UNDP Project Document

UNDP-GEF Medium-Size Project (MSP)

Government of the Kyrgyz Republic
Global Environmental Facility
United Nations Development Programme

State Agency for Architecture and Construction under the Government of the Kyrgyz Republic

PIMS 3910 Improving Energy Efficiency in Buildings

Brief description

Almost all the Kyrgyz housing stock has been constructed during Soviet period some 35-60 years ago without any regard to energy efficiency. These buildings are now in obsolete condition and do not provide for minimum hygienic and comfort living conditions. Energy use per square meter is almost 3-5 times as those in EU and varies between 320 and 690 kWh/m2 per year. The project aims at reducing energy consumption and associated GHG emissions in Kyrgyzstan building sector by 30-40% as compared to the current level by:

(1) adopting and enforcing mandatory building energy performance codes, standards and labels (the Energy Pass) in line with internationally recognized best-practices;
(2) demonstrating feasibility and viability of an integrated design approach for energy efficiency in public buildings;
(3) building capacity of building and construction professionals to implement new building regulation; and
(4) establishing a system to monitor energy consumption and CO_2 emissions in Kyrgyzstan building sector.

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Country: Kyrgyz Republic

UNDAF Outcome(s)/Indicator(s): **Poor and vulnerable groups have increased and more equitable access to quality basic social services and benefits, in a strengthened pro-poor policy environment**

Expected Outcome(s)/Indicator (s): **Sustainable development principles integrated into poverty reduction policies and programmes**

Expected Output(s)/Indicator(s):
#1 Improved energy performance codes;
#2 Improved enforcement levels of mandatory energy efficiency building codes;
#3 Pilot projects utilizing an integrated design approach;
#4 Promotion of best energy design and building practices in construction sector
#5 Monitoring of building energy consumption and GHG emissions

Implementing partner: **State Agency for Architecture and Construction under the Government of the Kyrgyz Republic**

Other Partners: **State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic; National Agency on Local-self Governance, Bishkek and Osh City Municipalities**

Programme Period: **2005-2010**
Programme Component: **Environment Protection for Sustainable Development**
Project Title: **Improving Energy Efficiency in Buildings**
Project ID: **00062794**
Project Duration: **2008-2012**
Management Arrangement: **NEX**

Total budget:	**USD 4,132,000**
Allocated resources:	**USD 950,000**
• Government	n/a
• Regular	**USD 50,000**
• GEF	**USD 900,000**
• In kind contributions	**USD 3,182,000**

On behalf of:	**Signature:**	**Date:**	**Name/Title:**
Government		5/12/08	**Narbaev Kanybek Dzhaichievich Director of State Agency for Architecture and Construction under the Government of the Kyrgyz Republic**
UNDP		5/12/08	**Neal Walker Resident Representative UNDP**

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Acronyms

APR	– Annual Performance Report
AWP	– Annual Work Plan
CEO	– Chief Executive Officer
CIS	– Commonwealth Independent States
EE	– Energy Efficiency
EU	– European Union
GEF	– Global Environment Facility
GDP	– Gross Domestic Product
GHG	– Greenhouse gases
SAEPF	– State Agency Environmental protection and Forestry under the government of the Kyrgyz Republic
Gosstroi	– State Agency for Architecture and Construction under the Government of the Kyrgyz Republic
IAs	–Implementation Agencies
IBD	– Integrated building design
IW	– Inception workshop
M&E	– Monitoring and Evaluation
MSP	– Medium-Size Project
NGO	– Non-governmental Organization
PB	– Project Board
PIF	– Project Information Format
PIR	– Project Implementation Report
PIU	– Project implementation unit
RCU	– UNDP/GEF Regional Coordinating Unit in Bratislava
BSR	– Building Standards and Rules
TBD	– To be determined
ToR	– Terms of reference
UNDP	– United Nations Development Programme
UNDP-CO	– United Nations Development Programme Country Office
USSR	– Union of Soviet Socialist Republics
SNiP	– Building Standards and Rules
EE	– Energy effective

SECTION I: Elaboration of the Narrative

PART I: Situation Analysis

I. A Building sector

1. Energy sector accounts for largest share (74% or 5MtCO2/yr1) of total GHG emissions in Kyrgyzstan. Economic recession and closure of major industries in last two decades led to significant reductions in GHG emissions from industrial sector. With resumed GDP growth in early 2000s, emissions are on the rise and are expected to increase up to 25 MtCO2e/yr already by 2010. However, growth is primarily consumption-driven (due to high volume of remittances from large Kyrgyz community residing and working abroad2) with significant contribution from construction sector. For the first time since the collapse of the USSR, Kyrgyzstan is experiencing a construction boom; real estate is rising by three-four times in major cities. With the new wealth of many Kyrgyz and few attractive investment alternatives, real estate has become a desirable asset for households while the poor state and crowded conditions of much of the Soviet-era housing stock have also stimulated spending on renovation. Further, migration to the capital and other large cities from rural areas where business opportunities are less available adds continuously to a steadily growing demand for housing. Consequently, share of buildings in total domestic energy consumption has grown up to 48% and is expected to remain high unless the need for greater energy efficiency is fully realized and given due consideration during building construction and renovation.

2. Almost all the Kyrgyz housing stock has been constructed during Soviet period some 35-60 years ago without any regard to energy efficiency. These buildings are now in obsolete condition and do not provide for minimum hygienic and comfort living conditions. Energy use per square meter is almost 3-5 times as those in EU and varies between 320 and 690 kWh/m2 per year. Kyrgyz statistics does not provide any comprehensive data on the number of dwellings and the split into different types of residential houses. Expert assumptions have been made regarding the current building stock and the construction rates for different types of buildings for the period 2005-2025. As indicated in Table 1, single-family houses are most likely to have the highest rate of construction in next two decades. This is mostly due to the steady population growth in large cities such as Bishkek and domestic migration from rural areas. New housing stock is largely privately owned and often built with limited financial means, leading to the use of inadequate building materials and illegal use of land. The proposed project will therefore put an emphasis on low- and no-costs energy efficient measures to overcome the lack of finance, while strengthening enforcement of the new building regulation.

Table 1: Housing stock and estimation of construction rates in Kyrgyzstan, 2005-2025

		Estimation					
Total m² in stock	**Stock in 2005**	**Built 2006 - 2010**	**Built 2011 - 2015**	**Built 2016 - 2021**	**Built 2022-2025**	**Replacements 2006-2025**	**Total stock in 2025 (est.)**
Apartments	18,916,500	252,170	349,432	558,922	474,620	88,445	20,463,200
Single houses	44,138,500	2,790,123	3,329,247	4,829,860	3,820,471	1,976,493	56,931,708
Kindergartens and schools	9,382,038	354,298	288,145	351,519	237,881	627,731	9,986,149
Hospitals	263,293	3,560	3,171	3,858	2,604	13,193	263,293

Source: own calculations, based on data received from Gosstroi

3. CO2 emission factor for the building sector has recently decreased: during last decade electricity coming mainly from large hydropower plants has become main energy source in the residential sector (up to 75% in multi-unit buildings and 60% in single family houses). The switch from district heating used in older buildings to electricity in new buildings explains the large drop in CO2 factor in the multi-unit residential sector: from 0.28 t CO2/MWh for the existing stock to

[1] Initial National Communication to UNFCCC, 1998

[2] According to National Bank of Kyrgyzstan, cash remittances from labor migrants to Kyrgyzstan amounted to over $700 million in 2007

0.14 t CO2/MWh for newly constructed buildings. In single-family homes, wood (40%) gas (20%) and coal (15%) are in use in the existing buildings, while new houses tend to prefer electricity, leading to a slight increase in the CO2 factor (due to replacement of biomass with electricity for heating). Table 2 presents current and assumed CO2 emission factor for building energy consumption based on 2005 official statistical data on energy sources used in different types of buildings and assumptions regarding expected changes in fuel mix based on information provided by State Construction and Architectural Committee (Gosstroi).

Table 2: Present CO2 emission factor and estimation for 2006-2021 in the building sector

t CO2 / MWh (based on heating mix)	Existing building stock	2005 (new buildings)	Estimations		
			2006-2010	2011-2015	2016-2021
multi-unit residential	0.28	0.14	0.14	0.13	0.13
single family homes	0.10	0.12	0.12	0.12	0.12
kindergartens and schools	0.20	0.13	0.12	0.12	0.12
hospitals	0.20	0.13	0.12	0.12	0.12

4. In light of the above, main characteristics of Kyrgyz building sector can be summarized as follows:
   - Large stock of existing buildings with low energy efficiency
   - Increasing number of new constructions, often illegal
   - Regulations on thermal insulation are outdated and largely ignored by the building industry
   - High percentage of small-volume buildings (i.e. single-family homes)
   - Increase use of electricity for heating to replace obsolete and unreliable district heating systems
   - Incompleteness and inaccuracy of data on energy demand in building sector
   - Lack of strategy for building sector development and coherent plans for new constructions and renovation of existing buildings

I. B Legal and Institutional Framework

5. Kyrgyzstan has adopted a number of comprehensive laws related to energy, electricity and energy saving back in 1998, but lacks secondary legislation and capacities to effectively enforce the provisions stated by the laws.

6. *Energy Law and Building Code*: The Law on Energy Savings adopted in 1998 forms the basis for implementation of consumption-based norms for buildings and their regular review every 3 years taken into account advances in technology and local market development. Current building code also adopted in 1998 is based on a prescribed thermal quality of the building envelope (maximum u-values of construction assembly) and is compatible with international quality levels. Although the code represents a substantial improvement in envelop thermal quality over the previous 1978 building code, its effectiveness is limited because of inconsistent enforcement and because it does not regulate the overall building energy performance. Several important factors including thermal bridges, solar gains and building compactness are not addressed. The energy consumption requirements are spread throughout different codes. While one code addresses the thermal performance of the building envelope, another is related to the energy requirements for heating, ventilation and air conditioning equipment. Finally, existing codes provide no basis for their systematic enforcement and compliance check.

7. *Building* inspection *and compliance*: The strict thermal requirements of the 1998 building code are not fully enforced nor strived for in building practice. First, reliable means to assess thermal performance of building components are limited due to capacity gaps in material certification, testing and standardization (Kyrgyzstan is partly using the Interstate standards drafted for all CIS.). Further, social and economic problems affecting population have hindered improvements in construction quality, generally perceived as costly, while oversight of new construction, especially with respect to small scale housing, remains inadequate.

8. The State Architecture and Construction Inspectorate is responsible for issuance of permits and checking compliance during the construction phase. It is placed under control of the State Architecture and Construction Agency. Construction permits are to be approved by the Chief Architect of the city, who assesses capacity and viability of the contractor, analyses costs estimates and check design and land ownership certificates. Approximately 360 permits are given every year: in 2006, 332 permits were granted, mostly for multi-storey new buildings, while in 2005, most of the 550 permits were given for retrofitting or important modification of one storey buildings. Inspection is performed at three levels: a) architects or engineers, for the surveillance of the structural aspects; b) permanent technical surveillance on-site by state or independent licensed inspectors; and c) Random inspection by Inspectorate at least 2 times a month.

