Terminal Evaluation Report
of the

UNDP/GEF Project
'Promoting Energy Efficiency in Public Building in Uzbekistan'

PIMS 4158

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DRAFT Terminal Evaluation Report of the
UNDP/GEF Project 'Promoting Energy Efficiency in Public Building in Uzbekistan'

The Terminal Evaluation of the UNDP/GEF project 'Promoting Energy Efficiency in Public Building in Uzbekistan' was carried out between 16 May and July, 2015.

The evaluation has been conducted for the United National Development Programme by the International Consultant, Dr. Adil LARI (Waehringer Strasse 115; A-1180 Vienna, AUSTRIA, e-mail: lari@acegroup.at) and the local consultant, Ms. Natalya Shulgina (email: shulginata@yahoo.com)

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Acronyms and Abbreviations

APR	Annual Project Review
AWP	Annual Work Program
CC	Climate Change
EE	Energy Efficiency
FSP	Full-Sized Project
GEF	Global Environment Facility
GHG	Greenhouse Gases
Gosarchitectstroy	State Committee for Architecture and Construction
IA	Implementing Agency
IBD	Integrated Building Design
MTE	Mid-Term Evaluation
NGO	Non-Governmental Organization
PB	Project Board
PIR	Project Implementation Report
PMU	Project Management Unit
QOR/QPR	Quarterly Operational Report/ Quarterly Progress Reports
RFP	Request for Proposal
ROAR	Results-oriented Annual Report
SNiP	Building Standards and Rules
TA	Technical Adviser
TE	Terminal Evaluation
ToR	Terms of Reference
UNDP	United Nations Development Programme
UNDP-CO	United Nations Development Programme Country Office

Executive Summary

The implementation of the full-scale UNDP/GEF Project "Promoting Energy Efficiency in Public Buildings in Uzbekistan" was started in October 2009 with an objective to reduce energy consumption and associated greenhouse gas emissions in public buildings in Uzbekistan, particularly in the healthcare and educational sectors (schools, colleges, rural health clinics and hospitals), by improving building norms and standards, demonstrating integrated building design approaches, and develop capacity of local specialists in design, construction, and maintenance. The project was completed on June 30, 2015.

Project Summary Table

Project Title:	**Promoting Energy Efficiency in Public Buildings in Uzbekistan**			
GEF Project ID:	3624		*at endorsement (Million US$)*	*at completion (Million US$)*
UNDP Project ID:	4158	GEF financing:	2,913,885	2,913,885
Country:	Uzbekistan	IA/EA own:	270,880	724,648
Region:	RBEC/CA	Government (in-kind, demo and other public buildings):	10,200,000	77,209,599
Focal Area:	Climate Change	**Other (as per below breakdown):**		**252,558**
		Study Tour to Turin (Italy)	*0*	*17,170*
		KNAUF isolation (applied to the new EE rural house)	*0*	*4,551*
		2 energy efficient boilers (installed at regional rural health clinics)	*0*	*4,777*
		Mupies (banners/posters placed in the city streets and buses, 2012-2014)	*0*	*226,060*
FA Objectives, (OP/SP):		Total co-financing:	10,470,880	78,186,765
Executing Agency:	UNDP	Total Project Cost:	13,113,885	81,100,650
Other Partners involved:	State Committee for Architecture and Construction	ProDoc Signature (date project began):		28.10.2009
		(Operational) Closing Date:	Proposed: 31.12.2014	Actual: 30.06.2015

Brief Description of the Project

In Uzbekistan, buildings account for almost half of the country's total energy consumption, or 17 million tons of oil equivalents, annually. Many buildings are now physically worn out and planned for reconstruction or rehabilitation. Increasing population places growing demand in education and healthcare's services, which requires further renovation of the existing ones and construction of new public buildings.

To respond to these demographic and social challenges, the Government of Uzbekistan has embarked on a series of large-scale programmes for renovation and construction of public buildings, which include schools, colleges, kindergartens, hospitals, and athletic facilities as well as residential buildings. Those programmes provide a tremendous opportunity for "building in" energy efficiency through improved design and technologies. The joint project of United Nations Development Programme, Global Environment Facility and State Committee for Architecture and Construction of the Republic of Uzbekistan has been actively worked during its implementation cycle to support the Government in improving energy efficiency of public and residential buildings, thus contributing to national reduction of carbon dioxide emissions.

The project was designed to promote energy efficiency of on-going and future state-funded construction and renovation programmes in Uzbekistan by revising building norms and standards, building capacity of relevant government authorities and energy managers, and showcasing integrated building design approach through demonstration projects. The project included five outcomes targeting both new and renovated buildings as follows: Outcome 1 will strengthen norms and regulations applicable to both new and re-constructed buildings, "building in" efficiency into design; Outcome 2 will establish a highly-visible energy management system in all targeted public sector buildings; Outcome 3 will build the capacities of building sector to meet more stringent energy performance requirements for all buildings, both on the design side and the construction technologies side; Outcome 4 will demonstrate the concept of integrated building design in two new and six re-constructed buildings; and Outcome 5 will integrate the results of the project into standard practice in the public sector and share results with the residential and commercial sectors.

The project National Executing Partner is the State Committee for Architecture and Construction, Gosarchitectstroy. The Implementing Agency is UNDP Uzbekistan.

Evaluation Rating Table

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

Ratings for Outcomes, Effectiveness, Efficiency, M&E, I&E Execution	***Sustainability ratings:***	***Relevance ratings***
6: Highly Satisfactory (HS): no shortcomings 5: Satisfactory (S): minor shortcomings 4: Moderately Satisfactory (MS) 3. Moderately Unsatisfactory (MU): significant shortcomings 2. Unsatisfactory (U): major problems 1. Highly Unsatisfactory (HU): severe problems	4. Likely (L): negligible risks to sustainability 3. Moderately Likely (ML):moderate risks 2. Moderately Unlikely (MU): significant risks 1. Unlikely (U): severe risks	2. Relevant (R) 1.. Not relevant (NR) ***Impact Ratings:*** 3. Significant (S) 2. Minimal (M) 1. Negligible (N)
Additional ratings where relevant:	Not Applicable (N/A)	Unable to Assess (U/A)

Summary of conclusions, recommendations and lessons

The project has delivered significant and sustainable impact, well above the original targets. EE improvements implemented during the project deliver **15.9 million tCO2** direct emission reductions over their lifetimes, exceeding the original project target by 20 times. Direct post-project emission reductions are expected to be over 35 million tCO_2 based on the continued enforcement and incremental improvements to the codes.

The project has realized ground-breaking revisions to national building codes which have already secured improvements to building energy efficiency with proven savings between 25 and 60% in public building programs amounting to over 4 million m2. New compulsory minimum energy efficiency requirements for new and renovated public and private buildings ensure long-term sustainable impact.

Improving building codes is a proven means to affect a large volume of buildings and to mainstream substantial impact. The immense and sustainable success of the project is attributable to the early endorsement and implementation of these codes. Project compliance and capacity building mechanisms supported smooth update of the new codes in the building sector.

Country ownership was a major factor in the development and implementation of the project. The project originated on the government side when an opportunity to embed energy savings in government building programmes was recognized. The project idea was raised by the Ministry of Economy during a meeting with UNDP in December 2007. Within two years the project was developed, approved and operational. The efficient development of the project and the quick approval by GEF helped ensure that the project activities, goals and objectives remained relevant at the national level and the dynamic and momentum were maintained.

The government of Uzbekistan and, in particular, Gosarchitectstroy, have proceeded with a resolve and commitment in implementing this project which should not be taken for granted in planning similar projects in other countries. The speed and thoroughness with which the legislative changes were developed, enacted and implemented speaks volumes for the national commitment and enthusiasm for the developments brought about by the project.

Introduction

The Terminal Evaluation of the UNDP/GEF project 'Promoting Energy Efficiency in Public Building in Uzbekistan' was carried out between 16 May and July, 2015.

Purpose of the evaluation

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP support GEF financed projects are required to undergo a terminal evaluation upon completion of implementation.

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

Evaluations for UNDP supported GEF financed projects have the following complementary purposes:

- To promote accountability and transparency, and to assess and disclose the extent of project accomplishments;
- To synthesize lessons that can help to improve the selection, design and implementation of future GEF financed UNDP activities;
- To provide feedback on issues that are recurrent across the UNDP portfolio and need attention, and on improvements regarding previously identified issues;
- To contribute to the overall assessment of results in achieving GEF strategic objectives aimed at global environmental benefit.

Scope & Methodology

This Terminal Evaluation has been conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects. The Terminal Evaluation addressed the evaluation criteria outlined in the Guidance Manual and the ToR

Relevance:

- the extent to which the activity is suited to local and national development priorities and organizational policies, including changes over time;

the extent to which the project is in line with the GEF Operational Programs or the strategic priorities under which the project was funded;
Note: Retrospectively, the question of relevance often becomes a question as to whether the objectives of an intervention or its design are still appropriate given changed circumstances.

Effectiveness:

- the extent to which an objective has been achieved or how likely it is to be achieved.

Efficiency:

- the extent to which results have been delivered with the least costly resources possible; also called cost effectiness or efficacy.

Results:

- the positive and negative, foreseen and unforeseen changes to and effects produced by a development intervention;

- in GEF terms, results include direct project outputs, short to medium-term outcomes, and longer term impact including global environmental benefits, replication effects and other local effects.

Sustainability:

- the likely ability of an intervention to continue to deliver benefits for an extended period of time after completion;
- projects need to be environmentally, as well as financially and socially sustainable.

The principles for ensuring the quality, integrity and independence of the evaluation include:

- The independent evaluation team consisted of one international expert and one national expert, both of whom were not involved in the planning or implementation of the project;
- The evaluation team was given free access to all relevant documents, financial statements, project deliverables and demonstration sites on request;
- Key participants, national stakeholders and project beneficiaries were interviewed and their opinions compiled in the report. Individual opinions expressed are held in confidence;
- Pilot demonstration sites were visited and inspected, the local beneficiaries interviewed and the building energy audit documentation reviewed.

The Terminal Evaluation assignment has been implemented according to the following methodology:

1) **Preliminary documentation review**

The initial stage involved the review of project documentation, project reports and associated documents. The documentation has been provided by the UNDP Country Office, the Project Manager and downloaded from the project and GEF websites.

The evaluation team has reviewed all relevant sources of information, such as the project document, project reports – including Annual APR/PIR, project budget revisions, midterm review, progress reports, GEF focal area tracking tools, in particular, the evaluation team has validated the data in the GEF CCM Tracking tool, project files, national strategic and legal documents, and any other materials that the evaluation team has considered useful for this evidence-based assessment. A list of documents that the evaluation team has reviewed is included in Annex E.

2) **Inception Report and preparation for mission**

Through discussions with the Project Manager and the Officer-in-Charge at the UNDP CO, the following were prepared;

- Interviewees were selected so as to provide a broad sample of the different groups or people involved in and influenced by the project and to examine and assess the perspectives of the various stakeholders (Annex C). - Itinerary for the local mission was proposed and developed (Annex B)
- Interview format (questionnaire) for the project team, stakeholders and beneficiaries was drafted and submitted (Annex G). The questionnaire was translated and provided to participants for consideration beforehand.

