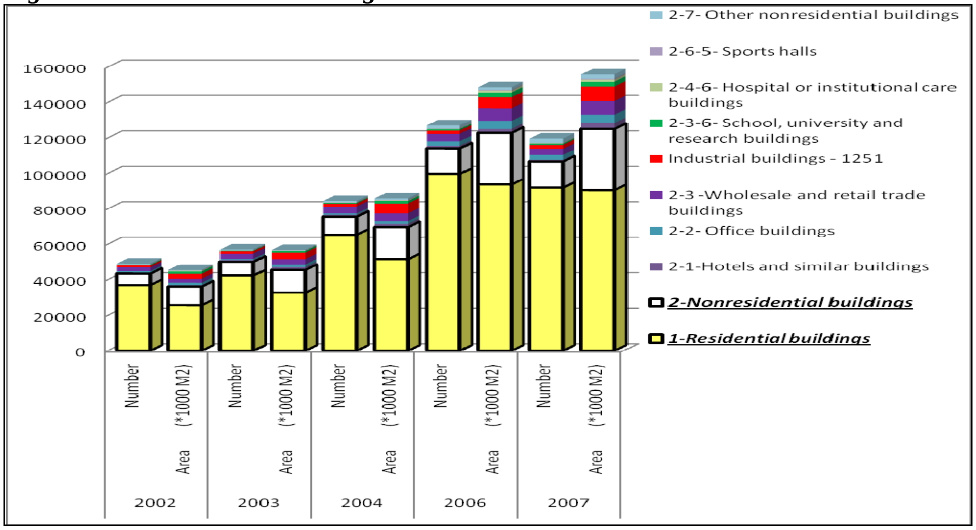
A. STATE THE ISSUE, HOW THE PROJECT SEEKS TO ADDRESS IT, AND THE EXPECTED GLOBAL ENVIRONMENTAL BENEFITS TO BE DELIVERED:

General Country Background

The total population of Turkey increased from 56.5 million in 1990 to 71.5 million by 2008. Along with the increase in population, Turkey's urbanization rate increased from 52.9% in 1990 to 74.9% in 2008[1]. As a result, the number of residential and commercial buildings in large cities has risen rapidly. In recent years, rapid urbanization has brought more people with disposable income into the major cities, and the building sector has shown significant increases in new buildings: 6% of the total historical building stock has been built in the last 7 years. To keep pace and increase housing supply at the national level, as well as to create necessary infrastructure (including educational, health care and other facilities) for the growing population, the Housing Development Administration (TOKI) in 2003-2009 built some 390,000 residential flats and a large number of other types of buildings[2]. In 2000, the Turkish Statistical Institute TUIK conducted a Building Census within 3,212 municipalities and other areas outside those municipalities but still under their responsibility. According to this census, there were 7.8 million buildings[3] in the country and the total heating area was approximately 900-1,000 million m^2. Between the 2000 census and 2008, an additional 750,000 buildings received construction permits[4], thus bringing the total number of buildings to 8.6 million, bringing the total floor area to approximately 1.7 billion m^2, not including unregistered or informal construction. According to TUIK Building Census 2000 and Annual Building Statistics on construction permits 2000-2006, the share of residential buildings stood 86%, while the remaining 14% covered non-residential buildings, including public buildings like schools and government buildings. However, residential building construction saw a slight decrease over 2006-2007, while commercial buildings and public buildings such as hospitals and schools increased (see Figure 1 below).

[1] TUIK Statistics 2008
[2] This figure equals 15 cities with a population of more than 100,000. In line with large-scale urban renewal program, a total conversion work was performed for 162,886 slum houses, in 83 regions, 40,731 houses applications have been initiated in the context of social facilities. In addition, construction of a large number of various public buildings has started (e.g. 564 high schools, primary and kindergartens, 60 hospitals, 80 health centers etc.); a large part has been completed.
[3] Categories according to the purpose of buildings includes: (i) residential, (ii) residential and commercial mixed, (iii) commercial, (iii) industry, (iv) educational, cultural, social, sport, health, (v) official, (vi) religion and (vii) others.
[4] TUIK Statistics Year Books,2007

Figure 1. Trends in New Building Construction



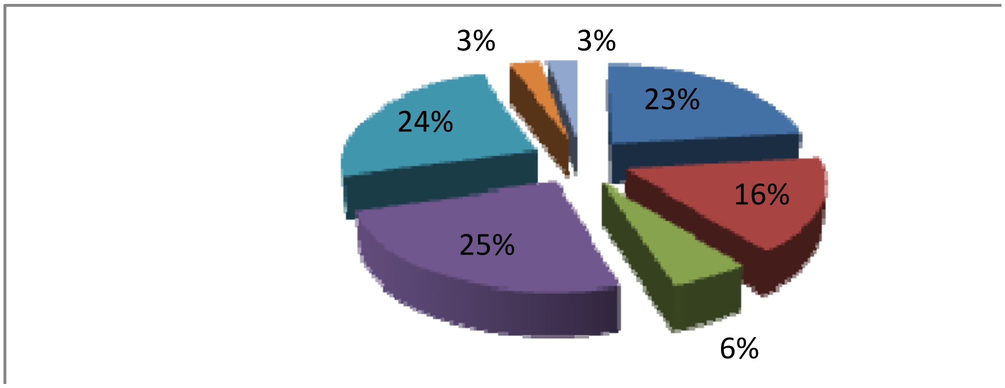
Source Energy: MENR and Buildings: TUIK 2008 (2005 building data is missing)

Though being the world's 17th largest economy, Turkey has the lowest GDP per capita among the OECD countries, and nominal per capita income is 12% of the 2003 EU-15 average[5], while consumer spending on energy accounts for 25% of the average household budget. With the welfare increases seen in recent years, it is expected that the inefficient energy use will cause increases in the energy consumption of the country if energy efficiency does not become the practice.

Energy Situation, Buildings Sector

Turkey's primary energy consumption of approximately 106 million toe (as at 2007)[6] ranks Turkey among the 25 most energy-consuming countries in the world. Although Turkey has the lowest per capita energy consumption in OECD countries (1.35 toe per capita against 4.64 toe for OECD average)[7], the country has great potential for rapid growth rate in energy consumption due to ongoing population and economic growth (though the latter somewhat slowed during the global economic crisis), which is forecast to reach over 220 million toe by 2020. Stimulated by the welfare rise in Turkish households and offices and rapid urbanization, Turkey's annual electricity demand has tripled since 1990, reaching 198 TWh in 2008. Electricity use in the residential sector stands at 40 TWh and commercial sector at 23 TWh. Though, the largest share of the building sector's energy consumption (70% of the total energy mix) belongs to heating and hot water needs, which are met through natural gas, coal, wood and oil (see Figure 2).

Figure 2. Breakdown of Building Sector Energy Consumption, 2008



[5] Relative Income Growth and Convergence, Kemal Dervis et al, 2008
[6] According to the State Planning Organization and MENR
[7] IEA "Key Energy Statistics", 2009

In terms of final energy consumption, the building sector represents the second-largest energy consumer accounting for 36% of the total final energy consumption in 2008 (equal to 28.3 million toe), which leads to considerable emissions of CO_2eq associated with combustion of fossil fuels: according to the 2007 GHG National Inventory Data the building sector's emissions (calculated according to energy consumption) totaled 34 million tons CO_2eq or 32% of the total national energy-related CO_2eq emissions (106 million tons). Without change to the "business-as-usual" (BAU) scenario, the Ministry of Energy estimates the building sector's energy consumption will grow to 47.5 million toe by 2020, leading to concomitant increases in CO_2eq emissions, which are expected to double. On the other hand, the building sector presents significant opportunities for cost-effective energy and CO_2eq savings, estimated at some 30-50% of the current levels.

Many of Turkey's new buildings (built post-2000) are energy inefficient compared with new buildings in the EU countries having similar degree-days. Comparisons of Turkey's new buildings alongside EU countries' energy-use standards reveals that even new buildings constructed in accordance to the Standard of Thermal Insulation Requirements for Buildings TS 825 (see the following sub-section on legal framework for details) and related implementing regulations require at least 50% more energy for heating than their EU counterparts. This is indicative of the fact that Turkey's building codes and standards need adjustment towards more stringent energy efficiency; additionally, as described in the barrier analysis below, code enforcement needs to be stepped up, too. According to a study conducted by General Directorate of Electrical Power Resources Survey and Development Administration (EIE) in 2002, Turkey's heat consumption in standard constructions is higher than that of other EU countries. For example, Denmark's maximum allowable was 23 kWh/m^2/year, the Netherlands 34 kWh/m^2/year and the United Kingdom 35 kWh/m^2/year.[8] These figures indicate that the Turkish average heating energy requirement of 110 kWh/m^2/year is still quite high.

Legal Framework

The legal framework for building energy efficiency in Turkey is based on a number of legal acts and regulations summarized in Table 1 below, with the Building Energy Performance (BEP) Regulation and TS 825 being the key ones.

To foster energy efficiency, the Turkish government drafted an Energy Efficiency Strategy in 2004 and issued Energy Efficiency Law 5627 in May 2007. This law aims to create an adequate institutional framework for supporting energy efficiency measures, including provision of an EE Coordination Board, authorized institutions, and ongoing support for establishment of energy efficiency consulting companies (ESCOs, or EVD in Turkish). Training, audits, consultancy, monitoring activities, and other specific support and/or incentives for energy efficiency projects are regulated by this law as well. The main entity assigned responsibility for the implementation of the law is the General Directorate of Electrical Power Resources Survey and Development Administration (EIE). The provisions of the EE law specifically addressing building energy efficiency include:

- appointment of energy managers at commercial and public buildings over specified size and accreditation of ESCOs;
- implementation of minimum energy performance (MEPs) criteria for buildings;
- establishment of "Building Energy Performance Certificates"; and
- application of individual heat meters for buildings with central heating systems.

The national Standard of Thermal Insulation Requirements for Buildings TS 825, issued in June 1999, provides a backbone for national efforts to improve energy performance in buildings by limiting heat loss through the envelope (all other energy components, like lighting, cooling, are outside of its scope). TS 825 standard became mandatory in June 2000; it complies with international standards (ISO 9164 and EN 832) and:

- sets the thermal insulation requirement for new and existing buildings where renovation of at least 15% of the total area is carried out;

[8] Case Study MURE database: A Comparison of Thermal Insulation Regulations in the EU

- defines the rules for the calculation methods of heating energy requirements in buildings and determination of the highest heating energy permitted (as annual kWh/m^2 according to heating degree days and building volume and area rates; country average of 110 kWh/m^2/year);
- divides Turkey into four climatic zones (depending on average degree-days) and limits the heat loss from the buildings in those regions (see Annex H).

The Ministry of Public Works and Settlement (MoPWS) modified the Regulation on Heat Insulation in Buildings for New Buildings (enacted May 2000, revised in 2002 and May 2008) and developed the Building Energy Performance (BEP) Regulation which was enacted in December 2008 and which will supersede the Regulation on Heat Insulation in Buildings in December 2009. In practice, the BEP supports adaptation of the European Union's Energy Performance for Buildings Directive (EPBD). With the adaptation of EPBD provisions, the requirements of the EE Law on building energy performance will be met. The BEP Regulation's main objectives are:

- To take into consideration the outdoor climate conditions, indoor requirements, local conditions, and cost;
- To define the calculation methods that can be used in evaluating the overall energy use of buildings;
- To define the performance criteria and their application principles and classify the buildings with respect to the primary energy utilization and CO_2 emissions;
- To determine the minimum energy performance (MEPs) requirements of existing buildings that will be significantly retrofit;
- To encourage use of renewable energy resources; and
- To conduct periodic inspection of heating and cooling systems.

In October 2008, the Energy Efficiency Regulation came into force to describe how ESCOs will be established, their training curricula set, and how they will be authorized. It also sets rules for EE in public buildings. Main features of the regulation are as follows;

- establishment of the Energy Efficiency Coordination Board;
- establishment of a national energy information center (in the EIE-Directorate General);
- authorization (accreditation) of entities (universities, engineering chambers) to provide applied energy manager training services to industrial enterprises and buildings; to provide training to consultants; and to accredit energy efficiency consulting firms (through consultancy certificates) to perform energy efficiency services across various end-use sectors (i.e. project preparation and implementation, energy manager training, etc.);
- certification of energy managers, to be employed by large end users (industries >1,000 toe/yr, buildings > 20,000 sq.m or >500 toe/yr, etc);
- preparing regulations for building energy performance (building energy efficiency codes), and issuance of energy identity certificate;
- preparing regulations for minimum energy performance standards (MEPS) and labeling systems for end-use appliances and equipment;
- providing financial incentives (up to 20%) for viable energy efficiency projects (<500,000 Turkish Lira, and payback period <5 years);
- providing financial incentives (20% subsidy on energy expenditures) to industries that have committed to reducing energy intensities through voluntary agreements.

The main law governing use of renewable energy is the Law No. 5346 Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy enacted May 18, 2005 This law is being modified, and it's a regulation under consideration of MoENR to allow the sale of electricity produced from renewables without having an electricity production license (for small power producers up to 500 kW of installed power). This new amendment to the Law on Utilization of Renewable Energy Resources will make renewable electricity production (e.g., solar energy) more attractive, including for application of renewables for power supply to individual buildings as a means to improve return on investment and reduce GHG emissions further.

Table 1. Energy efficiency laws and regulations applicable to buildings in Turkey

Title of the Law/Regulation	Regulates	Latest Revision
National Standard of Thermal Insulation Requirements for Buildings (TS 825)	Insulation standards for a building	May 2008 (minor revision); June 2000
Energy Efficiency Law 5627	Energy efficiency of a building	May 2007
Law on Renewables 5346	Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy	May 2005
Energy Efficiency Regulation	Authorization of ESCOs, Chambers and Universities for EE activities, Energy Managers, Training curricula of EM, Public entities EE program, etc.	October 2008
Building Energy Performance (BEP) Regulation	Energy performance of the building, its calculation, use of RE, and HVAC systems	December 2008 *Will supersede Reg. on Heat Insulation in December 2009*
Regulation on Heat Insulation in Buildings	Thermal performance owing to insulation	Revised August 2008 *To be superseded December 2009*

Institutional Framework

The **Ministry of Energy and Natural Resources (MoENR)** is the main organization responsible for formulation and implementation of general energy policies. The **General Directorate of Electrical Power Resources Survey and Development Administration (EİE**), one of the major organizations under the auspices of MoENR, has been involved in energy efficiency policy and programs, including energy audits, trainings and public awareness activities since early 1980's and is the main government entity responsible for the implementation of the EE law and by-laws, in the context of concerted/integrated collaboration mechanism with the related institutions. Additionally, EIE has been conducting energy efficiency and renewable energy projects in Turkey in cooperation with international donor organizations such as the World Bank, EU and Japan International Cooperation Agency (JICA).

As per the provisions of Article 4 of the Energy Efficiency Law, an **Energy Efficiency Coordination Board (EECB)** has been established and is functional. Among its other responsibilities, the Board is to "prepare national energy efficiency strategies, plans and programs, assess their effectiveness, coordinate their revision as necessary and taking and implementing new measures". Furthermore, it can "establish ad hoc specialty commissions by the participation from the relevant public agencies and institutions, universities, private sector and civil society organizations, with expenses covered from the EIE's budget, under the functions assigned to the Board and where it deems necessary". EIE shall also monitor the implementation of the decisions made by the Board and provide secretariat services. The EECB is chaired by Undersecretary of MoENR.

The **Ministry of Public Works and Settlement (MoPWS)** is responsible for design project preparation, construction and major repairs of public buildings, construction of housing in conformity with the principles of housing policy, taking necessary measures for the manufacturing and use of standardized construction materials in the most economic way for the country's requirements; setting standards for master plans of various scales and for urban infrastructure projects; preparing and publishing regulations, directives, ordinances, model contracts, terms of references and annual unit prices for building materials and construction services. This Ministry is responsible for implementation and monitoring of the BEP regulation.

Housing Development Administration (TOKİ) - is government agency set up to increase housing production at national level; TOKI supports the construction industry related to housing construction or those who are involved in this field. It is also subcontracting any research, projects and commitments, where deemed necessary. Since 1984, TOKİ has been acting effectively in providing affordable housing for the low and middle-income groups through innovative financial mechanisms. It has provided housing loans to approximately 1.2 million housing units by the end of 2004. As part of the proposed project, TOKİ will realize a school project which will use integrated building design approach to create a model energy efficient building for subsequent nationwide replication through its construction activities.