9. *Certification*: The Licensing and Certification department of the State Architecture and Construction Agency is, among other tasks, in charge of building materials certification and accreditation of architects. Certification for building materials is presently voluntary. As a result, many imported and most locally made building materials and components are applied without certification of thermal quality. Practitioners and inspectors thereby lack the means to ensure compliance of buildings and assemblies to the current thermal requirements of the building envelope. The capacity of inspectors to regulate and enforce building codes during construction of single family houses and smaller scale buildings is weak, while the number of inspectors is also insufficient to ensure timely and quality oversight for construction, especially for individual single-family buildings.

10. In addition, while building permits are legally required for all new constructions, in practice most single family homes and many other small buildings are constructed without permits. For example, in Bishkek extensive squatter areas have grown within the city. Building permit acquisition and building inspection practices are not clearly regulated, vary from municipality to municipality and need to be harmonized and streamlined.

I. C Construction sector

11. The bulk of domestic construction materials available on the market are bricks, panels and low quality cement. Standard quality insulation materials and windows with good thermal qualities are lacking on the market. Insulation materials, doors and windows are mostly imported from China and Turkey (over 90%), with only a fractional part complying with e.g. EU-level standards. Building materials are rarely certified or labeled for thermal quality, while imported materials and components lack labels or are labeled in an inconsistent manner. There would be some potential for developing domestically produced materials, and a domestic production of quality construction materials could be developed through the use of licenses for foreign components. However this would require substantial investments in plants capacity, technology adaptation, training and marketing, that seem to be premature at this stage, given limited market size. Such investments would only be viable when the standards enforcement capacities are in place, and when a real demand is effective on the market.

12. Building professionals thereby have no means to ensure the thermal performance of building assemblies and components which makes regulations regarding these largely ineffective. In addition, contractors will often substitute lower quality building materials or components without notifying architects or inspectors. There is little local experience or knowledge base for improving new building thermal performance. Further, architects and engineers are only marginally aware of low-energy building design and construction. There is a low level of knowledge among practitioners regarding ecological building or integrated building design approaches, as well as a low level of experience with low-energy building materials and components in the construction industry.

PART II: Strategy

II. A Project objectives, outcomes and outputs

13. The project aims at reducing energy consumption and associated GHG emissions in Kyrgyzstan building sector by 30-40% as compared to the current level by:
    (1) adopting and enforcing mandatory building energy performance codes, standards and labels (the Energy Pass) in line with internationally recognized best-practices;
    (2) demonstrating feasibility and viability of an integrated design approach for energy efficiency in public buildings;
    (3) raising the level of building and construction professionals' skills to implement new building regulation; and
    (4) establishing a system to monitor energy consumption and CO_2 emissions in Kyrgyzstan building sector.

Component 1 Improved energy performance building codes

- Support the State Architecture and Construction Agency in the development of new mandatory energy performance-based building energy code (SNiP[3]) compatible with international best practices, such as current Russian and CIS thermal performance codes and the European Energy Performance Building Directive.
- Simplify and "regularize" procedures, which regulating revisions of Building code to comply with the Energy Law requirements, e.g. the need for check and update of the code every 3 years (has not been followed since 1998)
- Elaborate and adopt national calculation methodology to determine building energy consumption based on standardized use and establish minimal requirements for thermal insulation, heating and air-conditioning systems, application of renewable energy sources and design of the building. The new regulatory basis will consider the total building energy balance (including heating, air conditioning, and ventilation).

Component 2 Improved enforcement levels of mandatory energy efficiency building codes

- Training for building inspectors on performance assessment and calculation methodology to help improve compliance levels of mandatory building codes.
- Develop procedures for the creation of an energy certification system for all buildings, including the issuing building efficient energy passports, to promote an economic driver for energy performance in buildings.
- Strengthen national capacity for certification of building materials and components for the building sector, to simplify the task of building inspectors.

Component 3 Pilot project utilizing an integrated building approach

- Design and construct (or reconstruct) two public objects in two settlements of Kyrgyzstan (desirable in northern and southern climatic zones of the country), using an integrated building design approach within available budget and time schedule. Following low- or no-costs measures (the list is not exhaustive) will be integrated:
    - orientation of the building to ensure maximum solar gains,
    - zoning of the used areas within the building to ensure that areas requiring more warmth are located where solar gains are most effective,
    - optimum ventilation to reduce heat loss,
    - reduction of wall block thickness by means of locally produced insulation materials,
    - optimal planning of the building to reduce the energy losses.

[3] SNiP stands for "Building Norms and Rules" in Russian

- Adopt integrated energy efficient design methodology in all planned public construction in Bishkek, Osh and in other big cities

Component 4 Promotion of best energy design and construction practices

- Develop and introduce module on energy efficient building design in the curricula of Kyrgyz universities of higher education with architectural specialization and provide training assistance and support materials for teaching staff
- Design and approve training courses at the Licensing and Certification Department of the State Architecture and Construction Agency in the field of building energy performance, solar architecture and applications for renewable energy sources in buildings
- Provide training courses for practicing architects and engineers concerning the application of the new codes and calculation methodologies including instruction in bioclimatic architecture and thermal solar applications
- Raise awareness of building constructors on economic, environment and social benefits of integrated building design and on locally available and tested technologies, materials and other EE applications in buildings (e.g. though public events at major construction events such as annual BishkekBuild Construction Exhibition)
- Organize information campaign for the general public promoting benefits of the new building code and the Energy Passport
- Promote issues on the increasing of the energy efficiency through the national media, portal CARnet (www.caresd.net) and Information Bulletin.

Component 5 Monitoring of energy efficiency in buildings and emissions of GHG.

- Support Gosstroi and SAEPF in putting in place a system to monitor energy savings and CO2 emissions reduction in buildings. The building energy performance requirements will be reviewed and strengthened at regular intervals (3 years minimum) based on technology and market advances
- Prepare and arrange for two independent evaluations of project results (mid-term and final)/

14. The new standards (component 1) and their enforcement (component 2) will be applicable to all new buildings, public and private alike. Pilot (component 3) will be applicable to both public and residential buildings in the following ways: it will demonstrate how the new standards can be implemented with no- or low-cost measures, using a) a new approach to design, i.e. integrated building design; and b) new or different materials, technologies, construction techniques. The project aims to pilot IBD in the public sector, and embed the approach through all public construction activities in the future, and thus offers high levels of replicability and energy savings in Kyrgyzstan. IBD will be voluntary for the private sector, however, there is expected to be strong uptake of IBD by the private sector because of the cost effectiveness of this approach. Finally, replication across all sectors will be enhanced by dissemination activities and the information and training of the sector professionals (Component 4).

15. The key expected climate change impact of the project is the reduction of CO2 emission by 267,000t CO2 by 2022 year, including 1,140 t CO2 directly from application of IBD in two new pilot buildings. Further indicators and the expected impact of the project are outlined in Section II Strategic results framework.

II. B Consistency with national priorities and coordination with other related initiatives

16. Initiation of this project is very opportune at this point in time, as reducing energy consumption and costs in residential and public sector is becoming one of the main priorities of the Kyrgyzstan government. This is related to drastic increases in gas prices from Uzbekistan and a growing share

of Municipal and State budgets being absorbed by energy costs. The project will advance implementation of the law on "Energy Saving" (1998) and National Strategy for Energy Efficiency. The project is also fully consistent and build on recommendations from the Initial National Communication to UNFCCC, namely i) development of integrated solutions for increasing energy efficiency, and ii) improvement of construction standards and control systems to monitoring the application of these standards in buildings. Finally, the project will support objectives of Municipalities of cities to enhance energy performance of municipal buildings.

17. Project preparation process involved meetings with broad range of stakeholders to ensure their support and avoid duplication of efforts. The project will build on the results of Energy Efficiency Program implemented recently by the Municipality of Bishkek with the support of the Norwegian Government. The program supported establishment of a municipal revolving fund for energy efficiency projects and created a database on buildings information and potential energy saving measures. Norwegian technical assistance program has also implemented an audit program in selected public buildings and developed training courses for auditors and municipal energy managers in cooperation with the State Architecture and Construction Agency. A few pilot projects have been supported to demonstrate the viability of energy efficiency measures in schools and hospitals, based on metering. The proposed project will complement the above efforts by introducing the concept of integrated building design approach and more advanced energy performance-based building codes.

18. A dialogue has been initiated between UNDP and KfW regarding potential cooperation within on-going Village Investment Project (VIP-KfW) implemented by the Kyrgyzstan Community Development and Investment Agency (ARIS) which provides grant and loan financing for local communities to improve economic and social infrastructure, including construction of new energy efficient public buildings (schools, kindergartens and hospitals). KfW is interested to work with UNDP/GEF project and support replication of IBD approach in other public buildings in Osh and other municipalities covered by VIP-KfW; scope and modalities of KfW's financial assistance will be agreed upon following trhe completion and sucessful demondation of IDB in pilot buildings.

19. The project falls under the UNDP-led GEF Global Framework for Promoting Low Carbon Buildings with a primarily focus on two thematic approaches promoted by the Framework: a) Promotion and increased uptake of High Quality Building Codes and Standards – by introducting and enforcing mandatory energy efficient building codes; and b) Developing and Promoting Energy Efficient Building Technologies, Building Materials and Construction Practices – by piloting integrated building design. The coordination platform offered by the global framework will help Kyrgyzstan learn from experiences and best practices from countries with similar on-going energy efficient building projects, including in the neighboring countries (Uzbekistan and Turkey).

II C Baseline and Alternative Scenarios for GHG emissions

20. The Government does not presently have plans, capacities and expertise to revise its building codes, build its enforcement capability, strengthen building product certification, introduce integrated building design, and nor are there plans to provide energy efficiency training for inspectors, architects, engineers.

21. A basic calculation has been made to compare a *baseline scenario*, where measures to improve the energy performance of buildings would be implemented at a later date and without sound coordination between building code changes and improvements to enforcement, and an *alternative scenario*, corresponding to a set of measures regarding the improvement of energy performance building codes, improved enforcement of legislation, integrated building design and promotion activities. The proposed measures have been assessed according to thermal

requirements following the existing building codes and compliance levels that will be increased over time. The calculated GHG benefit is to show the highest effectiveness when implemented in a combination of described measures.