9 demonstration sites were implemented by the project:

- 2 new schools
- 4 renovated school buildings
- 2 retrofitted rural health clinics
- 1 new rural house

The demonstration buildings are geographically dispersed throughout the country. It was agreed that the evaluation team should visit and inspect one demonstration site from each of the 4 categories and interview the local beneficiaries.

3) **Evaluation Mission (June 10 to 20, 2015)**

Interviews were conducted with UNDP, the project management team, key stakeholders and beneficiaries (Annex C). A selection of pilot demonstration buildings was visited (Annex D). The project team assisted the evaluation team by arranging interviews and travel. The mission itinerary (Annex B) included;

(a) Presentations and explanations by the project management team.
(b) Stakeholder and beneficiary interviews (Annex C)
(c) Field visits to pilot projects (Annex D)
(d) Collection of additional documentation.
(e) Presentation and discussion of preliminary findings and recommendations to the project team
(f) Participation in the international conference devoted to project results
(g) Wrap-up presentation with UNDP

4) **Further telephone interviews**

A further interview with the UNDP Regional Technical Advisor responsible for the project was carried out via Skype on July 2, 2015.

5) **Data analysis**

Following the mission, the collected data and opinions were compiled and analyzed. Multiple sources of information were assessed to ensure an evaluation according to GEF/UNDP Monitoring and Evaluation Policy. Key sources of information included audit documents and site photos from 9 demonstration buildings and from 10 sample public buildings built/renovated without project funding in 2013 and 2014, project reports, Project Board meeting minutes and financial statements. Key aspects of the evaluation included:

- assessing the volume (m2) of new and renovated public buildings under state investment programs;
- assessing the compliance and enforcement mechanisms and capacities;
- assessing the economic sustainability (payback) of energy efficient investments in ongoing public building programs.

6**) Preparation of Draft Terminal Evaluation Report**

The Terminal Evaluation Report was prepared based on the interviews with the relevant stakeholders and the review of available documentation. The Report includes relevant comments and suggestions raised by UNPD, the project team and the national stakeholders interviewed as well as the findings and opinions of the authors.

7**) Response to comments and submission of final Terminal Evaluation Report:**

Questions and comments to the Draft Terminal Evaluation raised by project stakeholders shall be responded to and incorporated into the final document.

Structure of the Terminal Evaluation Report

This Terminal Evaluation Report follows the structure outlined in the Evaluation Report Outline; Annex F of the ToR to the terminal evaluation assignment 'International Consultant / Evaluator / Team Leader.'

This Terminal Evaluation is based on a performance assessment approach guided by the principles of results-based management. The evaluation tracks impact according to the Logical Framework. The contribution of project outputs and project management is evaluated with reference to the achievement of the project outcomes and overall objective. This Terminal Evaluation reviews the implementation experience and achievement of the results of the project in question against the Project Document endorsed by GEF, including any changes made during implementation.

Project description and development context

The project aims at reducing energy consumption and associated greenhouse gas emissions in public buildings in Uzbekistan, particularly in the healthcare and educational sectors, by improving building norms and standards, demonstrating integrated building design approaches, and developing the capacity of local specialists in design, construction, and maintenance. The project's goal is to promote energy efficiency of on-going and future state-funded construction and renovation programmes in Uzbekistan by revising building norms and standards, building capacity of relevant government authorities and energy managers, and showcasing integrated building design approach through demonstration projects.

Project start and duration

The implementation of the full-scale UNDP/GEF Project "Promoting Energy Efficiency in Public Buildings in Uzbekistan" began in **October 2009**. The project's original planned duration was 5 years and 2 months (original planned completion was December 2014.) The project was completed on **June 30, 2015**.

Problems that the project sought to address

Located in the heart of Central Asia, the Republic of Uzbekistan became independent in 1991 after the collapse of the Soviet Union. Since then, the nation has undergone great political and economic transition, magnified by unusually high birth rates and the resultant rapid growth of the population, from 14 million at the time of independence to more than 30 million in 2015 – by far the largest population of any country of the region. Uzbekistan has met these challenges with notable success, achieving economic growth sooner than any of the other former Soviet republics, and maintaining a consistently rising GDP and steadily declining poverty rates.

In Uzbekistan, buildings account for almost half of the country's total energy consumption, or 17 million tons of oil equivalents, annually. Many buildings are now physically worn out and planned for reconstruction or rehabilitation. Increasing population places growing demand in education and healthcare's services, which requires further renovation of the existing ones and construction of new public buildings.

To respond to these demographic and social challenges, the Government of Uzbekistan has embarked on a series of large-scale programmes for renovation and construction of public buildings, which include schools, colleges, kindergartens, hospitals, and athletic facilities as well as residential buildings. Those programmes provide a tremendous opportunity for "building in" energy efficiency through improved design and technologies. The joint project of United Nations Development Programme, Global Environment Facility and State Committee for Architecture and Construction of the Republic of Uzbekistan has been actively worked during its implementation cycle to support the Government in improving energy efficiency of public and residential buildings, thus contributing to national reduction of carbon dioxide emissions.

The project was intended to overcome barriers that impede the implementation of energy efficiency in the public building sector of Uzbekistan. These barriers included priority on minimizing first costs; low awareness of international best practices including integrated building design; weak energy management in existing buildings; lack of emphasis, expertise, and organizational mission for energy efficiency in the government of Uzbekistan; and a mutually-reinforcing situation of low supply, low availability and market awareness, and low demand for energy-efficient products. These barriers are described in detail in the Project Document and the Request for CEO Endorsement.

Immediate and development objectives of the project

The project was designed to promote energy efficiency of on-going and future state-funded construction and renovation programmes in Uzbekistan by revising building norms and standards, building capacity of relevant government authorities and energy managers, and showcasing Integrated Building Design (IBD) approach through demonstration projects. The project included five outcomes targeting both new and renovated buildings as follows:

Outcome 1: to strengthen norms and regulations applicable to both new and re-constructed buildings, "building in" efficiency into design;
Outcome 2: to establish a highly-visible energy audit, management and certification schemes in public sector buildings;
Outcome 3: to build the capacities of building sector to meet more stringent energy performance requirements for all buildings, both on the design side and the construction technologies side;
Outcome 4: to demonstrate the concept of integrated building design in two new and six re-constructed buildings; and
Outcome 5: to integrate the results of the project into standard practice in the public sector and share results with the residential and commercial sectors.

Baseline Indicators established

Prior to the project, construction was carried out according to outdated building norms and practices. Energy efficiency considerations were not factored in to the design and construction process, leading to excessive energy consumption.

The following assumptions describe the business-as-usual baseline, reflecting practice at project outset:

1. **First Cost Decision-making Practices**: Construction is usually done on a first-cost basis. This means that investment costs are minimized to allow an as quick investment recovery as possible. Investments in improved energy efficiency and GHG emission reduction may only add a few percent (normally about 5% in most countries)

to construction costs and save energy, reduce GHG and operating costs over the life cycle of the building, but currently even such low investments are avoided. Current tendering practices do not take building operating costs into account when comparing the costs of various building designs.

2. **Low awareness of and experience with modern building practices**, such as integrated building design: building codes also do not incorporate the provisions for energy efficiency, such as the choice of location, requirements for thermal insulation in the roof, wall and floor of the building, the use of more energy efficient building materials, design and technologies for heat and water supply and lighting systems, as well as the use of renewable energy sources. Local experts estimate that only adequate internal and external insulation could save up to 30% of energy, while incorporating all available options in building design could provide for up to 50-60% of energy savings – estimates that reflect findings from a previous EU TACIS project.
3. **Weak energy management**: Modern energy management practices are lacking in both public and residential buildings in Uzbekistan and the level of energy performance is extremely poor. Even when modern equipment is installed, local technicians and engineers often lack skills to ensure its optimal operation and maintenance. Although the Law on Rational Energy Use mandates regular energy audits of large enterprises, organizations and institutions, corresponding by-laws and regulations for buildings are absent, as are the methodological, technical and institutional base for systematic energy performance monitoring of buildings. There is only one specialized company, the Energy Center of Uzbekistan, possessing a license and capacities to undertake energy audits, but they do not audit buildings.
4. **Low institutional capacity**: The State Committee on Architecture and Construction is the main governmental body responsible for development and implementation of national policies, norms and standards in building sector. The Committee exercises control for implementation of all state-funded construction and renovation programmes and their compliance with established norms and standards. It has limited technical experience in the field: there is no dedicated staff dealing with energy efficiency, little to no awareness about the principles of integrated building design and no system in place for the systematic collection and analysis of information on energy saving measures and their costs and benefits that would allow them to be incorporated into building sector regulations.
5. **Immature market for energy efficiency services and products** in building sector: The building sector is also handicapped by a lack of understanding of energy efficiency issues for buildings. Awareness of integrated building design is extremely low among technical experts, architects, engineers and builders and there are no pilot projects or education curricula to learn from. Another technical barrier is the limited availability of building components and construction supplies that would meet higher energy efficiency requirements. For example, there are possibilities and even small-scale production of high energy efficient insulation material (mineral wool), but due to the lack of demand (which stems primarily from the absence of correspondent requirements and norms), production is limited and material does not meet international quality standards. The State Corporation for Construction Materials, UzStrojMaterialy, had expressed its commitment to cooperating with the project to boost production of more energy-efficient construction materials in Uzbekistan.

Main stakeholders

Executing Agency: **UNDP CO Uzbekistan**

National Executing Partner: **Gosarchitectstroy** - State Committee for Architecture and Construction of the Republic of Uzbekistan

The primary stakeholders in this project at the national level were:

- Gosarchitectstroy,
- the Ministry of Economy,
- the Ministry of Health,
- the Ministry of Public Education,
- the Ministry of Higher and Secondary Specialized Education
- the Institute of Energy and Automatics of the Academy of Sciences,
- Tashkent State Technical University,
- the Tashkent Architecture and Construction Institute,
- the Department for the Fuel and Energy Complex under the Cabinet of Ministers of the Republic of Uzbekistan,
- professional building and construction organizations/associations, and
- other organizations working on energy efficiency, such as the Energy Centre of Uzbekistan and the Institute of Energy and Automatics of the Academy of Sciences.

Expected Results

The expected environmental benefits included 35 ktonsCO_2 annual (700 ktonsCO_2 lifecycle) direct emission reductions by end of project and 87.5 ktons CO_2 emission reductions by the end of the 10-year project influence period.