Union of Turkish Engineers and Architects (UCTEA) - is a corporate body and a professional organization defined in the form of a public institution and as of December 31, 2008, the number of Chambers has increased to 23, while the number of members reached 342.996. Graduates of some 70 related academic disciplines in engineering, architecture and city planning are members of the Chambers of UCTEA. The Union is a member of the Energy Efficiency Coordination Board.

Associations of building material producers (**IMSAD**) –a range of non-governmental organizations operate in Turkey representing the interests of the local manufacturers of various construction materials. These could provide valuable contributions to the project, including in EE studies, trainings, awareness raising activities.

Barriers to Promotion of Energy Efficient Buildings

Even though Turkey has gone a long way to create a regulatory environment favorable for investments in EE buildings, there are still a number of critical barriers hampering further development of the market. GEF support is requested in order to remove these barriers, thereby stimulating take-off of the market for EE buildings.

Insufficient scope and/or "ambition" of the current EE regulations – Thermal Insulation Requirements for Buildings Standard TS 825 and related implementing regulations address predominantly heating energy conservation – designed to allow for at least 50% more energy consumption for heating that their EU counterparts, while overlooking such important elements as cooling, lighting, ventilation, indoor thermal comfort, use of renewable sources of energy. In addition, special attention is required in hot and dry climatic areas of Turkey for less energy consumption in summer. Therefore, the current approach is not sufficient to improve the real energy balance of the buildings especially in hot and dry climatic areas of Turkey. Further, under the existing legislation (e.g., TS 825), building design documents do not need to show small (but vital) details for energy efficiency. For example, the insulation details, prevention of thermal bypass or thermal bridging, and other architectural details related to the thermal performance of a building are not required to be included in the drawings. Therefore, building constructors must attempt to comply with the specification for insulation (for example) without having a "detail"[9] to guide them. This leads to ineffective construction techniques, lack of monitoring, and ultimately, inefficient energy use by the building. Also, the current regulations apply primarily to new buildings (i.e. post 2000) and building renovations over 15% of the original building, which may be missing out on important EE opportunities available. According to a survey conducted by EIE in 1998 and updated in 2008, only 18% of all Turkey's existing buildings were found to have multi-pane glazing and only 16% of buildings had roof insulation, which is indicative of the scope of EE potential in the existing (i.e. pre-2000 when TS 825 came into force) building stock. The project addresses these barriers by (i) setting up an institutional mechanism for regular review of building codes; (ii) revising and enhancing building energy performance standards to reflect international best-practices; (iii) developing an effective mechanism for implementation and monitoring of proposed EE policies and programs.

Inadequate level of compliance with the current regulations - during project formulation discussions with stakeholders[10], countrywide code compliance rate was an assessed at 25-30% and that, even in buildings where compliance with insulation requirements is being sought, untrained laborers cannot ensure proper mounting of the insulation. Additionally, some insulation materials do not meet the criteria stated on the product packaging and the methods to install the insulation are frequently field-designed (if architectural details for insulation mounting are not included in the project documents). According to reports from engineers and architects, some locally-made equipment performs at levels estimated at half that stated by the manufacturers. This project addresses these barriers by (i) building capacity of key stakeholders (such as architects, private and municipal inspectors, and installers) to enable them to meet the requirements of the regulations; (ii) performing market

[9] In architectural drawings, a "detail" drawing allows a contractor to view a small section of the building so that understanding of the component and its installed relationship to other components is clear.
[10] Found in discussions with IZODER and other key stakeholders of insulation manufacturers.

evaluations and facilitating testing and certification of construction materials and equipment, and (iii) by providing demonstration buildings that lend replicable technologies, tactics, and architectural "details".

Low awareness of cost-effective opportunities for improving energy performance in buildings, including through IBDA – currently, architects and engineers perform their tasks without synchronizing efforts at the project's outset. This old method of architectural practice, known as "stove-piped design" does not allow the multiple disciplines (such as architecture and engineering) to be integrated at project outset, and therefore, synergistic benefits in the building's energy budget are not realized. This also means that there is no consideration of bioclimatic features, building orientation, or use of passive or active energy-saving tactics including use of renewable energy. Architectural education in Turkey does not typically teach energy efficiency approaches or Integrated Building Design Approach (IBDA), and few trainings are aimed at working professionals. In general, building designers and builders are "on their own" in how to implement the new energy efficiency laws and related by-laws. This project addresses these barriers by (i) providing training to practicing architects and engineering professionals, (ii) introducing new curricula for pre-professionals, and (iii) integrating multiple disciplines like architects and engineers at the building project inception via the demonstration buildings.

Lack of replicable investment models in energy efficient buildings - despite a few demonstrations[11], the practice of emphasizing energy efficiency in buildings is still relatively new in Turkey with the associated limited experience and trust of the building's performance and financial viability. Financing EE building projects is not common in Turkey. There is no incentive scheme for buildings and households yet in Turkey due to many reasons. For instance, the payback periods of EE projects may be long and there is not yet a finance mechanism developed for the building sector. Additionally, tenant-owner return-on-investment ratios are not clear so the economic viability of the EE investments to owners or householders is not understood. Recently, a number of public and commercial banks, which are intermediaries of international donors such as the World Bank, EBRD, French Development Agency (ADF) and others, expressed interest in financing viable EE buildings and ESCOs activities in Turkey. This project will help advance this interest by (i) illustrating financial attractiveness of investments in EE buildings, (ii) recommending financial mechanisms (including incentives) adapted to the Turkish condition, as well as by (iii) providing replicable demonstration buildings that will include a series of low-cost and high-cost measures (including, renewable sources of energy) which have a reasonable combined payback period and will help off-set any additional costs-to-build.

Weak energy management – under the existing regulations in Turkey energy managers are required to be employed by large end users (industries consuming over 1,000 toe of energy per year, or in buildings larger than 20,000 sq.m or using over 500 toe of energy per year). Since 2006, EIE has been running a training course for building energy managers, however but its scope and coverage are inadequate to the fully meet the demand in the market in response to the EE law and revisions of building codes. Further, necessary tools to facilitate better energy management in buildings are generally lacking. The project address this barrier by (i) revising and enhancing the current training course delivered by EIE and authorized bodies, (ii) adapting and/or developing modeling tools, procedures for data collection and reporting, and (iii) compiling market assessments for available technologies and practices.

The following table provides a summary of the key barriers identified alongside the proposed interventions under the project:

Table 2. Barriers and removal strategy

Identified barriers	Proposed project interventions
Insufficient scope and/or "ambition" of the current EE regulations	Outputs 1.1, 3.1, 3.2, 3.3
Inadequate level of compliance with the current regulations	Outputs 1.3, 2.3, 3.1, 3.2
Low awareness of cost-effective opportunities for improving	Outputs 1.3, 2.1-2.3, 3.1, 4.1

[11] Such as a small house built by Diyarbakır municipality, a working office built in Hacettepe University, and a small visitor demonstration building built in EIE premises.

Identified barriers	Proposed project interventions
energy performance in buildings, including through IBDA	
Lack of replicable investment models in energy efficient buildings	Outputs 1.4, 2.3
Weak energy management	Outputs 1.3, 3.1-3.3

Project Objective, Outcomes and Activities

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. This objective is envisioned to be achieved by four outcomes: (1) *improved energy efficiency in new and existing buildings* by revising, enhancing and improving enforcement of building energy performance standards; (2) *cost-effective energy efficiency solutions showcased* by introducing and adapting an integrated building design approach in Turkey and demonstrating the concept in two new buildings; (3) *new tools developed and introduced to facilitate compliance with higher energy efficiency standards* and promote best energy management practices, and (4) *project results integrated into standard practice in the building sector* by monitoring, quantifying and sharing the results with the relevant stakeholders.

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

Despite recent advances in building codes and regulations in Turkey, there is still much room for upgrading building energy efficiency codes and improving enforcement to align with international best practices. Further, to remain effective, these codes have to be regularly upgraded as technologies improve and costs of energy-efficient features and equipment decline. Such mechanisms for regular update of building codes are lacking, while relevant institutions and implementers require strengthening. This project seeks to address these barriers by:

1.1 Establishing an EE Working Group and revising two existing building codes (BEP and TS 825) and other relevant norms and standards to enhance their coverage (e.g. to include cooling, lighting, ventilation, indoor thermal comfort), improve energy performance and incorporate IBDA; developing two calculation methodologies (for heating and cooling) and MEPS for new buildings, and implementation tactics for insulation and inspections;

1.2 Developing for endorsement by EECB of an EE program for new and existing buildings with a Roadmap for EE in new and existing buildings that includes recommendations for improvement and better implementation of key regulations and an Action Plan with prioritized energy efficiency measures;

1.3 Developing an information management system linked with EITMF project, relevant methodology and indicators for measuring, monitoring and evaluating the improvement of energy efficiency in building sector and EE benchmarks for various building types, and delivering necessary trainings for EIE and MoPWS staff who will operate the system;

1.4 Enhancing the capacity of building inspectorates to assess compliance and enforce new building codes, including delivery of a dedicated training program for private and municipal inspectors;

1.5 Developing and introducing Turkish Certification System for buildings (similar to Leadership in Energy and Environmental Design LEED, BRE Environmental Assessment Method BREEAM, or Energy Passports) for all new public buildings and large renovations in order to facilitate compliance with the codes;

1.6 Establishing a Finance Working Group to develop recommendations for financial mechanisms (including incentives and support for the building sector) that encourage both the government and the private sector to finance EE and RE activities in buildings; presenting the recommendations to the EECB;

1.7 Revising the existing curricula for students of architecture and engineering and shape the architectural design guidance aimed at key implementation agents in order to incorporate IBDA and enhance EE aspects;

1.8 Delivering trainings and capacity-buildings for designers, architects, building inspectors, and building energy managers on compliance with the new and revised regulations;

1.9 Enhancing and delivering the EIE Training Program for Energy Managers and authorized ESCOs in accreditation and certification of Energy Managers.

Outcome 2: Cost-effective energy efficiency solutions showcased through integrated building design approach (IBDA) application in two demo buildings

Initial studies conducted during the project preparatory phase illustrated that there was little knowledge of IBDA and that awareness of viable EE demonstrations in buildings was limited. This outcome will focus on generating an IBDA that is relevant and adapted to the Turkish situation and climate zones; and that is illustrated through provision of two demonstration buildings. Key project partners, TOKI, EIE, and the Ministry of National Education (MoNE) will collaborate to provide one new building that is a public school (6,000 m^2), and one training unit of MoPWS (1,500 m^2) for demonstration of IBDA. Although both demo buildings are from public sector, the experience gained by TOKI and MoPWS as part of the project will be easily replicable to other types of buildings (residential and commercial) throughout the country constructed by their partner-contractors who will also participate in the project. Selection of public buildings for demonstration is also justified by the fact that this will enable easier access to the premises for stakeholders and general public, as well as easier monitoring of the buildings' energy performance. Also, location of the buildings in Ankara will facilitate immediate replication through increased visibility (which will help mobilize policy and decision makers to enhance existing regulations) and availability of similar climatic conditions across a major part of Turkey. Please refer to the Project Document Section I Part II for further details on the demonstration buildings selection and scope of activities.

An integrated building design approach (IBDA), as promoted by this project, is a process of design that integrates climatic conditions, the capture and the conservation of the free solar and internal gains, the efficient and comprehensive reduction of all heat losses through walls and ventilation, the accurate control of all external energy introduced for providing thermal comfort, light, and hot water, and – last but not least – user awareness of new behaviors regarding energy use and good operations and maintenance practices. The ultimate goal of applying IBDA is to achieve high performance and multiple benefits at a lower cost than the total for all the components combined if these were considered separately. The project will address this by:

2.1 Developing an IBDA adapted to the Turkish conditions and climate zones so that practicing architects and engineers can understand the code and produce designs that comply with IBDA and new laws;

2.2 Preparing an IBDA handbook and providing trainings for architects and engineers in IBDA;

2.3 Elaborating an implementation strategy and plan for EECB endorsement to have IBDA mandatory for all new public buildings in Turkey by 2013;

2.4 Site, plan, and construct two demonstration buildings (a school and a testing and training laboratory) to illustrate compliance with the new laws, practical use of renewable energy, and use of IBDA;

2.5 Monitoring demo buildings energy performance and quantifying energy and financial savings, CO_2 emission reductions.

Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards and application of integrated building design approach in buildings

Initial studies conducted during the project preparatory phase showed that there were insufficient tools for carrying out EE, complying with the BEP, and following the IBDA. There was no standardized verification process for building energy performance in existing buildings by which to report progress to EIE and MoPWS. This outcome will focus on supplying the tools and support services that will allow for sharing experiences and reporting progress through:

3.1 Adapting selected modeling software for assessing a building's energy use for the use of EIE and MoPWS, and generating new calculation tools that architects, engineers, and constructors may use for new and existing buildings;

3.2 Generating a standardized procedure for verification to allow data collection, measurements, and collation of building energy performance with a universal database;

3.3 Surveying and evaluating the marketplace for both domestically available and locally made equipment and materials and undertaking an analysis of "state-of-the-art" and "state-of-the-shelf" technologies available for use in constructions in the Turkish market[12]; evaluating cost-effectiveness and financial viability of the technologies in the Turkish market; facilitating testing and certification of construction materials and equipment;

3.4 Updating EIE and MoPWS websites and providing online support services for key stakeholders to report progress, record lessons learned, and share experiences.

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

Initial studies conducted during the project preparatory phase illustrated that there was no methodology used in Turkey for monitoring or measuring the indirect or direct savings or GHG emissions reductions from EE buildings. There was also a need to quantify the increased demand for EE buildings that may result to create a *market push* within the real estate market. The project will address these deficiencies by:

4.1 Developing a methodology for monitoring and measuring energy and GHG savings from IBDA, the demonstration buildings, and revised regulations using the adapted software and new calculation methods;

4.2 Establishing a control group of buildings for comparing the performance of the project demonstrations and assessing the impacts of the technological intervention;

4.3 Calculating energy savings and emissions reductions from the project and preparing a report on the measurement of savings to EECB;

4.4 Undertaking market monitoring for new buildings and technologies to assess the potential increase in demand characterized in a report which will guide and inform potential new businesses seeking the new market for EE goods and services in Turkey;

4.5 Producing two independent evaluations – mid-term and final – to give full account of project results in all dimensions.

4.6 Capturing lessons from this project and other national and regional EE projects and preparing a Lessons Learned Report to inform future building EE policies in Turkey.

Expected Global, National and Local Benefits

On a global level, the project will facilitate a "carbon neutral" path for sustainable development. The anticipated global environmental benefits are: a) GHG emission reductions owing to lower energy consumption by energy efficient buildings; and b) eventual additional GHG emission reduction gains achieved by the multiplier effect seen from TOKI's replication of the EE and RE measures undertaken in the demonstration school, as they build more schools and apartment buildings using these tactics (refer to Annex G for estimation of GHG emission reductions from this project). The main national and local benefits are expected to be economic costs savings and reduced dependency/expenditures on imported energy; reduced local pollution produced by conventional energy sources; and enhanced consulting or employment opportunities in EE, RE, and green buildings. Table 3

[12] Shorter payback period measures, such as lighting, may be bundled with medium-to-long-term technologies that may incur more first-cost (or learning curve cost to engineer) but which may lend a more artful solution to creating an energy efficient building. IPCC 2007 recommendations for low-cost, large-mitigation potential measures will also be considered.

illustrates the benefits of energy efficiency improvement and associated CO_2 emission reduction in buildings and examples of the key indicators.

Table 3: Benefits from energy efficiency improvement and associated CO_2 emission reductions in buildings

Category	Non-Energy Benefits	Examples of Indicators	Geographical Scope of the Benefit	Importance for the Project
Health effects	Reduced morbidity	Avoided hospital admissions, medicines prescribed, restricted activity days, productivity loss.	Local, national	High
	Reduced physiological effects	Learning and productivity benefits due to better concentration.	Local	High
Ecological effects	Reduction of outdoor air pollution	Similar to reduced morbidity but this category is broader including, for instance, avoided damage to building constructions.	Local, national, global	Low
	Construction and demolition waste benefits	Waste rate reduced.	Local, national	Low
Economic effects	Lower energy bills	Decrease in fuel and energy expenditures.	Local, national	High
	Employment creation and new business opportunities	Sales of efficient construction materials and design services.	Local, national	Medium
	Rate subsidies avoided	Decrease in the amount of subsidized energy bills	Local	Medium
	Decrease in energy imports and related costs	Fuel dependency rate and required foreign currency of the country to meet energy demand decrease	National	High
	Avoided costs to support human health, working environment, and building facilities	Avoided costs of mortality, hospital admissions, medicines prescribed, restricted activity days, insurance costs, productivity loss, building maintenance.	Local, national	High
Social effects	Increased comfort	Normalizing of humidity and temperature indicators; air purity.	Local	High
	Increased awareness	(Conscious) reductions in energy consumption; higher demand for energy efficiency measures.	Local, national	High

A. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL AND/OR REGIONAL PRIORITIES/PLANS:

The proposed project is in-line with the stated energy policy of Turkey to ensure adequate, reliable and cost-effective energy supply to support the targeted economic growth and social developments, while also protecting the environment and public health from pollution arising from energy production and consumption. It also complements the Energy Efficiency Strategy which was adopted by MoENR in June 2004 to define measures for improving energy efficiency in the final energy end-use sectors in Turkey, including buildings. By May 2007, the Government of Turkey had formulated the Energy Efficiency Law (Law no. 5627) to increase efficiency in use of energy resources, avoid waste, ease the burden of energy costs on the economy, and protect the environment.