22. Main assumptions and data used for the calculation of the baseline and project scenarios (see Figure 1 for detailed calculation methodology and results):

- Existing residential building stock in Kyrgyzstan, based on 2000-2005 statistics from the National Statistics Committee of Kyrgyzstan, and new building data (estimations until year 2025) provided by Gosstroi (see Table 1 above)
- Assumed rate of new construction, replacement and renovation of multi-unit residential, single-family houses, and public buildings, namely schools & kindergartens, hospitals (Table 3)

Table 3: Assumed rate of new constructions, replacement and renovation in 2005-2020

Annual Rates in %	**Year**		
assumed replacement	**2005-10**	**2011-2015**	**2016-2020**
Apartments	0.01%	0.02%	0.03%
single houses	0.20%	0.20%	0.20%
kindergartens & schools	0.40%	0.30%	0.30%
Hospitals	0.22%	0.25%	0.25%
assumed new construction growth	**2005-10**	**2011-2015**	**2016-2020**
Apartments	8.00%	6.00%	5.00%
single houses	3.75%	3.50%	3.50%
kindergartens & schools	0.75%	0.6%	0.6%
Hospitals	0.22%	0.25%	0.25%
assumed renovation	**2005-10**	**2011-2015**	**2016-2020**
Apartments	0.10%	0.15%	0.20%
single houses	0.20%	0.20%	0.20%

Source: Gosstroi

- Specific energy demand of existing building stock used for the baseline scenario:

Table 4: Specific energy consumption in existing building stock

in kWh/m².a	**Stock in 2005**
Apartments	140
Single houses	160
Kindergartens and schools	140
Hospitals	140

Source: National Statistics Committee

- CO2 emission factor for the building sector, based on 2005 energy mix (according to information provided by energy utilities and own calculations). Average tons of CO2 produced per MWh of heat is based on 2005 statistical information on heat sources used in different types of buildings. Assumptions have been made how this energy mix is going to change until 2025, based on information from Gosstroi:

Table 5: CO2 emission factor for Kyrgyzstan building sector

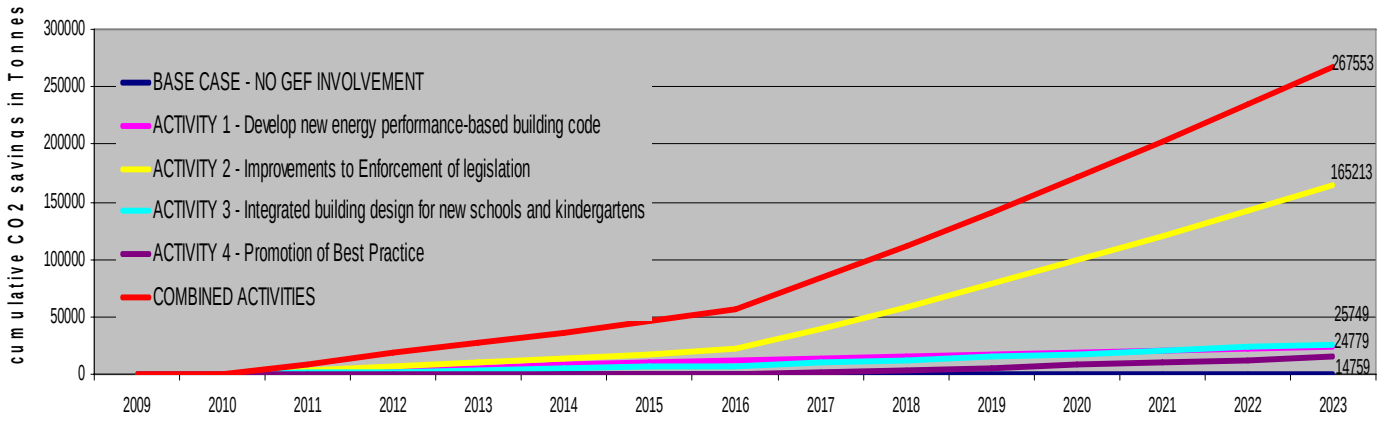
t CO2 / MWh (based on heating mix)	**Existing building stock**	**2005 (new buildings)**	**Estimations**		
			2006-2010	**2011-2015**	**2016-2021**
multi-unit residential	0.28	0.14	0.14	0.13	0.13
single family homes	0.10	0.12	0.12	0.12	0.12
kindergartens and schools	0.20	0.13	0.12	0.12	0.12
hospitals	0.20	0.13	0.12	0.12	0.12

Source: Gosstroi

23. Under the ***baseline scenario***, it is assumed that during next 15 to 20 years, major improvements of the building quality of the existing and new building stock would be omitted mainly because of the lack of enforcement of existing thermal requirements and quality of building materials. Although it is estimated that the thermal requirements of the building code will improve, the average level of compliance with the building code will remain very low. After 2020, only 5% of apartments, 10% of public buildings, but factually none of the single family houses are expected to show major compliance with the thermal standards being in place. As a result, the quality of the new and existing building stock of residential and public buildings will only slightly improve until 2025. Without increased capacities to strengthen the enforcement of energy performance codes it is assumed that the specific energy demand of buildings will decrease only marginally by approximately 3-5%, i.e. from 140 kWh/m²a to 132 kWh/m²/a for multi-unit residential buildings.

24. The ***GEF Project Scenario*** takes into consideration that a set of measures is being put in place to improve energy performance in buildings continuously and significantly. Once all activities foreseen under the GEF project (development of new energy performance-based building code, improvements in enforcement, pilot project and integrated building design and construction practices, promotion of best practices) are realised, energy demand of the building stock will be reduced, thus reducing the non-compliance of buildings already from 2011 on significantly. From 2016 onwards, it is expected that in fact all large-scale construction (multi-unit residential and public buildings) are out of non-compliance, and 75%-90% will completely adhere to all thermal standards. For the single-family houses, it is expected that the improvement will be much slower, but still 10% of the homes will comply with the requirements.

Figure 1: Cumulative new building lifecycle CO2 emission reduction compared to BASE



II.D Risks and risk management measures

25. A medium level risk is that enforcement levels do not improve sufficiently. In this case support to improve enforcement capacities will be concentrated in urban centers and on new building sectors where permit and inspection mechanisms are already well established and rapid growth is evident - most notably new multi-unit residential buildings.

26. Another risk, estimated to be rather low, is that cooperation between national organizations would not be optimal. To limit this risk further, a focal point will be appointed by Gosstroi to coordinate the national actors with support from the Project Manager. Steering Committee meetings will be organized on a regular basis to facilitate exchange of information and define cooperation.

27. Finally, there is a risk for the integrated project design not to be adopted by other municipalities than the two cities chosen for the pilot project. That would in effect limit the replicability factor of the project. However, given the involvement of the State Agency for Local Government Affairs in Outcome 3 (Pilot project and dissemination activities), and given the willingness expressed by Gosstroi to promote and implement such a design in public buildings, this risk should be relatively circumvented.

III.E Cost-effectiveness

28. The project will lead to a total GHG emission reduction of 267,000t CO2 by 2022 (See Annex F for details). With total project budget of 4 million US$ the CO2 abatement costs are about 15 US$/t CO2. In order to assess the cost effectiveness of the project, reference has been made to available sector studies analyzing GHG abatement potential and costs in buildings around the world.

29. Some of the most comprehensive analysis in this regard has been undertaken by the Working Group III of IPCC in their review of climate change mitigation potential in residential buildings[4]. IPCC suggests that about 32% of the projected global baseline emissions in the residential sector can be avoided cost-effectively through no or low cost best-practice measures cheaper than 20 US$/t CO2. Conversely, the study indicates that almost two-thirds of the potential can be realised only at a cost higher than 20 US$/t CO2. While the report mentions that it is impossible to draw universal conclusions regarding individual measures and end-uses applicable to a specific country, the most cost-effective measures suggested for countries in more northern locations, such as Kyrgyzstan, are fully consistent with proposed measures and include:

- Fuel switch and heat-saving measures, including insulation of walls, roofs, windows and floors, as well as improved heating controls for district heating
- Shift to more efficient appliances and lighting in buildings to reduce electricity consumption.

PART III : Management Arrangements

30. The national executing agency for the Project is the ***State Architecture and Construction Agency***. The Director's Office will be responsible for the overall coordination within the Agency and with other stakeholders. Other Departments within the Agency to be involved in project implementation are the Licensing and Certification Department, the State Inspectorate on Architecture and Construction, and the Center of Construction Certification

31. The Agency will allocate dedicated technical staff to support project implementation on a full and part-time basis, laboratory and other facilities, as well assign National Project Director to provide for overall project management and coordination with Agency's work. The following tasks to be performed by Gosstroi were agreed during the project preparatory phase:

Objective	***Tasks to be performed***
Over-all project coordination	- Co-ordination of activities within the Architecture and Construction Agency, and between the national stakeholders (municipalities and other governmental agencies) - Liaison with the Executive Agency (UNDP) and national and international consultants
Legislation –	- Co-ordination of the Commission and the Working Group in charge of

4 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.

introduction of new normative-legal basis of energy building	the preparation and submission of IBD - Draft building energy performance code (SNiP) with support from national and international experts - Approval of final version of the standards
Enforcement of legislation - ensure the implementation of the new standards' requirements	- Elaboration of national calculation methodology to determine the energy consumption based on standardized use and fixing the minimal requirements for thermal insulation, heating and air-conditioning installations, application of renewable energy sources and design of the building - Development of the procedures for the creation of an energy certification system for buildings, including the issuing building efficient energy passports - Strengthening of national capacity for certification of building materials and components for the building sector - Training for building inspectors on energy performance assessment procedures and calculation methodologies: capacity building of staff responsible at the State Architecture and Construction Inspectorate and the local Inspectorate Departments in main cities
Pilot projects – To disseminate the results of the pilot projects and to multiply the impacts related to the adoption of the new standards	- Participation in the development and implementation of an operational plan to extend the integrated building design demonstrated in the pilot project(s) to other municipalities and to the state-owned building stock - Cooperation with municipalities and with the State Agency for local Government Affairs
Dissemination – to enable the building sector to respond to more stringent building code requirements and to encourage the construction of more energy efficient buildings	- Organization of a workshop on energy performance for building and construction professionals - Training in the field of building energy performance solar architecture and applications for renewable energy sources in buildings: selection of staff and participation in training courses - Organisation of an information campaign for the general public promoting benefits of new building code

32. ***UNDP*** will act as the GEF Agency for this Project. The project builds on strong UNDP experience in Kyrgyzstan and in Central Asia with promoting energy efficiency and environmental protection, supporting democratic governance and poverty reduction initiatives. UNDP's National Governance Programme for the Kyrgyz Republic aims at supporting the country to establish an effective and transparent system of national government. UNDP has helped the Kyrgyz parliament to open its processes to the public, and advised on reforming of its procedures and structure. The project conforms with UNDP's agreed strategies to support good governance including: (i) Policy advice and technical support; (ii) Capacity development of governmental institutions and individuals; (iii) Advocacy, communications, and public information; and (iv) Knowledge networking and sharing of good practices. UNDP brings to the table a wealth of experience working with Government in the arena of reform, and is well–positioned to assist in both capacity building and institutional strengthening. As always, the UNDP Country Office will be responsible for ensuring transparency, appropriate conduct and professional auditing. Staff and Consultants will be contracted according to the established Rules and Regulations of the United Nations and all financial transactions and agreements will similar follow the same Rules and Regulations.

33. ***Project Implementation Unit will*** consist of Project Manager and Project Assistant to be hired for the full duration of the project. Project manager will be responsible for day-to-day management of all project activities, staff, consultants, disbursements, etc and for ensuring that M&E requirements are met in a timely fashion. Project Assistant will be responsible for secretarial and administrative tasks. Consultants, will be hired as required (based on pre-agreed ToRs and selection processes) by a selection committee which will include UNDP and State Agency for Construction and Architecture. Selection will be by unanimous agreement.

