United Nations Development Programme

Country: Turkmenistan

PROJECT DOCUMENT

Project Title:	Improving Energy Efficiency in the Residential Buildings Sector of Turkmenistan
UNDAF Outcome:	Outcome 3: by 2015, the system of environmentally sustainable economic management expands population's opportunities to participate in social and economic development, especially in rural areas
UNDP Strategic Plan	**Environment and Sustainable Development Primary Outcome**: Mainstreaming environment and energy
Expected CP Outcome:	Outcome 3.2. Environmentally sustainable use of natural resources contributes to effectiveness of economic processes and increased quality of life.
Expected CPAP Output:	Output 3.2.3. Government introduces carbon reduction and energy saving technologies.
Executing Entity/Implementing Partner:	State Concern "Turkmengas"
Implementing Entity/Responsible Partners:	Ministry of Construction, State Concern "Oil&GasConstruction", Municipalities, Ministry of Power and Industry

Brief Description: The proposed UNDP-GEF project will reduce greenhouse gas emissions by improving energy management and reducing energy consumption in the residential sector in Turkmenistan. The project will strengthen incentives and capacity to build highly energy-efficient buildings, develop capacity at Turkmengas to identify end-use energy savings in its housing stock and implement investments to reduce end-use energy consumption, introduce improved highly-efficient design measures to major housing designers and developers, and replicate these measures through protocols for energy-saving measures in prototype buildings and through mainstreaming EE issues into state construction and housing policies and programs.

Programme Period:	2011-2015
Atlas Award ID:	00061181
Project ID:	00077395
PIMS #	4134
Start date:	01/06/2011
End Date	01/06/2015
Management Arrangements	NEX
PAC Meeting Date	23 Dec 2010

Total resources required	$46,203,280
Total allocated resources:	$46,203,280
• Regular	$300,000
• Other:	
○ GEF	$ 2,516,280
○ TurkmenGas	$19,887,000
○ Ashgabat City	$17,500,000
○ Ministry of Construction	$ 6,000,000

Agreed by Turkmengas:

Date/Month/Year

Agreed by (UNDP):

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List of Acryonyms

AWP	Annual Work Plan
CEO	Chief Executive Officer
CIS	Commonwealth of Independent States
CNT	Construction Norms of Turkmenistan (*СНТ -- Строительные Нормы Туркменистана* in Russian)
CPAP	Country Programme Action Plan
EE	Energy Efficiency
EJ	Exajoule
EPBD	EU Directive on Energy Performance in Buildings
EU	European Union
FSP	Full-Sized Project
GEF	Global Environment Facility
GDP	Gross Domestic Product
GHG	Greenhouse gas
Glavgosexpertiz	Main State Expert Authority (building code design review and enforcement agency)
M&E	Monitoring and Evaluation
NEX	National Execution
NPD	National Project Director
PIF	Project Identification Form
PIR	Project Implementation Review
PA	Project Assistant
PM	Project Manager
PMO	Project Management Office
POPP	Programme and Operations Policies and Procedures
PPG	Project Preparation Grant
PB	Project Board
QA/QC	Quality control/Quality assurance procedures
RE	Renewable Energy
STAP	Scientific and Technical Advisory Panel
tCO_2e	Tons of carbon dioxide equivalent
TMT	Turkmenistan New Manat
toe	Tons of oil equivalent
ToR	Terms of Reference
UNDAF	UN Development Assistance Framework
UNDP	United Nations Development Programme
UNDP CO	United Nations Development Programme Country Office
UNFCCC	UN Framework Convention on Climate Change
USD	U.S. Dollar

I. SITUATION ANALYSIS

Background

Severe climate conditions in Turkmenistan make effective heating and cooling in buildings essential to well-being of the country's 5.11 million inhabitants. Temperatures range from an average of -6C in Northeastern Turkmenistan in January to maximum temperatures of 48-50C in the Central and Southeast Karakum in the summer. For this reason, cooling issues in the housing stock are as important as heating issues.

At present, neither new construction nor refurbishment projects consider the energy performance of the buildings involved. Conservative estimates place the potential for savings in new buildings at a minimum of 25% and in reconstructed buildings at a minimum of 38%. However, as buildings being constructed and refurbished now are designed and built without any attention to energy efficiency, they are effectively "locking in" patterns of energy consumption – and associated greenhouse gas emissions -- for the next several decades that are needlessly high. In 2004, natural gas consumption in the residential sector comprised 44% of all greenhouse emissions from natural gas in the country;[1] from 2000-2007, residential consumption of natural gas increased by 35%. Without intervention, these emissions will continue to grow unchecked.

In the past decade, the Government of Turkmenistan has promoted a number of policies to encourage an increase in housing construction and to increase private sector investment in construction, including the introduction of credit lines and mortgages for housing. Private sector investment increased from 55% of total investment in the housing sector in 2000 to 77% in 2007, which has also led to a 3-fold increase in overall investment in housing construction. The subsequent "boom" in housing construction has resulted in a 45% increase in the housing stock from 2000 to 2007, and government programs will continue to support increased rates of construction. While in 2000, per capita living space in Turkmenistan averaged 17.8 m^2, in 2007 it was 19.9 m^2, and the government target has been set at 21.1 m^2 by the year 2020. Furthermore, annual government investment in the housing sector is expected to increase by more than a third during the project implementation period.[2]

While 17% of population lives in the capital city of Ashgabat, an even higher percentage of new residential construction is taking place there, much of it carried out under "Construction of high-rise residential buildings with increased comfort and improved design in the City of Ashgabat," a state program that has provided the impetus for the construction of tens of modern residential high-rise buildings in new suburbs of the city. In early 2011, for example, the City Administration announced a tender for 25 four-story residential buildings. Furthermore, Ashgabat is the site of a relatively new government initiative to refurbish existing residential buildings – though at present, this refurbishment has been limited to cosmetic improvements.

For the reasons above, the proposed project will focus on improving energy efficiency in the residential sector in both new and refurbished buildings in the City of Ashgabat with the goal of putting the residential construction sector on a lower carbon trajectory.

Housing Stock

[1] Turkmenistan: Greenhouse Gas Inventory Report data (2004) in Support of the Second National Communication on Climate Change.

[2] National Program of the Presdient of Turkmenistan for Reshaping the Living Conditions of the Population in Villages, Towns, Cities, and District Centers to the year 2020.

Residential buildings in Turkmenistan can be divided into three categories:

1. One- and two-story private homes, often row houses that use some traditional design knowledge about maintaining a comfortable indoor climate. These houses often use electric heating and electric air conditioners; although some of these homes, particularly in Ashgabat, receive heat from district heating systems. These buildings have largely been constructed at the initiative of the occupants, and for the very small market segment of residential villas, local companies handle design and construction.

2. Contemporary, multi-unit, high-rise apartment buildings that have been built in the past 10 years. These buildings have a reinforced concrete structure and use mineral wool insulation and a marble façade to reduce heat loss. They rely largely on free-standing, building-level, or multi-building gas boilers for heat and hot water, and building-level or multi-building chillers for cooling. These buildings are commissioned by city governments, ministries, and state enterprises, and many of them are constructed by Turkish developers, with local sub-contractors for certain aspects of the construction documents and the construction itself. These buildings represent the vast majority of new construction in the City of Ashgabat.

3. Multi-story apartment buildings built between 1960 and 1991 in "micro-districts," which are often owned by municipalities. Construction techniques include low-rise brick and keramsite (clay aggregate) construction with a plaster façade and no roof or external wall insulation, but they also include high-rise panel construction or re-enforced concrete buildings, many of which were based on design templates from other then-Soviet republics. Many of these apartments are heated with district heating (often supplemented by electric heaters where heat delivery is unreliable) and cooled with electric air conditioning units. This group of buildings represents the largest potential for refurbishment and reconstruction; at present, refurbishment efforts have been limited to cosmetic improvements to selected low-rise buildings in the center of Ashgabat.

New Housing Construction

The process of construction continues to be highly centralized in Turkmenistan, and the government commissions, regulates, oversees, and provides substantial financing for new housing. The following shaded text describes this process and the stakeholders involved, including the parallel existence of local state-owned design/construction companies and private companies, which are mostly foreign.

Text Box 1 New Construction: Process and Stakeholders

1. For government-funded construction, the "client" (a **ministry**, **city administration**, or **state enterprise**) issues technical specifications for a new residential building, including parameters for resource consumption (heat, power, water) consumption. Energy efficiency is not currently considered in these parameters, although designs must conform to mandatory codes on maximum heat consumption per square meter per degree-day.
2. The client announces a tender for the construction contract based on the technical specifications.
3. The proposers (**public and private design firms from Turkmenistan and abroad**) submit bids, which include a model, a design proposal, technical and economic specifications, and a cost proposal.

4. The **Cabinet of Ministers** checks the tender, a winner is announced, and a **Presidential Decree** is issued on the cost of the project, the square meters, the equipment to be used, and the time frame and deadline for completion.
5. The **private construction company** or **state construction organization** that wins the tender is issued a license to design and construct the residential building. If the project is a large-scale housing project of a ministry, city administration, or state enterprise, their **in-house design institutes** are involved at this stage. If a foreign company wins the contract, it will hire local design companies, including private companies, as **subcontractors**. The foreign companies oversee the overall design and construction work, while the local subcontractors (state or private) adapt their designs to local codes and conditions.
6. Regardless of origin, all designs undergo a review by **Glavgosekspertiz** (the state buildings inspectorate based at the **Ministry of Construction**). The **Department of Capital Construction** of the ministry, city administration, or state enterprise conducts quality control checks during construction, and at the end of construction, Glavgosekspertiz issues a summary decision that serves as an occupancy permit – without this decision, new buildings are not supposed to be occupied. Other inspection services must also endorse this document, including the building's compliance with fire safety, seismic safety, and hygienic norms.

Note: Due to the tight time frame for construction, some detailed design work is done concurrently with construction on other parts of the building. Currently, multi-unit high-rise buildings are constructed in 12 to 30 months.

Refurbishment of Existing Housing

Data on reconstruction of the housing stock are more difficult to compile, because these initiatives are not done on the basis of individual projects or contracts. Currently, refurbishment is done for cosmetic benefits; i.e., to promote urban renewal, and it primarily involves re-doing the building façade and installing a new roof. Currently, opportunities to provide more efficient window and roof and external wall insulation are not being realized. Refurbishment efforts are currently concentrated in a "reconstruction" zone in Ashgabat and are expected to expand in the future.

Climate Change Adaptation Considerations

Scenarios developed for long-term expected climate change in Turkmenistan have indicated that if CO_2 concentrations double by the middle of this century from a base year of 1990, average annual temperature is expected to increase from 4.6 to 6.1 degrees Celsius, depending on the GCM and IPCC scenario used. While the models do not agree on the seasonal distribution of the temperature increase, the direction of the impact (an increase) is consistent across all of model runs. For this reason, buildings that emphasize comfort and efficient use of resource in relatively extreme temperatures should also be seen as an adaptation measure to climate change in Turkmenistan.

Policy, Regulatory, and Institutional Framework

National Policies

Currently, the government is launching reforms in both the housing sector and in energy efficiency. In housing, the **National Program of the President of Turkmenistan for Reshaping the Living Conditions of the Population in Villages, Towns, Cities, and District Centers to the year 2020** and the **National Strategy of Socio-Economic Development of Turkmenistan to the year 2030** both set targets for bigger average living space by increasing investment in residential construction (in many cases moving families from single-family dwellings into multi-unit apartment buildings). Presidential initiatives are also supporting privatization of the housing stock through mortgage schemes for new apartment owners, which typically involve a tripartite agreement with the buyer, the city administration, and the bank, which generally offers a loan term of 30 years and an annual interest rate of 1%. It should be noted that the government has stated targets for housing privatization in the past, and the amount of

private construction and apartment ownership is gradually increasing, but rates of privatization have not match stated targets, and the future tempo of privatization of the housing stock is uncertain.

In the energy sector, the National Strategy mentioned above targets improving the efficiency of the oil and gas sector, and the Government has been investing accordingly. To date, the government and the state-owned energy enterprise Turkmengas have focused mainly on supply-side savings in energy; however, discussions with stakeholders during project identification and preparation indicated that there is high-level interest in pursuing demand-side opportunities to reduce energy consumption. Currently, there is an immediate need for both assistance in reducing the amount of end-use energy consumption and for longer-term partnerships that will lay an institutional and programmatic foundation for a lower-carbon trajectory in the buildings sector.

Policy/Legal Framework for Energy Efficiency

In the area of energy efficiency, an *Energy Working Group* has been formed with support from UNDP and the Government of the United Kingdom, and the working group will oversee the development of a *National Sustainable Energy Strategy and Action Plan* (to be submitted for consideration as a Presidential Decree) and a *Law on Energy Efficiency and Renewable Energy* (to be submitted for consideration in 2011). Currently, there are no laws that explicitly address the sustainable use of energy.

The two laws that are most important to the residential sector at present are the **1992 Presidential Decree (No. 598)** "On Free Consumption by the Population of Turkmenistan of Electric Power, Gas, and Water" and the **2003 Presidential Decree** that extended the 1992 decree through the year 2020. These decrees mean that both natural gas and power are free up to a certain point for residential customers.[4] In spite of the obvious disincentive for end-users to make efforts to reduce energy consumption, there is a clear incentive for the government to reduce end-use consumption of natural gas: exports of natural gas provide valuable revenues to the state budget, while internal consumption is financed mostly by the government. Therefore, any natural gas saved through energy efficiency can be exported, and the difference is between no revenue (or even subsidy costs and negative revenue) and international market prices.

Institutional Framework

A unique feature in Turkmenistan is the multiple roles played by key institutions in the housing and energy sector. Several key agencies influence residential construction and energy policy, and at same time design and manage housing for their employees. For example, the **Ministry of Construction** oversees construction targets, it handles building codes and enforcement (through Glavgosexpertiz), but it also commissions, designs, and manages its own housing stock with the support of several other individual departments.

Turkmengas, which is the state monopoly in charge of natural gas management and development in Turkmenistan, also commissions, builds, and manages housing for its employees through several subsidiaries. For example, **Nebitgazkhyzmat** is the subsidiary in charge of providing energy to new buildings that are constructed; they are responsible for all new buildings built by the Oil and Gas Complex. They receive the specifications from the state organizations and then have to meet the stated capacity needs. Another subsidiary, **Neftegazstroy**, serves as a contractor to Turkmengas and is responsible for constructing employee housing and office buildings. They either contract out the building work (e.g., in Ashgabat) or use their in-house design and construction facilities (in other regions).

Other project stakeholders that commission, design, and manage housing stock include the **City of**

[4] Electricity is free up to 35 kWh/person/month. Additional kilowatt-hours cost approximately 0.004 USD.

Ashgabat local administration (through its Main Department of Architecture and Urban Planning) and the **Ministry of Energy and Industry**, which oversees **Turkmenenergo**, the state electric utility. Other local administrations in Turkmenistan also have similar roles and responsibilities in the residential sector.

The newest institution that will play a significant role in the development of the residential sector is the **Ministry of Communal Services**, which was just established in March 2011. It's particular mandate and responsibilities will be clarified in the coming months.

These institutions share another common feature: the vast majority of the buildings they manage are not metered for energy consumption, so it is not possible to identify or prioritize energy efficiency measures in any significant way. Nebigazkhyszmat simply supplies energy according to the stated technical specifications of the new buildings commissioned. While Turkmengas maintains statistics on total gas consumption by sector, it uses the data for supply planning rather than for integrated resource planning.