The EE Law and associated regulation for the efficient use of energy resources (October 2008) recommended (among other things) establishing an Energy Efficiency Coordination Board (EECB), a system of providing training and certification of energy managers for buildings of 20,000 m^2 in size or using more than 500 toe/yr (these limits will be half that for public buildings), undertaking national awareness-raising, and preparing building energy performance, codes, and standards.

B. Describe the consistency of the project with GEF strategies and strategic programs:

The project is consistent with the Climate Change focal area Strategic Program 1: "Promoting Energy Efficiency in Residential and Commercial Buildings" by promoting energy efficiency in buildings. It will (a) help Turkey to upgrade and enforce the energy performance standards for buildings by strengthening stakeholders; (b) support the adoption of an integrated building design approach through information, awareness-raising, and demonstration, and (c) promote energy efficiency in new buildings by providing valuable feedback and lessons learned. The project falls under the UNDP-led *GEF Global Framework for Promoting Low Carbon Buildings* with a primary focus on two thematic approaches promoted by the Framework: a) Promotion and increased uptake of high quality building codes and standards – by introducing and enforcing mandatory energy efficient building codes; and b) Developing and promoting energy efficient building technologies, building materials and construction practices – by piloting integrated building design. The coordination platform offered by the global framework will help Turkey learn from experiences and best practices from countries with similar on-going energy-efficient building projects, including relevant GEF projects in the region (Kyrgyzstan, Uzbekistan) and good practice building codes and standards work done in other countries.

C. Justify the type of financing support provided with the GEF resources:

The requested GEF financing will be used for technical assistance to share the costs of the planned policy development, capacity building, demonstrations and public awareness raising activities, which have been identified as critical cornerstones for increasing energy efficiency implementation and effective market transformation through the IBDA enhanced with energy efficiency and renewable energy measures. Non-grant instruments (e.g. loans) are not considered appropriate for the type of technical assistance (policy development, capacity building, etc.) envisaged within the project.

D. Outline the coordination with other related initiatives:

Energy Information and Technology Management Facility Project (EITMF): EIE will develop and initiate this project including construction of the facility in order to compile and process the data related to sectoral energy use. The project to be conducted with the assistance of the Scientific and Technological Research Council of Turkey (TUBİTAK) will provide inputs to support the GEF project activities such as assessment of EE policy' impacts; assessment EE technologies and materials existing in the Turkish market assessment, awareness-raising in governmental departments. Upon completion of the GEF project, the training center, to be supported by the GEF project, will carry on relevant activities to ensure sustainability of activities. In the scope of the GEF project, capacity of the staff to be employed in the center will be increased through training programs in abroad as well as in Turkey. The two projects will be harmonized and linked during their implementation to ensure long term sustainability.

Proposed-GEF-Funded Project Household Appliance Energy Efficiency: A proposed GEF-funded project seeking to strengthen ongoing national efforts in the development and implementation of household appliance energy efficiency labeling is being submitted within the same project cycle as this project. Under this EE buildings project being proposed, the market assessment on compliance with stated labeling efficiencies relevant to the building sector may provide useful insights to the labeling project.

The Project of Efficient Utilization of Energy in the Building Sector of Turkey-Pilot Region Erzurum: the sphere of Technical Cooperation Agreement between the Turkish and German Governments, a project on EE in buildings was initiated in 2002. The project was carried out in cooperation with German Technical Cooperation Agency (GTZ), EIE, and the Municipality of Erzurum and was completed in October 2005. The project, whose aim was to increase energy efficiency and mitigate environmental pollution at the city level, included many training programs, applicable policy tools and study visits.

One of the project's components ("training of trainers") was realized and launched in the program of "Certified Energy Managers in Buildings" who will have active roles in the EE operations of large-scale buildings. With the financial support of private companies, an existing orphanage dormitory building in Ankara was rehabilitated through the addition of insulation to exterior walls, low-e windows, thermostatic valves as well as heating system adjustments. Within the scope of the project, an Energy Consultancy Center was established in the Municipality of Erzurum to provide information to the general public as well as main actors in the construction sector. In addition to this, two demonstration projects were realized in Erzurum for rehabilitation. Although the GTZ project has now been completed, it has provided useful lessons, which this project has internalized during design. That project also created materials and a syllabus that this project will build on and aim to integrate more fully into teaching curricula. Following the GTZ project, EIE launched the program of "Certified Energy Managers in Buildings" in a training facility, in which energy efficiency measures and renewable energy tactics are placed in buildings.

At present, a two-week training program of "Certified Energy Managers in Buildings" (including theoretical and practical training modules) has been ongoing since April 2006 with the cooperation of the private sector and universities. The participants, who pass the examination and prepare an energy audit report to demonstrate the acquired knowledge in the field of "Energy Management in Buildings", will receive a certificate. Although this program is focused on EE operation of the existing buildings, training materials will be reviewed to use and be developed for the new buildings training program under this project.

Proposed EU-Funded Project on Building Energy Performance: An EU-funded project was proposed by MoPWS in 2007 on Energy Performance in Buildings Directive (EPBD). That project's goals were formation of a new laboratory designed to test and label products and materials, acting as a Building Research Institute, alignment with EPBD, and establishment of MEPs (minimum energy performance standards). The project was declined for funding as its scope was considered too narrow and needs a Feasibility Study to be funded. MoPWS has submitted a new proposal in a wider scope on the Laboratory project to ask funding by SEI (Support for the European Integration) for the preparation of the Feasibility Study in March 2009. However, that FS is not scheduled to be conducted until 2010. In November 2008, this project held discussions with the MoPWS and the EU Affairs Unit of the MoPWS to determine if this project was synergistic with the purposes of the EU project whose primary goal was EPBD alignment.

During these discussions, it was agreed that no alignment with the EPBD would be possible if energy efficiency in new buildings was not the norm in Turkey, and that the norm must begin with compliance with TS 825 BEP, and related energy efficiency regulations. While EU accession issues (or EPBD alignment) are not the goal of this GEF project, it is foreseen that this GEF project may provide significant outputs (such as advice on materials and methods) that a Building Energy Research Laboratory would find valuable. It was concluded that EPBD alignment is a "reach" goal while compliance with TS 825 and the Energy Efficiency Law are within the grasp of the country if this GEF project is successful, and further, that compliance is needed now. MoPWS and TOKI have agreed to co-finance this project and lend their support to the primary goals of this project since these goals are critical steps Turkey must take.

E. DISCUSS THE VALUE-ADDED OF GEF INVOLVEMENT IN THE PROJECT DEMONSTRATED THROUGH INCREMENTAL REASONING:

Business-as-Usual Scenario

Though BEP regulation is already in force (as of December 2009), initial reactions received from the key market players indicate that further improvement are needed due to gaps, inconsistencies with market conditions and existing structures identified once the actual implementation has started. The analysis of the new building standards and energy performance regulations, compliance levels, design procedures and energy management practice in buildings has revealed, however, that the country is still lagging behind EU standards and there is still room for improvement, as explained in the analysis above. In the absence of the proposed GEF intervention, i.e. under the business-as-usual scenario, the available potential in reducing energy consumption in buildings in Turkey would be realized at a slower pace and to a comparatively smaller scope. The key assumptions of the baseline scenario are:

1. *The pace and comprehensiveness of improvements in the national energy-efficiency building code and enforcement*. The current construction norms and standards for buildings are mandated by two key

regulatory mechanisms (BEP and TS 825) by December 5, 2009. Presently, with energy security (reliability) issues and growing energy prices, and also new environment created by new Energy Efficiency Law, it is likely that the level of concern in Turkey will be strong enough in the short-term period, likely within 2-3 years, to initiate the demand-side measures including the minor improvement of building regulations enforcement and implementation. Therefore it is likely that in the business-as-usual case the building codes will be updated to solve implementation problems within 2-3 years, i.e. by 2013. The question is however how much they would be strengthened. Based on the EU experience, the update usually takes place each 5-10 years and energy-efficiency requirement improvement is 10-20%/decade. Based on this experience, it is assumed that *starting in 2013*, heating energy requirement in new buildings defined in building codes in Turkey will be *decreased by around 10%*, i.e. down to an average of *100 kWh/m²/y* (since there is a significant efficiency potential, the maximum from other countries' experience was assumed).

2. *The compliance rate for building codes*. Relatively low compliance of buildings with building codes is a worldwide problem encountered not only in developing and transition economies but also in developed ones. Since there are no official statistics on code compliance in Turkey, informal consultations with key market players have been used to come up with the following assumptions: around 40% of buildings are assumed to be in full compliance with the current code (i.e. specific energy consumption for heating at an average of 110 kWh/m^2/y); 35% of buildings are in minor non-compliance (SEC 10% higher than the code requirement) and 25% in major non-compliance (SEC 50% higher than the code requirement). With the 10% improvement in code requirement in 2013, the compliance rate is expected to initially drop to 30% full compliance, 40% minor non-compliance, 30% major non-compliance (due to more stringent code requirements and lack of capacity building for all market players), before improving to 60% full compliance, 25% minor non-compliance, 15% major non-compliance by 2017.
3. *Building stock growth*. Reflecting the impacts of the global economic crisis and building on the recovery projections for the Turkish economy[13], as well as the TUIK building sector statistics for the past seven years, the business-as-usual building stock model is assumed to see 3% contraction in residential construction and zero growth per year in non-residential segment in 2009-2011, followed by zero growth in residential and 3% growth in non-residential segment in 2012-2014.

The above baseline scenario, therefore, conservatively assumes certain degree of improvements to be achieved in buildings energy efficiency through implementation of the TS-825 standard, though at a later stage and to a lesser degree as compared with the proposed GEF intervention. The resultant GHG emissions scenario is a continued growth in annual emission rates from the current 45 million tons CO_2eq per year to over 52 million tons CO_2eq by 2015 and over 66 million tons CO_2eq by 2025 (refer to Annex G for projections of GHG emissions under baseline and alternative scenarios). As can be seen from comparison of the baseline scenario to the GEF alternative, potential significant global environmental benefits in terms of CO_2 emissions reductions from enhanced building energy codes, improved compliance, energy management and IBDA in the buildings sector in Turkey will not be realized without the GEF support.

GEF Project Scenario

The GEF Project Scenario relies on a set of actions being undertaken to improve energy performance in buildings (enhancement of current energy performance standards, improvements in enforcement, integrated building design approach, demo buildings and improved energy management in existing buildings), which are forecast to drive energy demand of the building stock down, thus reducing the associated CO_2 emissions below the business-as-usual trend line.

With the GEF support the current building codes and regulations will be enhanced, resulting in a 15% reduction of average energy requirement for heating from the current 110 kWh/m^2/year to 94 kWh/m^2/year by 2012. The more stringent code requirements are expected to initially bring code compliance down to 25% full compliance,

[13] Economist Intelligence Unit (EIU) estimates Turkish economy has contracted by 5.9% in 2009, and forecasts growth at 3.4% in 2010, and 4% for 2011-2014 annually.

50% minor non-compliance, 25% major non-compliance by 2012. However, the project-supported capacity building and technical assistance will contribute to subsequent improvements in compliance to 70% full compliance, 15% minor non-compliance, 15% major non-compliance by 2014.

Application of an integrated building design approach in new buildings has been estimated to enable at least 40% reduction in energy requirement for heating from the current 110 kWh/m^2/year to 66 kWh/m^2/year. Moderate penetration rates have been assumed for IBDA adoption by the different segments: starting from 1% of annual construction volume in the residential segment in 2012 gradually increasing to 5.4% by 2024; starting from 2% in 2012 and up to 25% of annual non-residential construction by 2025; all public sector non-residential construction starting in 2013 will use IBDA. Further, improved energy management is expected to reduce heating energy demand by 10% in non-residential buildings constructed prior to 2000: in 10% of buildings in 2012 and 20% of buildings in 2015.

The combined impacts of the project-supported interventions and ensuing replications within 10 years of GEF project influence period are estimated to enable cumulative energy savings in the Turkish building sector to the tune of 529,153 GWh (calculated over 20 years of useful lifetime of investments). Thus, the GEF alternative GHG scenario shows considerable deviation below the baseline and is estimated at around 69 million tons CO_2eq of cumulative emission reductions (over 20 years), assuming CO_2eq emission factor of 0.163 tCO_2eq/MWh and GEF causality factor of 80% (refer to Annex G for estimation of GHG emissions reductions).

F. Indicate risks, including climate change risks, that might prevent the project objective(s) from being achieved and outline risk management measures:

Risk	Rating	Mitigation
Enabling policy framework for the secondary regulations and calculations are not implemented at the desired speed	Low	The project will work directly with the government entities responsible for approving the respective regulations, which will help ensure potential concerns are addressed timely to prevent delays in approval and implementation. Further. EU accession agenda defined in the *National Programme for the Adoption of the Acquis* will contribute to timely implementation of BEP and other related regulations.
International economic crisis may lead to an overall slowdown of construction activity and therefore impact GHG emission reduction estimates	Medium	Even though the global crisis is going to have its toll on the Turkish economy, construction is likely to remain a relatively high priority due to the growing population and urbanization trends. Reduction of operational budgets through improved energy performance of buildings will provide additional attraction for the building sector at the time of economic crisis. Finally, the GHG emission reduction estimates are based on fairly conservative assumptions that factor in a slowdown in building stock growth over the coming years, which will help assure the estimated GHG benefits are achievable through the proposed GEF intervention.
Integrated building design approach does not get sufficient uptake due to lack of understanding or replication	Low	The project will mitigate this risk by engaging key organizations in the project design and stakeholder training programs from the outset. Commitment from key organizations (EIE and MoPWS) to mandate the use of IBDA for all new public buildings and renovations via the revised building code and regulations will ensure immediate replication in the public sector. Additionally, TOKI's experience with the demo buildings will enable it to replicate those practices in the residential (private) sector construction.
Building codes may not be enforced effectively	Medium	The project will mitigate this risk by providing a training program aimed at municipal and private building inspectors to ensure their understanding of compliance requirements with new laws. The project will further address the enforcement risk by applying an energy performance certificate scheme with certificates tested and applied by trained inspectors. A new information management system for measuring, monitoring and evaluating EE improvements in the building sector will allow inspectors to input results and the new real-time website support will assist in answering enforcement questions. Turkey's

Risk	Rating	Mitigation
		drive toward joining EU will provide further impetus toward improving building energy codes enforcement and compliance.

G. Explain how cost-effectiveness is reflected in the project design:

As concluded by IPCC and other studies[14], substantial reductions in CO_2 emissions from energy use in buildings can be achieved using integrated design approach and mature technologies for energy efficiency that already exist and are applied widely, either with net economic benefits or at low cost. The use of the integrated building design process can help achieve energy savings in the order of 35–50% for a new building compared to standard practice at little or no additional cost.

For the GEF investment of US$ 2.62 million and cumulative expected lifetime GHG emission reductions in the range of 2 to 69 million tons of CO_2eq, the unit abatement cost of the proposed project totals in the range of US$1.22 to US$0.04 per tCO_2eq avoided. This compares favorably to the outcomes of IPCC assessments of building sector carbon abatement costs[15], which concluded that some 30% of BAU emissions in buildings could be avoided at a cost below US$20/t$CO_2$eq.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. Institutional arrangement:

NA (no other GEF agencies involved in project implementation).

B. Project Implementation Arrangement:

The project will be executed by the General Directorate of Electrical Power Resources Survey and Development Administration (EIE), following UNDP guidelines for nationally-executed projects. The Executing Agency will sign the project document with UNDP and will be accountable to UNDP for the disbursement of funds and the achievement of the project goals, according to the approved work plan. In particular, the Executing Agency will be responsible for the following functions:

- coordinating activities to ensure the delivery of agreed outcomes with project partners and other ministries and public administration;
- certifying expenditures in-line with approved budgets and work-plans;
- facilitating, monitoring and reporting on the inputs and delivery of outputs;
- coordinating interventions financed by GEF/UNDP with other parallel interventions;
- approval of Terms of Reference for consultants and tender documents; and reporting to UNDP on project delivery and impact.