34. The primary stakeholders in this Project at the national level to be invited to participate in the ***Project Project Board*** are:

- State Architecture and Construction Agency;
- State Agency for Environmental Protection and Forestry:
- State Agency for Local Government Affairs;
- State Agency for Energetics and Gases;
- Municipalities of the cities where pilot projects to be implemented
- Kyrgyzstan University for Building, Transport and Architecture;
- Kyrgyz-Russian (Slavic) University
- Professional building and construction organizations/associations,
- Research institute for architecture and antiseismic construction
- Energy efficient NGO.

The relations between the different project stakeholders are presented in organigram in the Section IV.

35. In order to accord proper acknowledgement to GEF for providing funding, a GEF should appear on all relevant GEF project publications, including among others, project hardware and vehicles purchased with GEF funds. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgment to GEF. The UNDP logo should be more prominent -- and separated from the GEF logo if possible, as UN visibility is important for security purposes.

PART IV: Monitoring and Evaluation Plan and Budget

36. Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP/GEF Regional Coordination Unit in Bratislava. The Strategic Result Framework in Section II provides performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis on which the project's Monitoring and Evaluation system will be built. Detailed description of the principle components of the Monitoring and Evaluation Plan is provided in the Section G of the Request for CEO Approval/Endorsement; indicative cost estimates related to M&E activities are presented 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 CO, UNDP GEF	$3,000	Within first two months of project start up
Inception Report	▪ Project manager ▪ UNDP CO	None	Immediately following IW
Measurement of Means of Verification for Project Purpose Indicators	▪ Project manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members	To be finalized in Inception Phase and Workshop. Cost to be covered by targeted survey funds.	Start, mid and end of 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 regional field officers and local IAs	TBD as part of the Annual Work Plan's preparation. Cost to be covered by field survey budget.	Annually prior to APR/PIR and to the definition of annual work plans
APR and PIR	▪ Project manager ▪ UNDP-CO ▪ UNDP-GEF	None	Annually
TPR and TPR report	▪ Government Counterparts	None	Every year, upon

	▪ UNDP CO, project manager ▪ UNDP-GEF Regional Coordinating Unit (RCU)		receipt of APR
Periodic status reports	▪ Project manager	None	TBD by project manager and UNDP CO
Technical reports	▪ Project manager	3,000	TBD by project manager and UNDP-CO
Mid-term evaluation	▪ Project manager ▪ UNDP- CO ▪ UNDP-GEF RCU ▪ External Consultants (evaluation team)	22,000	At the mid-point of project implementation.
Final External Evaluation	▪ Project manager, ▪ UNDP-CO, UNDP-GEF RCU ▪ External Consultants (evaluation team)	22,000	At the end of project implementation
Terminal Report	▪ Project manager ▪ UNDP-CO ▪ External Consultant	None	At least one month before the end of the project
Lessons learned	▪ Project manager ▪ UNDP-GEF RCU (formats for documenting best practices)	4,000	Yearly
Audit	▪ UNDP-CO ▪ Project manager	4,000 (average $1000 per year*)	Yearly
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	▪ UNDP Country Office ▪ UNDP-GEF Regional Coordinating Unit (as appropriate) ▪ Government representatives	12,000 (average one visit per year)	Yearly
TOTAL INDICATIVE COST *Excluding project staff time, UNDP staff and travel expenses.*		US$ 70,000	

PART V: Legal Context

37. This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of Kyrgyzstan and the United Nations Development Programme, signed by the parties in 1993 The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

38. The UNDP Resident Representative in Kyrgyzstan is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes:
    a) Revision of, or addition to, any of the annexes to the Project Document;
    b) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;
    c) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and
    d) Inclusion of additional annexes and attachments only as set out here in this Project Document.

SECTION II: STRATEGIC RESULTS FRAMEWORK

Project strategy	Objectively Verifiable Indicators				
Goal	Promote low GHG intensive buildings in Kyrgyzstan				
	Indicators	**Baseline**	**Target**	**Means of Verification**	**Important assumptions**
Project objective: Reduce energy consumption and associated GHG emissions in Kyrgyzstan building sector	Average thermal energy consumption in new/renovated residential/public buildings	Thermal energy consumption on average: 135 kWh/m²	Thermal energy demand reduced to an average of 110 kWh/m² (by 20%)	National statistics based on data from energy and GHG monitoring system to be set-up by the project	High growth rates for new construction sustain Monitoring is accurate
	New building lifecycle CO2 emission	5,6 mln t CO2 eq	5,3 mln tCO2 or 267,000 tCO2 eq less than in baseline		
Outcome 1. Improved energy performance codes	Adoption of mandatory energy efficient building code and its regular updates implemented	Current code exists since 1998 without revisions; it does not provide for performance-based energy consumption standards	New performance-based EE code adopted in 2010 and is being updated every 3 years	Official publication of adopted legislation and sequence of updates	National institutions remain motivated to implement advanced mandatory legal framework for buildings
	Level of minimum mandatory thermal requirements for buildings	90-100 kWh/m²	10-20% decrease down to 80 kWh/m²	New performance-based EE building code	Cost-effectiveness of stricter minimum thermal performance requirements is demonstrated
	Capacity of national authorities to design advanced building codes and ensure their regular update	Absence of trained staff and tools	Calculation methodology to determine building energy consumption agreed, software obtained and staff of Construction/Architecture Agency trained in its application	Available calculation methodology and tools Project Progress and M&E reports	Trained staff are not seeking employment elsewhere
Outcome 2. Improved enforcement of mandatory energy efficiency building	Level of enforcement of new standards (% of new buildings)	Low levels of compliance: max. 10%	Compliance levels radically improved up to 80%	National energy monitoring system for buildings	Monitoring is accurate Illegal construction of

					individual single-family houses is decreased
	Capacity to assess building energy performance in line with new standards	Insufficient technological base and absence of trained personnel	Laboratories equipped by end of year 1 20 staff from the Agency and University trained to undertake energy performance assessment by end of year 1	Project Progress and M&E reports	Trained staff are not seeking employment elsewhere
codes	Enforcement capacity for EE building code: trained staff, rules and procedures for building certification	Weak capacity of Building inspectorate and lack of regulations/rules to ensure compliance check	Procedures for mandatory building certification system adopted and tested by year 2 150 Building Inspectors trained in their application by end of year 3 Building certification works by year 3	Project Progress and M&E reports Statistics on energy certification	Mandatory energy efficiency building codes are in place Trained staff are not seeking employment elsewhere
Outcome 3. Pilot projects utilizing an integrated design approach	Energy- and cost-saving and social impact of integrated building design (IBD) in comparison with similar buildings	No buildings are built following IBD approach	No or maximum 10% increase in construction cost 35% decrease in building energy consumption or 1,140 tCO2e from pilot buildings Better comfort for users	M&E reports, site visits Specific reporting for the pilot and "reference" buildings, including energy consumption, costs and occupants survey	Integrated design and equipment properly installed Continued increase in gas and electricity price
	Scale of replication for IBD approach	No buildings are built following IBD approach	IBD introduced to all new public buildings in two largest Kyrgyz cities (Osh and Bishkek) by the end of the project	Municipal reports on implementation of public construction programmes	Availability of trained national staff in building industry to implement IBD Cost-effectiveness of IBD is proved and convincingly demonstrated
	New curricula on energy	Absence of regular	Curricula developed,	Report on curricula	Sufficient capacity of

Outcome 4. Promotion of best energy design and building practices in construction sector	efficient building design for universities	or vocational training opportunities on EE building design	registered with Ministry of Education and introduced in Kyrgyz University for Construction, Transport and Architecture	implementation (number of students with certified diploma)	professors to deliver new educational curricula
	Number of trained building engineers and architects	Slow improvement of knowledge by professionals	At least 100 industry professionals receive training in application of new codes	Project progress reports	Industry is willing to comply with new regulations
	Development of new products in conformity with new standards	Construction materials and building industry slow to develop new products	Larger availability of efficient materials and services	Industry reports: catalogue of building products, materials from BishkekBuild Exhibition	Industry has technical and financial capacity to develop new products and services
Outcome 5. Monitoring of building energy consumption and GHG emissions	Availability of accurate and up-to date data on energy consumption and CO2 emissions in buildings	Limited national capacity to monitor and assess energy savings and CO2 emissions in buildings	Monitoring system, including institutional framework, trained staff and technical tools and methodology, is in place by the end of the project	Project progress report and final evaluation report Annual reports on energy and GHG emissions in building sector	New calculation methodology to assess building energy performance and GHG emissions is officially adopted

SECTION III : Total Budget and Workplan

GEF Outcome/Atlas Activity	Responsible Party	Fund ID	Donor Name	Atlas Budgetary 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 Improved energy performance codes	**UNDP**	**62000**	**GEF**	71200	International Consultants	17,000	15,000	8,000	6,500	46,500	*1*
				71300	Local Consultants	3,000	3,000	750	750	7,500	*2*
				72100	Contractual services				4,500	4,500	
				71600	Travel	1,500	1,500	1,500	1,500	6,000	
				74500	Misc.	375	375	375	375	1,500	
				74200	Audio, video and print production costs			4,000	10,000	14,000	*16*
					Total Outcome 1	**21,875**	**19,875**	**14,625**	**23,625**	**80,000**	
Outcome 2 Improved enforcement levels of mandatory energy efficiency building codes	**UNDP**	**62000**	**GEF**	71200	International Consultants	7,000	8,000			15,000	*3*
				71300	Local Consultants	3,000	3,000	4,500	4,500	15,000	*4*
				72100	Contractual services		15,000	15,000	10,000	40,000	*5*
				71600	Travel	6,250	6,250	6,250	6,250	25,000	
				72200	Equipment	30,000	24,800			54,800	*6*
				74200	Audio, video and print production costs	15,000	15,000	15,000	15,000	60,000	*16*
					Total Outcome 2	**61,250**	**72,050**	**40,750**	**35,750**	**209,800**	
Outcome 3 Pilot project with integrated approach	**UNDP**	**62000**	**GEF**	71200	International Consultants	60,000	60,000	6,000	6,000	132,000	*7*
				71300	Local Consultants	10,000	10,000	7,000	6,000	33,000	*8*
				72100	Contractual services		100,000	60,000	20,000	180,000	*9*
				71600	Travel	3,500	3,500	4,000	4,000	15,000	
				74500	Misc.	1,000	2,000	1,000	1,000	5,000	
				72200	Equipment	60,000	5,000			65,000	
				74200	Audio, video and print production costs			10,000	10,000	20,000	*16*
					Total Outcome 3	**134,500**	**180,500**	**88,000**	**47,000**	**450,000**	
Outcome 4 Promotion of EE practices in building sector	**UNDP**	**62000**	**GEF**	71200	International Consultants	4,000	4,000	4,000	4,500	16,500	*10*
				71300	Local Consultants	3,000	3,000	3,000	3,400	12,400	*11*
				71600	Travel	1,000	1,000	1,000	2,000	5,000	
				74500	Misc.	150	150	150	150	600	
				74200	Audio, video and print production costs	2,000	3,000	3,000	7,500	15,500	*16*
					Total Outcome 4	**10,150**	**11,150**	**11,150**	**17,550**	**50,000**	
Outcome 5 Energy and GHG	**UNDP**	**62000**	**GEF**	71200	International Consultants	5,000	10,000	10,000	8,000	33,000	*12*
				71300	Local Consultants	1,500	1,500	1,500	1,500	6,000	*13*