Specific Project Outcomes included:

Component 1: New energy efficient standards and regulations are applied to approximately two million m2 of public space in the educational and healthcare sectors commissioned annually

- Five existing building codes for public buildings and other relevant norms and standards revised, implemented
- New EE Building Code Department established within the State Committee on Architecture and Construction
- Training for public servants involved in building code enforcement designed and delivered

Component 2: Government is aware of performance in existing healthcare and educational facilities and can prioritize investments in efficiency

- Mandatory energy audits established and carried out in public buildings
- Energy performance certificate scheme introduced that supports compliance in new and reconstructed public buildings and monitors performance in existing public buildings with trained personnel overseeing the program
- Energy information management system maintained and energy savings and GHG emission reductions quantified using appropriate methodologies
- Energy managers in public buildings appointed and time spent on operations and maintenance practices to reduce energy consumption

Component 3: Uzbek design and construction professionals have the capacity to design efficient buildings and manage their performance

- Practicing architects and engineers understand the code and can produce designs that comply with it
- Engineering and architecture students at the post-secondary level are exposed to integrated design concepts and techniques. Bachelors and masters students have the option of specifically studying energy efficiency in buildings
- Practicing architects and engineers have access to information and advice on integrated design, economical measures for reducing energy consumption, and best available technologies and materials
- Planners and building sector professionals have access to current information on best available technologies, materials, and services.
- Building industry and technology providers informed of potential market for their products under the new standards

Component 4: Energy- and cost-saving potential of integrated building design is demonstrated in two new buildings and six reconstructed buildings

- Construction completed and buildings commissioned at eight sites incorporating energy efficiency measures and – for new construction – integrated building design
- Energy, financial and GHG performance in buildings quantified and recorded
- Replication of results facilitated in other hospital and school buildings
- Building sector and energy management professionals in Uzbekistan and abroad are aware of the application of the buildings and their performance

Component 5: Project findings influence construction practices and public administration practices in Uzbekistan

- Lessons learned disseminated to stakeholders across the country
- Two independent evaluations conducted to assess project results
- Good practices from the project incorporated into at least one component of public administration

Other benefits were expected for the people who use the buildings affected by the project. For example, health care professionals and patients would be in surroundings that are more conducive to comfort and effective treatment. Teachers and students would have schools that provide a better environment for learning. In the education sector alone, government building programmes (new construction and reconstruction) were expected to affect the learning environment of approximately two million students by 2015. Advances in the capacity to design and build efficient building would have the potential to benefit other segments of the buildings sector. For example, experience with improved codes and design techniques are also very important for the residential sector, where annual construction totals some 8 million m^2.

Findings

Project Design / Formulation

The Project was designed specifically to operate within major ongoing and planned multi-year government initiatives for the construction and renovation of public buildings. Prospects for success depended on the support of various government agencies and on the consequent implementation of these investment programs.

The project idea was raised by the Ministry of Economy during a meeting with UNDP in December 2007. The Ministry introduced governmental plans for the construction of new and reconstruction of existing health and educational facilities and accepted UNDP's offer to help incorporate an energy efficiency component into the programme. Within two years the project was developed, approved and operational (project start was in October 2009). This relatively compact development and approval process helped ensure that the project activities, goals and objectives remained relevant and that national partners and programmes remained committed to the project.

During the project design phase international and national consultants developed the project concept and activities in cooperation with a broad selection of stakeholders. The following organizations provided input:

- Gosarchitectstroy
- Ministry of Economy
- Ministry of Foreign Economic Relations, Investment and Trade
- Ministry of Health
- Ministry of Public Education
- Ministry of Higher and Specialized Education
- State Committee for Nature Protection
- Center for Hydro Meteorological Service (Uzhydromet)
- Central and regional authorities
- Tashkent State Technical University
- Tashkent Institute of Architecture and Construction
- Construction companies
- Design institutes
- Closed Joint Stock Company ToshuyjoyLITI
- Open Joint Stock Company UzShaharsozlikLITI
- KishlokKurilishLoyiha
- "Eco-Energy" Scientific Center
- Energy Center of Uzbekistan
- GTZ (GIZ) – German Agency for International Cooperation
- TIKA – Turkish International Cooperation and Coordination Agency
- European Commission representation in Uzbekistan

The Law on Rational Energy Use #412-I of 25.04.1997 outlines the key priorities and instruments of the Government of Uzbekistan concerning national EE policy and included the development of energy efficiency norms and standards and mandatory energy audits.

The Government placed a high priority on the public sector anticipating the direct cost savings resulting from reduced fuel and power consumption. The proposed project was initiated by the Ministry of Economy of Uzbekistan, and was strongly supported by the First Vice-Prime Minister of Uzbekistan.

The Project is well designed. It applies an integrated approach with a sound foundation in the development and implementation of new national energy efficient building codes. Component one is the key driver of the project – changing the building codes creates the enabling environment for sustainable impact on a large scale, with the potential of affecting thousands of buildings during and after the project with long term energy savings and GHG emission reductions. Components 2 to 5 are well integrated and

support the effective implementation, uptake and enforcement of policy measures created under component 1 with capacity building, demonstration and dissemination.

The capacity of the National Executing Partner, Gosarchitectstroy, to influence the buildings sector – and to reduce building sector energy consumption and related emissions - is substantial. Gosarchitectstroy, is not only responsible for the development and implementation of building codes and their subsequent enforcement, but also manages all public sector building and rehabilitation programs and the licensing of building design offices.

The project builds on a strong tradition of compliance to building codes in Uzbekistan. Further, most design institutes are state-owned and focus on public sector construction.

Analysis of LFA/Results Framework (Project logic /strategy; Indicators)

The Logframe is clearly structured in terms of the relations between Outputs, Outcomes and Impact. Some confusion resulted from the application of 2 logframe formats (GEF format and UNPD format). The GEF logframe was used for reporting to GEF in the middle of the calendar year (end of GEF fiscal year) in a combined Annual Project Review (APR) and Project Implementation Report (PIR), and the UNDP logframe was used for project management and for reporting to UNDP on a quarterly and annual basis at the end of the calendar year (Progress Reports). The UNDP logframe tracked indicators for each year of project implementation and was thus better suited for operational evaluation of project results. GEF logframe in principle serves to evaluate the overall project achievements and thus was less suited for operational project management control. In essence, the two logframes did correspond to each other, but not in all aspects. This is addressed in detail in the Mid-term evaluation.

The Logframe lacked sufficient external indicators to track the real market uptake of EE technologies. For example, market uptake of insulation products and of energy efficient windows or Government spending on EE measures in its building programmes would have given an accountable indication of growth in the national EE markets.

Assumptions and Risks

The project targeted areas where the government was committed to reconstructing and constructing public facilities and mainstreaming energy-efficient building design into current practice. By focusing on both new construction and reconstruction, the project was able to reach a large segment of the public building stock. By focusing on design practices and code revisions, the project was able to affect education and healthcare facilities, but also other public and private buildings including residential. Because most design institutes are state-owned and focus on public sector construction strictly conforming to building codes, the potential for the government to play a leading role in reducing energy use and GHG emissions from the building was very high.

4 Risks were identified in the Request for CEO Endorsement/Approval

1. Lack of governmental commitment to revise and introduce more stringent energy efficient building norms and standards
2. Lack of motivation among public facilities managers (Ministry of Health and Education) to deal with energy efficiency
3. Subsidized prices for energy on the domestic market will reduce the willingness of project stakeholders to save energy.

4. Low level of knowledge and skills among local professionals to integrate energy efficiency in building design and operations

The first risk is substantial for projects involving legislative changes. The project benefited greatly by the continued commitment of Gosarchitectstroy and the government.

Further risks were identified during the project inception phase. In particular, the risk that government budget cuts to the planned and/or subsequent programmes for the renovation and construction of public buildings implemented during the project period would lead to lower construction volume than foreseen in the project logframe (2 million m^2 annually). This risk was identified during the inception phase, and a mitigation plan identified. The inclusion of other government building programmes addressing the residential building sector was eventually incorporated into the project (including the relevant code revisions) to accommodate lower volumes of construction in the education and health care sector than originally planned due to shifts in budgets.

Lessons from other relevant projects (e.g., same focal area) incorporated into project design

The project design is in line with Strategic Objective CC – 1 "To promote energy-efficient technologies and practices in the appliances and buildings" through improved energy performance in public buildings. 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 has helped Uzbekistan and neighbouring countries to learn from experiences and best practices from countries with similar on-going energy-efficient building projects, including relevant GEF projects in the region (Kyrgyzstan, Kazakhstan, Armenia, Turkmenistan and Turkey) and good practice building codes and standards work done in other CIS countries.

The Project focuses on the development and implementation of energy performance based building codes and the introduction of Integrated Building Design. Both are relatively new concepts in Uzbekistan, but have been introduced in other countries in the region with good results towards improving energy efficiency in buildings. Regional experience in the introduction of efficient building codes (from Russia and Kazakhstan) had shown that a broad, building energy performance-based compliance path – in which the required performance target is expressed in kWh/m² per year, varying based on climate – was also feasible for Uzbekistan.

Planned stakeholder participation

The project National Executing Partner, Gosarchitectstroy, is the governmental body in charge of implementation of all state-funded construction programmes in public sector. Further, they are responsible for the development, implementation and enforcement of buildings codes. As the centralized body responsible for building in Uzbekistan, they were a most effective and efficient partner and assumed a leadership role. Gosarchitectstroy also provided in-kind support in the form of staff time and office space (incl. utilities) for the project team.

The partnership strategy was well designed and all key local stakeholders and decision makers actively participated in project implementation including the necessary top-level policy and decision makers, key state institutions and design organizations, universities, and other specialized expert organizations.

The primary stakeholders in this project at the national level were:

- Gosarchitectstroy – as National Executing Partner, shared responsibilities with UNDP for strategic planning and management of the project
- the Ministry of Economy, - member of Project Board, contributed funding for demo buildings.
- the Ministry of Health, - member of Project Board, contributed 2 rural health clinics for rehabilitation as demo projects
- the Ministry of Public Education, - member of Project Board, contributed 4 schools for rehabilitation and 2 news schools as demo buildings. the Ministry of Higher and Secondary Specialized Education- member of Project Board
- the Energy Institute of the Academy of Sciences,
- Tashkent Technical University,-participant in Component 3, training and curricula
- the Tashkent Architecture and Construction Institute, participant in Component 3, training and curricula
- the Department for the Fuel and Energy Complex under the Council of Ministers.

Replication approach

At project outset, a huge potential for energy savings and GHG emission reductions in Uzbekistan was still practically untapped. In the building sector, few energy efficient materials and measures had been used. Only locally-assembled, plastic, double-glazed windows had begun to be implemented for windows replacement on a broad scale. No heat regulation was in place; radiators had no valves and were connected in series in a single pipe system that did not allow the control of individual room heat use. No external wall insulation was used. Window shading, if installed, was indoor and often inoperable. Utilization of untapped energy efficiency potential, both in space heating and in cooling, was seen to require significant amount of investment.