The Executing Unit (ECU) will consist of the representatives of the EIE, MoPWS, MoNE, and TOKI and the Project Team. The members of the ECU will take necessary actions within their areas of responsibility of their respective organization under the guidance of the PSC and support provided by the PMU. The ECU will also consult and work with other relevant stakeholders on specific issues and on request or for its own purposes, can invite any expert or authority member to participate in the meetings. The ECU will meet at least once a month. The EIE shall be authorized to make the final decision in case of dispute. The decisions will be submitted to the approval of PSC through PMU. More specifically, the role of the ECU will be to:

- implementing respective project activities, including organizing and reporting local meetings, purchasing items, working with experts/consultants on-site, etc.;
- reporting and providing feed-back to the PMU and partner organizations; and
- negotiating with stakeholders at site level and ensuring effective networking among them.

[14] e.g. McKinsey 2009

[15] Residential and commercial buildings. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

The project will establish a Project Steering Committee (PSC), and a Project Management Unit (PMU) at the inception of the project. It will be composed of the EIE, MoPWS, MENR, MoEF, UNDP/Turkey, SPO, TOKI, MoNE, Chambers of Engineers and Architects. The PSC will meet at least every six months and will be convened and supported logistically by the PMU. The PSC will be chaired by the EIE and will provide overall guidance for the project throughout its implementation. Specifically, the PSC will be responsible for:

- achieving co-ordination among the various government agencies;
- guiding the program implementation process to ensure alignment with national and international policies, plans and strategies;
- ensuring that activities are fully integrated with other developmental initiatives;
- overseeing work of implementation units, monitoring progress and approving reports;
- overseeing the financial management and production of financial reports;
- monitoring the effectiveness of project implementation; and
- preparing regular report-backs for the representing Departments/Institutions.

The administration of the project will be carried out by a Project Management Unit (PMU) under the overall guidance of the PSC. The PMU will be based in Ankara and will report to EIE under its Division of Planning under the Energy Efficiency Resources Survey Department or other division/department assigned by EİE. The PMU will be composed of Project Manager and a Project Assistant/Financial Officer. The Project Manager, which will be jointly assigned by the member organizations in ECU and externally hired by UNDP for the project period, will be a natural member of the PMU. He/she, will be supported by a Project Assistant/Financial Officer. More specifically, the role of the PMU will be to:

- ensuring the overall project management and monitoring according to UNDP rules on managing UNDP/GEF projects;
- facilitating communication and networking among key stakeholders including PSC;
- organizing the meetings of the PSC; and
- supporting the relevant stakeholders.

Figure 3. Diagram of Project Partners and Management

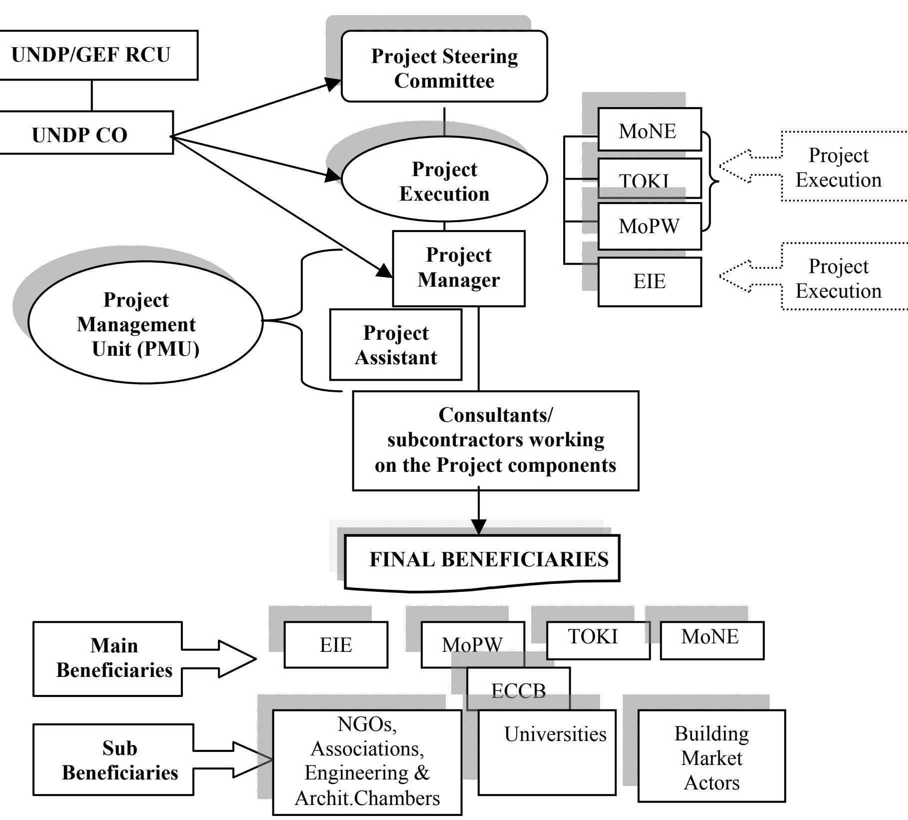
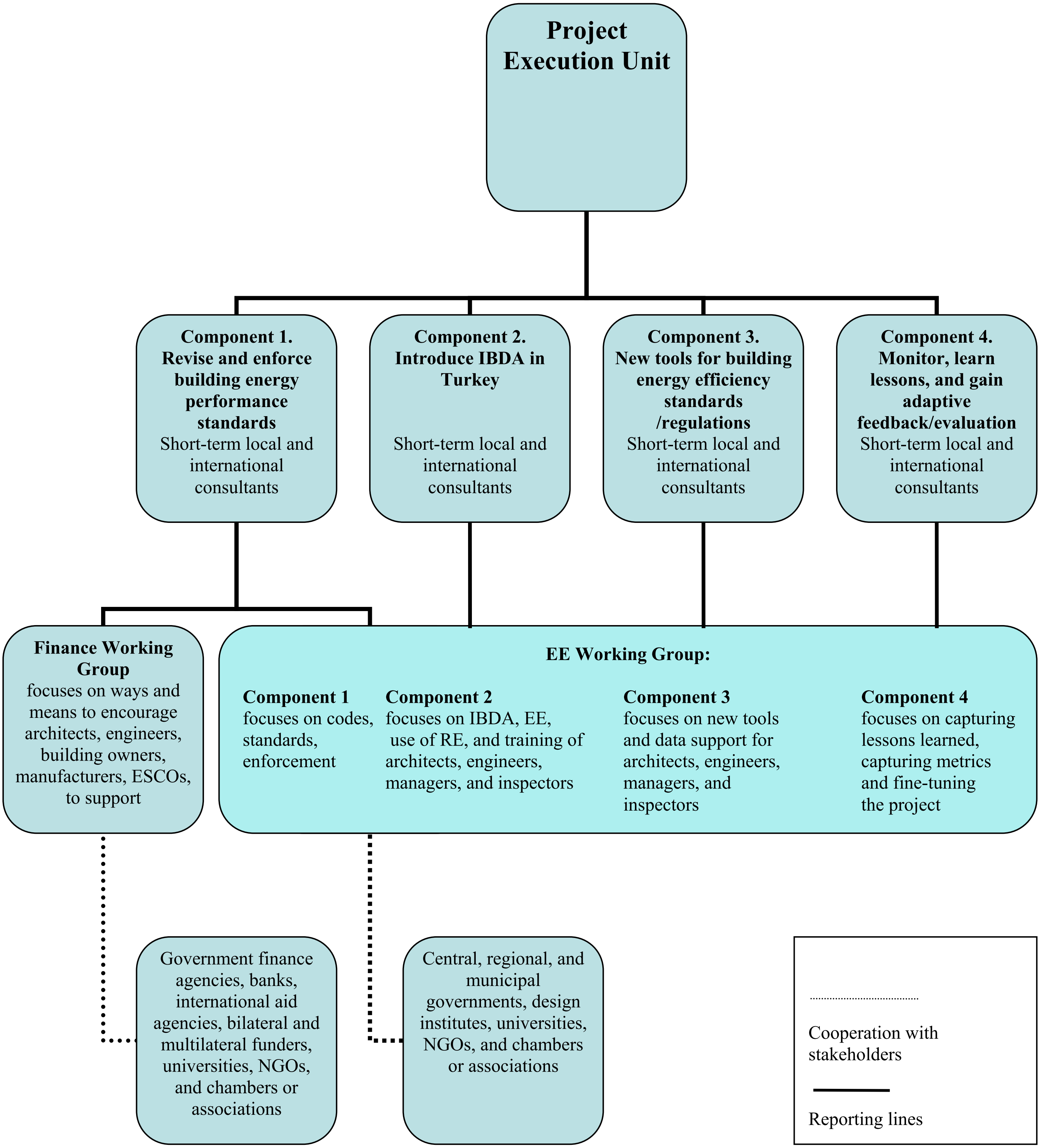


Figure 4. Stakeholder Involvement in Project Implementation via Two Working Groups (a Finance Working Group and a single EE Working Group contributing to all components)



PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:

The original PIF project design has been largely retained unchanged in terms of the expected outputs and outcomes.

The following revisions have been made in order to reflect PPG findings and analysis made:

- GHG emission reduction estimates have been trimmed down from the PIF amount of 99 million tons of CO_2eq to 69.2 million tons CO_2eq for the following reasons:
    - Turkish building stock data have been updated with 2006-2008 data which were not available at the time of PIF writing;
    - Turkish building stock growth projections have been adjusted downward to reflect the recently observed slowdown due to the global financial crisis;
    - Potential energy efficiency improvements in building sector factored into the baseline projections;
    - GEF causality factor (80%) applied to the GHG estimates.
- In response to a comment from GEF Council member, additional cash co-financing from UNDP (US$ 60,000) has been incorporated in the project budget.
- Following detailed assessment at the PPG stage and consultations with key project stakeholders, co-financing volume has been re-estimated downward from US$18.8 million at PIF stage to US$15.1 million at CEO endorsement. The most significant factor to reduce overall co-financing was that the original costs under Component 3 were over-estimated in the PIF (which is indicative of the fact that exact estimates are difficult to make at the PIF stage). The most costly endeavor under original PIF Component 3 would have been developing compliance software which is no longer a feature of this project. Further discussions during PPG revealed that calculation tools for ensuring compliance must be developed before a compliance software tool is developed for tracking. The PPG analysis has concluded that all of the planned project outputs (including those revised compared to PIF) could be delivered with a relatively smaller amount of co-financing. Despite the adjustment, the project still offers favorable GEF to co-financing ratio of more than 1:5.

PART V: AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement.

Agency Coordinator, Agency name	Signature	Date *(Month, day, year)*	Project Contact Person	Telephone	Email Address
Pradeep Kurukulasuriya UNDP/ GEF Officer-in-Charge		March 31, 2010	Dmitry Goloubovsky	+998 97 7494409	dzmitry.halubouski@undp.org

LIST OF ANNEXES

ANNEX A Project Results Framework

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 thermal energy consumption in new buildings compared to baseline	110 kWh/m^2/year	66 kWh/m^2/year for buildings built with IBDA	National energy statistics and project GHG monitoring system	Costs of EE and RE technology and materials do not increase Dynamics of construction of new buildings remain within the forecast range
	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, 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	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
Output 1.1 Institutional mechanism for regular revision of building energy performance, including EE program and roadmap	Clearly defined roles, responsibilities, actions and targets for regular revision of building codes	Mechanism and approaches for building code revision need streamlining	Two working groups (EE WG and Finance WG) formed; EE program and roadmap designed that provide key institutions and EECB clear roles, responsibilities, and common metrics to monitor EE improvements in buildings	EE Program for New Buildings with Roadmap and Recommendations for EECB Database for use by EIE and MoPWS Project reports	Working group studies and activities welcomed by relevant institutions, other stakeholders and EECB EE program suggested or new buildings is actionable and acceptable to key relevant agencies Acceptance and cooperation on the part of the various government agencies to use a universal database

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
Output 1.2 Two existing building energy performance codes and other relevant norms and standards revised and implemented	Approval of revised codes defining minimum energy performance standards (MEPS)	Building codes and relevant norms are not established	Two building codes upgraded, MEPS for new buildings defined	New codes, MEPS, as reported by MoPWS	Acceptance and cooperation on the part of the various government agencies to amend and/or add information to secondary regulations
Output 1.3 Enhanced capacity for compliance with the new regulations, including energy performance certificate scheme	Ability of architects and engineers to comply with more energy efficient codes by integrating better designs in buildings Content, acceptance, and status of the Certification Systems	Current designs do not emphasize energy efficiency and are above international standards for energy consumption No energy performance certificate scheme introduced	Submitted designs meet and exceed the requirements of more efficient codes by the end of the project At least 50% of key stakeholders have information about the energy performance certificate scheme	Review of prototype efficient designs. Survey of first-time acceptance rate for and statistics on building commissioning Monitoring reports and final evaluation of the impact of the certification scheme initiated.	Willingness of the targeted public authorities, academics, and implementers to benefit from the training and the supporting studies Interest of the private sector stakeholders to cooperate in the development, organization and dissemination of the labeling scheme for buildings
Output 1.4 Financial mechanisms (including incentives and support for the building sector) developed and presented to EECB	Increasing numbers of funding agencies, banks, and ODA donors seek to support EE buildings in Turkey	No market growth of EE buildings due to reality and perception of cost-to-benefits inequity	At least one innovative finance mechanism developed for each key target group: architects & engineers, building owners, ESCOs, and building inspectors	Anecdotal information received through surveys of banks, lenders, and funders	Key funding institutions and/or government of Turkey agree on financing mechanisms
Outcome 2: Cost-effective energy efficiency solutions showcased through integrated building design approach application in two demo buildings	Implementation of demo constructions with IBDA resulting in significant energy improvements	Limited market growth of buildings built with IBDA	Two IBDA demo constructions of 7,500 m^2 commissioned and using at least 40% less energy than in BAU	Issued Building BEP Identity Certificates for new buildings Calculations on the basis of the available market data and assumed baseline development	Continuing commitment of the key public authorities and government entities to develop and implement effective EE buildings policies and practices

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
				Official energy statistics	
Output 2.1 IBDA developed for Turkish climatic conditions, including implementation strategy and action plan;	Adoption of IBDA for new constructions in different sectors	Limited application of IBDA	IBDA mandated for use in all new public buildings as of 2013	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 the implementation strategy
Output 2.2 IBDA promoted to building sector professionals and key stakeholders	Content, acceptance, and status of the training	Limited knowledge or use of IBDA	100% of architectural and engineering students are taught IBDA, 50% of architects and engineers report high level of confidence, awareness and use of IBDA	Surveys of construction documentation; Guide on IBDA for architects and engineers	Interest of the universities to cooperate in the development, organization and dissemination of IBDA and EE principles
Output 2.3 Two demonstration buildings commissioned, showcasing IBDA and compliance with new energy codes	Energy performance of IBDA-enhanced demo buildings at least 50% better than country average of 110 $kWh/m^2/y$	New buildings (whose heat requirement is an average 110 kWh/m^2) are not built with IBDA enhanced with EE and RE	Two demonstration buildings built to use no more than 66 $kWh/m^2/y$ in energy for heating	Demo buildings' planning and construction documentation Project reports, records of energy audits	Demonstration buildings are built as designed
Outcome 3: New tools developed and introduced to facilitate compliance with higher energy efficiency standards and application of integrated building design approach in buildings	Required data, verification processes, and website utilization and relevance to key stakeholders	Tools and calculation methodologies are insufficient, no collation of relevant baseline data is possible	Over 50% of trained key stakeholders use new tools, websites, and IBDA	Project progress reports	Continuing commitment of the key public authorities and government entities to disseminate and provide training in use of new tools for EE and IBDA in buildings
Output 3.1 New calculation tools that architects, engineers, and constructors may use for compliance with the laws	Availability of required data and agreement on the verification process	Accurate calculation tools for key stakeholders needs to be strengthened	Over 50% of trained key stakeholders use the calculation tools, including modeling software	Project progress reports Two new calculation tools	Reporting of existing building energy performance is consistent and well-understood by key stakeholders