Regulatory Framework

The current building code for residential buildings, CHT 3.04.03-94, was last revised in 1994. A series of associated codes apply to buildings in the residential sector, and a list of all of these relevant codes is included in Annex D: Summary of Building Codes in Turkmenistan. While the residential building code is relatively old, research and analysis conducted during the project preparation period found that, controlling for climate conditions, the code was actually comparable to "good practice" codes in Europe in terms of the maximum amount of heat consumption permitted per square meter per degree-day expressed in terms of the required R values for building components such as walls and roofs (see Annex D).

However, current building codes do not have binding requirements regarding the overall energy performance of buildings *per se*, and there are currently no incentives to construct buildings that exceed mandated thermal requirements. While the official code enforcement process includes a design review and site checks followed by commissioning (see Text Box 1), no actual auditing is carried out to determine the energy performance of new buildings in practice. Finally, the maximum allowable heating consumption applies only to new buildings or existing buildings undergoing capital reconstruction, but not to buildings undergoing capital repairs, such as roof and façade replacement, which could provide key opportunities to reduce energy consumption significantly.

Barrier Analysis

In the relatively undeveloped energy market in Turkmenistan, there are numerous potential barriers that must be addressed in order to bring about actual investments in more energy-efficient housing. Over the course of project identification and later in project preparation and stakeholder meetings, a number of barriers were identified. The barriers are divided into four main categories:

1) Legal/regulatory/policy barriers – demand-side barriers in the legal, regulatory, and policy framework that restricted incentives to invest in energy efficiency.
2) Institutional barriers – demand-side barriers that restricted incentives to initiate investments in efficiency buildings restricting the level of demand for EE/RE technology and services.
3) Awareness barriers – lack of information and knowledge regarding general benefits of energy savings and specific opportunities for savings.
4) Capacity barriers – barriers restricting the ability of stakeholders to identify and realize investments in energy-efficient residential buildings.

Table 1 below summarizes these barriers and the corresponding project response.

Table 1: Barriers to Efficient Housing and Proposed Project Responses

Description	Barrier Type	Priority	Project response
Payment for gas and power is	Institutional /	High	Component 2 works specifically with the

Description	Barrier Type	Priority	Project response
made by the state (e.g. Turkmengas provides "free" gas for residential buildings), which leads to a principal-agent problem.	Awareness		"principal" (Turkmengas) to identify investments that will be cost-effective and focuses on Turkmengas, the stakeholder that (1) has the ability to make changes and investments; and (2) stands to benefit economically from these investments.
Lack of legal framework to promote energy efficiency	Legal/ Regulatory	High	This barrier will be addressed by UK/UNDP-co-funded activity (to support the development of a Law on Energy Efficiency and Renewable Energy (Activity 4.3.1).
Lack of specific policies and programs to improve energy efficiency	Legal/ Regulatory	High	This barrier will be addressed by the UK/UNDP co-funded activity (4.3.1) to support the development of a National Sustainable Energy Strategy and Action Plan (in the form of a presidential decree).
Lack of energy performance guidelines for existing buildings undergoing capital repairs, or *kapremont* (i.e., reconstruction of the building envelope).	Regulatory	High	Component 3 of the project will work with buildings undergoing reconstruction and will provide performance data and hands-on experience that will inform the planned guidelines.
Lack of awareness of the potential to save energy by improving efficiency in the housing stock.	Awareness	High	Components 1, 2, and 4 provide specific training and outreach for stakeholders involved in the commissioning, tendering, design, construction, and oversight process.
Architects, engineers, and policy-makers have insufficient knowledge and capacities to identify techniques that could be applied to exceed the energy performance of current codes applying to **new** buildings.	Capacity /Technical	Medium-High	Component 3 provides specific examples of efficient buildings by working through the commissioning, design, construction, and occupancy phase of new residential buildings that are significantly more efficient than code requirements. Components 1, 2 and 4 provide training to key stakeholders on building more efficient housing in training programs that are tailored to specific groups of professionals involved in residential housing.
Architects, engineers, and policy-makers have insufficient knowledge and capacities to identify techniques that could be applied to exceed the energy performance of current codes applying to **existing** buildings	Capacity /Technical	Medium-High	Component 3 provides specific examples of efficient buildings by working through the commissioning, design, construction, and occupancy phase of reconstructed residential buildings that significantly improve their energy performance. Components 1, 2 and 4 provide training to key stakeholders on building more efficient housing in training programs that are tailored to specific groups of professionals involved in residential housing.

Description	Barrier Type	Priority	Project response
Absence of energy performance data from the housing stock (and the building stock more generally)	Awareness / Information Capacity	Medium-High	Component 2 will provide specific information for the housing stock of a key state enterprise that will allow its leadership to make decisions on how to improve its efficiency. Component 3 will provide information from new and reconstructed high-efficiency buildings.
Absence of energy auditors who can conduct energy audits and identify opportunities to reduce energy consumption in residential buildings	Capacity	Medium	Components 1, 2 and 4 will provide training to key stakeholders on the importance of and role of energy audits in energy management. In addition, Component 2 will provide hands-on training.

Nearly all of the barriers are demand-side barriers; i.e., there is no market "pull" for energy efficiency designs, products, and services. This is not surprising given the overall low level of awareness of the economic benefits of energy efficiency, which has resulted in a system that has not emphasized energy performance and has not provided any incentives to develop capacity in this area.

Another notable finding from the barrier analysis is the absence of energy performance data from the housing stock (and from the building stock more generally). Heat consumption data from meters at the boiler-house level are useful only where there are building-level boilers (relatively unusual cases limited to the newest buildings), but they are not meaningful for buildings on the district heating system, where transmission and distribution losses reduce the actual amount of heat delivered, and where under-heated apartments may be using electric heaters to supplement district heating. Some limited metering data were collected in the course of project preparation from very new buildings, but in the absence of a certification or passport program and without auditing equipment or expertise, it is extremely difficult to quantify the potential for savings in new and existing buildings and to target particular sub-sectors for potential savings.

Two potential barriers turned out not to be as significant as they initially appeared:

1. The fact that energy is essentially free-of-charge to the population, while removing incentives for occupants to monitor and/or reduce energy consumption, turned out to be a manifestation of a principal-agent problem[5]. It was identified that Turkmengas, which supplies gas to residences, has a strong financial incentive to reduce energy consumption in the residential sector, as it can export any gas that it saves.[6]
2. A lack of investment in energy-efficient buildings did not turn out to be related to a lack of financing, as the government has consistently invested in the housing stock and in home financing, and government entities can announce tenders in a way that does not discriminate

[5] Principal-Agent problem refers to the potential difficulties that arise when two parties engaged in a contract have different goals and different levels of information. It is considered one of the most wide-spread and different to tackle barriers to energy efficiency in building sector. For detailed discussion and policy recommendations see, for instance, OECD/IEA. 2007. Mind the Gap - Quantifying Principal-Agent Problems in Energy Efficiency (http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=1954)

[6] Data from the National Greenhouse Gas Inventory under the Second National Communication indicate that from 2000-2007, the ratio of domestic consumption to gas exports remained fairly constant, with domestic consumption ranging between 24% and 27% of total gas production. Demand for both gas exports and domestic use is expected to increase in the near and medium term.

against more expensive, more efficient buildings. Instead, interviews with stakeholders revealed that the underlying barrier in this area was one of awareness – no connection was made between design improvements, resource efficiency, and reduced operating costs.

Incremental analysis

Project Baseline

The targets for the proposed intervention should be viewed in the context of the current baseline situation in Turkmenistan. Specifically, Turkmenistan has an extremely limited capacity at present to identify and undertake energy efficiency measures throughout its economy. The following table provides a regional comparison between six Eurasian countries (Russia, Ukraine, Kazakhstan, Uzbekistan, and Turkmenistan) on key capacity indicators.

Table 2: Relative Policy/Capacity to Improve Energy Efficiency: A Regional Comparison (a shaded column indicates that this capacity is present)

Policy/Capacity Indicator	RUS	UKR	KAZ	UZB	**TUK**
Law on Energy Efficiency	■	■	■	■	
National Action Plan / National Program on Energy Efficiency currently in effect	■	■			
Government Agency exclusively dedicated to Energy Efficiency	■	■			
Mandatory auditing for at least some segment of the economy	■			■	
At least one NGO or private company with ability to conduct audits and propose energy-saving measures	■	■	■	■	
Availability of auditing equipment in country	■	■	■	■	
Presence of local architects who are trained in energy-efficient construction techniques	■	■	■	■	
Low-energy or passive demonstration buildings constructed in country	■	■	■	■	
Familiarity with energy passport and at least a pilot trial of passports	■	■	■	■	

Business As Usual (BAU) Scenario

In new construction, there has been some limited progress in energy performance in residential buildings due to the evolution of the materials used and the construction techniques used at present; e.g. switching away from wooden frame single-glazed windows, the use of additional external materials with some insulating properties in high-end buildings, and others. In the absence of the project, it is assumed that this progress would continue at the present rate; i.e., far below the technical potential for residential buildings and conservative estimates of savings using standard energy efficiency measures of 25% and 38% in new and renovated buildings, respectively.

In renovated buildings, the lost potential is even greater. Retrofits that provide only cosmetic improvements to the buildings (e.g. re-plastering and roof repairs) will generate limited reductions in consumption, but they overlook the substantial potential gains from changes in the heating system and through improved insulation of the building envelope.

Under the BAU scenario, the government would not have sufficient capacity to develop and enact specific measures, such as energy passports or energy efficiency incentive programmes (as indicated in Table 2).

While some general energy efficiency legislation is likely to be passed during the project period, the government would be unlikely to have the capacity to commission or develop the supporting regulations and incentives or to update its building codes on a periodic basis. Therefore, there would be little incentive for designers and engineers to produce efficient designs for new and existing buildings. Furthermore, in the absence of auditing equipment and capacity, policy-makers would not have a sense of current performance of various types of new and existing buildings.

Turkmengas: In line with the objective of reducing energy losses in its system, *Turkmengas*, the state concern that pays for most of the gas provided to residential buildings, will carry out in 2011-2015 various activities such as gas reticulation system repairs and gas flow meter installation in the housing stock it supplies. The proposed GEF assistance to these baseline activities of Turkmengas is for building the company's capacity in assessing the data gathered from the flow metering systems to identify and quantify the potentials for reducing losses in building sector and in assist them in targeting investments in resource savings.

Finally, architects and engineers would continue to lack experience with energy efficient design and construction techniques. As a result, even if a market for these types of buildings were to develop, local architects and engineers would be at a distinct disadvantage.

From an energy and climate perspective, the energy consumption of residential buildings would remain relatively high, and new buildings constructed and renovated according to current practice would lock in a higher carbon trajectory.

GEF Scenario

The proposed project seeks to introduce efficient designs and technologies in the residential sector of Turkmenistan. The project would result in substantial gains in these areas due to the following:

- Incentive programmes for cities and/or other developers to commission buildings that are at least 25% more efficient than current building codes require.
- An assessment of Turkmengas housing stock and the potential to save gas in the residential sector, as well as an integrated plan for these investments that will be kick-started by an investment by the company of USD 19.9 million for metering in the housing stock as a part of the project.
- The construction of at least 3 new buildings that are at least 25% more efficient than code requirements and 3 reconstructed buildings that are at least 38% more efficient than current consumptions levels by the use of integrated design principles and efficient techniques, materials, and technologies.
- Guidelines for efficient new construction and reconstruction in common building prototypes (meeting the energy performance of the pilot buildings) and training for engineers and architects, including students in those professions.

Under the GEF scenario, the expected annual emissions reductions would be approximately 60,860 - 81,314 tonnes of CO_2e per year, for a total reduction of 1,217,196 – 1,626,290 tonnes of CO_2e over the project lifetime and 10-year assumed post-project lifetime, including 202,866 tCO2e of direct GHG emission reductions, and between 1,014,000 – 1,413,000 MtCO2e of indirect GHG emissions reductions. Further elaboration on the emissions reduction estimated under the BAU and the GEF scenarios is provided in Annex F of the GEF Request for CEO endorsement.

II. STRATEGY

Project rationale and policy conformity

The proposed project will reduce greenhouse gas emissions in the residential sector of Turkmenistan by facilitating the improvement of energy management and reduction of ing energy consumption in the residential sector in Turkmenistan. Currently, the design and construction of new and the operation of existing buildings do not consider energy performance or lifetime operating costs. The proposed project will focus on improving energy efficiency in the residential sector in both new and refurbished buildings in Turkmenistan with a particular focus on the City of Ashgabat, where construction and refurbishment projects are common and can serve as a model for the rest of the country, with the goal of putting the residential construction sector on a lower carbon trajectory.

The proposed project is designed based on two approaches:

1. Capture immediate benefits in the housing sector given the current institutional arrangements and energy market. The activities involved will be focused on working with key partners who are already paying for energy and who are working to improve energy efficiency policies and measures.
2. Lay the groundwork for continued growth in EE housing programs (and EE buildings programs more generally). The activities that will be carried out will be focused on awareness enhancement and capacity building, so that the government, and other stakeholders can take advantage of the increasing opportunities and incentives for EE that will come with future reforms.

The project falls under the GEF-4 Strategic Objective CC – 1 "To promote energy-efficient technologies and practices in the appliances and buildings". In realizing its objective of Improvement of energy management and reduction of energy consumption in the residential sector in Turkmenistan, the project will promote energy efficient technologies and practices in the country's building sector with a focus on new and existing residential buildings. The project will be implemented under the UNDP-led GEF Global Framework for Promoting Low Carbon Buildings with a primary focus on two thematic approaches promoted by the Global Framework: a) Promotion and increased uptake of High Quality Building Codes and Standards; and b) Developing and Promoting Energy Efficient Building Technologies, Building Materials and Construction Practices. The coordination offered by the global program will help Turkmenistan to learn from experiences and best practices from countries with similar EE building projects in the region (Armenia, Kazakhstan, Kyrgyzstan, Uzbekistan and Turkey) and good practice building codes and standards work done in other CIS countries.

The proposed project is fully consistent with Turkmenistan's plans in the housing sector; in the area of energy sector development; and in the general field of socio-economic development (see "Background" Section above). Furthermore, the project incorporates lessons learned from other similar projects in the GEF portfolio, from the previous GEF project on centralized heating in Turkmenistan, and from analysis conducted during the implementation of the PPG project. These lessons include the following:

- There is a need to pay special attention to renovation as a sector with largest potential for savings
- The project should reach beyond space heating to address cooling, lighting, and hot water provision in all training and design activities because of their significant roles in residential energy consumption
- In order to address the principal-agent issues in the energy sector of Turkmenistan, the energy provider should be fully engaged in project implementation
- Estimates of project impact and market transformation should be conservative given the very low baseline capacity and the current policy and regulatory framework in Turkmenistan
- The project will require significant time for the pilot buildings design and construction in order to allow local experts to be involved in the process in a meaningful way that will allow them to develop these skills, which can then be applied elsewhere.

Country eligibility and country drivenness

Turkmenistan is eligible for GEF funds because of its ratification of the UNFCCC and its status as a GEF member country. The project has been endorsed by the GEF Operational Focal Point for Turkmenistan.

The project approach of institutionalizing improved energy efficiency in buildings through improved design, efficient renovation, training, and demonstration directly contributes to the pursuit of *Millennium Goal Number 7:* Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.

This project is developed in the light of the high level of government interest and commitment to providing improved living conditions for the population of Turkmenistan on the one hand, and the interest in providing a system of "environmentally sustainable economic management," as expressed in Outcome 3 of the UNDAF, on the other. The project approach of institutionalizing improved energy efficiency in buildings through improved design, efficient renovation, training, and demonstration directly contributes to the pursuit of *Millennium Goal Number 7:* Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources. More specifically, the fuel savings generated by the project directly support Outcome 3.2 of the *UNDP Turkmenistan* Country Programme ("Environmentally sustainable use of natural resources contributes to effectiveness of economic processes and increased quality of life") and Output 3.2.3 of the Country Programme Action Plan (Government introduces carbon reduction and energy saving technologies).

