



Global Environment Facility

MOHAMED T. EL-ASHRY
CHIEF EXECUTIVE OFFICER
AND CHAIRMAN

January 24, 2001

Dear Council Member:

UNDP, as the Implementing Agency for the project, *Regional (Palestinian Authority, Lebanon): Capacity Building for the Adoption and Application of Energy Standards in Buildings*, have submitted the attached proposed proposal document for CEO endorsement prior to final approval of the project document in accordance with UNDP procedures. This medium-sized project of over \$750,000 was approved by the Council as part of the work program in December 1999.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by the Council and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by UNDP satisfactorily details how Council's comments and those the STAP reviewer have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.gefweb.org. If you do not have access the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Cc: Alternates, Implementing Agencies, STAP



United Nations Development Programme
GLOBAL ENVIRONMENT FACILITY (GEF)



30 June 2000

Dear Mr. *Mohamed* El-Ashry,

Subject: LEB/99/G35/A/1G/99; PAL/99/G35/A/1G/31 - Capacity Building for the Adoption and Application of Energy Standards for Buildings

I am pleased to enclose the regional proposal for Lebanon and Palestine entitled "Capacity Building for the Adoption and Application of Energy Standards for Buildings" which was approved by the GEF Executive Council in December 1999. The response to comments from Council Members is also attached and these comments have been addressed in the project document.

As per paragraph 29 and 30 of the GEF Project Cycle, we are submitting this project to you for circulation to the Executive Council Members for comments and, subsequently, for your final endorsement.

Thank you in advance for expediting the review and approval of this project.

Yours sincerely,

Rafael Asenjo
Executive Coordinator
Global Environment Facility, SEED/BDP

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RESPONSE TO COMMENTS FROM COUNCIL MEMBERS

Regional (Lebanon, Palestinian Authority): Capacity-building for the Adoption and Application of Energy Codes for Buildings, MSP (UNDP) GEF: \$0.99 m; Total: \$1.25 m

COMMENTS FROM COUNCIL MEMBERS

DECEMBER 1999 WORK PROGRAM: COMMENTS FROM COUNCIL MEMBERS
(REFERENCE TO GEF/C.14/6 – NOVEMBER 5, 1999)

Regional (Lebanon, Palestinian Authority): Capacity-building for the Adoption and Application of Energy Codes for Buildings, MSP (UNDP) GEF: \$0.99 m; Total: \$1.25 m

Comments from France:

Energy-efficiency in buildings is a major factor in reducing CO₂ emissions, particularly in Mediterranean countries. FFEM is already implementing a project in this area in Lebanon, and consultations should be held to ascertain what synergies might exist with the proposed project. The primary constraint is not the code itself, but rather, the arrangements adopted to gradually improve building practices as the various sector actors are brought on board.

Comments from Switzerland:

This project is logically built and reflects in its approach the experience of energy saving obtained through Building Codes and Regulations in the last two decades in Northern Europe.

The steps proposed in the proposal are sound and logical.

It seems that the proposal of a Building Code (based on the "Guide [l'isolation thermique et du confort des batiments au Liban]") does not include the installations such as boilers and cooling systems. It would be worth considering the development of a standard which includes building envelope and technical installations as well. It would then be possible to achieve more saving than mentioned in the proposal (25%).

This project should be supported. The issues mentioned above (including HVAC systems) could help, if considered, to increase the saving by application of more global standards.

RESPONSE TO COMMENTS FROM COUNCIL MEMBERS

Regional (Lebanon, Palestinian Authority): Capacity-building for the Adoption and Application of Energy Codes for Buildings, MSP (UNDP) GEF: \$0.99 m; Total: \$1.25 m

Response to the Comments from France:

The current project activities take into account the FFEM on-going project in the area of energy efficiency in Lebanon. The Project Steering Committee includes members from ALME and will include national specialist who have worked or are working in the EEB-FFEM project. The sensitization workshops and material preparation for these workshops will benefit from the results of the other project. The current project has structured activities in a way that integrates efforts and provides training for the various stakeholders of the building sector including market drivers. Conducting the environmental, economic and social assessment and dissemination of the assessment results before final adoption of the thermal building standard will ensure that there are no weak points in the standard and pave the way for adoption.