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
Output 3.2 Standardized procedures for data collection, measurements, and collation of building energy performance designed and trained;	Availability of required data and agreement on the verification process	Standardized processes for key stakeholders needs to be strengthened	Over 50% of trained key stakeholders use the verification procedures	Written Verification Procedure, sample test reports	Reporting of existing building energy performance is consistent and well-understood by key stakeholders
Output 3.3 Facility for online support services for key stakeholders and evaluation of cost-effectiveness and financial viability of the technologies in the Turkish market	Impact of the content of the support facility on key stakeholders	No website relevant to IBDA with regularly updated content on EE information and experiences available and market analysis	Over 50% of key stakeholders find the online facility useful and actively upload information relevant to EE buildings as well as take advantage of online training ,market analyses report cover all material which has more than 20% market share	Project progress reports Enhanced EIE and MoPWS Web sites Online information and training modules accessed Market report	Interest of the key stakeholders, and ministries to cooperate in the development and assessment of the impact of the websites, cooperation of market actors
Outcome 4: Building energy consumption, energy savings, and other results of the project monitored, evaluated, and reported	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	Project final evaluation Annual project reports GHG assessment reports	Successful completion of the prior project activities Adequate data will be available from the stakeholders and the market
Output 4.1 Methodology for monitoring and measuring project savings from IBDA, the demonstration buildings, and improved implementation of the regulations devised and implemented	Acceptance and reliability of the methodology for monitoring and measuring the impacts	No baseline information on the market, energy, GHG or financial impacts of EE, BEP compliance, or IBDA	An accepted and agreed methodology that is useful to key stakeholders for the assessments and monitoring	Monitoring Methodology and Plan Reports of Control Group of buildings for assessing the impacts of technological interventions Project progress reports	Ongoing monitoring and recording of the impact of the project and barriers faced

Project Strategy	Indicator	Baseline	Target	Sources of Verification	Important Assumptions
Output 4.2 Evaluation of project results and knowledge sharing	Status of the mid-term and final report	No consolidation of the results and lessons learned	Final project report consolidating the results and lesson learned from the implementation of the project	Project progress reports and final evaluation	Ongoing monitoring and recording of the impact of the project and barriers faced

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF)

Questions/Comments	Response	CEO ER Reference
STAP review: ***Scientific Justification*:** • *How will the building codes and standards be revised?*	The process for revising building codes, standards, and regulatory mechanisms under this project will be through two working groups of experts allied with international experts who will provide various perspectives and international experiences to be shared. Given that there is no implementation strategy for carrying out the new laws, this is proposed under this project (as part of the EE Program for New Buildings). After that, development of ratchet plans (to make the codes more stringent over time) and sunset plans (for those laws or codes which will be eclipsed or "go dark" over time) as well as penalties and supports for energy efficiency in new buildings will be devised by MoPWS with technical support by EIE.	Part II, Section A, Outcome 1
• *Where will the best practices come from (EU standards?).*	Considering the advancements on building standards within EU, key best-practice recommendations will be source from successful experiences within the EU member states.	Part II, Section A, Outcome 1
• *What methods and approaches will be used for revising the building performance standards and for developing integrated building designs?*	This project takes a step-by-step approach, beginning with understanding of the regulation, its potential impact, the design details that architects must draw for constructors in order that insulation is carefully installed, and intends to the concept of the "integrated building design approach" to introduce efficient lighting, appliances, water and space heating control systems, low GHG construction materials, district heating in colder climates, space cooling and ventilation in the warmer climates, and the notion of using both active and passive technologies and tactics. Also see response to bullet #1.	Part II, Section A, Outcome 1
• *What is the source of best technologies?*	The project will base its technological recommendation on the results of market assessments of domestically available and imported equipment and materials and analysis of "state-of-the-art" and "state-of-the-shelf" technologies available for use in the Turkish market.	Part II, Section A, Outcome 3
• *Which key energy efficiency technology options will be selected for co-financing and what will be the criteria?*	The project intends to undertake an analysis of "state-of-the-art" and "state-of-the-shelf" technologies available for use in the Turkish market. Consideration of the most effective and most cost-effective technologies that will mitigate GHG emissions in new buildings will be a factor of this report and guidance to implementers. Rather than specifying "which" technologies may be identified for co-financing, a "bundled approach" to designing energy efficient buildings will be promoted under this project. That way, shorter payback measures may be bundled with medium-to-long-term technologies that may incur more first-cost (or learning curve cost to engineers) but which may lend a more artful solution to creating an energy efficient building. However, in the creation of bundling advice under this project, the IPCC 2007 report for low-cost, large-mitigation potential listing will be consulted and considered.	Part II, Section A, Outcome 3
a. What are the components of integrated building design? Will they be developed or already available (source)? How different is the integrated building designs compared to building codes?	An integrated building design approach (IBDA), as promoted by this project, is a process of design that integrates climatic conditions, capture and conservation of the free solar and internal gains, efficient and comprehensive reduction of all heat losses through walls and ventilation, accurate control of all external energy introduced for providing thermal comfort, light, and hot water, and – last but not least – user awareness of new behaviors regarding energy use and good operations and maintenance practices. The goal is to achieve high performance and multiple benefits at a lower cost than the total for all the components combined. The IBDA to be promoted under this project will be derived from a review of other IBDAs used in both developing and developed countries. From these approaches, a set of guidance for Turkey's construction tactics, materials, manpower, and methods will be drafted. Subsequently, this guidance will be reviewed for cultural sensitivity and resonance with the Turkish marketplace. From this, a "totally Turkish"	Part II, Section A, Outcome 2

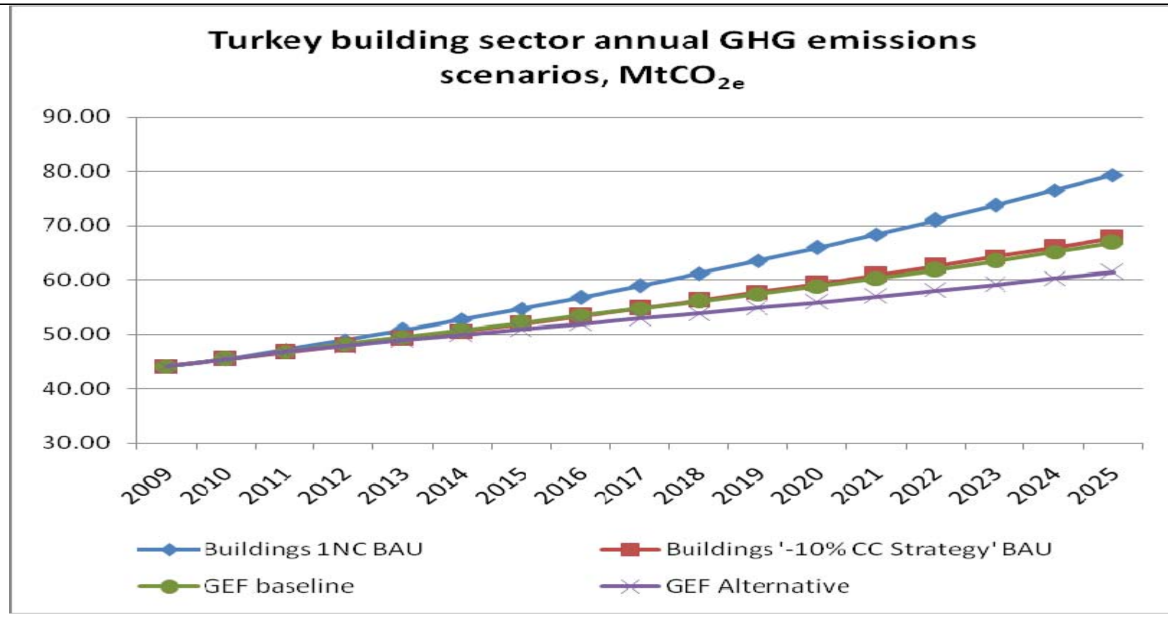
Questions/Comments	Response	CEO ER Reference
	integrated building design approach will be created. It is proposed that this approach, like the regulations themselves, will have a 'ratchet' plan that encourages increasingly more active technologies and synergies so that the marketplace for renewable energy, for example, can be stimulated. Presently, the building codes in Turkey are concerned more with materials and methods than with "properties" such as thermal bypass. These concepts, however, are now being considered and mandated, as witnessed in the TS 825 regulation. Yet it is the "implementation" of these laws that requires support—as key stakeholders lack information, training, awareness, market relevance, and the "business case" for compliance. The suggested penalties for non-compliance presently do not pose a sufficient enough "stick". Therefore, this project proposes to begin with the "carrot" of illustrating how to comply and what benefits accrue from compliance. A demonstration building will provide such a beacon to first-tier implementers. Additionally, workshops held at the locations of the various "energy efficient" buildings built in Turkey over the past decade will allow all knowledge to be shared and potential tactics or indigenous knowledge leveraged.	
b. National reporting of building energy consumption, is it feasible and necessary?	Accurate accounting and reporting of building energy consumption is an essential component of the government's energy and budget planning process. It also provides indispensable inputs into GHG emission calculations which Turkey is required to submit as part of its obligations under the UNFCCC. Feasibility of the proposed mechanisms will be tested and refined as part of the project to ensure a most cost-effective and straightforward process.	Part II, Section A, Outcome 3
c. Which energy efficient technologies are identified for co-financing	c. Please refer to the response to question under bullet #5 above	Part II, Section A, Outcome 3
<u>ii) Methods of monitoring energy efficiency and GHG reduction:</u> *What methods and techniques will be used for monitoring energy conservation and GHG reduction? Will there be Control Groups of buildings for assessing the impacts of technological interventions?*	The project will use best-practice methods to ascertain economic, energy and GHG benefits from the proposed interventions. The project will employ an International Consultant at the inception of the project to design a state-of-the-art monitoring, verification, and evaluation protocol, and a National Consultant will be employed on an ongoing basis to conduct routine project monitoring. Through dialogue with TOKI and MoPWS, the project will identify similar new buildings, with end-use, scale, type, and character for comparison with the demonstration buildings, which will be used as a "control group" for assessing the impacts.	Part II, Section A, Outcome 4
<u>iii) Cost-effectiveness and financial viability</u>: *Are there incremental costs to adopting energy efficient technologies? Will the financial analysis of the investments in energy efficient equipments and practices be carried out to show the financial viability?*	Adopting energy efficient technologies and approaches like IBDA in the building sector is clearly associated with additional costs over the business-as-usual case: additional capacity building and trainings are needed in order to enable relevant stakeholders to effectively apply the available technologies and assess their life-cycle costs to prove efficiency; existing barriers associated with the traditional silos-based design and construction process need to be removed; stakeholders' overall awareness of the longer-term benefits of energy efficiency over first-cost needs to be enhanced. Anecdotal information gained during project preparation shows that researchers in Turkey estimate a 5-8% increase in the cost of construction for an energy efficient building over a building designed "as usual". However, this project, through an "integrated building design approach", will help architects and engineers find synergies to reduce first-cost use of newer technologies while "right-sizing" or "down-sizing" over-sized equipment. The trade-off will be that fees for architects and engineers may need to rise to cover the costs of additional, unusual detailing, or overcome the "learning curve" of designing in a new way. Anecdotal information gained from architects and engineers in Turkey illustrates that their current fee structure is extremely low and may benefit the profession greatly by the review and scrutiny of their fees structure that will be undertaken during this project. A financial analysis of the investments in capacity-building, training, equipment, and uptake of an "integrated building design approach" will be undertaken to illustrate the financial viability of energy	Part II, Section A, Outcome 2

Questions/Comments	Response	CEO ER Reference
	efficiency in Turkey, build a "business case" for key stakeholders (including building owners), and pave the way for any subsequent projects that propose to create the financing structure for energy efficient buildings in Turkey.	
<u>iv) Risks:</u> *The risk of higher investment costs for energy efficient devices and practices as a barrier to spread of the technologies is not considered.*	Potential first-cost increases associated with designing and constructing an energy efficient building could be offset by applying sound cost management throughout the entire planning, design and development process. Furthermore, investment costs may ultimately not pose a significant barrier to energy efficient buildings in Turkey since this project is not technology-driven. A better design approach, the bringing together of isolated architects and engineers at project outset, the zeal to locate synergies, and the increased awareness of the marketability of energy efficient buildings will propel increased uptake of energy efficient design.	Part II, Section F
COMMENTS FROM COUNCIL MEMBERS (France) *There are currently no GEF climate changes in Turkey. The UNDP contribution is weak in cash terms. The added value of UNDP taskforce is not very specific.* *Strategic project strongly supported by the GoT. UNDP should invest more of its own resources.*	Upon consultations with the counterparts from the Turkish government, cash contribution from UNDP Turkey has been confirmed at US$ 60,000. On top of that, UNDP corporately will provide substantive contribution to the implementation of this project through technical expertise from UNDP Bratislava Regional Center, as well as leverage important lessons and experiences from exchanges with similar UNDP/GEF projects worldwide (e.g. in Brazil, Kyrgyzstan, Russia).	Part I, Table B

UNDP Response to the GEFSec Review at CEO Endorsement
March 9, 2010

GEFSec Comments	UNDP Response	Reference
8. Is the global environmental benefit measurable? The direct GEB (2 pilots) are measurable. The performance of the 2 buildings will be monitored. The indirect CO2 emissions reductions are calculated through the GEF methodology. It is noted that the "bottom-up approach" gives a result of 2 MtCO2 reductions and that the "top-down" approach gives a result of 69 MtCO2. These 2 approaches use the same parameters (GEF project influence period = 10 years + useful lifetime of buildings = 20 years). The difference is huge and must be understood. Could you please address the questions below: 1. I understand that the "bottom-up" approach only considers new buildings, whereas the "top-down" approach considers new AND existing buildings = is that correct ? 2. It seems that the "top-down" approach includes the existing building stock. However, if my understanding is correct, existing buildings will have to respect thermal insulation requirement only if they are renovated (at least for 15% of their area). It seems unlikely that the whole building stock of the country will be renovated within the 10 years after the project. Thus only a fraction of the building stock should be considered in the calculation. 3. I do not quite understand the first chart page 45 of the CEO endorsement (building sector annual energy savings). If I add the energy savings per year on this chart, it comes to 145,000 GWh and not 529,153	The extent of difference between the bottom-up (BU) and top-down (TD) is inherent to the GHG calculation methodology, inasmuch as BU considers only immediate replication potential of the project supported investments, whereas TD goes beyond that and assesses overall GHG mitigation potential in the impacted sector/market. In markets with substantial mitigation potential, project-supported transformative policy and regulatory changes can be expected to generate cumulative GHG emission reductions far more substantial than the sum of immediate replications: e.g. enhanced building codes and construction techniques showcased through a non-residential building demo can be expanded to residential sector as well, thereby generating impacts going beyond replication in just non-residential segment. This is exactly the case with the present project. Further, it should be noted that the scale of difference between BU and TD estimates in the present project (2 $MtCO_2$ vs. 69 $MtCO_2$) is largely similar to other approved EE projects, e.g. PIMS 4040 PEERAC (5 $MtCO_2$ vs. 446 $MtCO_2$). Answers to the individual questions posted in the review are given below. 1. Yes, this is correct. The BU approach considers only immediate replication of the project-supported investments, which are limited to *new non-residential buildings*; whereas the TD approach – considering that project's impacts are reaching across the whole building sector – looks at total potential for energy savings in both non-residential and residential buildings, i.e. the *entire* Turkish *building stock*,. Relevant clarification added. 2. Yes, the TD approach reflects some EE improvements in the existing building stock, but these are limited to *a fraction* of the existing building stock: under component 3, heating energy demand is expected to be reduced by 10% in just 10% of existing non-residential buildings by 2012 and in 20% by 2015. So the TD calculation operates with just a small part of the existing building stock which can realistically be impacted in the 10-year influence period. Relevant clarification added. 3. The first chart on page 45 of the CEO endorsement represents annual energy savings from the proposed GEF intervention for the entire building stock development over the 5-year project (2010-2015) plus 10-year post-project period (2016-2025). The GHG Calculation Manual requests to estimate indirect GHG impacts to be generated over the 10-year influence period and calculated over *investments lifetimes*. Therefore, indirect energy savings from the new buildings to be constructed over 2016-2025 (i.e. 10 post project years) have been calculated over *20 years* of buildings' lifetimes; since the energy figures reflect the incremental additions of new buildings each year, the actual formula applied is as follows: [energy savings in year2016+ year2017 + …+ year2025 + year2025*10]. Thus, the correct figure is 529,153 GWh. 4. Since potential improvements in buildings' energy performance have already been reflected in the dynamic baseline (also see response to question 5 below), and with fairly realistic assumptions for the alternative scenario, the GEF causality factor of 80% is believed to be quite appropriate.	 RCE Annex G RCE Part II, Section E RCE Annex G