In the Law on Rational Use of Energy from 1997, the Government of Uzbekistan outlined key priorities and instruments of national energy efficiency policy, including the development of energy efficiency norms and standards and mandatory energy audit. The Government was in the process of drafting several sector-specific energy efficiency programmes, and placed a high priority on the public sector because of the direct cost savings impacts that reduced fuel and power consumption could have on the national budget. The proposed project was initiated by a key governmental agency, the Ministry of Economy of Uzbekistan (who's role is to steer investment in a particular sector) and , was strongly supported by the Prime Minister's office. Gosarchitectstroy, as the central implementing agent for state-funded construction programmes and key body responsibe for policy-making in the building sector was highly supportive and proved well-suited in its implementation role.

As a key first step, the project focused on the development of new energy efficient building codes that are now compulsory in capital reconstruction of existing buildings and construction of new buildings. Improvements to EE building codes were able to tap the huge potential of large scale sustainable replication of EE investments with moderate additional costs, short payback periods and long-term energy and cost savings.

The focus of the project was very appropriate to the situation in Uzbekistan. As the first step towards tapping the huge potential of energy efficiency in the building sector, the project contributed to national development priorities and plans in accordance with the Law of the Republic of Uzbekistan on "Rational use of energy resources", #412-I of 25.04.1997, and to Anti-recession (anti-crisis) programs to support economy and increase of export (President's Decree No. UP-4058 as of 28.11.2008).

The efficient and sustainable uptake of new codes was supported by further project activities; training for building professionals and code enforcement bodies, new building energy efficiency curricula for university students and professionals, building certification and energy management schemes and dissemination activities. Local capacity was developed and pilot projects implemented to provide a verifiable model for replication. The pilot projects were developed, designed and constructed by partnerships of local design firms and international experts to ensure the combination of international best practice with cost-efficient local design and construction practices.

Besides standard EE measures such as exterior insulation, and good thermal windows, Integrated Building Design considers such no-cost factors as compact form and layout, solar orientation, passive solar gains in winter and shading in summer and the optimal zoning of inner rooms. Integrated Building Design facilitates the realization of buildings that save long-term operation costs with minimal additional costs over standard building investments. The implementation of Integrated Building Design requires building energy performance calculation methodologies and tools based on national construction practices and climate conditions. Further, it requires sufficiently skilled and experienced architects, designers and HVAC engineers who can coordinate from the first stages of building design in order to identify the optimal building shape, orientation, layout and EE measures to achieve high cost efficiencies.

The replication approach was well considered. The implementation of new energy efficient building codes and embedding of energy efficiency in government building programmes promises long-term replication of project results. Training for professionals, new EE building design curricula for University students and pilot demonstrations constructed in diverse regions throughout the country support smooth uptake and replication even outside of public building programmes.

UNDP comparative advantage

The project builds on UNDP's strong experience in Uzbekistan and in Central Asia with promoting sustainable energy and environmental protection while strengthening the capacity of government institutions. UNDP involvement in Uzbekistan included support for strengthening the capacity of the parliament, training for civil servants, and projects related to resource use including protected areas and water supply. The UNDP Country Office in Uzbekistan was responsible for ensuring transparency, appropriate conduct and professional auditing. Staff and Consultants were contracted according to the established Rules and Regulations of the United Nations and all financial transactions and agreements similarly followed the same Rules and Regulations.

Linkages between project and other interventions within the sector

The project, and its pilot building component, was designed in accordance with and adjusted to national investment programs in public sector, namely investment program focusing on reconstruction and construction of schools and health clinics in rural areas.

The project built on the results of a number of earlier and on-going UNDP-supported initiatives on sustainable energy, including the UNDP/Danish Government pilot project promoting the use of solar water heating devices in public and residential buildings, a UNDP project on solar PV use for sustainable energy supply in remote rural communities in Uzbekistan, and a UNDP-funded feasibility study on heat and power supply options to remote healthcare facilities.

The project was also designed to benefit from expertise built up under a previous EU TACIS programme, which supported methodology and capacity development for energy management in buildings and established the Energy Center of Uzbekistan. In addition, it was intended to coordinate its efforts with a planned regional TACIS initiative "Energy Saving Initiative in the Building Sector Eastern Europe and Central Asia (ESIB)."

In the healthcare sector, the project was designed to coordinate with the Health-2 programme (2005-2009) and its anticipated successor, Health-3 (2010-2014). The two projects focus primarily on the improvement of primary care provision and management reform, Health-2 funded equipment upgrades in a total of 2,200 hospitals and rural clinics, including the provision of lighting and medical equipment, which can be energy intensive. Sustainable heat and power supply remain critical issues, particularly in rural areas.

Management arrangements

The Project Implementation Unit was designed to consist of a Project Manager and a Project Administrative and Financial Assistant to be hired for the duration of the project. The project manager was to be responsible for day-to-day management of all project activities, staff, consultants, disbursements, etc. and for ensuring that M&E requirements are met in a timely fashion. Project Assistant was to be responsible for secretarial, administrative and financial tasks. Consultants, hired as required (based on pre-agreed ToRs and selection processes) by a selection committee which included UNDP and Gosarchitectstroy. Selection was to be made by unanimous agreement.

The primary stakeholders in this project at the national level were invited to participate in the Project Board. This included Gosarchitectstroy, the Ministry of Economy, the Ministry of Health, the Ministry of Education, the Energy Institute of the Academy of Sciences, Tashkent Technical University, the Tashkent Architecture- Construction Institute, the Department for the Fuel and Energy Complex under the Council of Ministers, professional building and construction organizations/associations, and other organizations working on energy efficiency, such as the Energy Centre and the Energy Institute of the Academy of Sciences.

The management arrangements outlined in the project document and the qualifications specified in the ToRs were appropriate.

Project Implementation

The project was implemented in an efficient and clearly results-oriented manner. The Project was officially launched by the signature of the ProDoc on October 28, 2009. The Project Manager was hired in December 2009 when the first actual project activities started. Further project staff and project component team leaders were hired during 2010.

The inception phase was completed in mid-2010. Minor delays due to initial hiring and appointments were referred to in the Inception Report.

Adaptive management (changes to the project design and project outputs during implementation)

Monitoring of overall project targets and adaptive management were well applied during implementation from the beginning of the project onwards. UNDP, Gosarchitectstroy and the Project Management were organized, goal-oriented and pro-active in the recognition of possible problems and opportunities and in developing alternative action plans throughout the implementation of the project.

The project start-up faced some initial problems with staffing which caused minor delays.

In the inception phase the project team recognized additional risks to those defined in the Project Document and the Request for GEF CEO Endorsement. Two important strategic risks were identified in the Inception Report:

- Delays in the timely addressing of issues raised by the project (expansion of replication strategy due to recent changes in government programs)
- Potential non-fulfilment of project target of reduced CO_2 emissions due to changes in Government policy and construction/retrofitting programs

These risks were logged in May 2010 with a status indicating "reduced" in the first case and "avoided" in the second case.

These two risks – sufficient replication and re/construction of energy efficient buildings and the achievement of the project emission reduction target of 35,000 tons CO2 annually (700 000 tCO2 direct emission reduction over the life-cycle of measures) were recognized as critical for project success and were closely monitored.

The Inception Report prepared in the 2010 analysed in detail the actual situation and proposed some key adjustments to project implementation including:

- In Uzbekistan, most design, construction and auditing organizations are government managed institutions. There is a lack of private sector expertise in the building sector. Instead of open tenders to select individual local experts to lead the project components, the project sought internal cooperation with the local institutions that held the responsibility and authority in the respective components. Contracting code experts from within Gosarchitectstroy, for example, ensured that the revised buildings codes were approved and endorsed (and subsequently enforced) without any unnecessary delays. An external team of national and international consultants, as originally foreseen in the Project Document, would not have achieved these results.
- Instead of the creation of a new Building Code Department within Gosarchitectstroy (target in the original Project Framework), a less costly solution was developed in which the project supported the development of relevant capacities in the existing Department on Monitoring of Activity of Design Organizations.
- Governmental investment programs had been revised and the question of opening the project to a new rural residential building programme (about US $164 million allotted for 6,800 new homes and public buildings) was tabled. In the inception phase, the decision was made to stay focused on public buildings in order to fully utilize the potential for replication and volume of investment in this sector, but the option was kept open and later implemented. The team

recognized that substantial additional impact was possible with only moderate adjustments to the activities.

- For the demonstration projects, issues related to the costs of EE measures were carefully considered in order to maximize replication potential. It was recognized that expensive technologies would be less effective in the long-term; if it could not be replicated on a large scale, it did not make sense to implement. Local materials and traditional construction methods were applied where possible. The team tried to define the middle ground of in terms of EE potential and replication potential. Technologies which were easy to service and maintain were favoured.

Later in the project, recognizing the opportunity to develop a comprehensive 'exit strategy' which would further strengthen the long-term impact of the project, the UNDP CO with the allocation of core funds in 2013, introduced an additional element; Component 7 was added to Support the Government in the Development of National Energy Efficiency Program (NEEP) for buildings. A working group with representatives of the Ministry of Economy, Ministry of Finance, Gosarchitectstroy and the project team, developed a Protocol which was subsequently approved by the Cabinet of Ministers in November 2014. Key mandates of the Protocol included:

- Introduction of periodic and compulsory updates to the building regulations to account for developments in the national EE building markets and practices;
- Establishment of the Centre on Development and Improvement of Building Codes and a Centre on Innovations in Architecture and Construction within Gosarchitectstroy;
- Revisions to requirements of manufactured construction materials and testing procedures based on advance international standards.

Partnership arrangements (with relevant stakeholders involved in the country/region)

This project benefited greatly from the support of many government agencies and organizations. Recognizing that bureaucracy can be a very complex barrier in projects involving several ministries and striving for legislative changes, this project has benefited from the strong commitment of government partners.

Gosarchitectstroy maintained active leadership and commitment throughout the project implementation, sharing responsibility with the UNDP project team in strategic planning and management of the project. The Ministries of Health and Education both actively participated in project initiatives (Project Board, seminars, relevant tenders, etc). There has been extensive and regular information exchange between the project and the respective departments of the involved Ministries.

The First Deputy Minister of Higher and Secondary Specialized Education, the Deputy Minister of Public Education, and a Department Head in the Ministry of Health were members of the Project Board. Their participation demonstrated strong motivation and ownership to support energy efficiency in the building sector by means of this project.

The project was implemented by local experts and key local institutions. International project consultants provide advice and experience in best international practice, however the actual project deliverables (energy efficient building codes, design of new and reconstructed buildings, educational curricula, etc.) were developed by local experts with strong experience in the workings of the key organizations.

The partnership strategy has been well implemented and all key local stakeholders and decision makers have actively participated in project implementation including top level policy and decision makers, key state institutions and design organizations, universities, and other specialized expert organizations.

The project implementation and Project Implementation Unit was overseen by the Project Board (Steering Committee) which met twice a year. The chair of the Project Board served was the National Project Coordinator representing Gosarchitectstroy.