Response to the Comments from Switzerland:

The current project does not include the installations such as boilers and cooling systems, as the project is mainly directed toward building envelopes. However, these installations will be part of the DSM project that is funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency” during the period 2000-2004.

Output 2.2 of the DSM Project states that: “Energy Efficiency standards and labels designed and their adoption initiated”, and its first activity 2.2.1 states the following: “Identify the first appliance for which minimum efficiency standards and labeling requirements will be developed. It is suggested that air conditioners be the first appliance as this currently has a low saturation rate but is rapidly growing and is a primary contributor to summer peak.” Other energy efficiency standards and labels will target boiler as well as other home appliances. The intended dissemination and technical workshops will include the effect of equipment efficiency on the demanded energy consumption. This will be part of the economic assessment of the current project that should translate the adoption of the thermal standard into reduction in the energy bill of the consumer and reduction in CO₂ emissions.

The activities of this project do observe coordination with the DSM project on issues related to financing modalities and market surveys. (See outputs 1.4 and 1.5 of the current project)

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SECTION A: CONTEXT

The Gaza Jericho Agreement of 1993 and the signing of the “Declaration of Principles” by Israel and the Palestinian Liberation Organization (PLO) in September 1993 gave the PLO control over territory in the Gaza Strip and the City of Jericho. The subsequent Oslo II Interim Agreement and Paris Protocol Agreement of 1995 formally established the Palestinian Authority (PA) and created a new set of economic and political relation between the PA and both Israel and Jordan. Through these agreements, the PA further gained certain monetary, taxing licensing, and police authority. However, the political and economic destiny of the PA remains closely linked to Israel. A large number of Palestinians are employed in Israel, which maintains certain controls over Palestinian imports and exports and polices all border crossings into the PA. Israel further exercises military and police presence within most of the area of the West Bank and about 1/3 of the territory of the Gaza Strip.

The West Bank and Gaza Strip consist of approximately 6,185 square kilometers and are inhabited by 2.65 million people. The West Bank area is 5,820 square kilometers with a population of approximately 1.8 million, while Gaza Strip consists of an area of 365 square kilometers and a population of approximately 0.85 million. The PA’s GDP in 1994 was \$2.5 billion or \$928 per capita. Per capita GNP in 1998 was considerably higher (estimated at \$1775) as the result of the large number of Palestinians that work in Israel. However, per capita GNP has declined to less than \$2,000 since the Paris Protocol, as the result of border closures due to an increase in political tension between Israel and the PA.

The Palestinian economy is largely based on agriculture and services. Agriculture represents about one-third of total GDP; government and other services comprise about 40% of GDP. Industry and construction together account for less than one-quarter of GDP. The PA hopes, however, to develop a large industrial and infrastructure base that is independent of Israel during the remainder of this decade. There are plans to develop a seaport in Gaza and an airport was opened in 1999. However, the environment of political risk and uncertainty that has prevailed during most of the brief history of the PA has inhibited investors from making large scale industrial investments. Continuing trade and immigration restrictions have prevented the PA from developing the seaports.

In 1999, the overall energy consumption in the PA exceeded 872 KTOE, out of which 348 KTOE was consumed by the residential sector (Table A). Space heating, space cooling and lighting represent a high percentage of this quantity. Electricity use in the residential sector accounts for more than 50% of all non-transportation energy use in the PA. The residential sector accounts for more than 40% of the gas and oil consumed by Palestinians in the PA. Most of this high percentage goes for space heating/cooling purposes.