GEF Outcome/Atlas Activity	Responsible Party	Fund ID	Donor Name	Atlas Budgetary 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:
saving monitoring				71600	Travel	1,000	2,000	2,000	1,900	6,900	
				72200	Equipment			7,000	7,100	14,100	
				74200	Audio, video and print production costs			5,000	5,000	10,000	16
					Total Outcome 5	**7,500**	**13,500**	**25,500**	**23,500**	**70,000**	
PROJECT MANAGEMENTS	**UNDP**	**62000**	**GEF**	71400	Project Manager (50%)	6500	6500	6500	6500	26,000	*14*
				71400	Project assistant (50%)	3250	3250	3250	3250	13,000	*14*
				74500	Misc.	300	300	300	300	1,200	
					Subtotal GEF	**10,050**	**10,050**	**10,050**	**10,050**	**40,200**	
		00012	**UNDP**	71400	Project Manager (50%)	6,500	6,500	6,500	6,500	26,000	*14*
				71400	Project Assistant (50%)	3,250	3,250	3,250	3,250	13,000	*14*
				71600	Travel	1000	1000	1000	1000	4,000	
				72100	Contractual services (audit)	1,000	1,000	1,000	1,000	4,000	*15*
				72200	Equipment	1,000				1,000	
				72500	Stationary	500	500	500	500	2,000	
					Subtotal UNDP	**13,250**	**12,250**	**12,250**	**12,250**	**50,000**	
					Total Management	**23,300**	**22,300**	**22,300**	**22,300**	**90,200**	
					PROJECT TOTAL	**258,575**	**319,375**	**202,325**	**169,725**	**950,000**	

Budget notes

1 Includes:
- 10% time cost of International Architect/Designer, Civil Engineer, Electro-mechanical Engineer, Building Physics Engineer, and Landscape Architect
- 100% time cost of EE Building Code Expert
2 30 person-week of Local Building Code expert
3 5 person-week International Energy/Certification Expert
4 60 person-week Local Institutional Capacity Development Expert
5 Contracts for organization of "Training programme for building inspectors on application of new EE Building code and building certification"
6 Laboratory equipment to undertake energy performance assessment in buildings
7 80% time cost of International Architect/Designer, Civil Engineer, Electro-mechanical Engineer, Building Physics Engineer, and Landscape Architect
8 Costs of Local Architect/Designer, Engineer, Electro-mechanical engineer, and PR specialist (148 person-weeks)
9 Contractual services for integrated building design of pilot buildings, construction oversight and quality control/quality assurance
10 10% time cost of International Architect/Designer, Civil Engineer, Electro-mechanical Engineer, Building Physics Engineer, and Landscape Architect
11 Costs of EE Training Curricula Development Expert and Construction materials and insulation specialist (60 person-weeks)
12 Cost of international evaluation experts and GHG monitoring expert (11 person-weeks)
13 Cost of local evaluation experts and GHG monitoring expert (30 person-week)
14 208 person -weeks of project manager (USD 52,000) and 208 person -weeks of project administrative assistant (USD 26,000); paid by UNDP and GEF (50%-50%)
15 Cost of annual financial audit (1,000 US$/year)
16 See Table III-1 below for details

Table III- 1 Breakdown of project audio, video and print production costs

Outcome	*Budget, US$*	*Description*
1: Improved energy performance codes	4,000	Bilingual publication (Russian-Kyrgyz) of national calculation methodology for building energy consumption
	4,000	Bilingual publication (Russian-Kyrgyz) of new mandatory buildings codes
	6,000	Organization of three round-table discussion at Kyrgyz TV to promote new building codes
2: Improved enforcement of building codes	12,000	Design and issuance of building Energy Passports
	23,000	A set of marketing materials on building Energy Passports targeting various categories of users: inspectors, investors, building/flat owners and users and associated PR campaign (including in mass-media)
	25,000	Publication of textbook for architects and inspectors on performance–based building codes and integrated building design
3: Pilot project with integrated approach	20,000	30 min documentary about the results of two demonstration projects and their broadcast at national and local TV
4: Promotion of EE practices in buildings	10,000	Publication and distribution of catalogue of EE building materials and practices
	5,500	Teaching materials for university on Integrated Building Design
5: Energy and GHG saving monitoring	10,000	Final project report/lessons learnt “Opportunities and benefits for energy saving and CO2 emission reductions in Kyrgyz building sector” (English-Russian-Kyrgyz)

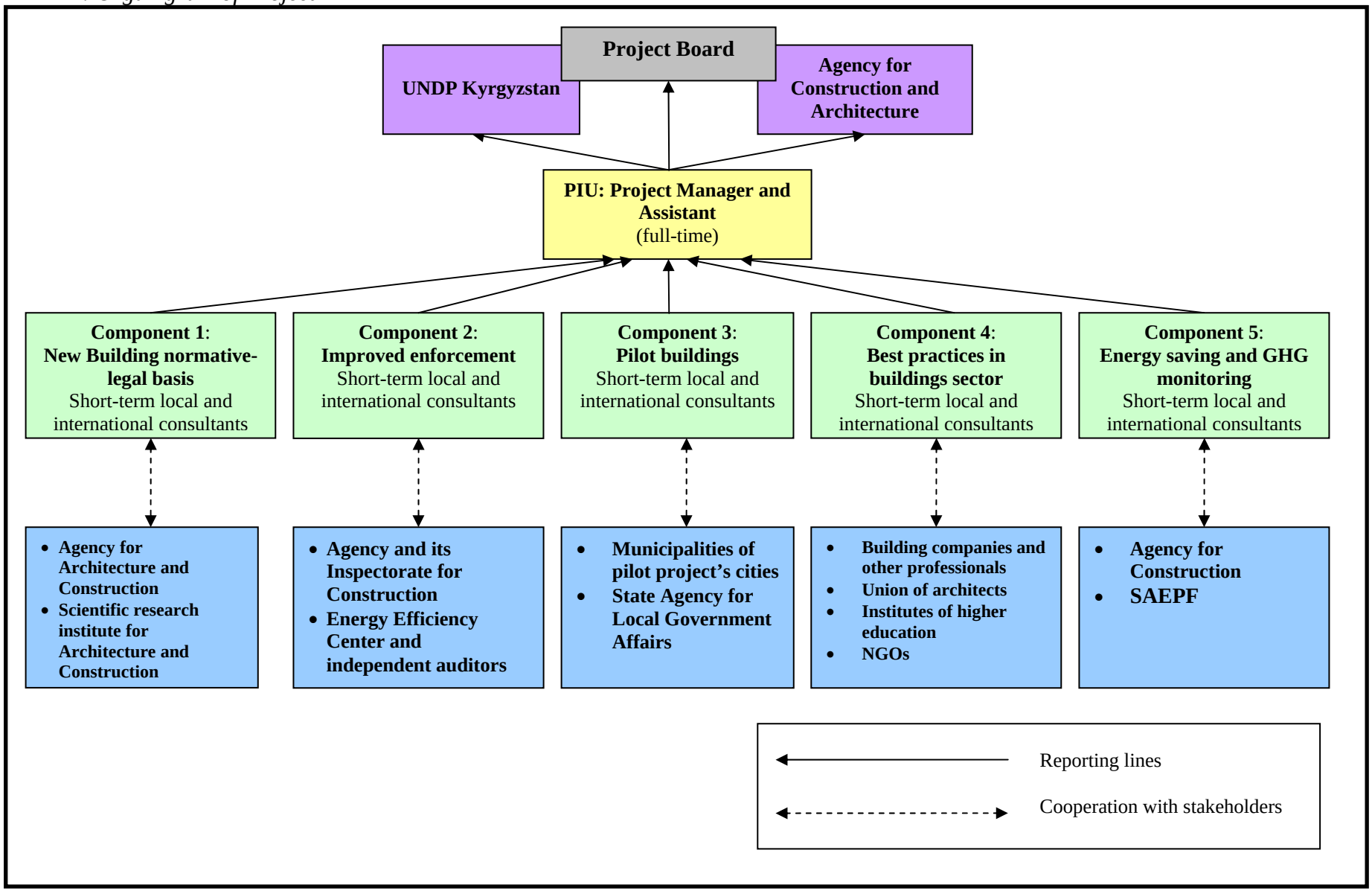
SECTION IV: ADDITIONAL INFORMATION

PART I:

1. Approved MSP PIF

Provided in a separate document

PART II: Organigram of Project



PART III: Project staff

III.A Consultants to be hired for the project

Position Titles	***$/ person week***	***Estimated person weeks***	***Tasks to be performed***
For Project Management			
Local		*580*	
Project Manager*	250	208	• Supervision of overall project implementation. • Responsible for day-to-day management and administration, including supervision of consultants, financial issues and M&E. • Coordination with the UN Country Office and the Project Director on behalf of the Executing Agency. • Organisation of ad hoc meetings and workshops and awareness campaign. • Provision of information about project activities and results on dedicated website. • Preparation of reports.
Project Assistant*	125	208	• Assistance to PM in maintaining close contacts with Government, Executive Agency and other counterparts. • Provision of operational support to PM and project consultants. • Collection of data and relevant information on project development. • Contribution to the preparation of reports. • Assistance in monitoring t project activities. • Assistance in the organisation of ad hoc meetings and workshops and awareness campaign
National Project Director**	250	104	• Co-chairing in PB and co-ordination of activities within the Architecture and Construction Agency, and between the national stakeholders • Supervising and guiding the Working Group in charge of the preparation and submission of the new code • Approval of final version of the code • Review and approval of the procedures for the creation of an energy certification system for buildings, including the issuing building efficient energy passports • Contribute to the design of certification of building materials and components for the building sector and ensure their approval and enforcement • Ensure adequate enforcement of new EE building codes and regulations
Two Demo project coordinators ***	200	60	• Supervise construction of two demonstration buildings in Osh and Bishkek and be responsible for building commissions in line with all national buildings norms and reuqirements • Coordinate work of international architects and local sub-contractors in the process of • Identify capacity gaps and provide input to the design of training programme for local