Project objective, outcomes, outputs/activities, and key indicators

Component 1: Energy Efficient Building Codes and Supporting Capacity Strengthening

Outcome 1: Energy consumption in new buildings is reduced beyond current requirements.

As the current building code already mandates maximum heat consumption and new building construction techniques appear to result in compliant buildings, this component will focus on encouraging the design and construction of highly-efficient buildings based on regional best practice while attempting to promote the adoption of more stringent codes in the near to medium term. Through training and an incentive program providing bonuses to design institutes, it is expected that the City of Ashgabat (and possibly other entities commissioning buildings) could commission buildings that would use 25% less energy than compared to current baseline performance and requirements. The emphasis on incentives to exceed code mandates results from experience in the Central Asian region, which suggests that incentives and enforcement may be more effective in the short term than creating stricter codes with which architects and engineers cannot comply.

The activities in Component 1 will directly address the following barriers: (1) Institutional barriers (a lack of incentives to build highly-efficient buildings); (2) Awareness barriers (a lack of awareness of the potential for energy savings in the residential sector); (3) Technology/capacity barriers (a lack of experience and knowledge regarding energy-efficient technologies and approaches) and a lack of capacity (due to the absence of energy auditing equipment and trained auditors in Turkmenistan).

GEF funding and government in-kind co-financing will jointly support expert analysis, training, and policy/program development. Government support will also include dedication of staff for training activities and of staff and data in support of policy analyses. The government will also directly support the presentation, promotion, and endorsement process for the incentive programs, organizational measures, and policy recommendations developed in support of Outputs 1.1 – 1.3.

Output 1.1: Incentive program for highly-efficient buildings is designed and piloted in at least one city.

Activity 1.1.1: Establishment of a working group on an incentive program for very efficient buildings (i.e., buildings that reduce energy consumption for heating and cooling by at least 25% over current building code requirements).

Activity 1.1.2: Development of a program to reward building design institutes for very efficient designs that are patterned after proven successful EE building design incentives programs implemented in the Eurasian region and elsewhere.

Activity 1.1.3: Presentation of the draft program to key stakeholders (housing developers and engineers and architects) through a half-day workshop.

Activity 1.1.4: Development of a final version of the program for presentation to key decision-makers.

Activity 1.1.5: Adoption and implementation of the program by at least one housing developer

Output 1.2: Roadmap developed that explores more stringent requirements for energy performance in buildings and supporting capacity for building code enforcement and revision strengthened

Activity 1.2.1: Compilation of a report on building codes development, best practices, and trends in the CIS and the EU.

Activity 1.2.2: Organization and provision of a 2-day training for 30 Glavgosekspertiz staff on building envelope evaluation, design review, and best practice in compliance.

Activity 1.2.3: Development and adoption of recommendations by the Ministry of Construction, with support from the International Consultants, for improved organization structures, staffing standards, capacities and accountability for Glavgosexpertiz.

Activity 1.2.4: Development and adoption by the Ministry of Construction of a roadmap for scheduled building codes review and revision that explores more stringent requirements for the energy performance of buildings.

Output 1.3: Energy passport system[7] and other policy tools to promote and enforce more energy efficient construction

Activity 1.3.1: Commissioning of a study and publication of the resulting study report on the potential for energy savings in the building sector if building heat performance standards were expanded to apply to existing buildings undergoing capital renovation (i.e. significant remodelling and refurbishment).

Activity 1.3.2: Commissioning and publication of a report on the potential benefits of the introduction of an energy passport system for new and reconstructed buildings in Ashgabat and a roadmap for its implementation.

Activity 1.3.3: Presentation of project reports on the passport system and other policy tools introduced in other project components to key decision-makers, including the findings from Output 1.1, and Activities 1.3.1 and 1.3.2, at a half-day workshop.

Activity 1.3.4: Development and adoption of a roadmap for mandatory energy passport system. The system will enable authorities the monitor the actual energy use in buildings and their compliance with original building design at commissioning stage, before/after major retrofit and throughout building lifetime.

Output 1.4: Architects and engineers trained on meeting the higher energy perfomance standards of incentive programs, using training materials adapted to local circumstances.

Activity 1.4.1: Development of guidance materials for architects and construction engineers on meeting a high-efficiency standard (i.e. 25% over current codes).

[7] Analogous to "Energy Performance Certificate" mandated by EU Energy Performance in Buildings Directive

Activity 1.4.2: Provision of training for 20 architects and engineers at design institutes through a one-day workshop on best practice in calculating building energy performance and on how to meet a 25% improved performance standard.

Component 2: Demand-side management partnership with Turkmengas

Outcome 2: Turkmengas has an overview of the potential for savings in its housing stock and has the capacity to identify and undertake investments in energy efficiency there.

As a key state enterprise, Turkmengas is responsible for providing gas to residential customers at virtually no charge. The management of the company is focusing on resource efficiency and is aware of supply-side opportunities to improve its efficiency and save gas that can then be exported. However, awareness of demand-side opportunities to reduce gas consumption at the operational level of enterprise is low, and there is a lack of information about its potential.

The activities and outputs in Component 2 will address the following barriers: (1) Institutional/awareness barriers (Turkmengas, a major housing developer and manager, is not currently aware of the potential to save energy in its building stock); (2) Technical / capacity barriers (there is currently only a negligible amount of metering in the building stock, and no audits can be performed in the absence of auditing equipment and trained staff to perform the audits; and (3) Awareness barriers (company management cannot undertake energy-saving investments without the necessary data on consumption).

Turkmengas will be making a sizable contribution to the project in the form of energy metering, which will allow it to provide data essential to compiling an integrated resources investment plan. Without proper metering it is impossible to establish the level of Specific Energy Consumption (SEC) in residential buildings, as well as to identify and monitor implementation of any demand-side management activities. GEF-funded activities focus on providing key information for decision-makers, thereby raising their awareness of demand-side savings and their ability to pursue investments in energy efficiency. They also focus on the housing stock that is managed and/or commissioned by Turkmengas, which is a natural starting point for resource savings that can be realized by the company and in the country.

Output 2.1: Analysis conducted on the most cost-effective means of reducing energy consumption in the residential sector.

Activity 2.1.1: Identification and quantification of energy-saving opportunities for both residential heating and residential cooling and options for realizing them based on internationally-acknowledged good practice.

Activity 2.1.2: Procurement and installation of meters to monitor building's energy use and establish the specific energy consumption (SEC) of the various residential buildings in Turkmengas housing stock (funded and implemented by Turkmengas).

Activity 2.1.3: Procurement of auditing equipment and conduct of initial audits in cooperation with the Construction Department of Turkmengas for at least 25 buildings in the company's housing stock. The audits will be used as a hands-on training session for the staff of the Construction Department and other project partners will be invited to participate as well (e.g. Ministry of Construction and Municipality of the City of Ashgabat).

Activity 2.1.4: Drafting and publication of a study that will identify cost-saving options in the housing stock, including a discussion of these options based on price, cost-effectiveness, payback period, applicability, and impact. The study will also include a macro-level analysis of the potential additional revenues from exporting the gas saved

Activity 2.1.5.: Documentation, publication, and dissemination of the energy audit work and findings and all available metering data to all key project stakeholders and other potential beneficiaries in the country.

Output 2.2: Key staff in Turkmengas trained in energy management and the identification of energy-saving investments.[8]

Activity 2.2.1: Organization and provision of hands-on training for company staff on integrated resources planning and demand-side management, using the results of audits conducted in Activity 2.1.2 and company data on energy expenditures in its housing stock and data from its metering initiative.

Activity 2.2.2: Organization and conduct of a study tour to observe best-practice, demand-side management programs abroad.

Activity 2.2.3: Development, in cooperation with the Construction Department of Turkmengas, in drafting an **Integrated Resources Plan** for the energy needs of the housing stock owned and/or managed by Turkmengas that treats energy efficiency as an energy resource, using data referenced in Activity 2.2.1.

Output 2.3: Investment plan for reducing energy losses in the housing stock that Turkmengas supplies.

Activity 2.3.1: Development of a draft of an investment plan (on the basis of the Integrated Resources plan developed in Activity 2.2.3) in conjunction with the IC DSM, the CTA, and the project technical staff.

Activity 2.3.2: Review and discussion of the plan.

Activity 2.3.3: Presentation of the investment plan to Turkmengas management and support for the plan through the endorsement process.

Component 3: Improved design measures for major residential consumers

Outcome 3: Energy-efficient design and technologies are incorporated and visually demonstrated in new and reconstructed residential buildings.

This component will include both new buildings and capital repairs on existing buildings in order to maximize its impact on the residential construction market in Ashgabat. GEF support will cover the incremental costs of more efficient design and (re)construction, while baseline (re)construction costs will be covered by the project developers and owners of the buildings. Proposed measures for new buildings include: (1) Improved siting and design to ensure optimal wall-to-window ratios in the building; (2) Optimized use of daylight and adequate measures to utilize sunlight while maintaining indoor comfort; (3) An integrated approach, involving early discussions between the builders, the architects, and the HVAC engineers to ensure that building systems can run at an optimal capacity and that savings from reduced energy consumption can be reflected in construction savings (i.e. smaller capacity boilers or chillers); (4) Optimal insulation reflecting international best practice; (5) Energy-efficient windows with high performance and adequate measures for ventilation; (6) Effective shading in building design in order to reduce the demand for air conditioning; and (7) Boilers and chillers that are highly efficient. Proposed measures for existing builings include: (1) Insulation of key areas (roofs, heating pipes, exterior walls and gables); (2) Energy-efficient windows with high performance and adequate measures for ventilation; (3) Upgrading building-level and flat-level heating systems; (4) Introduction of shading measures in order to reduce demand for air conditioning; and (5) Measures that consider the relationship between cooling needs and building performance.

The activities and corresponding outputs in Component 3 are designed to address the following barriers: (1) Technology / capacity barriers (architects and engineers lack the skills and technologies to construct and reconstruct buildings with high energy performance; (2) Institutional barriers (lack of performance requirements for capital repairs); and (3) information /awareness barriers (lack of data on the actual energy performance of the building stock and lack of an energy passport/labeling system).

[8] Note that Activity 2.1.2 will feed directly into this output as well by using the data collection exercise as a training opportunity for company staff.

GEF support will include the provision of international and local consultants to support site selection, permitting, design, procurement, and construction (or reconstruction, as applicable) of the demonstration buildings and payment of a share of the incremental construction costs. GEF funding will also cover monitoring of building performance, the development and demonstration of energy passports, and the documentation and dissemination of the approaches and findings from Component 3. Co-financing will cover the developers' work in site selection, permitting, design, procurement, and the baseline costs of construction (or reconstruction, as applicable).

Output 3.1: At least three new multi-unit residential buildings with significantly improved energy performance (i.e. at least a 25% reduction in consumption compared to currently mandated codes for typical buildings under similar conditions) are designed and constructed by the end of Year 4 of the project.

Activity 3.1.1.: Site identification (jointly carried out by the Project Team and the developers).

Activity 3.1.2.: Estimation of baseline performance for typical buildings under similar conditions.

Activity 3.1.3: Drafting the technical specifications for the tender for the design, engineering, supply of materials and implementation of specific EE features in selected demonstration buildings (jointly carried out by the Project Team and the developers).

Activity 3.1.4: Development of designs and submission of designs for design review (jointly carried out by the Project Team and the developers).

Activity 3.1.5: Acquisition of construction permits and procurement of construction materials and EE technologies (with procurement jointly carried out by the Project Team and the developers).

Activity 3.1.6: Construction and construction oversight (construction will be implemented by the developers; construction oversight will be jointly carried out by the Project Team and the developers).

Activity 3.1.7: Monitoring and evaluation of building performance, including gas consumption and electricity consumption), and development and application of a GHG monitoring methodology that will estimate GHG savings in the pilot buildings from baseline, expected, and achieved energy savings.

Activity 3.1.8: Ongoing documentation of the design and construction approach, including detailed plans and lessons learned, and dissemination of this information to the greatest extent possible to potential beneficiaries.

Output 3.2: At least three multi-unit residential buildings reconstructed with significantly improved energy performance (i.e. at least a 38% reduction in consumption compared to assessed baseline performance[9]) by the end of Year 4 of the project.

Activity 3.2.1: Building selection (jointly carried out by the Project Team and the developers).

Activity 3.2.2: Conduct of baseline audits to determine the energy performance of the buildings selected for retrofits.

Activity 3.2.3: Drafting the technical specifications for the tender for the design, engineering, supply of materials and implementation of specific EE features in selected demonstration buildings (jointly carried out by the Project Team and the developers).

Activity 3.2.4: Development of designs and submission of designs for design review (jointly carried out by the Project Team and the developers).

Activity 3.2.5: Acquisition of construction permits and procurement of construction materials and EE technologies (with procurement jointly carried out by the Project Team and the developers).

[9] Baseline performance: simple retrofit without additional energy saving measures will result in 10% saving. Project target is additional 38% saving on top of the baseline.

Activity 3.2.6: Reconstruction and oversight (reconstruction will be implemented by the developers; oversight will be jointly carried out by the Project Team and the developers).

Activity 3.2.7: Conduct of *ex post* monitoring and evaluation of building performance. Monitoring here will be similar to Activity 3.1.7, but it will also include indoor temperature to allow the project to estimate the possible effect of over- or under-heating.

Activity 3.2.8: Ongoing documentation of the design and renovation approach, including detailed plans and lessons learned, and dissemination of this information to the greatest extent possible to potential beneficiaries.

Output 3.3: Model energy passports developed for all pilot buildings and introduced through training

Activity 3.3.1: Development of a model energy passport based on international best practice and regional conditions.

Activity 3.3.2: Completion of energy passports for all pilot buildings in Outputs 3.1 and 3.2., including the conduct of performance audits where necessary. Energy surveys will be conducted as needed to validate information provided on energy performance in the energy passport.

Activity 3.3.3: Organization and conduct of training for selected stakeholders (enforcement officials, facilities managers, developers, and policy-makers) on the model passport, how to apply it to new and existing buildings, how to interpret it, and its use in EE programmes in other countries.

Activity 3.3.4: Publication of a brochure explaining the model passport and the passports used in the project and distribution of the brochure to policy-makers and city and regional administrations.

Component 4: Replication through partnerships with other developers and support for policies that encourage energy efficiency

Outcome 4: Replication facilitated via development of skills, prototype designs and policies for energy-efficient buildings.

This component will work to expand the use of energy-efficient techniques to the broader housing market and to "mainstream" energy efficiency considerations into construction and housing policy decisions. Voluntary protocols for introducing highly-efficient measures are recommended rather than prototypes because of the diverse, international group of construction companies that are involved and the single-tender system in the case of new buildings and because of the widely diverse nature of the housing stock involved in the case of buildings undergoing capital reconstruction.

GEF funding and government co-financing will jointly support identification and development of protocol designs. GEF funding will also support capacity development of current and future architects and engineers through a competition for students and a study tour for practicing architects; it will also fund the development and disseminaton of all lessons learned. The government will promote the use of the potocols and will support adoption of that and other measures that result from activities in Component 4. UNDP will co-finance the establishment and functioning of the Energy Working Group under the parallel "Energy efficiency policy project" which will ensure that UNDP-GEF project findings are reflected in the draft legislation and strategy documents, such as the Law on Energy Efficiency and Renewable Energy and the National Sustainable Energy Strategy and Action Plan.