Table A. Energy Use in the Palestinian Authority in 1999

Sector	Energy Usage by Type							
	Electricity		Oil/Gas		Charcoal & Bio-mass		Energy Use	
	KTOE	% of Total	KTOE	% of Total	KTOE	% of Total	KTOE	% of Total
Transportation	0	0	241	42	0	0	241	28
Residential	128	61	137	24	83	96	348	40
Commercial	38	18	68	12	0	0	106	12
Industrial	29	14	120	21	3	4	152	18
Government	13	6	6	1	0	0	19	2
Other	2	1	1	0	0	0	2	0
Total	210	100	573	100	86	0	872	100
% of Fuel Total		24%		66%		10%		100%

Sources: Administrative reports of the Central Bureau of Statistics Feb, 2000

A.1. Description of Subsector

As part of the Mediterranean Region, the Palestinian Territory (PT) enjoys a relatively hot summer and mild winter. Although small in area, the PT has a wide range of climate zones. The Jordan Valley, the Coastal Area, and the mountainous areas of Nablus and Hebron represent three different climate zones. Despite the relatively mild winters and summers that characterize the PT, heating in the winter (November/March) and cooling in the summer (June/September) remain essential.

After the Oslo Agreement between PLO and Israel and the establishment of the PA, West Bank and Gaza have witnessed a boom in the building sector. The number of new building-licenses, for example, granted in the West Bank and Gaza Strip from the first quarter of 1996 to the second quarter of 1997 reached 19,786. In 1999, this numbers settled down to 2,295 new licenses. Nevertheless, the anticipated need for housing units to cover the existing shortage in housing is enormous, exceeding 200,000. The construction of public buildings; schools, hospitals, municipalities, unions and government buildings have increased sharply in the last five years.

Construction and design of buildings in the PT have changed considerably over the last century. Flat roofed and thin walled buildings of relatively low thermal insulation have replaced the old dome-roofed thick high walled houses, which were characterized by good thermal insulation and ventilation. New buildings are, however, characterized by more efficient use of construction material. The need for heating, cooling and ventilation systems increased sharply and energy consumption in the new buildings increased ever since. Kerosene, diesel, charcoal, timber and electricity are the main sources of energy for these buildings. Consequently, there are increases

in energy imports, gas emissions, and health hazards, coupled with a decrease in human comfort. The enhancement of the existing insulating, lighting and ventilation capabilities of new building is essential to reduce the high energy-bills for heating, cooling and lighting.

The Ministry of Local Governments (MLG) took all responsibilities concerning building licensing and town planning, after its establishment in 1994. MLG is presently revising and upgrading the inherited building codes of 1966 in West Bank and 1938 in Gaza. In 1997 the Legislative Council has approved the new Regulations for Building and Planning as presented by MLG. These regulations mainly focus on the administrative polices and general codes for establishment of new buildings. Very little attention was given to energy efficiency codes in these regulations.

The present project is concerned with energy efficiency in buildings. Introducing Energy Codes for buildings that include adoption of high insulation materials, new techniques and building methods for minimizing heat loss in winter and heat gain in summer, better ventilation and solar lighting will yield to a more efficient utilization of energy. The project will have an impact on lowering energy consumption in buildings and minimize greenhouse gas emissions. Energy-efficient buildings will also create better comfort and a healthier environment for residents.

The climatic conditions, economic situation and building methods are very similar in most of neighboring Arab countries and many third-world countries. Thus, this project and its outcomes will equally benefit from, and be beneficiary to, these countries.

A.2. Host Country Strategy

The construction sector in the PA has been under revision for both institutional reform and modernization of tools, regulations and methods. The Palestinian Higher Council of Construction (HCC) was established for this purpose in 1995. The main objectives of the HCC are:

1. Institutional reforms for all parties working in the planning and regulation areas of the construction sector in the PA;
2. Rural development program and the upgrading of the technical and managerial capacities of Palestinian village councils;
3. Rehabilitation of public buildings, schools, hospitals and governmental buildings;
4. Organization of the “engineering” profession working in the construction sector; and
5. Adopting of modern codes for all construction aspects.