			construction companies on IBD
* Cost of Project Manager and Assistant will be co-financed by UNDP and GEF (50%-50%) ** Cost of National Project Director will be borne by Gosstroi *** Cost of Local Demo-Project Coordinators will be borne by respective municipality (Osh and Bishkek)			
For Technical Assistance			
Local		*484*	
Building code expert	250	30	Provide technical expertise and advise for development of new building codes, calculation methodology for assessment of thermal energy performance and other relevant norms and standards to incorporate mandatory provisions for integrated building design in new building codes such as climatic design, use of energy efficient materials and equipment
Institutional capacity development expert	250	60	Support Construction and Architecture Agency in preparation of new enforcement procedures for building codes, building and materials certification programme and design TOR for training programme and other capacity building activities for building inspectors
Architect/Designer	250	68	Provide recommendations on application of Integrated Building Design (in close collaboration with international consultants), prepare tender documentation for building construction work, ensure technical oversight over the process of construction of two new energy efficient schools as pilot projects; and contribute to the development of educational curricula for university and act as trainer during training workshops for architects and engineers on IBD
Engineer	200	48	Consult on application of Integrated Building Design for two new energy efficient school buildings and act as trainer during training workshops for architects and engineers on IBD
Electro-mechanical engineer	200	12	Consult on application of Integrated Building Design for two new energy efficient school buildings and act as trainer during training workshops for architects and engineers on IBD
PR specialist	200	20	Design and undertake promotional campaign to disseminate results of IBD pilots among municipalities, building industry professionals, other decision-makers and building occupants
EE training curricula development specialist	200	40	Contribute to the design of new educational curricula and teachers' guide on EE building design and participate as a trainer in roll-out of the programme in first stage (along with relevant international experts).
Construction materials and insulation specialist	220	20	Make analysis on construction materials used in building construction sector, collect information on local producers of construction materials; propose locally available energy efficient materials that can be used for building construction; development of a data-base and catalogue on best available materials and construction materials
Energy and GHG monitoring specialist	200	20	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
National evaluation consultants	200	10	Participate, alongside with the international consultants, in the mid-term and final evaluation of the project, in order to assess the project progress, achievement of results and impacts. Prepare draft evaluation report, discuss it with the project team, government and UNDP, and as necessary participate in discussions to realign the project time-table/logical framework at the mid-term stage. The standard UNDP/GEF project evaluation TOR will be used.
National expert on cross-project coordination, monitoring and evaluation (financed by UNDP)	215	156	Develop sample forms of monitoring and assessment, efficient indicators of assessing activities as well as introducing modern tools of monitoring the project results, Analyze information on monitoring and assessment results and hand in for placement on web-site www.caresd.net and for mass media. Provide entering and renewal of information based on this and sister projects. Provide technical consultative support to project staff on the issues of monitoring and evaluation, and/or develop ToRs for technical assistance as well as develop ToRs for trainings on capacity building and strengthening aiming to fill the gaps of knowledge and skills of personnel. Introduce best international and sub-regional practice through UNDP, GEF and other donor projects; Promote imbedding of the project results in other climate change mitigation projects and programmes that are under development within UNDP, or by other agencies/donors.
International		*81*	
Architect/Designer	3,000	35	Provide advice on development of improved energy performance codes (IBD) (30%) Technical oversight over Integrated Building Design pilot projects construction and monitoring, including consultant coordination and site inspections for 2 new energy efficient schools (60%). Act as trainer for training workshops for architects and engineers on IBD, as well as for EE building educational curricula in universities (10%)
Civil Engineer	3,000	5	Provide advice on development of improved energy performance codes (civil engineering) (30%) Advice on civil engineering planning following Integrated Building Design methodologies for 2 new energy efficient school buildings (60%). Act as trainer for training workshops for architects and engineers on IBD, as well as for EE building educational curricula in universities (10%)
Electro-mechanical Engineer	3,000	5	Provide advice on development of improved energy performance codes (appliances) (30%) Advice on power consumption optimization following Integrated Building Design methodologies for 2 new energy efficient schools (60%). Act as trainer for training workshops for architects and engineers on IBD, as well as for EE building educational curricula in universities (10%)
Building Physics Engineer	3,000	5	Provide advice on development of improved energy performance codes (building physics) (30%)

			Consultant for building physics following Integrated Building Design methodologies for 2 new energy efficient schools as pilot projects (60%). Act as trainer for training workshops for architects and engineers on IBD, as well as for EE building educational curricula in universities (10%)
Landscape Architect	3,000	5	Provide advice on development of improved energy performance codes (Landscape Architect) (30%) Advice on landscape design following Integrated Building Design methodologies for 2 new energy efficient schools (60%). Act as trainer for training workshops on bio-climatic site design for architects and engineers, as well as in the courses on bio-climatic landscape design for for EE building educational curricula in universities
EE Building Code Expert	3,000	10	Support to the State Architecture and Construction Agency in drafting new energy performance code and incorporation international best practices
Energy/Certification Expert	3,000	5	Expert consultant in developing improved building energy performance standards and codes including calculation methodologies. Support developing standardized building material and building energy certification and labels. Assistance to develop strategies for the uptake and handling of the new standards, codes, certification procedures and labels. Consultant for training workshops for architects and engineers. Expert consultant for developing training courses for building auditors, architects and engineers.
Energy /GHG monitoring specialist for buildings	3,000	7	Develop recommendations and support establishment of energy/GHG monitoring system in building sector
International consultants for mid-term evaluation	3,000	2	The main objective of the mid-term international evaluation team will be to determine progress being made towards the achievement of outcomes and will identify course correction to strengthen the chances for the delivery of the expected results. The team will test and confirm the key hypotheses underlying the project, reassess risks and assumptions, 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.
International consultants for final evaluations	3,000	2	The main task of the final evaluation team will be - in accordance with UNDP and GEF guidance - to 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 goals. The final evaluation should

			also provide recommendations for follow-up activities, and the report will feature management response to the issues raised.

III.B Terms of References for key project staff and main sub-contracts

Project Manager

I. Position information	
Position	Project Manager (PM)
Project title	Improving Energy Efficiency in Buildings
Duration	4 years

Under the direct supervision of the UNDP International Senior Programme Officer/Environment, and in close cooperation with the National Programme Director (NPD), the Project Manager is responsible for the day-to-day management and implementation of the Disaster Management Programme including all programme and administrative matters. All work of the Programme Manager will be carried out in line with the Country Programme Action Plan for 2005-2010 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. Justification /objectives

Almost all the Kyrgyz housing stock has been constructed during Soviet period some 35-60 years ago without any regard to energy efficiency. These buildings are now in obsolete condition and do not provide for minimum hygienic and comfort living conditions. Energy use per square meter is almost 3-5 times as those in EU and varies between 320 and 690 kWh/m2 per year. The project aims at reducing energy consumption and associated GHG emissions in Kyrgyzstan building sector by 30-40% as compared to the current level by:

(5) adopting and enforcing mandatory building energy performance codes, standards and labels (the Energy Pass) in line with internationally recognized best-practices;
(6) demonstrating feasibility and viability of an integrated design approach for energy efficiency in public buildings;
(7) building capacity of building and construction professionals to implement new building regulation; and
(8) establishing a system to monitor energy consumption and CO2 emissions in Kyrgyzstan building sector.

III. Functions

1. Be able to manage of the Project implementation during the Project implementation in accordance with approved Project Document ;
2. Be responsible for management of all Project activity, staff, consultants and etc., for timely implementation of requirements on M&E ;
3. Be able to manage the activity of Project Management Unit (PMU) consisting of Administrative-Finance Assistant and National/International Experts.
4. PM is accounts for UNDP Country Office, but should work closely with the Project National Director on behalf of the Implementing Agency.
5. PM coordinates its work with the UNDP Environment Program Staff
6. Analysis of the problem, and also preparation of feasibility study for addressing the challenges and its submission to concerned partners.
7. Analysis of the outputs and account of successful projects and experience of the previous Projects ;
8. Support in rising the awareness of the population regarding the Project activity ;
9. Make survey for receiving objective and reliable information ;
10. Coordination of the Project activity with relevant activity and initiative of the Government ;

11. Technical and organizational support of key institutes in the beginning of pilot implementation; 12. Regular submission of information regarding course of Project implementation on the Portal www.caresd.net for all concerned partners
IV. Outputs
Expected outputs: Successful and timely Project implementation in accordance with objectives, schedule and planned budget. The quality of work of the Manager will be assessed by successful achievement of general objectives of the Project, in particular: Preparation of annual Project reports, working plans and other relevant Project documents ; Documents on informative campaigns;
V. Remuneration
Remuneration is to be made on monthly basis according to Contract after approval of monthly report by UNDP International Senior Programme Officer/Environment
VI. Required qualification and/Competency

Education:	Higher education in economics, finance, business administration and management, biology, energy or relevant field. The availability of Scientific Degree (Master degree, PhD and etc) is an advantage
Experience:	- work experience in project management not less then 3-5 years; - in the sphere of international project management is an advantage
Knowledge of languages :	Excellent knowledge of Russian. Knowledge of English – will be an advantage
Skills	• Strong interpersonal and communication skills • Be able to take decisions • Strong computer skills (Microsoft Office, Internet, e-mail)

Administrative and Finance Assistant

I. Information about Position	
Position	Administrative and Finance Assistant
Project Name	Improving Energy Efficiency in Buildings
Duration	4 years

II. Introduction

Project Administrative and Finance Assistant performs a variety of information collecting, monitoring, technical and administrative and finance services in support of project activities and all national experts under the supervision of National Project Manager (PM). He/she must write and speak very good Russian and English, translate and interpret easily.

III. FUNCTIONS

- Assist the project officers in maintaining close contacts with the Government, Executing Agencies, donors and other counterparts through direct contacts, collection and summarizing of information, proposals, incoming and outgoing documents, drafting letters, organizing meetings under supervision of PM.
- Provide operational support to project activities implementation as well as to project management;
- Collect data and other information on project development and subject-matter activities (e.g. maintain, log, file and update records in prescribed format for subsequent use);
- Contribute to the preparation of status and progress reports by collecting information, preparing tables and drafting selected sections of it. Prepare background material to be used in discussions and briefing sessions;
- Arrange for the recording and processing of government requests for assistance;
- Assist in identification and formulation of development co-operation projects and in preparation of draft project documents;
- Assist in monitoring project/project activities by reviewing a variety of records, including

correspondence, reports, activities, project inputs, budgets and financial expenditures in accordance with UNDP requirements. Prepare and file correspondence and materials relevant to the above; • Assist in translation and organization of preparation of Terms of Reference for national and international experts; • Assist in the organization and logistical preparation for workshops, seminars, visiting missions, field trips and etc; • Assist on financial and administrative maters; • Prepare unofficial translations and may act as interpreter if necessary. • Perform other relevant duties.	
IV. RESULTS	
Accurate and efficient support for all project activities, reflected in approved Work Plan. Accurate project filing system	
V. Remuneration	
Remuneration is effected on monthly basis according to contract terms, upon certification of jobe performance by Project Manager	
VI. Required qualifications and competency	
Education:	• Higher education in economics, finances, business administration, or relevant fields;
Experience:	• Experience in administration and finance area at least 2 years; • Relevant experience in international projects is an advantage;
Languages:	• Excellent knowledge of English, Russian (writing and speaking). Knoweledge of Kyrgyz is an advantage;
Skills:	• Strong and fluent computer skills (MS Office, Internet, e-mail); • Aptitude to work with documents, conduct correspondence and prepare reports; • Excellent analytical, statistical, communication and organizational skills; • Ability to work in a team;

Architect (national)

Background

In 1998, the Government of Kyrgyzstan adopted the Law of Energy Savings which among other items requires the implementation of new construction norms and regulations to limit specific building energy consumption. The project will support the government in the development, adoption and enforcement of new building codes, standards and labels to improve and promote energy efficiency in new buildings and renovations. The project will do this by;

- supporting the Architecture and Construction Agency to develop new building regulations compatible with current CIS and European building energy performance building codes
- supporting adoption, enforcement, regular review and adjustment of these codes
- utilizing Integrated Building Design for the construction of 2 new energy efficient schools as pilot projects which meet and surpass new regulations
- promoting best practice in the construction sector and information campaigns for the general public

The project intends to reduce the energy consumption in new buildings in Kyrgyzstan by 30-40% and provide a global benefit of 267,000t CO_2 emission reduction by 2022.