Members of the Project Board (Steering Committee) included:

1. Mr. **Khalkhodjaev M**., National Project Coordinator, Head of the Department for Monitoring the Activities of Design Organizations under the State Committee for Architecture and Construction (formerly Mr. Achilov M.K., Deputy Chairman of the State Committee for Architecture and Construction);
2. Mr. **Shoabdurakhmanov R.M**., Deputy Minister of Economy;
3. Mr. **Javlonov Sh.S**., First Deputy Minister of Higher and Secondary Specialized Education, Director of Center of Secondary Specialized and Professional Education;
4. Mr. **Sabirov A.Z**., Deputy Minister of Public Education
5. Mr. **Khodjaev M.J**., Director of Innovation and Research Center "Ecoenergy" of the State Committee for Nature Protection
6. Mr. **Kadirov B.Sh**., First Deputy of General Director of Uzgidromet
7. Mr. **Ergashev B.T**., Head of Department, Ministry of Health
8. Mr. Jaco **Cilliers.,** Deputy Resident Representative, UNDP (replaced by Mr. Farid Garakhanov, UNDP DRR, upon completion of his assignment in Uzbekistan)
9. Mr. **Abdurahmanov A**., Head of Environment and Energy Unit, UNDP

At project board meetings, the project management delivered achievements and the draft action plan for the following year. The national partners and stakeholders were required to review and approve the work plan. Following stakeholders approvals, UNDP and Gosarchitectstroy signed and implemented the action plan.

Feedback from M&E activities used for adaptive management

The project Inception Workshop has been held on November 17, 2009. The project Inception Report was developed in spring 2010 and finalized on July 22, 2010. Adjustments made during the inception period are covered in **Adaptive Management (changes to the project design and project outputs during implementation)** above**.**

The Mid-Term Evaluation of the project took place in 2012.

Recommendations in the Mid-term Evaluation were carefully reviewed and considered by UNDP, Gosarchitectstroy and the Project Management:

- The MTE recommended some specific changes to the indicators and targets outlined in the project logframe. These have been integrated. Further, it was recommended that both logframes (GEF format and UNDP format) be updated so that they are consistent with one another. This has been done.
- The MTE recommended further capacity building in Integrated Building Design including development of new standard building designs based on IBD for government investment programmes. The project developed 3 rural house designs (different sizes) with energy consumptions 30% below compatible

homes. These designs were subsequently formally adopted by the government as standard designs to be realized in the rural housing investment programme.

- Based on recommendations in the MTE, it was decided to implement a further demonstration building, a new rural house, applying Integrated Building Design and complying to level 2 of the new EE building code. The house has been successfully completed and audited to verify compliance and savings.
- Regarding the energy management, energy auditing and energy certification schemes, the MTE recommends an analysis of the need to draft and pass new legislation supporting the compulsory adoption of the schemes. The project has developed 17 state standards regulating the certification scheme which were subsequently approved by the Council of Ministers.
- The MTE also recommended strengthening international and regional exchange of experience of EE in the building sector. The project was responsible for maintaining the joint website www.beeca.net on building sector energy efficiency projects in the Central Asia. On June 18, to close the project, an international conference and roundtable was organized in Tashkent with representatives from UDP/GEF building sector projects in Kyrgyzstan, Kazakhstan, Turkmenistan, Belarus, Russia, Moldova and Armenia to discuss project results and lessons.

Project Finance:

The project has benefited from the previous experience of both Project Manager and Administrative/Financial Assistant with UNDP projects. The financial implementation of the project was professionally managed and administered. A random review of financial records shows orderly and well-administered records.

The Uzbekistan CO has a Harmonized Approach to Cash Transfer (HACT) deferral for the current programmatic cycle (2010-2015), All NIM projects are administered through the UNDP accounting system. In view of this, the project was not subject to regular financial audits as none of the cash transfers were done within the project.

In 2015, the CO audit shall be conducted by the Office of Audit and Investigation (OAI) whereby the EEPB project (00057241) falls under review by the OAI. The report has not yet been officially published.

The project GEF cash contribution for re/construction of pilot projects was USD 668,016, i.e. on average 17%, ranging from 14% to 23%. The share of project contribution for pilot reconstruction projects is on average 18.2% and for construction of new pilot buildings 16.9%.

Government co-financing levels exceeded planned expenditures outlined in the Project Document.

Co-financing (type/source)	UNDP own financing (mill. US$)		Government (mill. US$)		Other sources (mill. US$)**		Total (mill. US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants	0.271	0.725					0.271	0.725
Loans/Concessions								
• In-kind			1.6	0.449		0.253	1.6	0.702

support								
• Other *			8.6	76.761			8.6	76.761
Totals	0.271	0.725	10.2	77.210		0.253	**10.471**	**78.188**

* Government co-financing in the form of the base investment costs of the 9 completed demonstration projects totalled US $3.1 million. In addition, substantial government investments were realized during the project period for EE measures in public buildings. A selection of 10 buildings built in 2013 and 2014 using government funds totalling US $73.663 million were audited by the project and shown to comply to the level 2 of the new building codes and have energy savings between 30 and 76%.

** Other sources include in-kind contributions from Knauf Company (insulation for demo rural house), boiler companies (efficient boilers provided free of charge and installed at regional school and health clinics), and Mupies (banners and posters exhibited in streets and buses provided for free by Tashkent City municipality).

Monitoring and evaluation: design at entry and implementation

The project results were regularly reported to UNDP and GEF on a quarterly and annual basis [UNDP Quarterly Progress Reports (QPRs) and Annual Review Reports (ARRs), and GEF Quarterly Operational Reports (QOR) and Project Implementation Reviews (PIRs)].

The Tripartite Project Reviews have been combined with regular Project Board meetings. The Project Board that oversees project implementation has met regularly twice a year. The Project Board reviewed progress towards achievements and approves the Annual Work Plans and Budgets for the following year.

The Inception Report was approved by the Project Board at its first meeting in July 2010.

Mid-Term Evaluation took place in 2012.

Final Evaluation has taken at project closure on June 30, 2015.

Monitoring and evaluation has been implemented according to the GEF/UNDP practice and in line with the monitoring and evaluation plan described in the Project Document.

Mr. Mark Chao, the project's Chief Technical Advisor assisted in the professional preparation of project reports and in project management.

Based on the review of all available information, monitoring and evaluation was rated highly satisfactory.

HS	S	MS	MU	U	HU	N/A
X						

UNDP and Implementing Partner implementation / execution (*)

The State Committee for Architecture and Construction, Gosarchitectstroy, acted as National Executing Partner and played a key role in project implementation. Gosarchitectstroy has the authority and responsibility in developing and implementing energy efficiency codes, licensing of construction specialists, approving building designs, and supervision of building constructions. Further, Gosarchitectstroy is responsible for the implementation of National construction and rehabilitation programmes. Their clear support and action were crucial for the successful implementation of the project.

The institutional support and the personal commitment of Mr. Mukhamadshokir Khalkhodjaev, the National Project Coordinator at Gosarchitectstroy, were critical for the smooth implementation of the project and its immense success.

Climate change specialist, Ms. Rano Baykhanova of the Energy and Environment Unit of the UNDP CO Uzbekistan and the Regional Technical Advisor, Ms. Marina Olshanskaya, provided important design, oversight and management support from project conception to finish.

Uzbekistan like many CIS countries has a strong tradition of following building codes but lack a tradition of updating their building codes. The key project component, the revised building codes were developed in a 6-12 month period and then, within only a few months, the codes were put into force. Without the clear mandate of Gosarchitectstroy and the support of UNDP, the building codes and other project components would not have been implemented so quickly. The project owes a great deal of its success to this smooth cooperation.

Based on the review of all available information, the UNDP execution was rated highly satisfactory.

HS	S	MS	MU	U	HU	N/A
X						

Based on the review of all available information, the Executing Agency execution was rated highly satisfactory.

HS	S	MS	MU	U	HU	N/A
X						

Coordination, and operational issues

The project management team operated from office space provided within the Gosarchitectstroy offices in Tashkent. The Project Manager, Mr. Kakhramon Usmanov, was appointed in December 2009 as the first contract and has very effectively lead the project, the project team and various local and international consultants from the start. His experienced leadership was an important factor enabling the efficient operation, successful implementation and smooth coordination between various stakeholders and, in particular, between UNDP and Gosarchitectstroy.

The implementation of the project components was organized and managed by 4 Task Leaders supported by project partners including national organizations and international consultants. The 4 Task Leaders were:

- Mr. Rustam Kuchkarov, Team Leader on Building Codes and Standards (Component 1)
- Mr. Petr Pozachanyuk, Team Leader on Energy Audit, Management and Certification (Component 2)
- Mr. Elyor Abbosov, Team Leader on Training, Education and Outreach (Component 3 and 5)
- Mr. Alisher Temirov, Team Leader on Demonstration Buildings (Component 4)

Further members of the project team were;

- Ms. Alyona Kim, Administrative and Finance Assistant
- Mr. Anatoly Verkhnyatsky, Driver

The project manager has contributed outstanding leadership, management and strategic planning skills. The strong motivation and initiative exhibited by the team contributed greatly to the project's timely and effective realization.

Project Results

Overall results (attainment of objectives) (*)

Project objective: Reduce energy consumption and associated GHG emissions of new and existing buildings in the education and healthcare sectors

SUCCESS CRITERIA (FROM LOGFRAME)	ASSESSMENT
Thermal energy demand reduced to an average of 140 and 150 kWh/m² (by 25%) for new and retrofitted buildings respectively	As a result of legislation developed by the project and enacted in 2011, all publicly funded buildings and renovations (including subsidized housing) are required to achieve the 2nd level of thermal performance which realizes heat energy consumptions 25-50% lower than compatible buildings built before the project.
By the end of the project (in 2014): 35,000 tons CO_2 annual savings, i.e. 20-year lifecycle direct project savings of **700,000** tons CO_2.	The direct ER calculated according to the GEF methodology (2013) (https://www.thegef.org/gef/pubs/STAP/Methodology-for-Calculating-GHG-Benefits-of-GEF-Energy-Efficiency-Projects-v.1) is 705,000 tCO2 annually by EOP or **15.9 million tCO2** over the lifetime of EE measures realized during the project implementation. This exceeds the original project target by 20 times.

The project has delivered significant and sustainable impact, well above the original targets. EE improvements implemented during the project are expected to deliver **15.9 million tCO2** direct emission reductions over their lifetimes, exceeding the original project target by 20 times. Direct post-project emission reductions are expected to be over 35 million tCO_2 based on the continued enforcement and incremental improvements to the codes.