The activities and outputs for Component 4 are designed to address the following barriers: (1) Institutional barriers (lack of a legal framework for energy efficiency); (2) Regulatory barriers (lack of specific energy-saving policies and measures); (3) Awareness barriers (lack of information available to policy-makers on effective energy efficiency policies and measures; and (4) Technology / capacity barriers (lack of information on the most effective means of reconstructing common building types to improve energy performance).

Output 4.1: Protocols for EE retrofits in the three most common prototype residential building designs developed and applied in at least 25 buildings.

Activity 4.1.1: Conduct of field research and interviews to ascertain the design prototypes with the highest potential replication impact.

Activity 4.1.2: Compilation of design documentation and information on measures for at least three prototype designs.

Activity 4.1.3: Development of draft protocols for EE construction and/or retrofitting for at least three prototype designs.

Activity 4.1.4: Discussion of draft protocols with practicing architects and developers.

Activity 4.1.5: Refinement of the draft protocols based on comments and feedack

Activity 4.1.6: Publication of the protocols and endorsement by the Ministry of Construction.

Activity 4.1.7: Dissemination of the protocols to all design institutes and housing developers, particularly velayats, and promotion of the protocols through the Component 1 working group on efficient housing and through the presentation of policy tools in Activity 1.3.3.

Activity 4.1.8: Demonstration of the application of the EE retrofit protocols (to be carried out by the developers).

Activity 4.1.9: Monitoring of the application of the protocols through review of permitting documentation and field interviews

Output 4.2: Architects, engineers and students in the fields of architecture and engineering trained in the protocols and on integrating efficient techniques into the buildings they design and (re)construct.

Activity 4.2.1: Organization of Training for 20 practicing architects and engineers, including adaptation of training materials and development of a training format. While the training in Outcome 1.4 focuses on code compliance and energy performance calculations, this training will address integrated building design and will provide an overview of measures to reduce energy consumption for heating, cooling, and lighting.

Activity 4.2.2: Development and introduction of curricula for students of architecture and construction engineering, including adaptation of training materials, the development of a training format, and packaging of training for the use in post-secondary academic curricula. Training will include an overview of design techniques, materials, and technologies related to heating, cooling, and lighting

Activity 4.2.3: Organization of a national competition for architecture and engineering students submitting designs for highly-efficient buildings meeting a standard of energy performance of at least 30% higher efficiency than in current codes.

Activity 4.2.4: Appointment of a advisory committee to judge submissions.

Activity 4.2.5: Arrangement of an awards ceremony and an exhibit, with accompanying brochure, that will ensure high visibility for the best designs.

Activity 4.2.6: Organization and conduct of an international study tour to expose a selected group of architects and engineers to existing best practice in highly-efficient buildings, with an emphasis on best practice buildings facing similar climatic demands.

Output 4.3: Recommendations from the project are incorporated into government energy efficiency policies and programs.

Activity 4.3.1: Ongoing communication and regular distribution of project findings between project personnel with the Energy Working Group and with key stakeholders, such as the Ministry of Construction, government institutions responsible for developing and implementing policies related to energy efficiency. This activity will also involve the presentation of all significant project data and findings to the UNDP/UK-funded energy efficiency policy project to ensure that project findings are reflected in the draft legislation and strategy documents that will result from that project, such as the Law on Energy Efficiency and Renewable Energy, the National Sustainable Energy Strategy and Action Plan.

Activity 4.3.2: Preparation of 3-5 executive reports on key policy issues addressed under the project (e.g. demand-side management programs, mainstreaming energy efficiency issues into housing policy and urban planning, economic benefits of efficient buildings programs, etc.).

Activity 4.3.3: Organization of high-level briefings for policy-makers to review the executive reports.

Activity 4.3.4: Publication of project findings and lessons learned to serve as "good practice" guidance for subsequent EE policies and programs in Turkmenistan.

Activity 4.3.5: Distribution of executive reports, and project lessons learned to the administration in other regions of the country and to other state entities that develop and manage a substantial amount of housing stock.

Risks and Mitigating Measures

Table 3 below provides an overview of project risks and measures taken to mitigate these risks.

Table 3: Risks and Mitigating Measures

Risk	Rating	Mitigation
Lack of governmental commitment to revise and introduce more stringent energy efficient building norms and standards	L	This risk is considered low. The government has demonstrated strong interest in housing reforms, resource efficiency, and climate change mitigation; it understands that building codes represent a straightforward and effective means of reducing end-use consumption in the housing sector.
Low incentives among housing developers to introduce more efficient designs and energy-saving measures	L-M	This risk is also considered as low to medium because all developers have to comply with building codes, which will continue to become more rigorous over time, and because the financial incentive program developed under the project will reward developers who produce significantly more efficient designs.
Lack of funding to support investments in the housing sector	L	This risk is deemed as being low because of the government's income from oil and gas revenues, their National Development Programme in the housing construction sector, and – perhaps most indicatively -- their track record of investments in construction in the residential sector over time.

Coordination with Other Initiatives

In Turkmenistan, the project will use the mechanism of the Project Board to ensure coordination with other key stakeholders in Turkmenistan. The proposed Project Board is to consist of the following member agencies:

- State Concern "Turkmengas" (Executive; Senior Beneficiary)
- UNDP Turkmenistan (Senior Supplier)
- Ministry of Construction (Senior Beneficiary)
- Ministry of Communal Services
- Ministry of Energy and Industry
- Ministry of Nature Protection
- City of Ashgabat Local Administration
- Turkmenistan Polytechnic Institute

The scope of work and role of Turkmengas, the Ministry of Construction, the Ministry of Communal Services, the Ministry of Energy and Industry, and the City of Ashgabat Local Administration are addressed in the Institutional Framework discussion of Section 1 of this document. Specifically, Turkmengas and the City of Ashgabat will provide co-financing for energy meters (Component 2) and for construction/reconstruction on the pilot buildings (Component 3), respectively.

The Ministry of Nature Protection will be an important partner because it houses the GEF Operational Focal Point and because of its capacity to assess the local and global environmental benefits of the project activities. Turkmenistan Polytechnic Institute will play an important role because of its status as the leading provider of post-secondary training in construction engineering and architecture in Turkmenistan (through its Construction Faculty, which is based in Ashgabat).

In addition, the project will also cooperate with the UK-initiated project that is currently being funded and implemented by UNDP. This project will develop a draft Law on Energy Efficiency and Renewable Energy, a National Energy Efficiency Action Plan, and a National Heat Strategy through the Energy Working Group that it has convened. The Project Team will communicate regularly with the Energy Working Group, particularly on activities under Component 4.

Regionally, the proposed project will coordinate with Green Buildings activities undertaken by UNDP-GEF and with other UNDP-GEF efficient buildings projects in the region. It will also communicate with UNEP's Sustainable Buildings and Climate Initiative (UNEP-SBCI), which is active at the regional level. Finally the project will maintain regular communication with the EU-funded Inogate project entitled Energy Savings in Buildings (ESIB), which provides technical assistance to promote efficient buildings in 10 countries. While this program will have a presence in Turkmenistan it is run regionally and provides a relatively small allocation for work in individual countries; nonetheless, the proposed UNDP-GEF project will ensure that technical assistance activities are not duplicated.

Financial modality

GEF support will be delivered in the form of technical assistance, which was considered the most suitable modality for grant delivery given the nature of barriers to be addressed and proposed intervention (institutional capacity development, training, awareness enhancement, and the demonstration of integrated building design).

Cost-effectiveness

This project is designed to leverage existing government support for residential construction and guide this spending towards the commissioning and construction of more efficient buildings. The project will build capacity not only in the area of policies and measures, but also in the area of design and construction. The project is expected to result in the following:

- Direct emission reductions of 202,866 tCO_2e over a 20-year buildings lifetime through the new and retrofitted efficient buildings that will be designed and (re)constructed.
- Direct energy savings equivalent to 5,133,535m^3 of natural gas per year, or 102,670,709m^3 of natural gas over a 20-year assumed building lifetime.
- Indirect post-project emission reductions ranging from 1,014,330 to 1,423,424 tCO_2e over 10 years post-project influence period.

The project exhibits cost-effectiveness in that it leverages existing trends in investment by the Ministry of Construction, the state concern Turkmengas, and other government agencies in the housing sector and provides these stakeholders with the tools to make these investments significantly more energy efficient. Specifically,

- Output 3.1 will result in direct GHG emission reduction from piloting integrated building design in 3 new buildings in the amount of 9, 600 tCO2e/year or cca 192,000 tCO2e over the building lifetime (20 years)

- Output 3.2 will result in direct GHG emission reduction from implementing additional energy efficiency measures in reconstructed buildings in the amount of 560 tCO2e/year or cca 11,000 tCO2e over the building lifetime (20 years)
- Capital costs additional to the baseline costs of building construction/reconstruction can vary between 5% and 15% for the individual cases. The project will adopt the target of maximum 10% increase in the overall baseline costs or up to 50 US$/m2 for new buildings and up to 30 US$/m2 for reconstructed buildings. This would make an equivalent of 15.8 US$/tCO2e in direct GHG abatement cost for pilot new buildings and up to 23 US$/tCO2e in direct GHG abatement cost for pilot reconstructed buildings.
- These results are comparable with the outcomes of IPCC assessments of building sector carbon abatement costs10, which concluded that some 30% of BAU emissions in buildings could be avoided at a cost below US$20/tCO2eq.These estimates are also comparable with the current carbon market prices, which are in the range of 10-20 USD (depending on the type of carbon assets traded).

Information on how the emission reductions were calculated is provided in Annex F.

Sustainability and Replicability

Sustainability

The focus on capacity building in the project will ensure the sustainability of project results in several ways:

Under Component 1, sustainability will be ensured by strengthening the capacity of housing developers to oversee efficient building practices and allow them to request more efficient designs that results in reduced operating costs. Strengthening the capacity of Glavgosexpertiz to evaluate highly-efficient designs and to systematize enforcement of the energy performance aspects of buildings will provide the ministry with a strategic means for keeping actual building performance higher than it would be otherwise and will give staff the expertise to enforce future, even more stringent versions of the codes.

Under Component 2, the demand-side partnership between the UNDP-GEF project and Turkmengas will provide the latter with information that will allow it to reduce operating costs in its housing stock and increase the amount of natural gas for export, providing strong incentives to invest over the long term in energy savings.

Under Component 3, the energy efficient pilot buildings, both new and reconstructed, will incorporate measures and techniques that can easily be replicated by housing developers, and the energy passports on the pilot buildings will provide a visual demonstration of the life-cycle savings that are possible.

Under Component 4, strengthening the capacity of architects and engineers to design more efficient buildings will result in cost-effective techniques that these professionals will continue to use in their businesses. Raising awareness of developers and utilities regarding the economic benefits of more-efficient housing will result in higher demand for more efficient apartments even after the awareness-raising activities have concluded. The development of EE protocols for prototype buildings will allow for broad replication of EE measures when retrofitting and/or constructing buildings, bring them to a national audience, and avoid the need to develop these measures individually for each project.

Cross-cutting capacity measures, such as the development of policy recommendations and testing of key measures, such as an incentive program for high-efficiency buildings and a system of energy passports for buildings, will encourage the incorporation of EE concepts into government policies and measures.

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

Replicability

By using locally-available materials and straightforward design techniques that are also affordable and do not add substantially to the cost of the building, the demonstration is expected to be replicated because of *market pull.* There are both demand-side and supply-side components of the strategy.

On the supply side: (1) Practicing architects, who design both public and private buildings, and architecture and engineering students, will be trained in efficient building techniques.

On the demand side: (1) Close cooperation with the Ministry of Construction, the implementing partner which oversees government-funded construction in the residential sector, will increase the uptake of the techniques that are piloted in the demonstration building in other state-funded construction, and cooperation with municipalities, which oversee renovation projects in the residential sector, will demonstrate results that can be replicated in municipalities across Turkmenistan; (2) An awareness-raising campaign – both through training and outreach to developers and a competition for engineers and architects -- will increase the demand for buildings with lower operating costs; and (3) Incentive programs for highly-efficient residential buildings will create a very strong incentive to design more efficient buildings.

III. PROJECT RESULTS FRAMEWORK:

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD: Outcome 3.2 Environmentally sustainable use of natural resources contributes to effectiveness of economic processes and increased quality of life.

Country Programme Outcome Indicators:

1. Comprehensive policy framework is in place regulating long-term measures for sustainable use of energy resources and promotion of alternatives/renewables
2. No. of residential buildings apply energy efficient practices and technology
3. No. of carbon finance projects developed and generate alternative revenue in the energy intensive sectors
4. No. of municipalities started practicing energy efficient public lighting
5. No. of pilot projects are in place promoting alternative and renewable sources of energy

Primary applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): 1. Mainstreaming environment and energy OR 2. Catalyzing environmental finance OR 3. Promote climate change adaptation OR 4. Expanding access to environmental and energy services for the poor.

Applicable GEF Strategic Objective and Program: CC-SP1

Applicable GEF Expected Outcomes: Favourable Conditions for Market Development in Terms of: Policy , Finance, Business Models, Information and Technology

Applicable GEF Outcome Indicators: Number of buildings programmes supported

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Project Goal:	Reduction (direct and indirect) of GHG emissions from residential sector of Turkmenistan, tCO2e	0[11]	Direct: 202,866 tCO2e Indirect: 1.014-1.413 MtCO2e	Final evaluation	Assumes continued interest in and investment in the residential housing sector (risk of a decrease in investment is LOW)
Project Objective[12] **(equivalent to output in ATLAS)**	Tonnes CO_2eq reduced over the lifetime of the EE measures supported by the project (direct reductions)	0	202,866 tCO_2e	Audit data Project reports PIRs Mid-term evaluation Final evaluation	Assumes continued interest in and investment in the residential housing sector (risk of a decrease in investment is LOW)
	1000m^3 natural gas saved annually as a direct result of this project	0 (No savings programs currently underway)	5,133.535 thousand m^3 natural gas		
	Co-financing leveraged for investments in efficient construction and energy efficiency	0 (No money currently spent on energy efficient construction and energy efficiency in buildings)	USD 40,000,000		

[11] *No reductions currently planned in the buildings sector*

[12] *Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR*

	in housing stock				
Component 1[13]: Energy Efficiency Building Codes and Supporting Capacity Strengthened (equivalent to activity in ATLAS)					
Outcome 1: Energy consumption in new buildings is reduced beyond current requirements	Adopted roadmap for building code revision to mandate more energy efficient building design	0[14]	Roadmap for building code revision is developed and adopted by the end of the Project	**Audit data** **Interviews** **Project documentation**	Assumes willingness and availability for training by project stakeholders (risk is LOW)
	% improvement in the minimum energy performance requirements of the proposed highly energy-efficient buildings codes	0	25%		
Output 1.1 Incentive Program for highly efficient buildings developed and adopted by housing developers	Number of incentive programs adopted for efficient building design that exceed current building codes requirements	0[15]	Program developed by the end of Year 2 and adopted by at least one housing developer by the end of Year 4	Project documentation, including text of Incentive Program Documentation of training, supporting materials, participant feedback. Project-related publications. Mid-term and final evaluations.	Assumes willingness and availability for training by project stakeholders (risk is LOW)
Output 1.2 Roadmap developed that explores more stringent requirements for energy performance in buildings and supporting capacity for building code review and revision strengthened	Number of trained staff from Glavgosexpertiz in enforcement and design review for more efficient codes	0[16].	At least 30 staff by the end of Year 2		
	Developed roadmap for building code revision to mandate more energy efficient building design	0	Roadmap for building code revision is developed and adopted by the end of the Project		
Output 1.3 Energy passport system and other policy tools to promote more energy efficient construction	Adopted roadmap for introduction of an energy passport system (to be piloted under Component 3)	0[17].	Roadmap for introduction of an energy passport system		
	Number of policy tools proposed by the project and adopted by the Government by EOP	0	At least one policy tool		