The HCC is very aware of the importance of energy-efficient codes for buildings. However, the lack of information, experience and other barriers have so far resulted in a low priority for this matter. The coordination between Palestinian Energy Authority (PEA), MLG and HCC in their efforts to improve energy efficiency in all PA sectors will promote the efforts for establishing the energy efficiency codes in buildings. Links also have been established between the HCC and the PEA which affect the mode of action of the HCC.

The Palestinian Ministry of Local Government (MLG) is presently revising and upgrading the inherited building codes of 1966 (effective in the West Bank) and 1938 (effective in the Gaza Strip). The revisions are largely concerned with health, sanitation, scenery, and planning issues, and will be submitted to the Palestinian Legislative Council for adoption. The MLG, in line with the national energy policy, is concerned and expressed interest in addressing the issue of energy efficiency in buildings within their ongoing activities.

The PEA has adopted an energy policy, which was clearly defined in the Letter of Power Sector Policy and Associated Action Plan (LSPL). The LSPL, signed by the Chairman of the PEA and the Chairman of the PA on July 6, 1997, provides the basis for a new organizational structure of the PA energy sector and clearly indicates that energy end-use efficiency is a priority for the PA.

There have been very little concrete programs and specific targets made for energy efficiency savings in the PA so far, which is attributable to several technical and financial factors. However, the PEA is presently carrying out a GEF/UNDP-funded project which aims at “Energy Efficiency Improvements and Greenhouse Gas Reduction” (PAL/97/G31). This project will assist in reducing the long-term growth of GHG emissions from electric power generation and from consumption of non-renewable fuel resources. The main objective will be to facilitate adoption and implementation of energy conservation measures in residential, commercial, and industrial sectors through education, promotion, financing, and standard-setting activities.

A.3. Prior and Ongoing Assistance

The PEA is presently carrying out a GEF/UNDP-funded project which aims at “Energy Efficiency Improvements and Greenhouse Gas Reduction” (PAL/97/G31), with a total investment of US\$ 2.675 million. This project will assist in reducing the long-term growth of GHG emissions from electric power generation and from consumption of non-renewable fuel resources. The long-term policy and overall objectives will be achieved through:

- supporting efficiency improvement and loss reduction in the distribution of electric power;
- facilitating adoption and implementation of energy conservation measures in residential, commercial, and industrial sectors through education, promotion, financing, and standard-setting activities;
- stimulating and guiding the private sector in the development of a capability for end use energy efficiency service planning, feasibility analysis, conceptual design, and project implementation, including the manufacture of energy efficient products;
- assisting in the international and regional transfer of experience and technology that could be instrumental in GHG emission reduction; and
- promoting public and private sector investments in energy projects that are beneficial for the global environment.

Annex 8 shows the aspects of difference and complementarity between the PAL/97/G31 and this project.

The PEA has also received funds from the European Community to perform energy end-use research and selected energy efficiency projects, and is currently seeking support from ESCWA for the development of a planning study on renewable energy development. These projects address mainly the removal of barriers for end-user energy efficiency. However, the establishment of energy codes for buildings, despite its importance, is still a concern yet to be addressed. Even though the Ministry of Local Government (MLG) will be the active counterpart for this project, the PEA will be a participant at the Steering Committee level in order to ensure compatibility and complementarity between the two energy saving projects.

The UNDP is also supporting the MLG in several rural development projects and support to municipalities and villages councils, part of the assistance includes the construction of schools, clinics, hospitals and other major construction work. The construction through the MLG is seen to abide with outputs of this project.