Component 1 – Building codes

SUCCESS CRITERIA (FROM LOGFRAME)	ASSESSMENT
Updated codes for public buildings reduce allowable consumption by at least 25%.	10 mandatory buildings codes have been revised under the project and officially passed and adopted in 2011. The original target was 5. Their timely implementation enabled a widespread application within the project implementation.
By the end of Year 3, all healthcare and educational facilities will be constructed or reconstructed (approx. 2 million m^2) using designs that ensure a	All building and renovations using public funds (public buildings but also subsidized residential) are required to achieve the second level of thermal performance which realizes 25-50% (or more) energy savings depending on the type of building and the region. In 2014, more than 4 million m^2 new building and renovation

minimum 25% reduction in energy consumption from the baseline year assuming constant conditions.	conforming to the new code requirements was commissioned under government investment programs. This included education (254,600m^2), healthcare (127,100m^2), urban housing (2,089,200m^2) and rural housing (1,573,000m^2)
Approximately 20 staff trained in efficient codes and able to oversee implementation and provide guidance to design organizations by the end of Year 2.	Based on project recommendations, Gosarchitectstroy has adopted and is implementing a comprehensive strategy for capacity buildings within the Department of Monitoring of Activity of Design Organizations (UMDPO). The project team prepared and published 5 manuals on EE building design compliant to the revised codes. At least 1000 architects, construction specialists, teachers and students of architecture and construction institutes have participated in master classes across the country on code compliance and EE building design.

The revision and adoption of the 10 building codes was implemented quickly and effectively. The revisions were developed by Gosarchitectstroy and the project team within a 6-12 month period, and then adopted a few months later (in June 2011). The decisive action of Gosarchitectstroy with the project team and the bold resolution of the government in adopting these codes were the crucial basis of the overall project success. The result is a monumental shift in the national perception of EE and a market growth of energy efficient buildings and products. EE equipment is now more readily available – consumers have adopted the concept of EE investment and payback.

As a result of broadening of the focus and shifting of budget of the Government construction and rehabilitation programs during the project implementation, the original target sectors of education and health care buildings were augmented by urban and rural housing. This ensured that the project met and surpassed the building volumes originally targeted.

The new building codes follow the structure of existing building codes and are based on the combination of traditional prescriptive thermal requirements and energy performance requirements.

The code KMK 2.01.04-97 on Building Thermal Engineering describes 3 levels of minimum thermal resistance of the building components (walls, windows, roofs and floors) applicable to different types of buildings.

- Level 1 applies to non-subsidized residential buildings and some public and commercial buildings (theatres, shops, banks, etc)
- Level 2 is mandatory for all buildings funded fully or partly by government including education and healthcare facilities but also subsidized residential building.
- Level 3 is voluntary.

Energy performance requirements are addressed in the revised code KMK 2.01.18-2000 on Normative Energy Consumption for Space Heating, Ventilation and Air-conditioning in Buildings. The energy performance is defined as maximum energy loss over total building area (W/m2). Minimum energy performance is specified according to different building types conforming to the prescriptive requirements outlined in KMK 2.01.04-97.

Component 2 – Building certification, energy auditing and energy management

SUCCESS CRITERIA (FROM LOGFRAME)	ASSESSMENT
National programme on energy performance certification, including energy audit for public buildings drafted, accepted by Gosarchitectstroy, and submitted to the Cabinet of Ministers of Uzbekistan for adoption as an official Resolution	Seventeen new state standards defining the energy performance certification systems for buildings were developed and adopted by Gosarchitectstroy. Among other aspects, the standards cover energy audit methodologies, credentials for service providers and building energy performance labelling.
Energy performance certificate scheme introduced in at least two pilot regions by the end of the project. Data collected during certification process is available through the information system.	In January 2015, President Islam Karimov issued an order for Gosarchitectstroy and the National Standards Agency (UzStandard) to develop a plan for the phased nationwide introduction of building audit, certification and labelling schemes. The work is ongoing. The energy audit concept has been introduced to national practitioners through demo buildings and training. The information system to collect, store and analyse data on energy consumption of buildings has been accepted by the Ministries of Health and Public Education and is being steadily introduced within education and healthcare facilities.
By Year 3, Job duties of building maintenance personnel in pilot regions include energy management tasks.	The Project has developed new tools and procedures for energy management within public facilities including an energy information management system. Energy management has been introduced in a few demonstration facilities and responsible people trained.

Component 2 - **Building energy management, audit, certification and labelling** - is the single weak component in terms of implementation and attaining targets. The enabling environment has been prepared (by policy changes and training) and the government commitment is evident, but the realization of audit, certification and labelling schemes (even in 2 pilot regions) requires additional capacity and time beyond the project implementation.

During the project implementation, in accordance with the request of the Deputy Minister of Health, an energy management system with collection and analysis of building energy consumption data was tested in two demonstration rural health clinics located in Navoi and Tashkent regions. Monthly monitoring of the system operation was carried out by the Ministry. The test systems were shown to be highly effective and the Ministry has instructed further regional health authorities to implement this system in health facilities.

The project document defined a coordinated effort to promote "energy passports," which provide an informational summary of a building that can include building geometry and orientation, materials and their thermal resistance, calculated energy consumption, and other data. The passports which document code compliance and certify the performance

of buildings over their lifetimes were already used in Russia. They are used to rate existing buildings according to energy performance, to create incentives for achieving greater efficiency than that required by code, and to identify the need for urgent renovation of highly inefficient buildings. Audits are essential to the passport concept, as they provide the necessary performance data.

Some doubts or misconceptions about the short- and long-term benefits of building audit, certification and labelling schemes (especially considering the effort and costs necessary to develop, launch and maintain these services in the market) seem to have resulted in a cautious approach on the part of project partners. The component lacked a clear definition of the national need it was required to fill and a vision of the new market niche – practitioners, services and instruments – it intended to create. The development and launching of a basic audit tool for planned, new and renovated buildings which should have been made accessible free-of-charge to building planners and practitioners would have benefited this component and the whole project a great deal. This missed opportunity is being taken up by ENSI, who have adapted their basic audit program to the Uzbek market based on the dynamic created by the project. The ENSI audit program must be purchased and is aimed primarily at existing buildings.

The mid-term evaluation addressed a lack of achievement in this component. The project team was asked to identify and analyze feasibility of costs associated with the implementation and operation of these schemes. Further, it was recommended that the project should identify and initiate drafting of the legislation necessary which defines the responsible parties to develop, administer and finance the schemes so that the system could be implemented within the project implementation.

Component 3 – Trainings and educational programs

SUCCESS CRITERIA (FROM LOGFRAME)	**ASSESSMENT**
Submitted designs meet and exceed the require-ments of more efficient codes by EOP.	Energy audits involving site inspections were conducted on 10 selected new building projects (not Project demos). Audit results confirm energy savings and the conformance to new EE building codes.
At least 300 architects trained by the end of the project.	At least 1000 architects, construction specialists, teachers, and students of architecture/construction institutes and colleges have participated in master classes over the country.
Bachelors and masters program in energy management expanded to cover a specialization in buildings. Integrated building design introduced as a subject for architecture students.	New bachelor's and master's degree programmes on energy efficiency in buildings are now offered at Tashkent State University (TSTU) and the Tashkent Architecture and Construction Institute (TACI), the nation's 2 leading institutes of higher education in building design, construction and maintenance. Approx. 200 students per year are enrolled in bachelor program and further 12 in the master program. TSTU programmes have been extended to other technical universities, with approx. 400 undergrad and 32 graduate students in new programmes on EE in buildings.
100% of designs of new public buildings and newly reconstructed (capital reconstruction)	In 2013 and 2014, energy audits were conducted on 10 selected building projects (not Project demos). The buildings were analysed in terms of design, calculations of energy performance and verification of actual installation of design

public buildings meet at least second level of the revised building code KMK 2.01.04-97* by the end of the project.	features. Audit results confirm conformance to second level of revised EE building Codes and energy savings over 30%. Six buildings attaining savings over 45%.

Component 3 – training and education programs - has been professionally and timely implemented and has achieved well above expected targets. The programs and curricula for university students and graduates on energy efficiency in buildings have been developed, approved and implemented since 2011. These include: six State Educational Standards for Bachelor's and Master's courses and nine Educational Programs on energy efficiency in buildings for Bachelor's and Master's courses. University laboratories have been equipped with computers and software for calculating building energy requirements. Further courses have been prepared for professional education and retraining.

Component 4 – Pilots

SUCCESS CRITERIA (FROM LOGFRAME)	**ASSESSMENT**
Six energy-efficient buildings reconstructed and 2 new energy-efficient buildings constructed by the end of 2012. Energy performance documented by the end of the project, first draft developed by the end of 2013.	The Project has realized 9 demonstration buildings (2 new schools, 4 renovated schools, 2 renovated health clinics and a new rural house) which showcase EE building measures, designs and construction. Energy audits (before and after renovation work and following completion of new buildings) were prepared and distributed. All demonstration buildings have been shown to achieve 40-65% energy savings.
Plans and prototype information on energy efficiency measures used, costs and calculated energy savings in pilot buildings circulated to 36 leading design institutes and other design organizations by the end 2012, updated with monitored energy performance in 2013 and 2014.	Energy audits (before and after renovation work and following completion of new buildings) were prepared and updated regularly. The results were made available in brochures which could be downloaded on the project web-site. The pilot projects were featured in newspapers, television, seminars, conferences, trade fairs and study trips.
Designs and performance information for pilot buildings will be available nationally and internationally by end of Year 4.	The project has enhanced the energy performance of 3 typical rural house designs included in the State Programme 'Housing for Comprehensive Rural Development.' Integrated Building Design was applied to enhance the EE of the rural house design which included enhanced insulation, efficient heating devices, heat recovery and solar PV and water heating. Construction was completed in 2014.

At least one new building design (public school or rural family house) is developed and fully based on IBD, i.e. it reaches at least energy efficiency level two with standard investment costs (minimum incremental costs) as buildings with the same total area. New full IBD is submitted to the government for approval as a new typical building design to be constructed, financed and replicated within one of its national investment program	The house meets and exceeds requirements of EE level 2. The plans of all 3 house types have been adopted by the government for replication in the State Programme 'Housing for Comprehensive Rural Development.'

The pilot projects were implemented within 2 government programs for public building construction and renovation and rural housing. Standard investment costs were covered by the government and the UNDP/GEF project financed the energy efficiency incremental costs – on average 17% above the capital costs.

The demo projects for public buildings generally showcase simple inexpensive technical measures; insulation, double-glazed windows, thermostatic valves and heat shields for radiators. In addition to these simple measures, the rural house has some more advanced systems including heat recovery, solar PV and hot water systems.

Despite some missed opportunities, the demo buildings have achieved substantial savings and impact. For the government and building practitioners, they clearly illustrate the new building code requirements and their long-term benefits in terms of initial costs, energy savings and comfort. For the users of the building, they are more comfortable and showcase concepts of energy conservation and conscientious use of heat energy and electricity. Not only building professionals, but the students, their parents, the health care professionals, and their patients have appreciated and adopted these principles. The results of the energy monitoring for the school sites has shown a significant reduction in energy consumption, but also a stable indoor temperature, improved comfort, reduced incidence of sickness among students and teachers in the winter period and, as a result, an improvement of the learning progress.

Traditionally, government programs in Uzbekistan use approved standard building designs for new schools, health facilities and residential houses. The use of standard designs for the demo buildings meant the opportunities to achieve and showcase the benefits of the many no-cost, low-cost measures (compact building form, orientation to benefit from solar gains, etc) were not identified and implemented using an Integrated Building Design. The problematic is described extensively in the Mid-term evaluation.