Duties and Responsibilities

- Participation in Integrated Building Design, tender preparation and site inspections for 2 new energy efficient schools as pilot projects.
- Consultant for training workshops for architects and engineers.

Qualifications and Skills

- Certified architect consultant according to local requirements and law.

- At least 8 years local experience in building construction including planning, permits, contracts and site administration.
- Fluency in written and spoken English.
- Excellent understanding of local construction costs, materials and practices.
- Outstanding time-management, organizational and inter-personal skills.

Reporting arrangements
- Reports to the Project Manager.

Recruitment will be carried out by open competition in line with UNDP principles.

Civil Engineer (national)

Duties and Responsibilities
- Consultant for Integrated Building Design for 2 new energy efficient school buildings.

Qualifications and Skills
- Certified civil engineering consultant according to local requirements and law**.**
- At least 8 years experience in building planning and construction.
- Fluency in written and spoken English.
- Outstanding time-management and organizational skills.

Reporting arrangements
- Reports to the Project Manager.

Recruitment will be carried out by open competition in line with UNDP principles.

Electro-mechanical Engineer (national)

Duties and Responsibilities
- Consultant for Integrated Building Design for 2 pilot projects.
- Consultant for training workshops for architects and engineers.

Qualifications and Skills

- Certified electro-mechanical engineering consultant according to local requirements and law**.**
- At least 8 years experience in planning electro-mechanical installations for new building and building rehabilitation including sizing of systems and cost analysis.
- Fluency in written and spoken English.
- Outstanding time-management and organizational skills.

Reporting arrangements
- Reports to the Project Manager.

Recruitment will be carried out by open competition in line with UNDP principles.

TORS FOR KEY INTERNATIONAL PROJECT CONSULTANTS

Architect (international)

Duties and Responsibilities

- Consultant in developing improved energy performance codes.
- Lead Integrated Building Design including consultant coordination and site inspections for 2 new energy efficient schools as pilot projects.
- Consultant for training workshops for architects and engineers.
- Expert consultant for introducing courses in universities.

Qualifications and Skills

- At least Masters Degree in architecture or construction engineering.
- At least 8 years experience in low-energy building, passive house construction and energy efficient building rehabilitation in cold climates.
- Expertise and leadership in Integrated Building Design practice.
- Good understanding of recent developments in building codes and standards to increase energy efficiency in buildings in Europe and CIS countries.
- Fluency in written and spoken English.
- Good understanding of local construction materials and practices.
- Outstanding time-management, organizational and inter-personal skills.

Reporting arrangements

- Reports to the Project Manager.

Recruitment will be carried out by open competition in line with UNDP principles.

Civil Engineer (international)

Duties and Responsibilities

- Consultant for civil engineering planning following Integrated Building Design methodologies for 2 new energy efficient school buildings.

Qualifications and Skills

- At least Masters Degree in civil engineering.
- At least 8 years experience in building planning and construction.
- Fluency in written and spoken English.
- Outstanding time-management and organizational skills.

Reporting arrangements

- Reports to the Project Manager.

Recruitment will be carried out by open competition in line with UNDP principles.

Electro-mechanical Engineer (international)

Duties and Responsibilities

- Consultant in developing improved energy performance codes.
- Consultant for electro-mechanical planning following Integrated Building Design methodologies for 2 new energy efficient schools as pilot projects.

Qualifications and Skills

- At least masters degree in electro-mechanical engineering.
- At least 8 years experience in energy efficient building and building rehabilitation including use of on-site Renewable Energy Sources.
- Experience in Integrated Building Design practice.
- Fluency in written and spoken English.
- Outstanding time-management and organizational skills.

Reporting arrangements
- Reports to the Project Manager.

Recruitment will be carried out by open competition in line with UNDP principles.

Building Physics Engineer (international)

Duties and Responsibilities
- Consultant in developing improved energy performance codes.
- Consultant for building physics following Integrated Building Design methodologies for 2 new energy efficient schools as pilot projects.

Qualifications and Skills

- At least masters degree in building physics.
- At least 8 years experience in energy efficient building and building rehabilitation.
- Experience in Integrated Building Design practice.
- Fluency in written and spoken English.
- Good knowledge of local construction materials.
- Outstanding time-management and organizational skills.

Reporting arrangements
- Reports to the Project Manager.

Landscape Architect (international)

Duties and Responsibilities

- Consultant for landscape design following Integrated Building Design methodologies for 2 new energy efficient schools as pilot projects.
- Consultant for training workshops on bio-climatic site design for architects and engineers.
- Expert consultant for introducing courses on bio-climatic landscape design for architects and landscape architect in universities.

Qualifications and Skills

- At least masters degree in landscape architecture.
- At least 8 years experience in bio-climatic site design with emphasis on colder climates.
- Experience in Integrated Building Design practice.
- Fluency in written and spoken English.
- Good knowledge of local plant material, climate and practices.
- Outstanding time-management and organizational skills.

Reporting arrangements

- Reports to the Project Manager.

Recruitment will be carried out by open competition in line with UNDP principles.

Legal Expert (international)

Duties and responsibilities

International Legal expert focus on attainment of the following activities:

- Support to the State Architecture and Construction Agency in drafting the new energy performance code
- Support to the municipalities and the project team in procurement issues related to the construction of the pilot projects

Qualifications and skills

- At least Masters Degree in civil law.
- At least 7-10 years of experience of work in one of the following areas: energy law, environmental law, and contractual law.
- Excellent knowledge of the legal system in CIS.
- Solid experience of work in energy sector.
- Fluency in written and spoken English and if possible in Russian.
- Outstanding time-management, organizational and inter-personal skills.
- Excellent computer literacy.
- Excellent drafting skills.

Reporting arrangements

- Reports to the Project Manager

Recruitment will be carried out by open competition in line with UNDP principles.

Energy/Certification Expert (international)

Duties and Responsibilities

- Expert consultant in developing improved building energy performance standards and codes including calculation methodologies.
- Support for developing standardized building material and building energy certification and labels.
- Assistance to develop strategies for the uptake and handling of the new standards, codes, certification procedures and labels.
- Consultant for training workshops for architects and engineers.
- Expert consultant for developing training courses for building auditors, architects and engineers.

Qualifications and Skills

- Post graduate qualification in building energy related discipline.
- At least 5 years experience as a senior energy consultant including experience in developing building energy performance standards, codes and labels.
- Excellent understanding of recent developments in building codes and standards to increase energy efficiency in buildings in Europe and CIS countries.
- Fluency in written and spoken English.
- Good understanding of local construction materials and practices.
- Outstanding time-management, organizational and inter-personal skills.

Reporting arrangements

- Reports to the Project Manager.

Recruitment will be carried out by open competition in line with UNDP principles.

Part IV GHG Emissions Saving Calculations

This part sets out the methodology and explains key assumptions for the following GEF GHG emissions reductions categories:
- Project direct
- Indirect

A. Project direct emission reductions – 1,140 t CO2 eq

Direct emission reduction in the amount of 1,140 tCO2 will be achieved as a result of construction of two energy efficient buildings following Integrated Design Approach. The estimate is calculated based on the following formula and assumptions:

CO2 direct = E * L * C; with

- c – CO2 emission factor, i.e *0.12 tCO2 eq/ MWh*

  Carbon emission factor is derived based on a) CO2 emission factors for various source of fuel in Kyrgyzstan (Table A-1); b) data on existing and forecasted fuel mix in schools and kindergartens (Table A-2). Current and forecasted level of CO2 emission in schools is presented in Table A-3. For the purpose of conservativeness, the minimal estimate (*0.12 tCO2 eq / MWh*) is used.

- L – average useful lifetime of new buildings, *20 years*; and

- E - annual energy saving, i.e. the difference between BASE energy consumption per square meter in a typical school (*140 kWh/m2*) and the targeted level (*90 kWh/m2*) product the area of two pilot buildings (*6,000 m2 and 3,500 m2*).

CO2 direct = 0.05MWh/m2 *9,500 m2*20 years *0.12 tCO2 eq/ MWh
CO2 direct = 1,140 t CO2

Table A-4 presents summary of project direct emission calculations.

Table A-1: CO2-emission rates, tCO2/MWh

DH	0.30
Electricity	0.09
Gas	0.20
Coal	0.35
Black oil/mazut	0.26

Table A-2: Heat sources (from statistical information and new building licenses)

	existing stock (2005)	*assumptions*		
kindergartens and schools		*2006-2010*	*2011-2016*	*2017-2023*
heated by district heating	30%	*5%*	*5%*	*5%*
heated by electricity	30%	*80%*	*80%*	*80%*
heated by coal boilers	15%	*5%*	*5%*	*5%*
heated by gas boilers	15%	*5%*	*5%*	*5%*
heated by biomass oven	5%	*5%*	*5%*	*5%*
heated by other sources	5%	*0%*	*0%*	*0%*

Table A-3: tCO2/MWh average based on heating mix

	existing buildings	2005	*2006-2010*	*2011-2016*	*2017-2023*
kindergartens and schools	0.20	0.13	*0.12*	*0.12*	*0.12*

Table A-4: Direct Project Emissions

Demo site area, m^2	BASE Energy use, kWh/m2a	IBD Energy use, kWh/m2a	Annual energy saving, MWh	CO_2 emission factor, tCO2/MWh	Annual direct emission reductions, tCO_{2yr}	Total direct emission reductions, t CO_2
(1)	(2)	(3)	(4)= [(2)-(3)]*(1)/1000	(5)	(6)=(4)*(5)	(7)=(6)*20 years
9,500	**140**	**90**	**475**	**0.12**	**57**	**1,140**

B. Replication and indirect impact – 22,800 tCO2 eq (bottom-up approach)

The bottom-up approach was used to calculate GHG reduction impact from replication of integrated building design approach to all new building constructions in Kyrgyzstan based on the following formula:

CO2 indirect BU = CO2 direct * RF;

with
CO2 direct = estimate for total direct emission reductions (see section A)
RF = replication factor

In order to complete the estimate, a suitable replication factor must be determined. The factor of 20 will be applied as it is assumed that both Osh and Bishkek municipality will apply integrated building design to all new planned schools building construction from 2010 onwards. In other words 20 new schools buildings (10 in Osh and 10 in Bishkek) would be constructed using IBD between 2010 and 2012.

CO2 indirect BU = 1,140 t CO2 * 20
CO2 indirect BU = 22,800 t CO2

C. Replication and indirect impact – 267,000 tCO2 eq (top-down approach)

A basic calculation has been made to compare a *baseline scenario*, where measures to improve the energy performance of buildings would be implemented at a later date and without sound coordination between building code changes and improvements to enforcement, and an *alternative scenario*, corresponding to a set of measures regarding the improvement of energy performance building codes, improved enforcement of legislation, integrated building design and promotion activities using a top-down approach. The proposed measures have been assessed according to thermal requirements following the existing building codes and compliance levels that will be increased over time.