GWh. What is the correct figure? 4. Given that the background of the project is the adaptation of European directives, a GEF causality factor of 80% is considered to be too high. 5. In the top-down approach, the baseline scenario is highly questionable (see also other comments below): given that the background of the project is the adaptation of the EPBD, and given that strong signals tend to show that energy performance in buildings will be strengthened at the european level, it seems difficult to consider, as you do page 17 of the CEO endorsement request, that the baseline scenario is only a decrease of heating energy requirement by 10%, down to 100 kWh/m2/y.	5. Most of EU EPBD requirements (on building certification, calculation methodology, training etc) have been transposed into national legislations (TS 825, BEP), therefore the proposed project is not really about adaptation of EU directives. Rather, it aims to advance the progress achieved under the national regulations to further enhance building energy performance and improve code enforcement. While the EPBD provides an overall framework, building energy performance requirements are set at the national level, and should be regularly reviewed. Though Turkey is not an EU member state (and therefore EPBD is not immediately applicable here) the country has been gradually improving its building energy use requirements: TS 825 standard introduced in 2000 has reduced annual energy consumption for heating in new buildings from around 225 kWh/m2/year to an average 110 kWh/m2/year, i.e. a 50% reduction. With another 10% decrease assumed under the baseline by 2012, cumulative reductions over a period of 12 years would reach some 60% which is comparable to the level of improvements undertaken by some of the EU member states in the process of implementing EPBD (also see discussion under the next point below). Looking beyond just energy performance requirements for buildings, the baseline scenario assumes gradual improvements in the code compliance rates (from 40% full-compliance with the current code, up to some 60% full-compliance with the enhanced code by 2017), thus accounting for additional gains which are not immediately visible through the 10% reduction in heating energy requirement. Tightening of building energy performance requirements should be a gradual step-wise process, commensurate to maturity of the national market and compatible with government strategies for the economy as a whole. Setting the standards too high could compromise further market growth and, in fact, lead to higher non-compliance rates, thus eroding potential EE and GHG benefits. Finally, the assumed baseline scenario proves more conservative than the sectoral projections in the 1st National Communication of Turkey under UNFCCC, which put annual emissions from the buildings sector in 2020 at around 65 $MtCO_2$, which, if extrapolated at the same rate to 2025, would yield over 76 $MtCO_2$ in 2025. To reach that level in 2025, the building sector would need to keep the heating energy requirement at the current average of 110 $kWh/m^2/y$ with no significant improvements to the compliance regime. On the other hand, the project baseline appears to be quite in line with the potential emissions scenario envisaged under the recently drafted Climate Change Strategy of Turkey until 2020 which has been submitted by the Ministry of Environment to the High Planning Council of Turkey for endorsement. Under the Strategy, Turkey aims to limit its emissions growth to 10% of the BAU by 2020. Assuming similar dynamics for the buildings sector (which, in the absence of sectoral projections, is the only reasonable assumption), annual emissions would grow to some 59 $MtCO_2$ by 2020 and to 67 $MtCO_2$ by 2025 (i.e. a 15% reduction against the 1NC BAU scenario in 2025). These figures closely match the proposed project baseline, which assumes 10% reduction in heating energy requirement, as well as gradual improvements in code compliance until 2025. The various scenarios are presented in the graph below:	

	 Thus, considering the above reasoning, the proposed baseline assumptions are believed to be realistic and supported by the available strategic documents, as well as the current state of developments in the Turkish building sector.	
9. Is the project design sound, its framework consistent &sufficiently clear (in particular for the outputs)? The project is very sound, clear, straightforward. The IBDA approach is innovative and it will be very interesting to follow its implementation in this dynamic country. However, given that the background of the project is the adaptation of EU directives, there is a strong concern about the energy targets set by the project (66 kWh/m2/y for IBDA buildings and 94 kWh/m2/y for other new or renovated buildings). First, could you please clarify: - if this target includes space heating only or also water heating - if this target concerns new buildings only	The energy targets set by the project are 66 kWh/m^2/y for IBDA buildings and 94 kWh/m^2/y for new buildings only. Existing buildings *are not included* in this target and there is no data on the volume of reconstruction from which to gather data. This target includes *space heating only*. Ideally, minimum performance requirements would take into account all types of energy use occurring in a building (heating, cooling, water heating, air conditioning, plug loads, etc.); therefore expansion of the energy performance targets for new buildings in Turkey to include some (or all) of these energy uses will be considered by the project. As is detailed below, the proposed the energy targets represent a safe optimum in terms of capturing a considerable share of the available energy saving potential, while not constraining further market growth. Actual level of energy savings may in fact prove higher than the estimates, which will be duly reflected in the project monitoring system. The building energy performance targets proposed by the project have resulted from intensive analysis and stakeholder consultations undertaken at the PPG stage. Responses to the individual questions posted are given below: 1. Although the PIF assumed ~55% savings from IBDA buildings and ~30% savings for other non-IBDA buildings, more conservative targets were agreed during stakeholder consultations and PPG analysis: 40% savings from IBDA and 15% for other buildings. One reason for the more conservative expectations was that our research into the introduction of new techniques in Central European countries showed a correspondent annual energy demand reduction of 40-60 kWh/m^2/y for new buildings. The most conservative end of that is 40 kWh/m^2/y.	

or also existing buildings (after renovation) Second, we expect these targets to be strengthened (both for IBDA and other buildings) for the following reasons: 1. In the PIF, you were talking about 50 kWh/m2/y for IBDA buildings and 80 kWh/m2/y for the other ones. 2. As stressed by the STAP, IPCC has shown that it is possible to achieve 75% of energy savings in individual new buildings, precisely through IBDA. IPCC report says that "best practices" are around 15 kWh/m2/y for heating, even in moderately cold climates. 3. As you explain page 6 of the CEO endorsement request, many European countries have already set targets far lower than the one you define: 23 kWh/m2/y in Denmark, 34 kWh/m2/y in Netherlands, 35 kWh/m2/y in UK. See also the survey made by European Commission, page 10 of http://ec.europa.eu/energy/efficiency/doc/buildings/info_note.pdf. 4. Finally, on April 23rd 2009, the European Parliament adopted a position to amend the EPBD, including new provisions on energy performance of new buildings (especially "Members States shall ensure that all new buildings are at least net zero energy buildings by 31 December 2018 at the latest...). It is thus very plausible that the EU directive on EE in buildings will evolve in this direction.	Additionally, different EU countries took various approaches to calculating energy performance of new buildings—so we were not confident that the calculations were reliable enough to go to the 60 kWh/m^2/y end of the range. So our project established the definition as "maximum value for heating demand of a building" because research in other EU countries has proven this approach to be a fundamentally more systematic than "average transmission through the shell" or "unit approach for individual components (heat flow)". This definition and its use also seems to lead to fully integrated approaches more readily than have the former two approaches because it provides a reliable measurable baseline. 2. While the IPCC has shown that it is possible to achieve *up to* 75% of energy savings in individual new buildings through IBDA, the "best practices" model closest (15 kWh/m^2/y for heating in moderately cold climate) is Germany's Passive House. In that case, Germany began with a *unit shell approach* and went to a *heating demand approach*, and finally, *an integrated approach*.—which is closest to IBDA. But it began with regulatory mechanisms aimed at insulation. In 17 years of regulations, Germany's (as one of the most advanced countries in the area of building EE) reduction compared with each previous stage was about 30%. The IPCC range of 35-70% energy savings from application of IBDA, to be achieved at little or no additional capital cost, but with a potential increase in design costs—seems overly optimistic at the higher range. Given Germany's trajectory and the IPCC report, the project target for Turkey of 40% with IBDA, 15% without, seems most reasonable. 3. The targets set by other European countries as outlined in page 10 of http://ec.europa.eu/energy/efficiency/doc/buildings/info_note.pdf do not provide a useful comparison since the terms are not consistent. (For example, the Netherlands seeks a *Passive House* approach, moving towards *energy neutral*, the UK seeks *zero carbon*, while France seeks *low consumption building* moving towards *energy positive*). Without a consistent definition within the EU of a low energy building's performance, we chose instead to compare the targets set for other European countries (e.g., Denmark, Netherlands, UK, Germany). However, it should be noted that even within those comparisons (which were corrected for climate factors to make it appear that there is one climate zone), some targets were quite ambitious and perhaps unrealistic for Turkey to aspire to. However, what is useful in both reports is that low-energy buildings typically use insulation, energy efficient windows, low levels of air infiltration and heat recovery ventilation to lower heating and cooling energy and may also use passive solar building design techniques or active solar technologies. So the consensus for our project was to begin with insulation, modest use of renewable energy, and introduction of IBDA. 4. Turkey is not an EU member country yet. So while it is carefully watching the EU developments, with regards to aligning with EBPD prior to accession, Turkey does not have to comply with rules yet to be set but does consider positioning itself to comply as a strategically-sound "reach goal". Since, in at least one EU member country's case (Germany), it took decades to achieve compliance with heating performance requirements based on regulations alone, and without demonstrations as this project proposes, good energy performance on the heating side of new buildings in Turkey is anticipated to greatly reduce that trajectory. The agreement on revised EPBD reached at the end of 2009, has somewhat soften the language and extended the target date, aiming to have all new buildings "*nearly zero* energy as of *2020*". http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1733&format=HTML&aged=0&language=en&guiLanguage=en	

	With this project, the advantages and cost-effectiveness of IBDA will be revealed and will ensure a conservative minimum level of savings with 66 kWh/m^2/y heating energy requirement. Project implementation will create demand and prepare the market to further tighten the energy performance of new buildings. Also it is expected that extensive training and awareness-raising activities to be held country-wide and stakeholders-wide will increase the implementation rate of existing regulation in all new buildings. Thus, notwithstanding the results of Turkey EU accession negotiations, with this project's contribution the country would be better positioned to meet the enhanced requirements of EPBD.	
11. Is the project consistent and properly coordinated with other related initiatives in the country or in the region? What are the lessons learned from the GTZ-funded project (especially regarding the pilot)? Could you please elaborate on possible coordination with future EU-funded projects (especially the new proposal to be funded by SEI alluded to page 16 of the CEO endorsement request)?	Lessons learned from the Project of Efficient Utilization of Energy in the Building Sector of Turkey-Pilot Region Erzurum (carried out in cooperation with German Technical Cooperation Agency (GTZ), EIE, and the Municipality of Erzurum completed in October 2005) came from many training programs, applicable policy tools and study visits. Particularly the *"training of trainers" for building managers*, who will have active roles in the EE operation of large-scale buildings, was instructive to illustrate that application of features such as insulation greatly affected energy management in the buildings. The pilot project to rehabilitate an existing orphanage dormitory building in Ankara through the addition of insulation to exterior walls and low-e windows (among other things) showed that *training for architects* to generate valuable construction *details for insulation and windows* are necessary. The training materials and syllabi from that project will provide the basis for more theoretical and practical training modules for new buildings—since the GTZ project focused on existing buildings. The EU-Funded Project on Building Energy Performance, submitted by MoPWS to EU for funding in 2007 was rejected as its scope was considered too narrow and needed a Feasibility Study to be funded. In April 2010, MoPWS may re-propose that FS and project preparation, but is awaiting the GEF response on the present proposal before proceeding. Meanwhile, MoPWS and TOKI have agreed that having a materials testing lab is crucial and would allow for materials testing and training under this GEF project—one way the two projects may coordinate efforts. This GEF project could provide significant outputs (such as advice on materials and methods) that the proposed Building Energy Research Laboratory would find valuable. For insulation materials testing, labeling, handling, installation, and inspection, close cooperation with this new testing laboratory will be useful to this project. Certainly the lessons from this GEF project will be useful to speed alignment with the EPBD.	
14. Is the project structure sufficiently close to what was presented at PIF? Yes. However the cofinancing has been significantly reduced. This concerns component 3, whose cost is reduced from \$4.6M to \$0.78M. In these conditions, what you write page 22 seems difficult to believe: "all of the planned project outputs could be delivered with a relatively smaller amount of cofinancing, which is indicative of the fact that exact	The most significant factor to reduce overall co-financing was that original costs under component 3 were over-estimated in the PIF (which is indicative of the fact that exact estimates are difficult to make at the PIF stage). The most costly endeavor under original Component 3 in the PIF would have been developing compliance software which is no longer a feature of this project (see further details below). The cost of component 3 does not include *Design of a web tool for national reporting of energy use in buildings*. The decision was made that, if not preceded by development of the calculation tools, practice in their use and manipulation for data capture, and creation of standardized procedures so that all building energy auditors are "on the same page" in their use of those tools—such a web tool would not be useful and would be costly. So while this PIF output has been dropped, ensuring compliance has been emphasized. Calculation tools were not considered in the PIF, however such compliance software was considered. Further discussions during PPG revealed that calculation tools for ensuring compliance must be developed before a	RCE, Part IV

estimates are sometimes impossible to make at the PIF stage". Please explain exactly how the decrease of cost of component 3 is reflected in the scope of the activities under this component.	compliance software tool is developed for tracking. International experience has shown that calculation tool use typically is trained for one year and then fine-tuned during next three or more years of practical use. After that process and tools are refined, compliance-tracking software that incorporates benchmarks, using that data, can be developed. It was considered too aggressive to set out to develop the overarching software first, before those tools are developed, trained, and vetted. Developing online support services for key stakeholders that is reliant upon inputs from the calculation tools will allow for data collection, cross-referencing of lessons, and support to new users of the tools. This project includes *generating a standardized procedure for verification* to allow data collection, measurements, and collation of building energy performance with a universal database which will allow a model for measuring and verifying building data to be developed and benchmarks of the data ensured. Its cost has therefore been reduced from what a web-based compliance software would have cost, to a lesser amount to devise the calculation architecture. The two PIF outputs *Launch a website and supporting services for long distance continuing education for Energy Managers* and *Post energy consumption, energy and financial savings data onto website* were revised. In the interim, both EIE and MoPWS have launched websites, with EIE's website including links to training modules (past) for energy managers and MoPWS's website providing some collated energy consumption statistics. The GEF project will combine the PIF outputs and amend them to link the websites, provide real-time support for project implementers, and post data that is transparent and shared. By aligning existing websites of EIE and MoPWS the databases will share information and metrics and support key stakeholders like energy managers. Lessons learned and case studies devised will also be available through these websites. The cost has therefore been dramatically reduced since the EIE and MoPWS have borne the cost to develop these websites in the interim. However, costs remain in providing linkage, collating datasets, and providing real-time services. Those are now reflected in the project design. Along with using the new calculation tools, collection, measurement, and collation of building energy performance will be undertaken. The original scope of work on energy management in large buildings has been curtailed due to the fact that training for energy managers has already been ongoing under EIE. However, training for energy managers in tool use and achieving good building energy performance remains a feature and its emphasis increased. So while the PIF output *Develop in-depth training modules on procurement, contracting and basic contract negotiation skills for building managers* has an amended focus, the features considered most important for future training under the GEF project in the areas of obtaining new technologies and materials for use by building managers—has remained. The GEF project will undertake a *survey of domestically available and locally made equipment and materials* to see what is available and what may be cost-effectiveness for use. Additionally, the survey will reveal disparities between specified capacities of equipment, and actual capacities of equipment, as these items are tested in the materials and equipment laboratory to be set up by MoPWS for this purpose. Its cost is reflected under the GEF funding request of Component 3. Since the energy managers training has been underway, the educational curricula for universities and technical schools to accredit building sector energy managers has been able to be updated using the EIE modules. However, overall training for architects and engineers in energy efficiency is still lacking. So the PIF output *Roll-out an education curricula for universities and technical schools to accredit building sector energy managers* was amended to focus this element on first-tier stakeholders (architects and engineers) who are the likely candidates to become energy experts and energy managers once they are professionally-	

	accredited in their respective fields. This training has been placed under Component 2 and its cost has therefore been somewhat increased, both in the GEF funding and particularly in the co-funding being provided as this would be carried out under the ongoing training of EIE and MoPWS.	
23. Has the Tracking Tool3 been included with information for all relevant indicators? Yes. However page 25 there seems to be a discrepancy between: - the wording of the indicator on CO2 emissions reductions from new buildings (cumulative emission reduction from new buildings to be built during project lifetime (2010-2015) against the baseline ; and its target (2MtCo2) - and the CO2 calculation page 44 (bottom up): this calculation include buildings built over a 10 year influence period (to wit until 2025) How are you going to monitor this indicator?	The second objective-level indicator (Cumulative CO_2 emission reductions from new buildings to be built during project lifetime (2010-2015) against the baseline) intentionally focuses on new buildings (not just demo buildings) to be constructed over the *project lifetime (2010-2015)* in order to compare their GHG profile to that of the baseline. The resultant emission reductions, monitored as part of the project M&E during the project lifetime, will then be extrapolated to the 20-year building lifetime to yield an estimated 2 $MtCO_2$ in emission reductions targeted by the project. So, the discrepancy highlighted in the comment is intentional, as these two figures are based on two different data sets, and the objective-level indicator is specifically limited to the project lifetime construction.	