The project team appreciated that any additional costs for EE measures needed to be

moderate-to-low level in order to generate broad replication based on the demonstrations. From the perspective of international practice however, some surprisingly simple opportunities were missed; for example, in classrooms of the demo school in Fergana, radiators were not equipped with valves and simple ventilator fans were installed through the double glazed windows in order to regulate indoor temperatures.

The evidence of international involvement and best practice in the design and realization of the demo buildings is weak. Opportunities for low-cost, no-cost measures which could provide substantial additional energy savings (20-35%) were missed. A close cooperation between a local office and an international consultant experienced in the design and realization of EE buildings through all phases (design, detailing and supervision) would have realized more low-cost, no-cost measures and substantial additional savings. While an international consultant was engaged by the project for this purpose, the reports and recommendations produced by the consultant found little actual application in the demo buildings. Due to budget and time constraints, the demo buildings (with the exception of the rural house) used standard approved building layouts developed before the project, with improved insulation, windows and heating systems.

Component 5 – Information dissemination

SUCCESS CRITERIA (FROM LOGFRAME)	**ASSESSMENT**
Guidance manual on building codes published and disseminated, information on energy efficiency performance of pilot projects disseminated to potential investors in public and other sectors, including residential, energy efficiency best practice and policy manual/ strategy paper disseminated to key relevant national and regional governmental stakeholders, energy efficiency policies adopted by public sector administration (incl. focus on level two and three of a building code, effective system of energy performance certification of public buildings implemented, building certificates/	The project has prepared and published 5 guidance manuals on EE building design in compliance with the revised codes. These guidebooks are practical instructions for building professionals and students on the new regulations and the means by which to fulfil their requirements. They were used in the education and training programs implemented under component 3 The PR component of the project has been professionally and enthusiastically implemented. The project has conducted a wide range of outreach via mass media including frequent appearances on television, radio, print media and internet. The Project has participated in exhibitions and other events throughout the country and abroad. Posters, brochures and project promotions have been prepared with a high level of professionalism and are well-directed to target audiences. The project has taken the lead in developing and maintaining the website www.beeca.net which is the clearinghouse for information of ongoing and completed UNDP/GEF projects on EE in buildings in the CIS region (Uzbekistan, Kyrgyzstan, Turkmenistan, and Kazakhstan) and Armenia. The operation and updating of the website has been transferred to the ongoing UNDP/GEF project in Armenia to ensure continued availability promotion of project results. Eventually, the web-site will be transferred back to Uzbekistan in the course of a new UNDP/GEF project addressing rural housing. The project team also publicized and provided advice on

labels publically displayed and pub-licized, energy auditing scheme of public buildings in place).	energy efficiency in local media. The full rollout of information dissemination was professionally and enthusiastically implemented.

In all components except component 2 (energy audit, certification and labelling), the project has achieved and surpassed the original targets set out in the project document.

Based on the review of all available information, the overall results (considering results of all 5 components) were rated highly satisfactory.

HS	S	MS	MU	U	HU	N/A
X						

Relevance(*)

At the project outset, national practitioners and consumers understood very little about energy efficiency. Appliances and equipment were coming on the market, but the concept of energy efficient buildings was very new. During the Soviet era, energy was very inexpensive. Even now, energy prices have increased but not to the level which covers production and distribution costs and certainly not to levels compatible with the international market. Conservation and energy efficiency remains a relatively new concept in Uzbekistan but the project has created substantial and sustainable impact and change in the way government, building professionals and consumers think and act.

The project has realized ground-breaking revisions to national building codes which have already secured improvements to building energy efficiency with proven savings between 25 and 60% in public building programs amounting to over 4 million m2. Compulsory minimum requirements for new and renovated public buildings but also private buildings ensure continued relevance.

Project components and activities supporting code uptake in the building sector, have attracted broad interest. Students and building professionals have enrolled in training, education programs and curricula developed under the project. The success of the demonstration projects has inspired government, building professionals and the general public to implement the measures and practices on a broad scale.

Based on the review of all available information, the project was rated **relevant** (Relevance ratings: 2. Relevant (R), 1. Not Relevant (NR))

R	NR	N/A
X		

Effectiveness & Efficiency (*)

The development, implementation and enforcement of energy efficient building codes have proven to be an effective means to integrate energy efficiency and GHG emission reductions in national public building programs in Uzbekistan. Audits conducted on 10 public buildings financed and built independently of the project in 2013 and 2014 have shown compliance to the new building codes and energy and GHG reductions in the range of 30-76% (compared to compatible buildings built before the new codes or, in the case of renovations, to the actual energy use before renovation.) All new and renovated

buildings (including residential buildings) which use public funds are required to comply to the second level of the new codes achieving 25% energy and GHG savings or better.

Several state building investment programs have already been affected including programs addressing schools and healthcare (381,700m2 in 2014), urban housing (2,089,200m2 in 2014) and rural housing and infrastructure (1,573,000m2 in 2014)

The government has recognized and supports the benefits of energy efficiency in terms of long-term national energy and cost savings, the comfort, security and health advantages for the building users and the reduced global environmental impact. Further, the government has demonstrated its intention to achieve further energy savings in the building sector through legislation, capacity building and market support mechanisms.

Based on the review of all available information, the effectiveness was rated highly satisfactory.

HS	S	MS	MU	U	HU	N/A
	X					

The project complies with UNDP/GEF incremental cost criteria. Key project components (changes to legislation, demo projects, training) would not have been implemented (or implemented much later) without GEF funding.

GEF incremental costs were required to implement the project components which, in turn, have created the enabling environment (legislation and capacity) for large-scale, sustainable impact. As a result of project activities, continued investment in EE technologies and practices in the Uzbek building sector (public and private buildings) is now mandated and enforced by legislation.

Buildings selected from the government programs for construction and rehabilitation of public buildings provided the starting point for demonstration projects. The GEF contribution towards the construction and extensive renovation of pilot projects ranged from 14% to 23% (average 17%) to cover EE measures which would not have been implemented without GEF funding. These contributions went towards incremental costs associated with new EE heating systems (heat pipes, radiators with thermostatic valves, new heat boilers with regulation), thermal insulation, new double-glazed windows, entrance vestibules, new efficient lighting, etc.The use of standard building designs for the schools and health facilities meant opportunities to realize and showcase the benefits of the many no-cost, low-cost measures (compact building form, orientation to benefit from solar gains, etc) were not identified and implemented using an Integrated Building Design. The problematic is described extensively in the Mid-term evaluation.

Project co-financing (described under Project Implementation/Project Finance) far exceeded the planned co-financing ration of 3.6 to one. In the Request for CEO Endorsement/ Approval, planned government cofinancing of US$10 million included US$8.6 million cash for demonstration buildings and US$1.6 million in-kind support for staff time and office space in Gosarchitectstroy At project close, government co-financing in the form of the base investment costs of the 9 completed demonstration projects totalled US$3.1 million and in-kind support through Gosarchitectstroy totalled US$0.449. Substantial government investments (including EE measures required for new code compliance) in public building programs were realized during the project period. A selection of 10 buildings built/renovated in 2013 and 2014 by government funds totalling US$73.663 million were audited by the project and verified to comply to level 2 of the new codes and have energy savings between 30 and 76%. The total

government investment costs (including costs of EE measures) of these 10 buildings were included as indicative co-financing raising the co-financing ration to 26.8 to one. In fact, government investment in building construction and renovation with EE measures far exceeded this amount and will continue in a sustainable fashion after project closure.

Based on the review of all available information, the efficiency is rated highly satisfactory.

HS	S	MS	MU	U	HU	N/A
X						

Country ownership

The government of Uzbekistan, and in particular Gosarchitectstroy, has proceeded with a resolve and commitment in implementing this project which should not be taken for granted in planning other such projects in other countries. The speed and thoroughness with which the legislative changes were developed, enacted and implemented speaks volumes of the national commitment and enthusiasm for the changes brought about by the project. The desire to implement mechanisms which reduce the energy consumption in buildings clearly originates on the Government side. Further to the project results, in 2014, the government resolved to review and update its building codes every 5 years with the goal of further increasing energy efficiency according to market potential.

The project contributed to development of NAMAs on buildings by the UNDP project "Supporting Uzbekistan in transition to low-emission development path" (2011-2015); to joint piloting of green rural homes within the national program on rural construction, and it was involved in development of a concept for the Government of Uzbekistan "Better Housing – Green Jobs".

The project cooperated with the Centre of Economic Researches (CER) under the Cabinet of Ministers on studies related to greening of buildings, and the supports locally the RIO+20 process (including participation in the Round Table to support the national preparations to Rio+20; and contribution to baseline assessment of greening potential of building sector in Uzbekistan conducted by the CER as a part of the National Report to Rio+20).

In the final year of project implementation, the government has opened 2 new energy efficient centres.

Mainstreaming

By 2014, 4 million m2 of buildings had been constructed or retrofitted according to the new energy efficiency buildings codes. All buildings met energy efficiency construction requirements based on modern building codes revised and approved under the project. The buildings not only save energy, but are noticeably more comfortable and durable than compatible buildings completed before the project.

A dynamic in the building sector and among consumers has been clearly established. Representatives from the building industry have remarked on the market growth of energy efficiency products (insulation and windows) and renewable energy technologies (solar PV and hot water).

Sustainability (*)

The project has realized the development, enactment and implementation of revised buildings codes which secure energy saving and GHG reductions in the Uzbek building sector. The change initiated by this ground-breaking legislation is already evident in the building sector and the EE technology market. Local practitioners are required to comply with these new codes. National experts have been trained and new university programs on building energy efficiency have been implemented.

The implementation of project components required incremental costs and support to strengthen local capacity, but limited support and/or financing in a long-term. Building energy audits has demonstrated that the lifetime energy cost savings far exceed the initial investment costs of the energy efficiency measures. Legislative and regulatory mechanisms are in place, and capacity has been developed supporting the sustained implementation of energy efficient design and investments in the building sector.

Further, the mentality of the population has changed. The people are now interested in EE. The EE and RE equipment market has grown (sensors, EE boilers, solar thermal systems.) Consumers have taken up the initiative.

The overall likelihood of sustainability of the project is rated **Likely** (Sustainability ratings: 4. Likely (L): negligible risks to sustainability, 3. Moderately Likely (ML): moderate risks, 2. Moderately Unlikely (MU): significant risks, 1. Unlikely (U): severe risks)

L	ML	MU	U	N/A
X				

Impact

Energy Audits conducted on 8 demonstration buildings (total of 10,500 m2 heated floor area) verified emission reductions of 380 tCO_2/yr. Energy Audits conducted on 10 selected public buildings (total of 49,100 m2 heated floor area) built in 2013 and 2014 without GEF financing verified emission reductions of 1132 tCO_2/yr. Over the lifetime of measures (20 years) these 18 buildings will save 30.4 $ktCO_2$. In 2014 alone, state building investment programs realized over 4 million m2 of new or renovated building area. According to legislation developed, enacted and enforced under the project, this building activity must be compliant to level 2 of the new codes.