[13] *All outcomes monitored annually in the APR/PIR. It is highly recommended not to have more than 4 outcomes.*

[14] No plans for building code revision

[15] No incentives currently exist to build residential buildings that exceed current building codes

[16] No training geared towards enforcing above-average EE standards in the residential sector exists

[17] No policy tools to encourage EE residential construction exist in Turkmenistan

Output 1.4 Guidance on the incentive programs and training on compliance developed and provided to architects and engineers.	Number of architects and engineers trained to meet above-average EE building code requirements	0[18]	At least 20 architects and/or engineers trained by the end of the project.		
Component 2: Demand-side management partnership with Turkmengas implemented					
Outcome 2: Turkmengas has an overview of the potential for savings in its housing stock and the capacity to identify and undertake investments in energy efficiency there.	Amount of investments in demand-side energy information management	20,000,000 US$	20,000,000 US$	**Skills assessment** **Metering and audit data** **Project documentation** **Investment plan**	Assumes that interest and cooperation on the side of Turkmengas will remain strong (risk that interest in saving fuel that can be exported will decrease is LOW).
	Amount of investment in demand-side energy efficiency measures by TurkmenGas by EOP	0	20,000,000 US$		
Outcome 2: Turkmengas has an overview of the potential for savings in its housing stock and the capacity to identify and undertake investments in energy efficiency there.	Amount of investment in demand-side energy management by TurkmenGas by EOP	0	20,000,000 US$	**Skills assessment** **Metering and audit data** **Project documentation** **Investment plan**	Assumes that interest and cooperation on the side of Turkmengas will remain strong (risk that interest in saving fuel that can be exported will decrease is LOW).
Output 2.1 Analysis conducted on the most cost-effective means of reducing energy consumption in the residential sector.	Number of energy audits conducted in residential buildings	0	25 audits by the end of Year 2.	Project reports and publications Procurement records Data logs Training materials and documentation Mid-term and final evaluations	Assumes that interest and cooperation on the side of Turkmengas will remain strong (risk that interest in saving fuel that can be exported will decrease is LOW).
	Analysis of cost-effective means of reducing end-use residential energy consumption in Turkmengas housing stock (0 – Not available, 1 - available)	0	1 (Analysis completed by the end of Year 2)		
	Number of Turkmengas officials and relevant policy-makers familiarized with potential about energy saving in residential sector	0	At least10 high-level officials from Turkmengas and relevant governmental agencies		

[18] No architects or engineers trained to meet above-average EE standards in the residential sector

Output 2.2: Officials in the construction department of the company are trained in energy auditing and management in the housing stock.	Number of company staff trained in energy audit[19]	0[20]	At least 10 staff trained by the end of Year 2		
Output 2.3: Investment plan for reducing energy losses developed and adopted by the Construction Department for the housing stock that Turkmengas supplies.	Number of investment plan developed, presented to, and endorsed by Company Management by the end of the project. Volume of TurkmenGas investment in plan implementation by EOP, US$	0[21] 0	1 20,000,000 US$		
Component 3: Improved Design Measures for Major Residential Consumers Implemented					
Outcome 3: Energy-efficient design and technologies are incorporated and visually demonstrated in new and reconstructed residential buildings	• No. of financed demonstration energy efficient multi-unit residential building design and retrofit projects implemented by EOP • Volume of leveraged financing in EE building demonstration projects (new and retrofits) by EOP, US$ • Energy savings realized from EE residential building demonstrations by EOP, % to BAU energy use[22]	0 0 0	3 new EE efficient buildings and 3 EE retrofits 20,000,000 US$ 25% - for new buildings 38% - for reconstructed buildings	**Energy consumption data from pilot buildings** **Project documentation** **Interviews**	

[19] Measured as staff able to audit existing housing stock and generate data on energy performance in the buildings they audit

[20] Construction Department staff do not have capacity to carry out audits. Energy audits are not currently conducted and equipment is not available for auditing; no knowledge of energy performance in un-metered buildings.

[21] Turkmengas does not address energy losses in end-use sectors and does not have the planning tools to do so.

[22] For reconstructed buildings BAU refers to basic retrofit

Output 3.1: Three new multi-unit residential buildings with significantly improved energy performance are designed and constructed by the end of Year 4 of the project[23].	Number of multi-unit residential buildings with significantly improved energy performance (i.e. total energy consumption that is at least 25% lower than current code requirements) designed and constructed by EOP	0	3	Construction documentation, permits, and deeds. Energy audit data and energy labels. Model passport. Other project documentation. Mid-term and final evaluation.	Assumes that construction will take place as planned (risk is LOW given overall high volume of residential construction in Ashgabat).
	Energy savings realized in new EE residential building demonstrations by EOP, % to reference building	0	25%		
Output 3.2: Three multi-unit residential buildings are re-contructed with significantly improved energy performance by the end of Year 4 of the project.	Number of multi-unit residential buildings re-contructed with significantly improved energy performance by the EOP	0	3		
	Energy savings realized in reconstructed residential building demonstrations by EOP, % to baseline retrofit	0	38%		
Output 3.3: Model energy passports developed for all pilot buildings and introduced through training	Number of model energy passport applications in residential buildings by EOP	0	6		
Component 4: Replication through partnerships with other developers and support for policies that encourage energy efficiency					

[23] End-of-year 1 target: Pilot buildings selected and their selection is formally approved by the Government (pilot buildings need to have special status formalized via a number of regulatory acts);
End-of-year 2 target: Team of local and international experts is in place; local experts are trained in and understand the concept of integrated building design; pilot building design developed
End-of-year 3 target: Pilot buildings design finalized and approved by the government as mandated by regulator, construction started
End-of-year 4 target: Construction completed

Outcome 4: Replication facilitated via development of skills, prototype designs and policies for energy-efficient buildings.	Number of building construction/retrofit projects designed based on adopted EE protocol Minimum reduction in specific energy consumption in buildings designed based on adopted EE protocols for: - New buildings, % to baseline - Retrofits, % to baseline Number of policies supportive of EE building initiatives that are formulated, approved and enforced by the government by EOP	0 0 0 0	25 25% 38% At least 1	Project documentation Final evaluation.	Assumes that EE policy will develop and that decision-makers will be willing to incorporate key project findings (risk is LOW-MEDIUM but mitigated by the approach of mainstreaming EE policies and measures into other sector policies, which provides more opportunities for intervention).
Output 4.1 Protocols for EE design/retrofits in the three most common prototype residential building designs developed and applied	Number of EE protocols developed by the end of Year 2 Number of protocol applications for EE design/retrofit projects in residential buildings by EOP Number of building developers that consider the EE retrofit protocols useful in facilitating the smooth, proper and cost-effective implementation of EE retrofit projects	0 0 0	3 25 At least 10	Protocol documentation Training documentation and supporting materials Government records Mid-term and final evaluations.	

Output 4.2 Design institutes and major housing developers are trained in and encouraged to incorporate energy efficiency protocols for the most common residential prototype designs.	Number of design institute employees and housing developers trained in EE concepts and protocols for common prototype designs by the end of Year 3 of the project	0[24]	At least 30.		
	Number of students in architecture and construction engineering trained in EE concepts and practices by the end of Year 3 of the project	0	At least 100		
	Number of universities and academic institutions that incorporated energy-integrated building design and construction in their architecture and civil engineering curricula by EOP.	0	2		
Output 4.3 Recommendations from the project are incorporated into energy efficiency policies and programs	Number of policies or programmatic innovations from the project incorporated into relevant national sectoral policies or programs by the end of the project	0[25]	At least 1		
	Number of policies supportive of EE building initiatives that are formulated, approved and enforced by the government by EOP	0	At least 1		

[24] Design institutes do not currently address energy performance when working on housing construction or retrofits

[25] While resource efficiency and sustainability are stated national priorities, Turkmenistan does not currently have explicit policies and/or programmes to support EE.

IV. TOTAL BUDGET AND WORKPLAN

Award ID:	00061181	Project ID(s):	00077395
Award Title:	PIMS 4134 CC: EE in Residential Buildings Sector		
Business Unit:	TKM10		
Project Title:	Improving Energy Efficiency in the Residential Buildings Sector of Turkmenistan		
PIMS no.:	*4134*		
Implementing Partner (Executing Agency)	State Concern "Turkmengas"		

GEF Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
OUTCOME 1: Energy Efficiency Building Codes and Supporting Capacity Strengthened	**Turkmengas**	**62000**	**GEF**	71200	International Consultants	$30,000	$40,000	$40,000	$15,000	$125,000	1
				71300	Local Consultants	$30,000	$30,000	$30,000	$20,000	$110,000	2
				74200	Printing and Publications		$10,000	$10,000	$5,000	$25,000	3
				75700	Training, workshops	$10,000	$10,000	$10,000	$10,000	$40,000	4
					sub-total GEF	**$70,000**	**$90,000**	**$90,000**	**$50,000**	**$300,000**	
					Total Outcome 1	**$70,000**	**$90,000**	**$90,000**	**$50,000**	**$300,000**	
OUTCOME 2: Demand-side management partnership with Turkmengas implemented	**Turkmengas**	**62000**	**GEF**	71200	International Consultants	$20,000	$30,000	$30,000	$20,000	$100,000	5
				71300	Local Consultants	$15,000	$20,000	$20,000	$15,000	$70,000	6
				71600	Travel	$10,000	$20,000	$10,000	$10,000	$50,000	7
				72100	Contractual services	$20,000	$40,000	$30,000	$20,000	$110,000	8
				72200	Equipment & Furniture	$20,000	$20,000	$10,000	$20,000	$70,000	9
				74200	Printing & Publications	$5,000	$10,000	$10,000	$5,000	$30,000	10
				75700	Training, workshops	$10,000	$30,000	$20,000	$10,000	$70,000	11
					sub-total GEF	**$100,000**	**$170,000**	**130,000$**	**$100,000**	**$500,000**	
					Total Outcome 2	**$100,000**	**$170,000**	**130,000$**	**$100,000**	**$500,000**	

GEF Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
OUTCOME 3: Improved Design Measures for Major Residential Consumers Implemented	Turkmengas	**62000**	**GEF**	71200	International Consultants	$20,000	$30,000	$30,000	$20,000	$100,000	12
				71300	Local Consultants	$20,000	$30,000	$30,000	$20,000	$100,000	13
				71600	Travel	$20,000	$30,000	$30,000	$20,000	$100,000	14
				72100	Contractual services	$50,000	$80,000	$80,000	$50,000	$260,000	15
				72200	Equipment & Furniture	$20,000	$20,000	$20,000	$20,000	$80,000	16
				74200	Printing & Publications	$10,000	$10,000	$10,000	$10,000	$40,000	17
				75700	Training, workshops	$30,000	$30,000	$30,000	$30,000	$120,000	18
					sub-total GEF	**$170,000**	**$230,000**	**$230,000**	**$170,000**	**$800,000**	
					Total Outcome 3	**$170,000**	**$230,000**	**$230,000**	**$170,000**	**$800,000**	
OUTCOME 4: Replication through partnerships with other developers and support for policy reforms that encourage energy efficiency	**Turkmengas**	**62000**	**GEF**	71200	International Consultants	$20,000	$20,000	$20,000	$30,000	$90,000	19
				71300	Local Consultants	$10,000	$20,000	$30,000	$30,000	$90,000	20
				71600	Travel		$20,000	$20,000	$30,000	$70,000	21
				72100	Contractual services	$30,000	$60,000	$80,000	$100,000	$270,000	22
				74200	Publications & Printing		$30,000	$30,000	$40,000	$100,000	23
				75700	Training, workshops	$10,000	$20,000	$20,000	$30,000	$80,000	24
					sub-total GEF	**$70,000**	**$170,000**	**$200,000**	**$260,000**	**$700,000**	
					Total Outcome 4	**$70,000**	**$170,000**	**$200,000**	**$260,000**	**$700,000**	
Project Management	**Turkmengas**	**62000**	**GEF**	71400	Individual Contracts	$27,000	$36,000	$36,000	$36,000	$135,000	25
				71600	Travel	$3,000	$5,000	$5,000	$5,000	$18,000	26
				72200	Office Equipment	$5,000				$5,000	27
				72800	ICT Equipment	$15,000				$15,000	28
				72500	Office Supplies	$3,000	$3,000	$3,000	$3,000	$12,000	29

GEF Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
				72400	Communication	$3,280	$4,000	$4,000	$4,000	$15,280	30
				75700	Training, workshops	$4,000	$4,000	$4,000	$4,000	$16,000	31
					sub-total GEF	**$60,280**	**$52,000**	**$52,000**	**$52,000**	**$216,280**	
		04000	UNDP	71200	International Consultants	$	$25,000	$	$25,000	$50,000	32
				71300	Local Consultants	$	$5,000	$	$5,000	$10,000	33
				72500	Office Supplies	$5,000	$5,000	$5,000	$5,000	$20,000	
				74500	Misc	$5,000	$5,000	$5,000	$5,000	$20,000	
					sub-total UNDP	**$10,000**	**$40,000**	**$10,000**	**$40,000**	**$100,000**	
					Total Management	**$70,280**	**$92,000**	**$62,000**	**$92,000**	**$316,280**	
					PROJECT TOTAL	**$480,280**	**$752,000**	**$712,000**	**$672,000**	**$2,616,280**	

Budget Notes:

1. *International Consultants (35 staff weeks) to provide expertise and technical assistance in providing assessment, analysis, revision and recommendations for alignment of building codes and norms to integrate energy efficiency*
2. *Energy Efficiency Building Code Specialist (200 staff weeks) to provide expertise and technical assistance in supporting assessment, analysis, revision and recommendations for alignment of building codes and norms to integrate energy efficiency*
3. *Costs of services for preparation, translation, editing and printing of the results from the building codes revisions and further distribution nationally*
4. *Costs of workshops and roundtables on revision and clearance of energy efficient building codes and norms*
5. *International Consultants (25 staff weeks) to provide expertise and technical assistance in providing assessment, analysis, revision and recommendations for demand-side management issues*
6. *Energy economists (150 staff weeks) to provide expertise and technical assistance in supporting assessment, analysis, revision and recommendations for demand-side management issues*
7. *Travel costs associated with providing assessments and monitoring of demand-side management*
8. *Contractual services in implementing tasks for facilitating effective demand-side management*
9. *Costs of technical equipment that will be required to provide analysis and monitoring of demand-side management*
10. *Costs of printing and publications to advocate and communicate results on demand-side management along with translation and editorial services*
11. *Costs of workshops and roundtables on demand-side management issues*
12. *International Consultants, Designer/Architect and GHG monitoring expert (20 staff weeks) to provide expertise and technical assistance in enhancing national practices and capacity building measures for improving design measures, including monitoring energy and GHG performance of pilot buildings and project performance*
13. *Senior Architect/Designer, GHG monitoring specialist (20 staff weeks) to provide expertise and technical assistance in supporting the enhancement of national practices and capacity building measures for improving design measures, including monitoring energy and GHG performance of pilot buildings and project performance*
14. *Travel costs associated with implementing activities and promoting capacity building on improved design*