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT USING GEF RESOURCES

Position Titles	***Estimated person weeks***	***USD / person week***	***Tasks to be Performed***
For Project Management *LOCAL*			
Project Manager	139	1,000	Executing of operational project management in accordance with the project document and the UNDP guidelines and procedures for nationally executed projects. General coordination, management and supervision of project implementation
Project Assistant	208	400	Take care of logistics and administrative support of the all project implementation and activities, and support the project manager, keep the records of the project. documents and spending.
Subtotal	**347**		

For Technical Assistance *LOCAL*			
Energy Efficiency Expert for Buildings	178	1,000	Propose EE building policies, programs, designs, and methods adopted or under development for this project. Assist in the technical and financial feasibility analysis of different EE policies or practices in Turkish market for buildings. In collaboration with the international and local experts working for outcome 2, assist in the introduction of an integrated building design approach for Turkey.
Energy Efficiency Architecture Design Expert	126	1,000	Review and analyze current EE building design practices in Turkey together with the existing institutional and other arrangements for their implementation, and identify possible gaps and improvement needs. In collaboration with the experts working for outcome 2, assist and support the teams designing the energy efficient demonstration building..
Training Expert for Energy Efficiency in Buildings	109	1,000	Train personally or, as needed, organize other training for the local stakeholders to successfully implement the project and to meet its capacity building objectives. Organize and provide training to the key stakeholders to further develop and implement the adopted practices, methods, or materials
GHG and Climate Change Expert	11	1,000	Monitor, track, and suggest methods by which to calculate key metrics of GHG emissions saved as a result of this project. Provide reporting to the mid-term, final evaluation, and general information collection and report drafting according to UNDP/GEF M&E requirements.
Public Awareness and Marketing Expert Specialized in EE	100	1,000	Propose methods for undertaking specific consumer surveys for collecting information about the key drivers or barriers in undertaking EE in new buildings as well as the impact of the public awareness-raising and marketing activities supported by the project. Lead development of the communications strategy. Identify key stakeholders Support establishment and further development of the project web-site.
EE Construction Expert	66	1,000	Provide construction details, as needed, for the guidance on integrated

			building design approach.
Renewable Energy Expert for Buildings	22	1,000	Suggest practical methods and means by which to undertake RE in buildings.
Web Designer	50	1,000	Establish and develop the project web-site and create ways to keep it updated and relevant to the targeted customers and project partners.
Evaluation Expert(s) for Mid-Term and Final Evaluations	30	1,000	Support the project's mid-term and final evaluation and related stakeholder consultations, information collection and report drafting.
Other Local Experts and Subcontractors	49	1,000	Provide complementary support for and/or actual implementation of the projects public outreach, market monitoring and other related activities.
Subtotal	**841**		
For Technical Assistance *INTERNATIONAL*			
International Project Advisor	41	2,250	Support the local project team in organizing the implementation of the different sub-components of the project. Support the project manager in supervising the work of the contracted individual experts and companies.
Energy Efficiency Architecture Design Expert	40	2,250	Support the local project team in organizing the implementation of the different sub-components of the project at the inception phase and beyond. Support the local project team in monitoring and evaluating the performance and outcome of the pilot projects under implementation.
Training Expert in Energy Efficiency Buildings	45	2,250	Monitor, report and organize training and guidance to the local stakeholders on the international EE building designs and methods adopted or under development and on the lessons learned and best practices as regards their implementation.
Expert in Buildings Energy Efficiency Policy	35	2,250	Review and analyze current EE building policies in Turkey together with the existing institutional and other arrangements for their implementation, and identify possible gaps and improvement needs.
Expert of Verification and Monitoring of Energy Efficiency	30	2,250	Compile and summarize information on the availability and capacity of the existing materials or methods labs in Turkey (government, private sector and/or manufacturer in-house) to be used for enhanced product testing and compliance checking with regards to materials, equipment, and methods for EE buildings.
EE Modeling and Design Software Expert	50	2,250	Coordinate with the project managers and experts to devise EE modeling software that supports areas considered of key value to this project. Provide training in software use
EE Market Assessment and Survey Instrument Designer	20	2,250	Design survey instruments for undertaking specific stakeholder surveys for collecting information about the key drivers or barriers in undertaking EE in new buildings as well as the impact of the public awareness-raising and marketing activities supported by the project.
GHG and Climate Change Expert	22	2,250	Monitor, track, and suggest methods by which to calculate key metrics of GHG emissions saved as a result of this project. Provide reporting to the mid-term, final evaluation, and general information collection and report drafting according to UNDP/GEF M&E requirements.
Public Awareness-Raising and Marketing Expert	20	2,250	Generate a communications strategy for the project. Support the finalization of the stakeholder involvement plan.
Evaluation Expert(s) for Mid-Term and Final	22	2,250	Support the project's mid-term and final evaluation and related stakeholder consultations, information collection and report drafting

Evaluations			according to UNDP/GEF M&E requirements.
Other International Experts and Contractors	18	2,250	Provide complementary support for and/or actual implementation of the projects public outreach, market monitoring and other related activities
Subtotal	**343**		

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN. Yes, the required background studies and the project documentation for GEF approval were finalized in the form expected.

B. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY: The current project design and risk mitigation strategy presented in the project document reflects the barriers, opportunities, and risks identified during the project preparatory phase.

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMENTATION STATUS IN THE TABLE BELOW:

Project Preparation Activities Approved	*Implementation Status*	*GEF Amount ($)*				*Co-financing ($)*
		Amount Approved	*Amount Spent To-date*	*Amount Committed*	*Uncommitted Amount**	
Gap and barrier analysis of building EE legislation and regulations	Completed	10,000	10,000	0	,0	45,000
Assessment of capacities and implementation strategies for an integrated building design approach	Completed	30,000	12,300	17,700	,0	30,000
Assessment of training needs and elaboration of a training program for building energy managers	Completed	15,000	7,406	7,594	,0	25,000
Monitoring and evaluation plan	Completed	20,000	0	20,000	,0	20,000
Finalizing the project design and presentation	Completed	25,000	0	25,000	,0	30,000
Total		100,000	29,706	70,294		150,000

* Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee.

ANNEX E: CALENDAR OF EXPECTED REFLOWS

N/A

ANNEX F: Total Budget and Workplan

GEF Outcome/Atlas Activity	Responsible Party / Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget notes
OUTCOME 1: Revise and enforce building energy performance standards	EIE	62000	GEF	71200	International Consultants	56,250	67,500	67,500	90,000	69,750	351,000	1
				71300	Local Consultants	60,000	80,000	70,000	70,000	59,000	339,000	2
				72100	Contractual services	10,000	25,000	25,000	10,000	5,000	75,000	3
				71600	Travel	10,000	20,000	19,000	15,000	14,500	78,500	4
				74200	Audiovisual & Printing Production	3,500	3,500	3,500	3500	3500	17,500	5
				74500	Miscellaneous Expenses	1,200	1,200	1,200	1,200	1,200	6,000	6
					Total Outcome 1	**140,950**	**197,200**	**186,200**	**189,700**	**152,950**	**867,000**	
OUTCOME 2: Introduced integrated building design in Turkey	EIE	62000	GEF	71200	International Consultants	33,750	157,500	90,000	33,750	18,000	333,000	7
				71300	Local Consultants	30,000	85,000	80,000	50,000	20,000	265,000	8
				72100	Contractual services	5,000	20,000	10,000	5,000	5,000	45,000	9
				71600	Travel	10,000	47,500	23,750	14,750	9,000	105,000	10
				74200	Audiovisual & Printing Production	2,220	8,850	5,550	2,220	1,110	19,950	11
				74500	Miscellaneous Expenses	900	900	900	900	900	4,500	12
					Total Outcome 2	**81,870**	**319,750**	**210,200**	**106,620**	**54,010**	**772,450**	
OUTCOME 3: Promote best energy practices in the building sector	EIE	62000	GEF	71200	International Consultants	22,500	100,000	63,000	39,500	13,500	238,500	13
				71300	Local Consultants	12,000	50,000	28,000	30,000	17,000	137,000	14
				72100	Contractual services	4,000	14,000	7,500	7,500	7,000	40,000	15
				71600	Travel	10,000	20,000	14,000	10,000	7,000	61,000	16
				72200	Equipment & Furniture	7,000	13,000	13,000	5,000	2,000	40,000	17
				74200	Audiovisual & Printing Production	1,000	2,000	5,000	3000	4000	15,000	18
				74500	Miscellaneous Expenses	1,000	1,000	1,000	1,000	1,100	5,100	19
					Total Outcome 3	**57,500**	**200,000**	**131,500**	**96,000**	**51,600**	**536,600**	
OUTCOME 4: Monitoring, learning,	EIE	62000	GEF	71200	International Consultants	4,500	11,250	18,000	13,500	29,250	76,500	20
				71300	Local Consultants	16,000	20,000	20,000	20,000	20,000	96,000	21

GEF Outcome/Atlas Activity	Responsible Party / Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget notes
adaptive feedback and evaluation				72100	Contractual services	400	400	400	400	400	2,000	22
				71600	Travel	1,000	1,000	1,000	1,000	1,000	5,000	23
				72500	Supplies	100	100	100	100	100	500	
				74200	Audiovisual & Printing Production	200	200	200	200	200	1,000	24
				74500	Miscellaneous Expenses	200	200	200	200	150	950	25
					Total Outcome 4	**22,400**	**33,150**	**39,900**	**35,400**	**51,100**	**181,950**	
Project Management	**EIE**	**62000**	**GEF**	71300	Local Consul(PM)	17,375	34,750	34,750	34,750	17,375	139,000	26
				71300	Local Consul(PA)	10,400	20,800	20,800	20,800	10,400	83,200	27
				71600	Travel	1,500	4,500	3,500	3,000	1,500	14,000	28
				72200	Equipment & Furniture	16,000	4,000	2,800	2,000	1,000	25,800	29
					Sub-total	**45,275**	**64,050**	**61,850**	**60,550**	**30,275**	**262,000**	
		4000	**UNDP**	71600	Travel	6000	6000	6000	6000	6000	30,000	30
				72200	Equipment & Furniture	3000	1500	500	500	500	6,000	31
				72400	Communication & Audio Visual Equip.	3000	1000	1000	500	500	6,000	32
				74200	Audio Visual Productions	2000	2000	2000	1000	1000	8,000	33
				74500	Misc Expenses	2500	2500	2500	1500	1000	10,000	34
					Sub-total	**16,500**	**13,000**	**12,000**	**9,500**	**9,000**	**60,000**	
					Total Management	**61,775**	**77,050**	**73,850**	**70,050**	**39,275**	**322,000**	
					Total Budget:	**364,495**	**827,150**	**641,650**	**497,770**	**348,935**	**2,680,000**	

Summary of funds:

Source	Amount Year 1	Amount Year 2	Amount Year 3	Amount Year 4	Amount Year 5	Total
GEF	347,995	814,150	629,650	488,270	339,935	2,620,000
UNDP	16,500	13,000	12,000	9,500	9,000	60,000
EIE	1,102,427	2,579,177	1,994,693	1,546,810	1,076,893	8,300,000
MoPWS	398,468	932,233	720,973	559,088	389,239	3,000,000
TOKI	478,161	1,118,679	865,168	670,905	467,086	3,600,000
TOTAL	**2,343,551**	**5,457,240**	**4,222,484**	**3,274,573**	**2,282,153**	**17,580,000**

Budget notes:

General Cost Factors:

- Short-term national consultants (NC) are budgeted at $1000 per week.
- International consultants (IC) are budgeted at $2250 per week.
- DSA's are budgeted at $200 per day.
- Local flight tickets are budgeted at $200 per round trip.
- International flight tickets are budgeted at $1000 per round trip.
- This is based on UNDP standard costs.

Outcome 1:

1. 156 Man/weeks of international short term consultant support (156 M/w x $2250: $351,000) – The consultant will be hired to guide the PMU and the national consultant throughout the revision and enforcement of codes.
2. 339 Man/weeks of local short term consultant support (339 M/w x $1000: $339,000) - The consultant will be hired to support the revision and enforcement of codes by providing local knowledge and perspective.
3. Sub-contract with companies for the meetings, trainings, workshops etc. (15 Meetings x $5000 = $75,000))
4. 10 local and 10 international flights (10 flights x $200, plus $800 total per diem = $1,000 per trip) + (10 flights x $1000 airfare plus $5800 total per diem = $6,800 per international trip)
5. Printing and reproduction of $500 for copies over 4 years represents 5,000 black and white copies at 10 cents per page: plus $17,000 of 6,800 pieces printed material at $2.50 each color print
6. $1200 is budgeted for miscellaneous expenses. The precise costs of the workshops are difficult to anticipate. The project will look for cost-savings wherever possible, particularly in relation to travel.

Outcome 2:

7. 148 Man/weeks of international short term consultant support (148 M/w x $2,250: $333,000) – The consultant will be hired to guide the PMU and the national consultant through the introduction of IBDA in Turkey.
8. 265 Man/weeks of local short term consultant support (265 M/w x $1000: $265,000) - The consultant will be hired to support the introduction of IBDA in Turkey by reviewing the situation in the country and providing local knowledge.
9. Sub-contract with companies for the meetings, trainings, workshops etc. (9 Meetings x $5000 = $45,000)

10. 16 local and 13 international flights (16 flights x $200, plus $800 total per diem = $1,000 per local trip = $16,000) + (13 flights x $1000 airfare plus $5800 total per diem = $6,800 per international trip = $89,000)
11. Printing and Production Audio Visual materials including graphic design (5 Graphic Designs and printing x $ 3,000 = $15,000) + (1 CD Design and copying x $4,950 = $4,950)
12. $4,500 is budgeted for miscellaneous expenses. The precise costs of the workshops are difficult to anticipate. The project will look for cost-savings wherever possible, particularly in relation to travel.

Outcome 3:

13. 106 Man/weeks of international short term consultant support (105 M/w x $2,250: $238,500) – The consultant will be hired to guide the PMU and the national consultant through the promotion of best energy practices in the building sector.
14. 137 Man/weeks of local short term consultant support (137 M/w x $1000: $137,000) - The consultant will be hired to support the promotion of best energy practices in the building sector by reviewing the situation in the country and providing local knowledge.
15. 40 Man/weeks of local short term consultant support (40 M/w x $1000: $40,000)
16. 6 local and 8 international flights (6 flights x $200, plus $800 total per diem = $1,000 per local trip = $6,000) + (8 flights x $1000 airfare plus $5800 total per diem = $6,800 per international trip = $55,000)
17. Equipment and Furniture to be purchased for the demonstration buildings (20 lots x $2,000 = $40,000)
18. Printing and Production Audio Visual materials including graphic design (5 Graphic Designs and printing x $ 3,000 = $15,000)t
19. $5,100 is budgeted for miscellaneous expenses. The precise costs of the workshops are difficult to anticipate. The project will look for cost-savings wherever possible, particularly in relation to travel.

Outcome 4:

20. 34 Man/weeks of international short term consultant support (34 M/w x $2250: $76,500) – Consultants will be hired to undertake mid-term and final evaluation, as well as to guide the PMU and the national consultant through the monitoring, learning, adaptive feedback.
21. 96 Man/weeks of local short term consultant support (96 M/w x $1000: $96,000) - The consultant will be hired to support the monitoring, learning, adaptive feedback and evaluation.
22. Service Contract with companies for the monitoring meeting support costs (5 Meetings x $400 = $2,000)
23. 4 local and 2 international flights (4 flights x $200 = $800, plus, 4 days DSA x $200 = $800 = $1,600) + (2 flights x $1000 airfare = $2,000 ,plus, 7 days DSA x $200= $1,400= $2,400) = $5,000
24. Printing and reproduction of 1,000 copies per year over 5 year x 10 cents per page = $1,000
25. $950 is budgeted for miscellaneous expenses. The precise costs of the workshops are difficult to anticipate. The project will look for cost-savings wherever possible, particularly in relation to travel.

Project Management:

26. 139 Man/weeks of Project Manager (139M/w x $1,000: $139,000).
27. 208 Man/weeks of Project Assistant (208 M/w x $400: $83,200).
28. 14 local flights (2 flights x $200, plus $800 total per diem = $1,000 per local trip = $14,000)
29. Equipment and furniture of average $600 per piece of 43 pieces = $25,800

30. 30 local flights (2 flights x $200, plus $800 total per diem = $1,000 per local trip = $30,000)
31. Equipment and furniture of average $600 per piece of 10 pieces = $6,000
32. Communication and AV equipment of average $600 per piece of 10 pieces = $6,000
33. AV production of two video records of $4,000 each =$8,000
34. $10,000 is budgeted for miscellaneous expenses. The precise costs of the workshops are difficult to anticipate. The project will look for cost-savings wherever possible, particularly in relation to travel.