The project has delivered significant and sustainable impact, well above the original targets. EE improvements implemented during the project are expected to deliver **15.9 million tCO2** direct emission reductions over their lifetimes, exceeding the original project target by 20 times. Direct post-project emission reductions are expected to be over 35 million tCO_2 based on the continued enforcement and incremental improvements to the codes.

The huge difference between the original target and the achieved results can be attributed to a number of reasons;

- The original target was a cautious estimate based on conservative assumptions of efficiency, compliance, and application. Annex F of the Request for CEO Endorsement/ Approval illustrates a variety of impact scenarios based on efficiency (25% or 40%), compliance (pessimistic 20% or optimistic 80%) and the exclusion/inclusion of renovation programmes. The original target corresponds to the 'worst-case scenario' assuming 25% savings, 20% compliance and the

exclusion of renovation programmes. The realized project impact lies in the middle field of the projected impact scenarios between the most optimistic and the most conservative scenarios accounting for new construction and renovations.

- Energy audits of demo buildings conducted before and after renovation have shown higher baseline energy consumptions than those assumed in the original project document.
- As a result of broadening of the focus of the Government construction and rehabilitation programmes during the project implementation, the original target sectors of education and health care buildings were augmented by urban and rural housing.
- Further, it should be noted that the fuel supply during the cold winter period, especially in remote rural areas, is often interrupted, resulting in indoor temperatures falling as low as 10 ºC. In such cases, the energy savings attributable to EE measures would be less than those calculated based on the maintenance of 20 ºC indoor comfort temperatures. The implemented energy efficiency measures significantly improve the comfort and indoor temperature even where the problems with fuel supply continue.

Conclusions, Recommendations & Lessons Learned

The project has realized ground-breaking revisions to national building codes which have already secured improvements to building energy efficiency with proven savings between 25 and 60% in public building programs amounting to over 4 million m2. New compulsory minimum energy efficiency requirements for new and renovated public and public buildings are delivering long-term sustainable impact.

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

Not applicable as the project closed on June 30, 2015, prior to the final evaluation.

Actions to follow up or reinforce initial benefits from the project

Recommendations for Government

1. **Regular update of building energy performance code requirements.** The compulsory minimum building energy performance requirements need to be tightened regularly (at least every 5 years). The revised regulations are a good basis, but compared with international practice (even in other countries in the region) there is substantial potential to further reduce energy consumption from public buildings with proven cost-efficient measures.

   Further, the codes developed by the project are still largely based on prescriptive measures (minimum u-values of external walls, windows, floor and roof.) The transition to performance based codes (based on maximum kWh/m^2 per year including heating and cooling loads) needs further support and development. Performance based codes support the uptake of no-cost/low-cost energy efficiency measures such as compact building form and building orientation.

2. **International best practice, design methodologies and tools.** Local experts need further contact with international expertise and best practice tools. If the

local experts and practitioners are given adequate access to the state-of-the-art procedures, methodologies and tools, they will apply them. The procedures, calculation programs and methodologies currently being applied are outdated with little common basis for improving EE based on low-cost/no-cost measures. A spreadsheet application for building energy performance calculation ($kWh/m^2.a$) and certification which incorporates national climate data, calculation methodologies and code requirements should be developed and made widely available as a tool for students, building professionals and designers.

3. **Implementation of building energy management, energy audit and certification schemes.** Component 2 - the implementation of building energy management, auditing, certification and labelling - required the development of a service industry which did not exist before the project. At the end of the project, the legislative base for the component was created, and the training of energy auditors and energy managers had taken place on a limited scale but the creation of the new service industry - even within a limited area as foreseen by the project document – was not realized. During project implementation it became evident that this component lacked a clear understanding of its cost-efficiency and usefulness within the national context (low energy tariffs, limited turnover of real estate) and the vision of the new market niche it intended to create.

   The realization of these schemes remains a gap at the end of the project. The project created the base but did not fully reach the targets foreseen in the Project Document. The post-project development of energy management, auditing, certification and labelling schemes and markets needs further monitoring and support. Up-scaling of these systems throughout the country requires additional efforts in the field of capacity building of local specialists, improvement of infrastructure, new software products, etc. This work requires additional time and effort.

4. **Update standard designs for schools and other public buildings using IBD.** The use of standard building layouts developed prior to project implementation meant many opportunities to achieve and showcase the benefits of some proven no-cost, low-cost measures (compact building form, orientation to benefit from solar gains, etc) were not identified and implemented in the public building demonstration projects. The development and implementation of new designs for the demonstration buildings was recognized as a complex undertaking involving additional government approvals, costing exercises, potential budget shifts and delays.

The government should apply Integrated Building Design and best-practice low-cost/no-cost measures considering heating and cooling loads in the 4 climate regions of the country to prepare new standard designs for public buildings (schools and hospitals) with the potential for strong replication within governmental funded programs. Focusing on the optimal relation of investment costs to energy performance and operating costs, the target should be to implement best practice no-cost/low-cost measures within the budgets foreseen in building programmes. This should be done by Gosarchitectstroy in close cooperation with international experience and best practice to enable the subsequent adoption of the new standard designs and large-scale rollout in government investment programs. The selection process for any international experts for the EE building designs should be specific in seeking strong experience with the design,

implementation and verification of low-cost/no-cost measures for energy savings in similar climate conditions.

Recommendations for UNDP

5. **Maintenance of project website**. The project has closed efficiently. Project equipment/vehicle has been transferred for use in a national follow-up project. The operation and management of the project website which covers similar projects in 5 neighbour countries has been transferred (according to the agreement with the RTA) to the Armenian 'Improving Energy Efficiency in Buildings' Project due to be completed in 2016. This regional web-site with comprehensive information on similar building sector EE projects in the region should be maintained by integrating it into future projects in Uzbekistan and the region.

Proposals for future directions underlining main objectives

1. **Government incentives and financing mechanisms** should be developed and implemented to help support public and private sector investments in EE measures and practices for buildings. Currently, cost savings resulting from energy conservation in public facilities lead to budget reductions in subsequent years. National spending is reduced, but the facility itself does not benefit directly from these cost savings. An incentive programme developed to further motivate public facilities to save energy (through energy management or further investments in EE/RE) will help ensure sustainable impact from the project.
2. An accountable **national building material, component and equipment testing and certification scheme** ensures the quality and consumer confidence in EE and RE technologies. Material and equipment certification enables planners, investors and consumers to make informed decisions regarding up-front costs (based on quality of the product) and long-term saving potential. Laboratory testing and certification also supports quality control and verification of code compliance at the building site.
3. **Energy tariffs** currently do not support the large-scale uptake of EE and RE measures in the private sector. Low energy costs mean long payback periods for even the most cost-efficient EE measures. Tariff structures (in combination with possible financial incentive programmes) should be evaluated based on the potential of increasing public sector investment in EE / RE technologies.

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

Best Practice

1. Improving building codes is an excellent means to affect the large volume of buildings necessary to achieve substantial impact. The immense and sustainable success of the project is attributable to the endorsement and implementation of these codes with the supporting compliance and capacity building mechanisms.
2. The success of the project was highly dependent on the timely implementation of expected legislation and national building programmes. Delays in the

endorsement of legislation or implementation of government programmes are common in these types of projects and represent a significant risk.

The government of Uzbekistan and, in particular, Gosarchitectstroy, have proceeded with a resolve and commitment in implementing this project which should not be taken for granted in planning similar projects in other countries. The speed and thoroughness with which the legislative changes were developed, enacted and implemented speaks volumes for the national commitment and enthusiasm for the developments brought about by the project.

The project management should also be commended for their role in facilitating a smooth implementation of legislation. The project management recognized the necessity that the revisions to the codes be developed within Gosarchitectstroy itself and adjusted the project activities accordingly. Essentially, the expert mandated by the project to develop the revisions was a Gosarchitectstroy employee and code expert; by allotting this expert the time and international support necessary to develop the codes within Gosarchitectstroy, the subsequent approvals and endorsement processes were simplified considerably.

3. The project originated on the government side when an opportunity to embed energy savings in government building programmes was recognized. The project idea was raised by the Ministry of Economy during a meeting with UNDP in December 2007. Within two years the project was developed, approved and operational. The efficient development of the project and the quick approval by GEF helped ensure that the project activities, goals and objectives remained relevant at the national level and the dynamic and momentum was maintained.
4. The 5 guidance manuals for building professionals explaining the revised standards and describing solutions and practices conforming to the new codes are useful tools supporting market uptake. These can be updated based on new code developments but also as new materials, procedures and equipment become available on the market.
5. This project had a full time PR team member responsible for components 3 and 5 (revision of educational materials, creation of 5 guidance manuals for practitioners, dissemination activities including television, internet and presentations at trade shows and international conferences.) The professional and enthusiastic implementation of these activities created further dynamic and uptake of project results among government, building sector professionals, investors and the general public in Uzbekistan and in the region.
6. Demonstration buildings need to strike a careful balance between showcasing new technologies and using traditional construction methods and practices. For the most part building materials and practices used in the public demonstration buildings were local – this ensured a good cost balance and a high replication potential.

Weaknesses

While the project has shown immense success, there were a few weaknesses which are addressed here as guidance in the development of future projects.

1. The use of standard building layouts developed prior to project implementation meant many opportunities to achieve and showcase the benefits of proven no-cost, low-cost measures (compact building form, orientation to benefit from solar gains, etc) could not be identified and implemented in the public building

demonstration projects. The development and implementation of new designs for the demonstration buildings was recognized as a complex undertaking involving additional government approvals, costing exercises, potential budget shifts and delays. Development of future projects should recognize and address these constraints.

2. The Logframe lacked sufficient external indicators to track the real market uptake of EE technologies. Market uptake of insulation products and of energy efficient windows or Government spending on EE measures in its building programmes, for example, would have given an accountable indication of growth in the national EE markets.
3. The evidence of international involvement and best practice in the design and realization of the demo buildings is weak. Opportunities for low-cost, no-cost measures which could provide substantial additional energy savings (20-35%) were missed. A close cooperation between a local office and an international consultant experienced in the design and realization of EE buildings through all phases (design, detailing and supervision) would have realized more low-cost, no-cost measures and substantial additional savings. While an international consultant was engaged by the project for this purpose, the reports and recommendations produced by the consultant found little actual application in the demo buildings. Due to budget and time constraints, the demo buildings (with the exception of the rural house) used standard approved building layouts developed before the project, with improved insulation, windows and heating systems. Integrated Building Design was not effectively applied.

Annexes

- Annex A - ToR
- Annex B - Mission Itinerary
- Annex C - List of persons interviewed
- Annex D - Summary of field visits
- Annex E - List of documents reviewed
- Annex F - Questionnaire used
- Annex G - Evaluation Question Matrix
- Annex H - Evaluation Consultant Agreement Form
- Annex I – Report Clearance Form
- Annex J – Terminal Evaluation Audit Trail
- Annex K – Terminal GEF CCM Tracking Tool