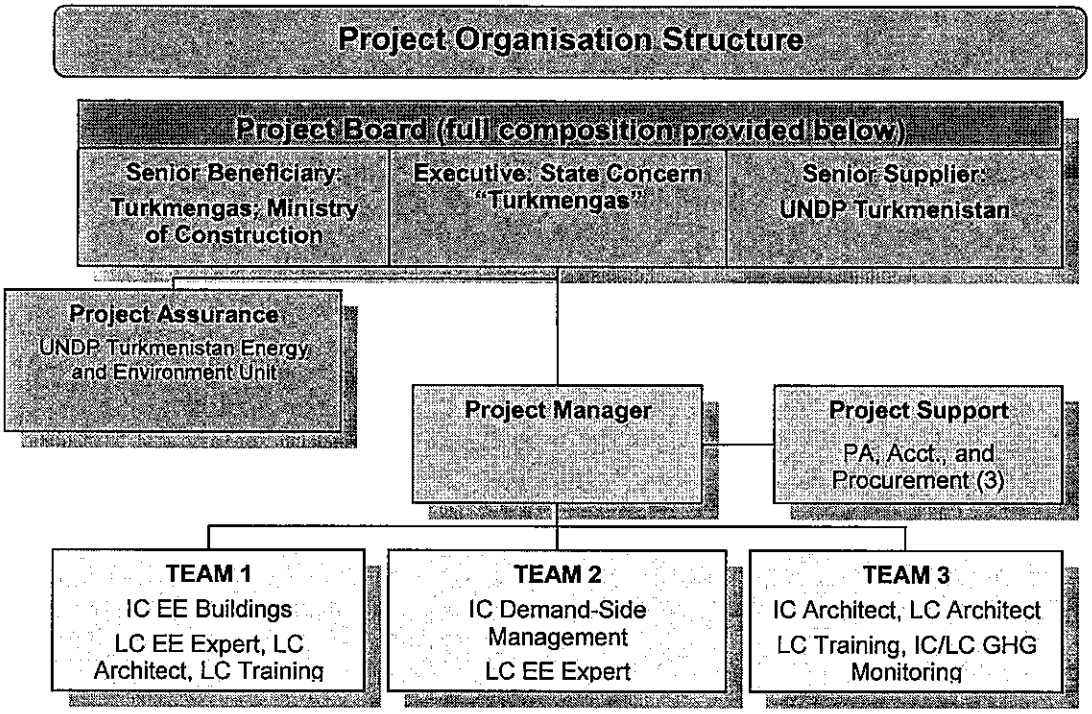
15. *Contractual services in implementing tasks for demonstrating pilot measures required and promoting national capacity building for energy efficient design*
16. *Costs of technical equipment and material that will be required to support piloting improved design measures*
17. *Costs of printing and publications to advocate and communicate results on energy efficient design along with translation and editorial services*
18. *Costs of workshops and roundtables on improved design measures*
19. *International Consultants (25 staff weeks) to provide expertise and technical assistance in protocol and policy development*
20. *Curricular development specialist (150 staff weeks) to prepare training materials and a proposed curriculum to support outreach and capacity-building activities*
21. *Travel costs associated with implementing activities on replication of results and promoting energy efficient housing reforms*
22. *Contractual services in implementing pilot initiatives on replication of results and integrating energy efficiency in housing reforms*
23. *Costs of printing and publications to advocate and communicate results on replication and housing reforms*
24. *Costs of workshops and roundtables on replication*
25. *Contracts of project management and support staff (2 full-time, 2 part-time)*
26. *Travel costs associated with project planning, implementation, supervision, monitoring and reporting*
27. *Cost of minor office equipment*
28. *Cost of ICT equipment for project staff and key consultancies*
29. *Cost of office supplies and disposables*
30. *Cost of communication, Internet and email charges*
31. *Cost of Project Board organization*
32. *Cost of mid-term and final evaluations: International consultants*
33. *Cost of mid-term and final evaluations: National consultant*

Summary of Funds: [26]

	Amount Year 1	Amount Year 2	Amount Year 3	Amount Year 4	Total
GEF	$470,280	$712,000	$702,000	$632,000	$2,516,280
UNDP	$110,000	$110,000	$40,000	$40,000	$300,000
Government (grant & in-kind)	$7,000,000	$21,500,000	$13,387,000	$1,500,000	$43,387,000
TOTAL	$7,580,280	$22,322,000	$14,129,000	$2,172,000	$46,203,280

[26] *Summary table should include all financing of all kinds: GEF financing, cofinancing, cash, in-kind, etc...*

V. Management Arrangements



The **Project Board** is responsible for making management decisions for a project in particular when guidance is required by the Project Manager. The Project Board plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities. Based on the approved Annual WorkPlan, the Project Board can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

In order to ensure UNDP's ultimate accountability for the project results, Project Board decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case consensus cannot be reached within the Board, the final decision shall rest with the UNDP Project Manager.

Potential members of the Project Board are reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the Board as appropriate. The Board contains three distinct roles, including:

1) **An Executive**: individual representing the project ownership to chair the group.
2) **Senior Supplier**: individual or group representing the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project.

3) **Senior Beneficiary**: individual or group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries.
4) The **Project Assurance** role supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions. The Project Manager and Project Assurance roles should never be held by the same individual for the same project.

The proposed **Project Board** is to consist of the Project Manager and the following member agencies:

- State Concern "Turkmengas" (Executive; Senior Beneficiary)
- UNDP Turkmenistan (Senior Supplier)
- Ministry of Construction (Senior Beneficiary)
- Ministry of Nature Protection
- Ministry of Communal Services
- Ministry of Energy and Industry
- Turkmenistan Polytechnic Institute
- City of Ashgabat Local Administration

Project Manager: The Project Manager has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost.

Project Support: The Project Support role provides project administration, management and technical support to the Project Manager as required by the needs of the individual project or Project Manager.

Executing Agency: The project will be executed by the State Concern "Turkmengas" following the UNDP guidelines for nationally-executed (NEX) projects. Turkmengas, among its other activities, provides natural gas to households, covers the costs of natural gas for most residents, and also oversees a significant amount of housing stock. It has a direct interest in all project components, and its corporate leadership is interested in supporting national efforts to prioritize resource efficiency.

Other Partners: The other key implementing partner in the project is the Ministry of Construction of Turkmenistan, which will play a key role in Components 1, 3, and 4, particularly in codes work and capacity building and training. The Ministry and Turkmengas are considered to be the senior beneficiaries of the project.

Other government bodies that will be involved in project implementation include (1) the Turkmenistan Polytechnical Institute (for the training components in Component 4); and (2) the City of Ashgabat Local Administration (for the incentive program in Component 1, and the pilot reconstruction work in Component 3, and the protocols for reconstruction work in Component 4, among other activities).

Monitoring Framework and Evaluation

The project will be monitored through the following M&E activities. The M&E budget is provided in the table below.

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team Staff time*	Time frame
Inception Workshop	▪ Project Manager ▪ UNDP Turkmenistan ▪ UNDP GEF	5,000	Within first two months of project start up

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team Staff time*	Time frame
Inception Report	▪ Project Team ▪ UNDP Turkmenistan	None	Immediately following the inception workshop
Development of a Methodology for Measuring Building Performance and Related Emissions Reduction	▪ Oversight by UNDP-GEF Technical Advisor ▪ Short-term international consultant	9,000	Immediately following the inception workshop
Measurement of Means of Verification for Project Purpose Indicators	▪ Project Manager will oversee commissioning of specific studies and institutions and delegate responsibilities to relevant team members	To be finalized in Inception Phase and Workshop.	At project inception, at the mid-term, and at the end of the project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis)	▪ Oversight by Project GEF Technical Advisor and Project Manager ▪ Measurements by UNDP Turkmenistan staff and the national implementing agency	To be determined as part of the Annual Work Plan's preparation.	Annually prior to APR/PIR and to the definition of annual work plans
APR and PIR	▪ Project Team ▪ UNDP Turkmenistan ▪ UNDP-GEF	None	Annually
TPR and TPR report	▪ Government Counterparts ▪ UNDP Turkmenistan ▪ Project team ▪ UNDP-GEF Regional Coordinating Unit	None	Each year, upon receipt of APR
Project Board Meetings	▪ Project Manager ▪ UNDP Turkmenistan	None	Following Project inception workshop and subsequently at least once a year
Periodic status reports	▪ Project team	None	To be determined by Project team and UNDP CO
Technical reports: Roadmap on Codes and draft incentive program (C1), macro-level analysis and integrated resource investment plan (C2), awareness-raising reports and policy recommendations (C4)	▪ Project team ▪ External consultants as needed	50,000	To be determined by Project Team and UNDP-CO
Mid-term External Evaluation	▪ Project team ▪ UNDP Turkmenistan ▪ UNDP-GEF Regional Coordinating Unit ▪ External Consultants (i.e. evaluation team)	21,000	At the mid-point of project implementation.
Final External Evaluation	▪ Project team, ▪ UNDP Turkmenistan	21,000	At the end of project

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team Staff time*	Time frame
	▪ UNDP-GEF Regional Coordinating Unit		implementation
Terminal Report	▪ Project team ▪ UNDP Turkmenistan ▪ Intl. Cons. (EE Buildings)	5,000	At least one month before the end of the project
Lessons learned	▪ Project team ▪ UNDP-GEF Regional Coordinating Unit (suggested formats for documenting best practices, etc)	5,000	Annually
Audit	▪ UNDP Turkmenistan ▪ Project team	10,000 (2,500 per year)	Annually
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	▪ UNDP Turkmenistan ▪ UNDP-GEF Regional Coordinating Unit (as appropriate) ▪ Government representatives	3,200	Annually
TOTAL INDICATIVE COST *Excluding project team staff time and UNDP staff and travel expenses*		US$ 129,200	

Project start:

A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan.

The Inception Workshop should address a number of key issues including:

a) Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis à vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
b) Based on the project results framework and the relevant GEF Tracking Tool if appropriate, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
c) Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
d) Discuss financial reporting procedures and obligations, and arrangements for annual audit.
e) Plan and schedule Project Board meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the inception workshop.

An Inception Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly:

➢ Progress made shall be monitored in the UNDP Enhanced Results Based Managment Platform.

- Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).
- Based on the information recorded in Atlas, a Project Progress Reports (PPR) can be generated in the Executive Snapshot.
- Other ATLAS logs can be used to monitor issues, lessons learned etc... The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

Annually:

- Annual Project Review/Project Implementation Reports (APR/PIR): This key report is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines both UNDP and GEF reporting requirements.

  The APR/PIR includes, but is not limited to, reporting on the following:
  - Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
  - Project outputs delivered per project outcome (annual).
  - Lesson learned/good practice.
  - AWP and other expenditure reports
  - Risk and adaptive management
  - ATLAS QPR
  - Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.

Periodic Monitoring through site visits:

UNDP CO and the UNDP RCU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.

Mid-term of project cycle:

The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation (insert date). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the UNDP Evaluation Office Evaluation Resource Center (ERC).

The relevant GEF Focal Area Tracking Tools will also be completed during the mid-term evaluation cycle.

End of Project:

An independent Final Evaluation will take place three months prior to the final Project Board meeting and will be undertaken in accordance with UNDP and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any

such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC).

The relevant GEF Focal Area Tracking Tools will also be completed during the mid-term and final evaluation.

During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

Learning and knowledge sharing:

Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums.

The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects.

Finally, there will be a two-way flow of information between this project and other projects of a similar focus.

Communications and visibility requirements:

Full compliance is required with UNDP's Branding Guidelines. These can be accessed at http://intra.undp.org/coa/branding.shtml, and specific guidelines on UNDP logo use can be accessed at: http://intra.undp.org/branding/useOfLogo.html. Amongst other things, these guidelines describe when and how the UNDP logo needs to be used, as well as how the logos of donors to UNDP projects needs to be used. For the avoidance of any doubt, when logo use is required, the UNDP logo needs to be used alongside the GEF logo. The GEF logo can be accessed at: http://www.thegef.org/gef/GEF_logo. The UNDP logo can be accessed at http://intra.undp.org/coa/branding.shtml.

Full compliance is also required with the GEF's Communication and Visibility Guidelines (the "GEF Guidelines"). The GEF Guidelines can be accessed at: http://www.thegef.org/gef/sites/thegef.org/files/documents/C.40.08_Branding_the_GEF%20final_0.pdf. Amongst other things, the GEF Guidelines describe when and how the GEF logo needs to be used in project publications, vehicles, supplies and other project equipment. The GEF Guidelines also describe other GEF promotional requirements regarding press releases, press conferences, press visits, visits by Government officials, productions and other promotional items.

Where other agencies and project partners have provided support through co-financing, their branding policies and requirements should be similarly applied.

Audit arrangements (required)
The Government will provide the Resident Representative with certified periodic financial

statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the Programming and Finance manuals. The Audit will be conducted by the legally recognized auditor of the Government, or by a commercial auditor engaged by the Government.

Legal Context

This document together with the CPAP signed by the Government and UNDP which is incorporated by reference constitute together a Project Document as referred to in the SBAA and all CPAP provisions apply to this document.

Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner.

The implementing partner shall:

a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;

b) assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

VI. ANNEXES

Annex A: Risk Analysis

To be inserted following GEF CEO Endorsement and prior to signature.

Annex B: Letters of Commitment, Co-Financing

These letters are appended separately.

Annex C: Terms of Reference for Key Project Staff

PM 1: Project Manager

I. Position information

Duration: 5 years

Under the direct supervision of the UNDP CO Environment & Energy Unit, the Project Manager is responsible for the day-to-day management and implementation of the UNDP-GEF project, including all project administrative and reporting matters. All work of the Project Manager will be carried out in line with the Country Programme Action Plan and in full compliance with the UNDP Rules and Regulations. The management and coordination process will be pursued through undertaking appropriate actions in programme formulation, implementation and evaluation. Strong emphasis will be made on ensuring cohesion with other UNDP programmes.

II. Functions

(i) Be able to manage of the Project implementation during the Project implementation in accordance with approved Project Document ;
(ii) Be responsible for management of all Project activity, staff, consultants and etc., for timely implementation of requirements on M&E ;
(iii) Be able to assemble a team for and manage the activity of the Project Management Unit (PMU), consisting of the Project Assistant and National/International Experts;
(iv) Be accountable to the UNDP Country Office, but also work closely with the National Project Coordinator appointed by the Implementing Partner;
(v) Coordinate his/her work as necessary with the UNDP Energy and Environment practice staff and communicate project results that may be useful for other UNDP projects;
(vi) Conduct ongoing analysis of project implementation and communicate with all parties involved in order to address implementation issues quickly and effectively;
(vii) Take the lead on the preparation and distribution of project documentation, including mandatory reporting for UNDP and GEF, including the oversight of documentation prepared for project meetings;
(viii) Support the visibility of the project among decision-makers, stakeholders, and the public.
(ix) Coordinate project activities with other relevant activities and initiatives of the Government and donor organizations active in Turkmenistan;
(x) Provide technical and organizational support to participating institutions during project start-up; and
(xi) Submit updates, press releases, and project reports regularly to the project website and to the UNDP CO website.

III. Outputs

Expected outputs:

- Successful and timely project implementation in accordance with objectives, schedule and planned budget.

- The quality of work of the Project Manager will be assessed by successful achievement of general objectives of the project, in particular:
    - Preparation of annual Project reports, Project Implemention Reviews, working plans and other relevant Project documents ;
    - Documents on awareness and outreach campaigns.

IV. Remuneration

Remuneration is to be made on monthly basis according to Contract after approval of a monthly report by the UNDP CO Head of Environment & Energy Unit.

V. Required qualifications/Competences

Education: University degree in economics, finance, business administration and management, biology, energy or relevant field. Candidates with an advanced degree in the sciences (MSc., PhD, Candidate/Doctor of Sciences, etc.) are preferred

Experience: Work experience in project management of not less than 3-5 years; work on international project management is an advantage

Languages: Excellent knowledge of Local Languages and English

Other skills:

- Strong interpersonal and communication skills
- Able to take decisions and manage in an institutional operating environment where external factors may change
- Strong computer skills (Microsoft Office, Internet, e-mail)

PM 2: Project Assistant (PA)

I. Position Information

Duration: 5 years

The Project Assistant will work under the direct supervision of the National Project Coordinator and provide assistance to project implementation in the mobilization of inputs, the organization of training activities and financial management and reporting.