Main assumptions and data used for the calculation of the baseline and project scenarios:

- Existing residential building stock in Kyrgyzstan, based on 2000-2005 statistics from the National Statistics Committee of Kyrgyzstan, and new building data (estimations until year 2025) provided by Gosstroi – Table C-1

Table C-1: Existing and forecasted building stock in Kyrgyzstan

		Estimation					
Total m² in stock	**Stock in 2005**	**Built 2006 - 2010**	**Built 2011 - 2015**	**Built 2016 - 2021**	**Built 2022-2025**	**Replacements 2006-2025**	**Total stock in 2025 (est.)**
Apartments	18,916,500	252,170	349,432	558,922	474,620	88,445	20,463,200
Single houses	44,138,500	2,790,123	3,329,247	4,829,860	3,820,471	1,976,493	56,931,708
Kindergartens and schools	9,382,038	354,298	288,145	351,519	237,881	627,731	9,986,149
Hospitals	263,293	3,560	3,171	3,858	2,604	13,193	263,293

- Assumed rate of new construction, replacement and renovation of multi-unit residential, single-family houses, and public buildings (namely schools & kindergartens, hospitals) – Table C-2

Table C-2: Annual rate of new construction and renovation

Annual Rates in %	Year		
assumed replacement	**2005-10**	**2011-2015**	**2016-2020**
Apartments	0.01%	0.02%	0.03%
single houses	0.20%	0.20%	0.20%
kindergartens & schools	0.40%	0.30%	0.30%
Hospitals	0.22%	0.25%	0.25%
assumed new construction growth	**2005-10**	**2011-2015**	**2016-2020**
Apartments	8.00%	6.00%	5.00%
single houses	3.75%	3.50%	3.50%
kindergartens & schools	0.75%	0.6%	0.6%
Hospitals	0.22%	0.25%	0.25%
assumed renovation	**2005-10**	**2011-2015**	**2016-2020**
Apartments	0.10%	0.15%	0.20%
single houses	0.20%	0.20%	0.20%

Source: Gosstroi

- Specific energy demand of existing building stock used for the baseline scenario as follows:

Table C-3: Energy demand in existing buildings

in kWh/m².a	Stock in 2005
Apartments	140
Single houses	160
Kindergartens and schools	140
Hospitals	140

Source: National Statistics Committee

- CO2 emission factor for the building sector, based on the energy mix (according to information provided by energy utilities and own calculations) for Kyrgyzstan 2005. The average tons of CO2 produced per MWh of heat is based on 2005 statistical information on heat sources used in different types of buildings. Assumptions have been made how this energy mix is going to change until 2025, based on information from Gasstroi.

Table C-4: tCO2/MWh average based on heating mix

t CO2 / MWh (based on heating mix)	Existing building stock	2005 (new buildings)	Estimations		
			2006-2010	2011-2015	2016-2021
multi-unit residential	0.28	0.14	0.14	0.13	0.13
single family homes	0.10	0.12	0.12	0.12	0.12
kindergartens and schools	0.20	0.13	0.12	0.12	0.12
hospitals	0.20	0.13	0.12	0.12	0.12

NB: The emission factor for the energy mix is rather low, as during the last decade the share of electricity coming mainly from large hydropower plants has dominated the use as a main fuel source in the residential sector (up to 75% in multi-unit buildings and 60% in single family houses). This also explains the large drop of the CO_2 factor in the multi-unit residential sector from 0.28 for the existing stock to 0.14 in 2005 – it is due to a switch from district heating used in the older building stock to electricity in new buildings. In single-family homes, wood (40%) gas (20%) and coal (15%) have been in use in the existing buildings, while new houses also tend to use electricity , leading in total to a slight increase of the CO_2 factor (mainly switch from biomass to electricity).

Baseline Scenario

Under the baseline scenario, it is assumed that during next 15 to 20 years, major improvements of the building quality of the existing and new building stock would be omitted mainly because of the lack of enforcement of existing thermal requirements and quality of building materials. Although it is estimated that the thermal requirements of the building code will improve, the average level of compliance with the building code will remain very low. After 2020, only 5% of apartments, 10% of public buildings, but

factually none of the single family houses are expected to show major compliance with the thermal standards being in place.

As a result, the quality of the new and existing building stock of residential and public buildings will only slightly improve until 2025. Without increased capacities to strengthen the enforcement of energy performance codes it is assumed that the specific energy demand of buildings will only improve approximately by 3-5%, i.e. for example from 140 kWh/m².a to 132 kWh/m².a for multi-unit residential buildings.

Table C-5: Baseline Scenario

BASELINE - NO GEF INVOLVEMENT

		building code thermal requirements			average compliance level		
kWh/m².a	existing stock (2005)	2006-2010	2011-2015	2016-2021	2006-2010	2011-2015	2016-2021
multi-unit residential	140	100	100	90	135.2	134.48	131.75
single family homes	160	120	120	100	156	156	154
kindergartens and schools	140	100	100	90	134.48	132.6	126.5
hospitals	140	100	100	90	134.48	132.6	126.5

		total compliance - thermal requirements			total non-compliance		
% new construction		2006-2010	2011-2015	2016-2021	2006-2010	2011-2015	2016-2021
multi-unit residential		0%	2%	5%	95%	93%	90%
single family homes		0%	0%	0%	100%	100%	100%
kindergartens and schools		2%	5%	10%	93%	85%	70%
hospitals		2%	5%	10%	93%	85%	70%

Project Scenario

The GEF Project Scenario takes into consideration that a set of measures is being put in place to improve the energy performance in all buildings continuously and significantly. In case that all activities foreseen under the GEF project are being realized, the scenario "Combined Activities" will apply. In this scenario the non-compliance of buildings with new energy efficient standards will reduce significantly already from 2011 (see Table C-6 below). From 2016 onwards, it is expected that in fact all large-scale construction (multi-unit residential and public buildings) are out of non-compliance, and 75%-90% will completely adhere to all thermal standards. For the single-family houses, it is expected that the improvement will be much slower, but still 10% of the homes will comply with the requirements.

Table C-6: GEF Project Scenario

COMBINED ACTIVITIES

		building code thermal requirements			average		
kWh/m2.a	existing stock (2005)	2006-2010	2011-2015	2016-2021	2006-2010	2011-2015	2016-2021
multi-unit residential	140	100	90	80	135,2	116,5	84,8
single family homes	160	120	110	95	156	154	147,39
kindergartens and schools	140	100	90	80	133,68	113,5	88,4
hospitals	140	100	90	80	133,68	111,5	86

		compliance - thermal requirements			total non-compliance		
% new construction		2006-2010	2011-2015	2016-2021	2006-2010	2011-2015	2016-2021
multi-unit residential		0%	30%	80%	95%	50%	0%
single family homes		0%	0%	6%	100%	90%	80%
kindergartens and schools		2%	30%	80%	80%	10%	0%
hospitals		2%	30%	80%	80%	25%	0%

GHG emission reduction

According to the methodology applied, it is expected that between 2009 and 2023 the accumulated CO_2 emission reduction for new construction will be approximately 267,000 tons CO2e. As illustrated in the graphs below, the biggest potential is being derived from the improvements of enforcement of legislation, by setting up procedures for the certification of buildings and providing support and training for inspectors. Therefore, activity 2 accounts for about 165,000 tCO2e, whereas the new energy performance-based building code accounts for some 25,000 tCO2e of total reduction.

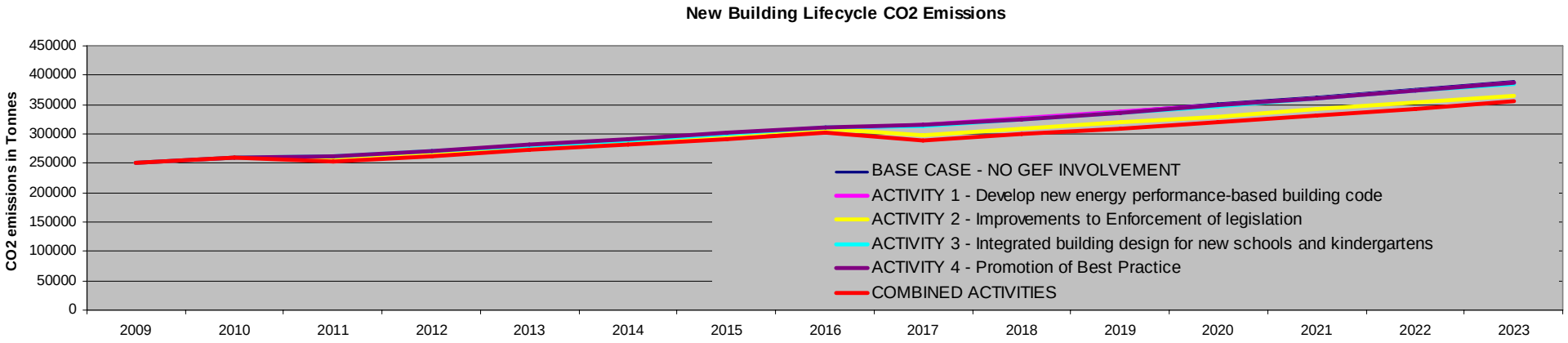
D. Total project GHG emission reduction

Direct Emission Reductions: Part of the outputs of the project will be the following investments: *Construction of two new schools buildings following an integrated building design approach*. These investments will result in direct greenhouse gas emission reductions during the project's implementation phase. As a result of these activities during the project implementation period of four years, direct greenhouse gas emission reductions totaling ***1,140 tons of CO2 eq*** will be achieved over the useful lifetime of the investments of twenty years. In the non-GEF case, these energy needs would be satisfied by power and heat generation capacity with an emission factor of (c) ***0.12 t CO2 e / MWh***. The project does not foresee any activities that would result in direct post-project greenhouse gas emissions.

Indirect Emissions Reductions: Using the GEF bottom-up methodology, indirect emission reductions attributable to the project are ***22,800 tonnes of CO2 eq***. This figure assumes a replication factor of ***20*** (i.e. 20 news schools built using integrated building design approach). Using the GEF top-down methodology, indirect emission reductions attributable to the project are ***267,000 tons of CO2 eq***. This figure represents the total technological and economic potential for GHG emission reductions in new buildings in the period between 2009 and 2023 and assumes a project causality factor of 100% due to the fact that other factors with potential impact on energy efficiency improvements in buildings (e.g. improved compliance with existing building norms and switch to less GHG intensive energy sources in buildings) have already been taken into account when constructing dynamic baseline projects for building GHG emissions (See Table C-5 and graphs below).

The difference between top-down and bottom-up estimation of indirect emission reductions is explained by the fact that project direct and indirect replication impact calculated based on GEF guidelines take into account *only emission reductions from integrated building design in pilot schools in selected municipalities (Component 3)* while project total indirect emission reduction impact calculated using top-down approach also takes into account the introduction of more stringent energy efficient building codes for all buildings, their improved enforcement and wider dissemination of integrated building design approach to other municipalities and type of buildings. As demonstrated above, the biggest share of indirect emission reductions (165,000 tons CO2e) is expected to come from improved enforcement of building norms and building certification, which is not counted in direct project emission reduction impact.

New building lifecycle CO2 emissions:



Cumulative new building lifecycle CO2 emission reduction compared to BASE