ANNEX G: CO_2 EMISSION SAVINGS CALCULATION

This Annex calculates the CO_2 emission reductions[16] associated with the implementation of the present GEF project based on the GEF Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects. The annex sets out the methodology and explains key assumptions for calculation of the *project direct* and *indirect* CO_2 emission reductions.

Project direct emission reductions

The project will support investments into construction of two energy efficient buildings (a school and an energy information and training center) following IBDA principles. As a result of these activities, direct emission reductions totaling **1,076 tons** of CO_2eq will be achieved over 20 years of the buildings useful lifetime. The estimate is calculated based on the following formula and assumptions:

*CO_2 direct = E * L * C; where*

- C – CO_2 emission factor, i.e. 0.163 tCO_2eq/MWh (calculated based on fuel mix used for heating in buildings and IPCC default CO_2 emission factors (Table G-1)). Since the actual emission factors of the fuel mix are by definition higher than the IPCC defaults, the proposed combined emission factor is conservative.
- L – average useful lifetime of new buildings, 20 years; and
- E – annual energy saving, i.e. the difference between baseline energy consumption per square meter in a typical public building (110 kWh/m^2/year) and the targeted level (66 kWh/m^2/year) multiplied by the area of two pilot buildings (6,000 m^2 and 1,500 m^2).

Table G-1: CO_2 emission factors for building heating energy mix

Energy Source	Share in fuel mix, %	IPCC default emission factor, tCO_2eq/MWh
Natural gas	51	0.20
Coal	13	0.34
Fuel oil	2	0.27
LPG	6	0.23
REs	28	0

Table G-2: Direct project emission reductions

Demo site area, m^2 a	Baseline energy use, MWh/m^2/y b	GEF alternative energy use, MWh/m^2/y c	Annual energy saving, MWh d=a*(b-c)	CO_2 emission factor, tCO_2eq/MWh e	Annual direct emission reductions, tCO_2eq/y f=d*e	Total project direct emission reductions, tCO_2eq g=f*20
7,500	0.11	0.066	330	0.163	53.8	1,076

Direct post-project emission reductions

The project does not include activities that would result in direct post-project greenhouse gas emission reductions.

[16] The only greenhouse gas associated with energy services covered by the GEF project is carbon dioxide.

Indirect emission reductions (bottom-up)

Using the GEF *bottom-up* methodology, indirect emission reductions attributable to the project are estimated at **2 million tons** of CO_2eq calculated over 20 years of useful lifetime of the investments. The GEF bottom-up approach implies the replication of the project methodology and investments to other buildings in Turkey and is calculated per following formula:

*CO_2 indirect BU = CO_2 direct * RF, where*

- CO_2 direct = estimate for total direct emission reductions
- RF = replication factor

The direct CO_2 emission reductions were estimated in the previous section at 1,076 tCO_2eq. The replication factor was arrived at using the following assumption: in the absence of available long-term fixed plans by the MoNE or MoPWS for construction of educational and other public facilities (similar to the project demos), it is conservatively assumed that at least 2000 new similar public facilities (or about 15% of the projected construction in the public segment for the period) are going to be built over 10 years after GEF project completion using the methodology applied by this project in the demo buildings; thus, applying the above formula:

1,076 tCO_2eq * 2,000 = **2,151,600 tons CO_2eq**.

Indirect emission reductions (top-down)

Using the GEF *top-down methodology*, indirect emission reductions attributable to the project have been estimated at around **69 million tons** of CO_2eq over 20 years of useful lifetime of the buildings.

The GEF top-down assesses indirect GHG impacts by estimating the combined market potential for the proposed approach or technology within the 10 years after the project lifetime and is calculated per following formula:

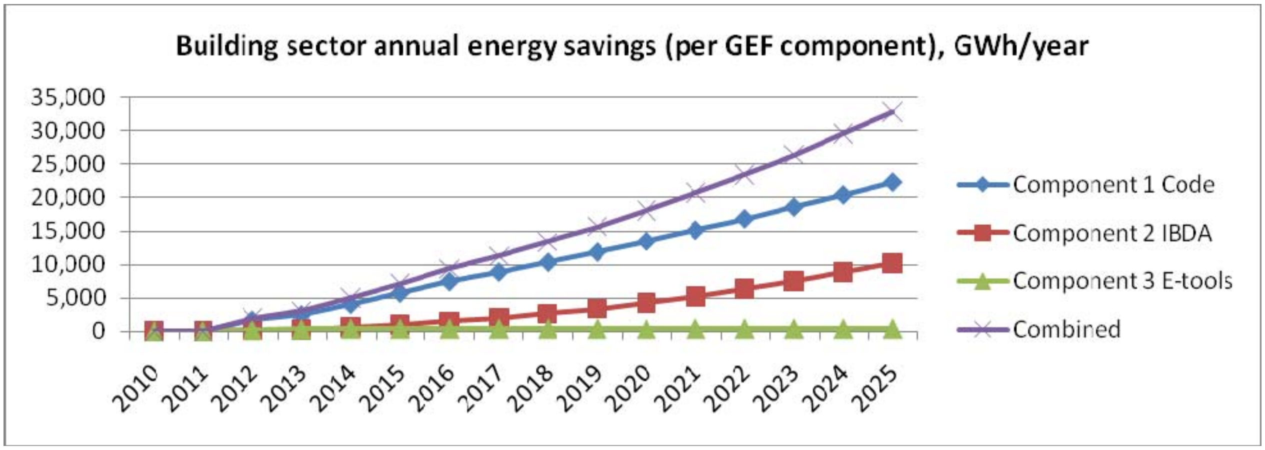
*CO_2 indirect TD = P10 * CF, where*

- P10 = technical and economic potential for GHG savings with the respective application within 10 years after the project;
- CF = GEF causality factor.

The market potential for energy savings and GHG emission reductions has been estimated based on the forecast of Turkish building stock dynamics and the following key assumtions.With the GEF support the current building codes and regulations will be enhanced, resulting in a 15% reduction of average energy requirement for heating from the current 110 kWh/m^2/year to 94 kWh/m^2/year by 2012. The more stringent code requirements are expected to initially bring code compliance down to 25% full compliance, 50% minor non-compliance, 25% major non-compliance by 2012. However, the project-supported capacity building and technical assistance will contribute to subsequent improvements in compliance to 70% full compliance, 15% minor non-compliance, 15% major non-compliance by 2014.

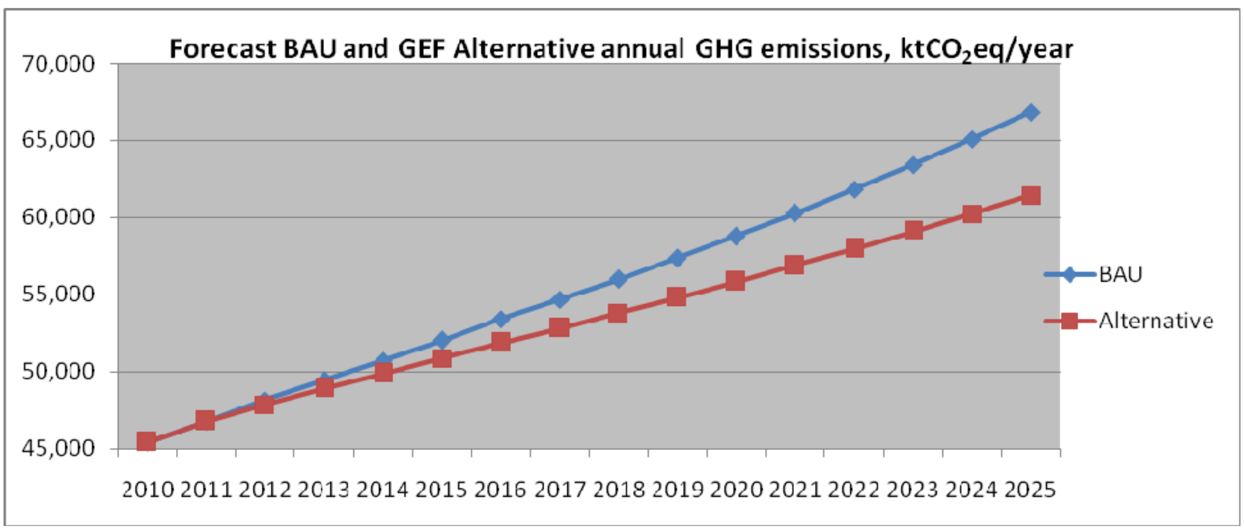
Application of an integrated building design approach in new buildings has been estimated to enable at least 40% reduction in energy requirement for heating from the current 110 kWh/m^2/year to 66 kWh/m^2/year. Moderate penetration rates have been assumed for IBDA adoption by the different segments: starting from 1% of annual construction volume in the residential segment in 2012 gradually increasing to 5.4% by 2024; starting from 2% in 2012 and up to 25% of annual non-residential construction by 2024; all public sector non-residential construction starting in 2013 will use IBDA.
The annual energy savings in the Turkish building stock to be built in 2010-2025 resulting from the three

project components are presented in the graph below. The combined impacts of the project-supported interventions and ensuing replications within 10 years of GEF project influence period (2016-2025) are estimated to enable cumulative energy savings in the Turkish building sector to the tune of 529,153 GWh (by calculating energy savings from the buildings to be constructed during the 10-year influence period over 20 years of buildings' lifetimes).



Thus, the resulting GEF alternative GHG emissions scenario shows considerable deviation below the baseline (see graph below) and is estimated at around 69 million tons CO_2eq of cumulative emission reductions (over 20 years of buildings lifetimes), assuming CO_2eq emission factor of 0.16 tCO_2eq/MWh and GEF causality factor of 80%:

529,153 GWh * 0.163 tCO_2eq/MWh *0.8 = 69,001,551 tons CO_2eq.



The GEF causality factor 4 (80%, GEF contribution is dominant, but some of this reduction can be attributed to the baseline) is used, since some degree of improvements in energy efficiency in buildings has already been taken into account when constructing the dynamic baseline for Turkish building stock and business-as-usual policy developments (e.g. 10% improvement in code requirements by 2013, etc.).

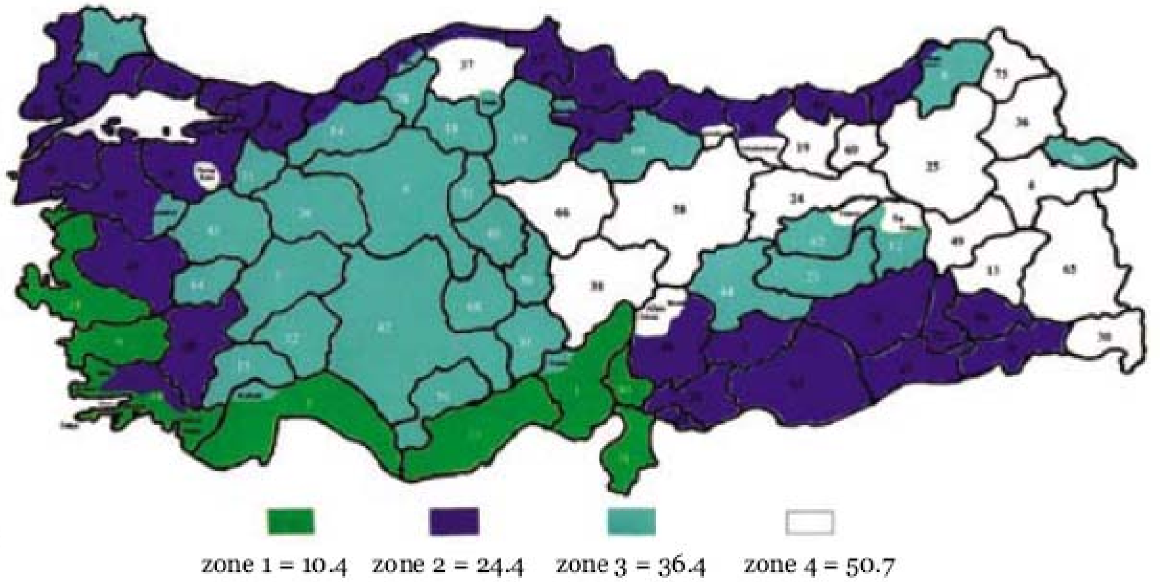
Total emission reductions

Direct Emission Reductions: the project investment in two demonstration buildings (a school and an information center) during the project's implementation phase will result in direct greenhouse gas emission reductions. As a result of these activities during the project implementation period of four years, direct greenhouse gas emission reductions totaling ***1,076 tons of CO_2eq*** will be achieved over 20 years of useful lifetime of the buildings. In the non-GEF case, these energy needs would be satisfied by heating energy generation capacity with an emission factor of ***0.163 tCO_2/MWh***. The project does not foresee any activities that would result in direct post-project greenhouse gas emissions.

Indirect Emissions Reductions: Using the GEF bottom-up methodology, indirect emission reductions attributable to the project have been estimated at ***2 million tons of CO_2eq*** over 20 years of useful lifetime of the buildings. This figure assumes a replication factor of ***2000*** (i.e. 2000 news schools and other public buildings built using integrated building design approach) over 10 post-project years of GEF influence (2016-2025). Using the GEF top-down methodology, indirect emission reductions from new buildings constructions over the GEF inluence period (2016-2015) attributable to the project are exsimate at ***69 million tons of CO_2eq*** calculated over 20 years of useful lifetime of the buildings. The difference betwen BU and TD estimates can be attributed to the fact that the BU approach considers only immediate replication of the project-supported investments, which are *new non-residential buildings*; whereas the TD approach looks at total potential for energy savings in the *entire* Turkish *building stock*.

Annex H. Climatic zoning in Turkey as per TS 825 standard

According to TS 825 Heat Insulation Standards in Buildings, Turkey is divided into 4 main climatic zones based on the number of heating degree-days. The following map shows building heating requirements based on a climatic zone. As can be seen, most of the country is located in zones 3 and 4.



Source: TSE, 2006

Annex J List of Abbreviations

ADF	French Development Agency
APR	Annual Project Report
ATCEA	Association of Turkish Consulting Engineers and Architects
AWP	Annual Work Plan
BEP	Building Energy Performance
BREEAM	BRE Environmental Assessment Method (an accreditation system)
CEDBIK	Turkish Green Building Association
CEO	GEF Chief Executive Officer
CIS	Commonwealth of Independent States
CO	UNDP Country Office
CO_2eq	Carbon Dioxide equivalent
EBRD	European Bank for Reconstruction and Development
ECU	Executing Unit
EE	Energy Efficiency
EECB	Energy Efficiency Coordinating Board
EIE	General Directorate of Electrical Power Resources Survey and Development Administration
EITMF	Energy Information and Technology Management Facility
ESCOs	Energy Services Companies
EU	European Union
EVD	Energy Services Companies (in Turkish language)
GAZBETON	Association of Autoclaved Aerated Concrete Producers
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GoT	Government of Turkey
GTZ	German Technical Cooperation
HVAC	Heating Ventilation and Air Conditioning
IBDA	Integrated Building Design Approach
IR	Inception Report
IMSAD	Association of Turkish Building Material Producers
IZODER	Association of Thermal Insulation, Waterproofing, Sound Insulation and Fireproofing Material Producers, Suppliers and Applicators
LEED	Leadership in Energy and Environmental Design (an accreditation system)
kW	Kilowatt
kWh	Kilowatt Hour
M&E	Monitoring and Evaluation
m^2	Square Meter
MoENR	Ministry of Energy and Natural Resources
MoNE	Ministry of National Education
MoPWS	Ministry of Public Works and Settlement
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
PDF	Project Development Facility
PIR	Project Implementation Review
PMT	Project Management Team
PMU	Project Management Unit
PSC	Project Steering Committee
PV	Photovoltaic
QPR	Quarterly Progress Report
RE	Renewable Energy
REC	Regional Environment Center
RCU	UNDP Regional Co-ordination Unit
SGP	Small Grants Programme

SPO	State Planning Organization
tCO_2e	Tons of Carbon Dioxide Equivalent
TOE	Tons of Oil Equivalent
TOKI	Housing Development Administration
TPR	Tripartite Review
TSE	Turkish Standard Institute
TTMD	Turkish Society of HVAC & Sanitary Engineers
TTMOB	Union of Turkish Engineers and Architects (UCTEA)
TPR	Tripartite Review
TTR	Terminal Tripartite Review
TUIK	Turkish Statistical Institute
TUBITAK	The Scientific and Technological Research Council of Turkey
TOKI	The Housing Development Administration
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change