II. Functions

The Administrative and Finance Assistant will be responsible of the following duties:

(i) Prepare all payment requests, financial record-keeping and preparation of financial reports required in line with NEX financial rules and procedures

(ii) Provide assistance to the recruitment and procurement processes, checking for conformity with UNDP and the Government rules and procedures

(iii) Provide assistance to the organization of in-country training activities, ensuring logistical arrangements

(iv) Make internal and external travel arrangements for project personnel

(v) Maintain equipment ledgers and other management archives for the project

(vi) Provide routine translation/interpretation during project meetings and draft correspondence as required
(vii) Maintain project the project electronic and hard-copy filing systems
(viii) Other duties which may be required

Qualifications

Education: University Degree, some training in business and/or administration desirable (finance or accounting)
Experience: At least five years administrative experience
Skills: Good organizational skills
Good computer skills, including spreadsheet and database experience
Languages: Fluent in Local Language and English

PM 3: Accountant

I. Position Information

Duration: 5 years (part-time)

The Accountant will oversee the bookkeeping for the project and will prepare all necessary documentation for audits and financial reporting.

Qualifications

Education: Professional qualification in accounting
Experience: At least five years experience; experience with international projects is an advantage
Skills: Accounting software
Languages: Fluent in Local Language and proficient in English

PM 4: Procurement Specialist

I. Position Information

Duration: 5 years (part-time)

The Procurement specialist will oversee all tendering and procurement of project-funded equipment, materials, and services.

Qualifications

Education: Professional qualification in financial management, university degree in a relevant field preferred.
Experience: At least five years experience; experience with international projects is an advantage
Languages: Fluent in Local Language and proficient in English

Local Consultants

LC 1: Energy Efficiency Specialist

Job Content:

(i) **Provide economic analyses of project measures for policy-makers and stakeholders**

(ii) **Assess the potential impact of project measures**

(iii) **Provide research and input on the development of a financial incentive for highly-efficient building design**

(iv) **Estimate the potential impact of an energy passport system for Turkmenistan.**

(v) **Present findings to policy-makers and other stakeholders in a format that is understandable and easy to use.**

Qualifications:

At least fifteen (5) years of working experience in energy economics, energy engineering, or a related field;

- Academic qualification in the field of economics and/or engineering.
- Practical experience in the economic analysis of policies and measures
-- Knowledge of English is an advantage

LC 2: Senior Architect/Designer

Job Content:

Consult on application of energy efficient design in the demo buildings, provide on-site consultations and monitor the application of the planned measures, act as trainer during training workshops for architects and engineers on efficient building design. Other duties are as follows:

(i) Provide recommendations on application of Integrated Building Design (in close collaboration with international consultants

(ii) Prepare tender documentation for building construction work with guidance from the IC Architect

(iii) Ensure technical oversight over the process of construction of three new residential buildings and three reconstructed buildings

(iv) Contribute to the development of educational curricula for university and act as trainer during training workshops for architects and engineers on integrated building design (IBD)

(v) Provide technical expertise and input on the development of the incentive program for highly-efficient buildings

(vi) Provide input on the ongoing process of strengthening building codes and compliance with them.

(vi) Provide input on the ongoing process of strengthening building codes and compliance with them.

Qualifications:

At least fifteen (15) years of working experience as a certified architect or building designer

- Academic qualification in the field of engineering, architecture, or construction.
- Practical experience in residential construction.
- Working experience in other countries is an asset
- Good knowledge of building codes and other relevant norms and standards;
- Knowledge of English is an advantage.

LC 3: Senior Curriculum / Training Specialist

Job Content:

Contribute to the design of new training curricula and guide on EE building design and participate as a trainer in roll-out of the programme in first stage (along with relevant international experts).

Qualifications:

At least 10 years of working experience as a specialist in the field of building codes and construction

- Academic qualification in the field of energy, engineering, architecture, or construction.

--Experience with curriculum development and teaching

LC 4: Senior Energy and GHG Monitoring Specialist

Job Content:

Review and analyze existing information sources; effectiveness of collection, assessment, and use of data on energy consumption in buildings and develop recommendations on institutional and technical aspects for establishment of a unified energy consumption and GHG monitoring system in buildings.

Qualifications:

-At least ten (10) years of working experience as a specialist in the field of GHG emission reduction and climate change impacts;

-Academic qualification in environmental science, energy, or economics, with specialization in GHG emissions related aspects. He/she shall have knowledge of economics and/or energy economics;

-Practical experience in implementation and monitoring of pilot and demonstration projects, working experience in developing countries and CIS countries is an asset;

-Practical experience in financial and economic analysis and GHG emission reduction and carbon trade issues;

-Good ability in partnering and networking;

International Consultants

IC 1: Energy-Efficient Buildings Expert

Job Content:

Provide leadership, oversight, and training for local experts on all project-related policy measures, such as the incentive for highly-efficient building design, the proposed introduction of an energy passport system, building codes development over the longer term, and others.

Propose the structure of project–related reports in these areas, and assist with trainings and presentations.

Share, on an ongoing basis, international best practice in efficient buildings policies and measures, including building codes.

Qualifications:

- At least fifteen (15) years of working experience as a specialist in the field of building codes and efficient buildings;
- Academic qualification in the field of energy, engineering, architecture, or construction.
- Practical experience in implementation and monitoring of model building codes
- Working experience in CIS countries in the area of building codes is a significant advantage
- Strong awareness of international best practice in the field of building codes
- Proficiency in English; preferably proficiency in written Russian (spoken Russian an advantage).

IC 2: Architect (Expert)

Job Content:

(i) Guidance and recommendations on the development of an incentives program for efficient buildings (5%)

(ii) Technical oversight over efficient building pilot projects construction/renovation and monitoring, including consultant coordination and site inspections for all demo buildings (70%)

(iii) Act as trainer for training workshops for architects and engineers on efficient design, as well as for EE buildings educational curricula in universities (15%)

(iv) Provide guidance and oversight for EE protocols for prototype building design retrofits (10%)

Qualifications:

- At least ten (10) years of working experience as a specialist in the field of design and construction of energy efficient buildings,
- Academic qualification in building construction energy, preferably with specialization design and construction of residential buildings. He/she must have knowledge of integrated building design and high-performance buildings;
- Sound practical experience in implementation and monitoring of pilot and demonstration projects related to design and construction of EE in buildings;
- Proficiency in English, excellent analytical and presentation skills;
- Excellent interpersonal and cross-cultural communication skills;
- Previous experience of working in CIS countries on EE buildings projects will be an asset.

IC 3: Demand Side Management Expert

Job Content:

(i) Provide advice on the detailed work plan necessary to produce the deliverables in Component 2 of the project

(ii) Provide ongoing support to and written feedback on the integrated resources plan for Turkmengas.

(iii) Oversee the identification of cost-effective demand-side investments and the calculation of their economic and environmental benefits

(iv) Act as trainer for LCs and for Turkmengas staff on integrated resources planning and demand-side management.

(v) Provide advice on presenting results and recommendations to key actors in the sector

Qualifications:

- At least a Masters Degree in energy engineering, economics, or another relevant field;
-At least 10 years experience in integrated resources planning and demand-side management, preferably with direct experience in working with utilities / energy companies.
- Fluency in written and spoken English;
- Excellent time-management and organizational skills;

IC 4: GHG Monitoring Specialist for Buildings

Job Content

- Develop recommendations for a GHG and energy use monitoring plan for the project
- Support the development of the monitoring system, including a measurement plan and overall monitoring plan for the duration of the project
- Make recommendations on monitoring and analytical techniques and provide support and training to local project staff and contractors as necessary
- Ensure that the baseline is effectively covered and that energy performance is measured in relation to a control group of buildings that reflect the target building stock in the project.

Qualifications

- At least five (5) years of working experience as a specialist in the field of GHG emission reduction and climate change impacts;
- Academic qualification in environmental science, energy, or economics, with specialization in GHG emissions related aspects. He/she shall have knowledge of economics and/or energy economics;
- Practical experience in implementation and monitoring of pilot and demonstration projects, working experience in developing countries and CIS countries is an asset;
- Practical experience in financial and economic analysis and GHG emission reduction and carbon trade issues;
- Good ability in partnering and networking;

- Proficiency in English, excellent analytical and drafting skills; preferably knowledge of written and spoken Russian and/or Turkmen language;
- Excellent interpersonal and cross-cultural communication skills;

For Contractual Work:

Budget Line 8: Energy, economic, and investment analysis and the development of both the study of least-cost options in the housing sector in Output 2.1 and (in conjunction with Turkmengas) the investment plan developed in Output 2.3.

Budget Line 15: Design work, drafting, and technical support for the new and reconstructed pilot buildings selected in Outputs 3.1 and 3.2.

Budget Line 22: Design work, drafting, and technical support for the energy efficiency protocols for new and existing building designs in Output 4.1.

Annex D: Summary of Building Codes in Turkmenistan

In Turkmenistan, there exist a number of building technical regulations (CHT: Строительные Нормы Туркменистана – Construction Norms of Turkmenistan - CNT) concerning construction and heating of buildings. The technical standards are based on the former Soviet technical norms, so called SNiPs (СНиП - Строительные Нормы и Правила - Building Standards and Regulations), which have been transformed into Turkmen jurisdiction between 1994 and 1998.

Construction technical codes with impact on residential building energy efficiency include the following main regulations - Construction Norms of Turkmenistan/CNT:

CHT 3.04.03-94 on Residential Buildings,

CHT 3.05.02-94 on Heating, Ventilation and Air-Conditioning,

CHT 3.05.04-94 on District Heating Networks,

CHT 3.04.07-94 on Office and Residential Buildings,

CHT 2.01.01-98 on Building Climatology, and

CHT 2.01.03-98 on Building Thermal Engineering

The CHT 2.01.03-98 norm on building thermal engineering (Строительная теплотехника) is one of the key building codes concerning building level energy efficiency. This norm regulates among others also thermal resistance value (R-value) of different building structures. (R-value is a reciprocal of a U-value - thermal conductivity, which is used in EU norms.)

Examples of minimum R-values required by this norm for new buildings of minimum three floors developed after year 2000 show the table 1. For lower buildings and for reconstruction of buildings apply somewhat less strict R-values.

Table 1: Building Envelope Thermal Resistance Minimum Values

Buildings and facilities	Heating Degree-days [°C · day]	Building Envelope Thermal Resistance Minimum Values R_0 [m^2. °C/ W]				
		Wall	Roofs and ceilings above corridors	Attic ceilings, structures above cold basement and underground	Windows and balcony doors	Bay/oriel
Residential buildings, hospitals, schools, dormitories	2000	2,1	3,2	2,8	0,3	0,3
	4000	2,8	4,2	3,7	0,45	0,35
	6000	3,5	5,2	4,6	0,6	0,4
	8000	4,2	6,2	5,5	0,7	0,45
	10000	4,9	7,2	6,4	0,75	0,5
	12000	5,6	8,2	7,3	0,8	0,55
Other buildings, office and residential buildings, except for premises with higher indoor humidity	2000	1,6	2,4	2,0	0,3	0,3
	4000	2,4	3,2	2,7	0,4	0,35
	6000	3,0	4,0	3,4	0,5	0,4
	8000	3,6	4,8	4,1	0,6	0,45
	10000	4,2	5,6	4,8	0,7	0,5
	12000	4,8	6,4	5,5	0,8	0,55
Buildings operated in dry and normal conditions	2000	1,4	2,0	1,4	0,25	0,2
	4000	1,8	2,5	1,8	0,3	0,25
	6000	2,2	3,0	2,2	0,35	0,3
	8000	2,6	3,5	2,6	0,4	0,35
	10000	3,0	4,0	3,0	0,45	0,4
	12000	3,4	4,5	3,4	0,5	0,45

Source: CHT 2.01.03-98 Строительная теплотехника – Turkmen Code on Building Thermal Engineering, Table 1b, page 9

Comparison of minimum R-values of key building structures of residential buildings as required by the Turkmen norm CHT 2.01.03-98 with an EU harmonized Czech technical norm on Thermal Protection of Buildings ČSN 73 0540-2:2007 is illustrated in a Table 2.

Table 2: Comparison of Turkmen and EU (Czech) minimum R-values

	Czech (EU harmonized) norm ČSN 73 0540-2:2007 R [m^2. K/ W]	**Turkmen norm** CHT 2.01.03-98 R [m^2. K/ W]
Roof	**4,17**	**3,7 (4,2)**[27]
Wall	**2,6/3,3**	**2,8**
Window	**0,58**	**0,45**

Source: ČSN 73 0540-2:2007, CHT 2.01.03-98, comparison for new buildings, 4000 heating degreedays

Note: The higher R-value of the thermal resistance, the more energy efficient and better insulated the building structure is.

The comparison shows that the Turkmen building code CHT 2.01.03-98 on building thermal engineering requires thermal resistance R-values that are slightly lower (i.e. less demanding), but very well comparable with the Czech EU harmonized norm on Thermal Protection of Buildings ČSN 73 0540-2:2007.

[27] The requirement varies depending on the type of roofing construction.

Annex E: Documentation of Stakeholder Consultation and Stakeholder Involvement Matrix

INCEPTION WORKSHOP

Improving Energy Efficiency in Residential Building Sector in Turkmenistan (PPG)

20 April 2010

Summary Notes

Inception Workshop on Energy Efficiency project (preparation phase) has been attended by representatives from ministries and agencies: Ministry of Construction of Turkmenistan, State Concern "TurkmenGas", Central Public Utilities agency, State Concern "TurkmenEnergo", Ministry of Nature Protection as well as by UNDP experts and by Ms. Marina Olshanskaya, Regional Technical Specialist for Climate Change for the Energy and Environment Practice from UNDP Bratislava Regional Centre.

Mr. Rovshen Nurmuhamedov, National Programme Officer, UNDP Turkmenistan, opened the meeting by introducing the main purposes and activities of the project, its main goals, scope of work and results to be achieved during the preparatory stage of the project. Programme Officer stressed that the main goal of the future full-sized project is to stimulate in Turkmenistan the energy efficiency concept of the residential buildings sector through improvement of existing construction norms and standards, demonstration of integrated approach at the initial residential building project plan, building institutional capacity of the national architectural, construction, public utilizes, energy ministries and other state organizations.

Then, participants have been presented with activities to be undertake during the initial phase of the project which are to collect baseline data, conduct analysis of information gap, institutional capacity assessment for promotion of energy efficiency in the residential sector, preparation of stakeholder analysis and stakeholder involvement plan and design demonstration projects. (An elaborative plan and description of the initial phase has been distributed to the participants earlier for their information).

Ms. Olshanskaya has further elaborated the project goals, mechanisms and best-practices from similar project which have been implemented by UNDP in Central Asia and Eastern Europe. During the presentation it has been stressed that an important aspect for a successful for project implementation is close interest and cooperation from concerned state ministries and agencies, particularly those state entities which contract for construction of residential houses.

Representatives from state agencies were quite positive and expressed their interest in participation in the project. A representative from "TurkmenEnergo" stated that the project is a very timely initiative and offered his agency's support and assistance for the project, in particular, as it concerns to the relevant data and statistics needed for the collection of project baseline data. The representative has also briefed the audience regarding "TurkmenEnergo" plans to develop a sound climate change compliant national strategies and policies. There also a number of investment plans which are being envisioned by Turkmen Government, which are related to alternative sources of energy, solar and wind generated energy projects.

A specialist from the State Concern "TurkmenGas" has also supported the idea of the project, stating that his agency's interest in the project lies in the concept of decreasing the consumption of gas in the residential sector by applying international best-practices in energy

saving methods with a view of exporting the saved gas to world markets which would bring additional financial inflows to Turkmenistan.

The municipal public utilities representative supported the idea of the project and noted that the most important part of the project is building capacity among partners involved in the project.

Other state participants also expressed their support for the project and voiced readiness for active partnering during the initial phase as well as during implementation of full-seized project.

Список участников вводного семинара

«Улучшение эффективности использования энергоресурсов в жилищном секторе Туркменистана»

20 апреля 2010 г.

Гостиница «Гранд Туркмен», г. Ашхабат

№	**Ф.И.О.**	**Место работы, должность**
1	Курбанов Баймурат	Консультант, ПРООН
2	Курбанов Язмурат	Генеральный директор, Туркмен Довлет Таслама, Министерство Строительства
3	Бабаев Бегмурат	Главный специалист по охране окружающей среды, Государственный Концерн Туркмен Газ
4	Лукьяненко Ася	Ведущий инженер, Туркмен Комун Таслама
5	Шмидт Вадим	Начальник ПТУ, Туркмен Энерго
6	Аллабердыев Гурбангельды	Ведущий инженер, Министерство Охраны Природы
7	Атамурадова Ирина	Консультант по изменению климата, Министерство Охраны Природы
8	Экяев Мухаммед	Начальник управления, Министерство Строительства
9	Нурмухамедов Ровшен	Руководитель программы ПРООН в Туркменистане в области охраны окружающей среды
10	Хаджиев Джемшид	Программный Ассистент, ПРООН
11	Ольшанская Марина	Эксперт, ПРООН

Stakeholder Involvement Matrix

Stakeholder	*Roles / responsibilities relevant to the project*	*Involvement in Project*
State Concern Turkmengas	*Provides gas to residential consumers, serving as the "principal" where energy consumption is concerned. Commissions, designs, builds, and manages housing stock for its employees. Determines energy needs for all oil and gas sector housing (and institutional buildings).*	*Will serve as the project executive and project beneficiary; member of the Project Board. Will be involved in all aspects of the project implementation and will participate actively in Component 2, providing meters for data collection and staff for training and analysis activities. Will work with the project team to develop and integrated resources plan for providing energy to the housing stock and will accept the plan developed. May adopt incentive program for highly-efficient construction.*
Ministry of Construction	*Develops policies and carries out programs in the construction sector. Includes the bureau that is responsible for design review and enforcement of building codes. Commissions, designs, builds, and manages housing stock for its employees.*	*Will serve as the project beneficiary; member of the Project Board. Will provide both technical assistance and investment funds for efficient construction. Ministry staff will participate in training, particularly on code-related issues in Component 1. Will endorse efficient protocols for standard building types. May adopt incentive program for highly-efficient construction.*
City of Ashgabat Local Administration	*Commissions, designs, builds, and manages housing. Oversees urban planning and management in Ashgabat, where several other stakeholders have housing stock. Oversees a housing renovation program.*	*Member of the Project Board; will be involved in all project components, particularly those affecting new construction and reconstruction in Ashgabat, such as the pilot buildings and protocols in Component 3. May adopt incentive program for highly-efficient construction developed under Component 1. Will provide investment funds for new and/or reconstructed pilot buildings in Component 3 and/or apply protocols for new construction and reconstruction developed under Component 4.*
Ministry of Nature Protection	*Houses the GEF Operational Focal Point and assesses local environmental benefits of projects.*	*Member of the Project Board; will provide guidance on determing local environmental benefits from the project and will ensure coordination with other GEF projects in Turkmenistan.*
Ministry of Energy and Industry	*Among other responsibilities, Oversees energy resource development Commissions, designs, builds, and manages housing stock for its employees.*	*Member of Project Board. Will gather lessons learned for its own housing stock and may oversee the integration of project recommendations into the anticipated Law on Energy Efficiency*
Turkmenistan Polytechnic Institute	*Trains architects and engineers in the construction profession at its Construction Faculty*	*Member of the Project Board. Will introduce a curriculum on energy efficiency to its Construction Faculty and train students under Component 4. Will support the implementation of the student design competition in Component 4.*
Ministry of Communal Services	*As the Ministry has just been established (2011), its specific scope has yet to be determined.*	*Member of Project Board. Will hopefully provide support on applying lessons learned in demand-side management and investment to the communal services sector in Turkmenistan.*

Annex F: GHG Emission Reduction Estimates

This annex provides an overview of the calculation of CO2 emission reductions and reductions in energy consumption associated with the proposed project.

The following emission reductions are expected:

- direct emission reductions associated with the three (3) new pilot buildings
- direct emission reductions associated with the three (3) reconstructed pilot buildings
- indirect emission reductions associated with capacity development activities (application of proposed design incentives, use of skills acquired in training, etc.)

The emission factor used in these calculations is 15tC / TJ natural gas, with a correction of .995 for incomplete combustion, given the current in-country conditions of gas-fired heat and power production.

1. System Boundary

The geographical boundary of the project is assumed to be the territory of Turkmenistan.

2. The Business as Usual (Baseline) Scenario

The Business as Usual (BAU) scenario describes the project without GEF support. The following assumptions are made:

- In new residential buildings, very limited progress would be made in improving energy performance in residential buildings due to the evolution of the materials used and the construction techniques used at present; e.g. switching away from wooden frame single-glazed windows, the use of additional external materials with some insulating properties in high-end buildings, and others. This progress would not reach more than 1% per year. Opportunities to implement more efficient designs, materials, and technologies would not be realized.
- The reconstruction of residential buildings would not be a priority for investment, and reconstruction activities would lead mostly to cosmetic improvements (e.g. re-plastering the façade, limited window replacement, and roof repairs) that would reduce energy by 10%,
- Significant additional savings due to policies and measures would not take place due to the lack of an institutional framework. While a Law on Energy Efficiency might be adopted, key stakeholders responsible for its implementation in the buildings sector (e.g. the Ministry of Construction, local administrations, and the new Ministry of Communal Services) would lack the capacity to implement the law successfully.
- The demand for gas exports would continue to increase due to the completion of the new pipeline to China, but pressure on gas supply would increase, as residential gas consumption would continue to increase at its previous, steady, upward rate.
- Privatization of the housing stock would continue to progress – perhaps slowly, perhaps more dramatically – but in the absence of efficiency measures or the option to purchase more efficient housing, residents would not be able to alter their energy consumption without sacrificing comfort.

Furthermore, the following awareness barriers would remain:

- Enforcement officials would not know how to develop and enact specific measures, such as energy passports or energy efficiency incentive programmes, that would generate sector-wide savings.

- In the absence of auditing equipment and capacity, policy-makers would not have a sense of current performance of various types of new and existing buildings.
- Architects and engineers would not have the requisite skills to design more-efficient buildings.
- Turkmengas, the state concern that pays for most of the gas provided to residential buildings, would be likely to undertake steps to reduce losses in its system, such as repairing pipelines, but it would not be able to assess the potential for reducing losses in end use and would not be able to identify and prioritize potential investments in the buildings sector.
- Without any highly-efficient buildings, all stakeholders would lack an in-country example of the benefits and feasibility of these types of buildings.

3. The GEF (Alternative) Scenario

Under the GEF scenario, GEF support (along with co-financing from the implementing partners identified at present and those who will become involved during project implementation) is expected to remove many of the existing barriers and reduce the impact of others.

Direct Project Emission Reductions

Project activities that will reduce emissions directly are as follows: 1) Construction of three new buildings under Component 3 of the project; and 2) Reconstruction of three existing buildings under Component 3 of the project.

In new buildings, expert analysis conducted during the project indicated that more efficient materials and technologies would result in savings of at least 15% and design measures would reduce heat consumption by at least an additional 10%. In buildings targeted by the proposed incentive program in Component 1, improvements in energy performance must be at least 25% above current codes.

Proposed measures in new buildings are likely to include:

- Improved siting and design to ensure optimal wall-to-window ratios in the building
- Optimized usė of daylight and adequate measures to utilize sunlight while maintaining indoor comfort.
- An integrated approach, involving early discussions between the builders, the architects, and the HVAC engineers to ensure that building systems can run at an optimal capacity and that savings from reduced energy consumption can be reflected in construction savings (i.e. smaller capacity boilers or chillers)
- Optimal insulation reflecting international best practice
- Energy-efficient windows with high performance and adequate measures for ventilation
- Effective shading in building design in order to reduce the demand for air conditioning
- Boilers and chillers that are highly efficient

In existing buildings, simply retrofitting them to comply with current building codes (CHT 2.01.03 - 98 on heat parameters for construction) would reduce energy consumption by 38%,[28] measures that have gone overlooked because they are simply not considered by the urban planners financing reconstruction. Design features (i.e. overhangs) and retrofits to the heating systems could generate substantial additional benefits.

Proposed measures in existing buildings are likely to include:

[28] Allaberdiyev, 2011.

- Insulation of key areas (roofs, heating pipes, exterior walls and gables)
- Energy-efficient windows with high performance and adequate measures for ventilation
- Upgrading building-level and flat-level heating systems
- Introduction of shading measures in order to reduce demand for air conditioning
- Measures that consider the relationship between cooling needs and building performance

The characteristics of the buildings were selected to be representative of current trends in construction and reconstruction and to optimize energy savings per building.

Table F1: Overview of Pilot Buildings in Component 3

Pilot Building	Size	Characteristics	Current Annual Energy Demand (m^3 of natural gas)	Potential for Savings	Estimated Annual Energy Savings (m^3 of natural gas)	Corresponding Annual GHG Reductions (tCO_2e)
Output 3.1						
New Building #1	20,299m^2	12-story residential building, 72 units, reinforced concrete construction, mineral wool insulation, central heating and cooling	6,454,272[29]	25%	1,613,568	3198
New Building #2	20,299m^2	12-story residential building, 72 units, reinforced concrete construction, mineral wool insulation, central heating and cooling	6,454,272	25%	1,613,568	3198
New Building #3	20,299m^2	12-story residential building, 72 units, reinforced concrete construction, mineral wool insulation, central heating	6,454,272	25%	1,613,568	3198

[29] Total consumption includes 723,118 m^3 natural gas for heat and hot water and 5,731,154 m^3 natural gas for cooling and electricity used for other needs (lighting, appliances).

Pilot Building	Size	Characteristics	Current Annual Energy Demand (m^3 of natural gas)	Potential for Savings	Estimated Annual Energy Savings (m^3 of natural gas)	Corresponding Annual GHG Reductions (tCO_2e)
		and cooling				
Sub-Total						9,594
Output 3.2						
Renovated Building #1	2,792m^2	4-story residential building, 24 units, constructed prior to 1985, brick or keramsite construction with plaster façade; no wall or roof insulation.	256,870[30]	38%	97,611	183
Renovated Building #2	2,792m^2	4-story residential building, 24 units, constructed prior to 1985, brick or keramsite construction with plaster façade; no wall or roof insulation.	256,870	38%	97,611	183
Renovated Building #3	2,792m^2	4-story residential building, 24 units, constructed prior to 1985, brick or keramsite construction with plaster façade; no wall or roof insulation.	256,870	38%	97,611	183
Sub-Total						549
TOTAL	69,273m^2		20,133,425		5,133,535	10,143

[30] For renovated pilot buildings, total energy consumption is comprised of natural gas consumption for heating (41,250m^3) and electricity consumption for hot water heating and for air conditioning (the equivalent of 215,620m^3).

As Table F1 indicates, the annual direct reductions that can be attributed to this project are expected to be approximately 10,143 tCO_2e due to savings from the six pilot buildings (3 new residential buildings, and 3 existing residential buildings that will be reconstructed) that will be built under project activities in Component 3. Over a 20-year project lifetime, these savings are estimated to total 202,866 tCO_2e.

Direct post-project emission reductions

No direct post-project emission reductions have been counted in this analysis.

Indirect post-project emission reductions – top down

According to data from the Second National Communication of Turkmenistan to the UNFCCC, the residential sector consumes 19.4% of energy-related GHG emissions in the country, where annual emissions from the energy sector are estimated to be 48,914,907 tCO_2e. Residential emissions were therefore assumed to be 9,489,492 tCO_2e.

Assuming a conservative potential of 3% improvement in the buildings sector (including both new construction and reconstruction), and a GEF causality factor of 50% (relatively high because of the few resources supporting change in the current policy arena), GHG emission reductions would equal 142,324 tCO2e per year, or 1,423,424 tCO_2e over a 10-year post-project lifetime.

Indirect post-project emission reductions – bottom up

The proposed project features several activities that directly promote the replication of pilot approaches to new construction and reconstruction of existing buildings.

- In Component 1, an incentive program will be developed for all high-rise residential buildings in the City of Ashgabat that will reward design institutes that design buildings that meet or exceed the standards set for the pilot buildings (i.e. 25% or greater improvement in performance compared to current codes).
- In Component 1, recommendations on the building code that would promote limits on total energy consumption (rather than only heating consumption) could provide a widespread mandate to reduce energy use in buildings.
- In Component 2, the implementing partner Turkmengas will undertake an integrated resources assessment and will receive an investment plan that will highlight cost-effective investments in company-owned and company-built housing stock that will provide a clear overview of incentives to invest in efficient buildings.
- In Component 3, the new pilot buildings will be highly relevant to the project partners (all of whom are supporting these types of buildings). The reconstructed pilot buildings will be relevant to the City of Ashgabat and to all other cities in Turkmenistan.
- In Component 3, the energy passports completed for the pilot buildings will provide a clear and visible indictor of savings to developers, residents, and policy-makers.
- In Component 4, training for practicing and future architects and engineers will provide them with the skills necessary to replicate the approach used in the pilot buildings in their own work.
- In Component 4, the development of protocols for new and/or reconstruction will make it significantly easier for design studios to develop designs that are significantly lower in energy consumption for the most common types of residential buildings.

Based on a replication factor of 5 and the direct reduction of 202,866 tCO_2e, an additional post-project indirect reduction of 1,014,330 tCO_2e would be realized over the 10-year post-project lifetime.

4. Calculations

The calculations for emission estimates are presented in the following table:

Table F2: Overview of Project-Related Emission Reductions

Sources of Reduction (over 20 years)	Total (tCO_2e)
Direct	202,866
Indirect (Post-Project, Top Down)	1,423,424
Indirect (Post-Project, Bottom Up)	1,014,330
Total	**1,217,296 – 1,626,290**

SIGNATURE PAGE

Country: TURKMENISTAN

UNDAF Outcome (s)/Indicator (s):

Outcome #3: by 2015, the system of environmentally sustainable economic management expands population's opportunities to participate in social and economic development, especially in rural areas.

CPAP Outcome (s)/Indicator (s):

Outcome #3.2. Environmentally sustainable use of natural resources contributes to effectiveness of economic processes and increased quality of life.

CPAP Output (s)/Indicator (s):

Output 3.2.3. Government introduces carbon reduction and energy saving technologies.

Executing Entity/Implementing Partner: State Concern "Turkmengas"

Implementing entity/Responsible Partner: Turkmengas, City of Ashgabat Local Administration, Ministry of Construction, Turkmenistan Polytechnic Institute

Programme Period:	2011-2015
Atlas Award ID:	00061181
Project ID:	00077395
PIMS #	4134
Start date:	01/06/2011
End Date	31/03/2015
Management Arrangements	NEX
PAC Meeting Date	23 Dec 2010

Total resources required	$46,003,280
Total allocated resources:	$46,003,280
• Regular	$300,000
• Other:	
○ GEF	$ 2,516,280
○ TurkmenGas	$19,887,000
○ Ashgabat City	$17,500,000
○ Ministry of Construction	$ 6,000,000

Agreed by Turkmengas

17 11 11

NAME SIGNATURE Date/Month/Year

Agreed by (UNDP):

17 11 11

NAME SIGNATURE Date/Month/Year