A.4. Institutional Framework For Subsector

The ultimate PA institution responsible for the approval of building codes, planning schemes and licenses is the Palestinian Higher Council of Construction (HCC). The Authority of this Council supercedes the authorities of the Ministry of Local Government, municipalities and village councils. The HCC includes representation from the following institutions:

1. The Palestinian Ministry of Local Government, Chair, Secretariat and Treasurer
2. The Palestinian Engineer Association
3. The Ministry of Environmental Affairs
4. The Palestinian Ministry of Housing

To ensure the successful implementation of the project activities, a working group will be established to include all stakeholders and counterparts.

Institutional Capability of Major Counterparts

· Ministry of Local Government (MLG)

Palestinian Ministry of Local Government (MLG), which will be the main implementers of the project, was established in 1994 and became responsible for providing all services to local authorities and councils, including licensing, zoning, infrastructure planning, local elections. The MLG has central office in Ramallah and sub-offices in the various governments of the West Bank and Gaza Strip. The MLG includes several departments such as Engineering Department, Planning and Projects Department, and others. The Minister of MLG acts as the chairperson of the Palestinian HCC that revise or establish town planning laws and building codes in the PA areas. MLG staff also acts as the secretary and treasury of this council.

· Palestinian Engineers' Association

The Palestinian Engineers' Association is a unique union of Palestinian engineers and architects. It is concerned with the improvement of the engineering profession and standards of Palestinian engineers. The Association of Engineers is an active body in the design and implementation of

building codes and accreditation of engineering offices, consultants and contractors. In addition, the Association has a continuing education and training program to improve the quality of its members. The Association has offices in both the West Bank and Gaza Strip. The building codes devised by this Association are the codes that are currently applied by the Ministry of Local Government until further revisions are completed.

• **Palestinian Standard Institute (PSI)**

The Palestinian Standards Institute (PSI) is a non-profit independent organization controlled by a council of 19 members. The members represent the PA institutions, industry and trade associations, and academic institutions. PSI was established in 1994 and its main office is located in Nablus. Three other branch offices are located in Gaza, Ramallah and Hebron. PSI works with Palestinian manufacturing and service industries, business and government to put into place the standards, product testing and certification, laboratory accreditation and training. These activities aim to improve Palestinian society and enabling local companies to compete on equal commercial terms with their counterparts at home and abroad.

So far, PSI has adopted more than 600 Palestinian Standards through more than 110 technical committees, accredited 13 laboratories, and granted 65 supervision (product) certificates and 18 quality certificates. A team of technical engineers, certified quality engineers, and certified auditors staffs PSI. Also, PSI has developed many testing labs and currently operates other labs including one newly established for evaluating the energy efficiency of domestic solar water heaters.

• **Palestinian Universities & Research Centers**

(Departments of Architecture, Civil and electrical engineering)

Three major universities in the PT offer undergraduate engineering programs, including civil, electrical, mechanical and architectural engineering. These universities are:

- An-Najah National University in Nablus;
- Bir-Zeit University in Ramallah; and
- Islamic University in Gaza

In addition to those universities, there are partial engineering programs at the Palestinian Technical Colleges in Hebron and Tulkarm (Khadori). An-Najah University is the unique institution that provides a graduate program leading to M.Sc. in engineering in the areas of Structure, Construction, Water and Sanitation, Transportation and Planning.

• **Energy Centers**

The Renewable Energy and Global Environment Research Center (REGERC) at An-Najah National University is a unique academic research center in the PA with members of different academic departments at the University, mainly the Department of Electrical Engineering, Department of Architecture and Department of Physics. Renewable energy, energy efficiency and clean production are the main areas of interest of the Center. The Center is currently carrying out different research projects in the areas of Biogas, end-use energy efficiency, passive solar heating and cooling, and photovoltaic applications. Also, the center has conducted several training courses in those areas.

- **The Palestinian Energy Authority**

The PEA is the agency responsible for the overall coordination of the energy sector, as well as for policy formulation and system development. Specifically, PEA shall have responsibilities in: (1) rural electrification, (2) regional interconnection, (3) energy conservation, and (4) research that cannot be realistically or efficiently commercialized (??). The PEA will coordinate energy efficiency and conservation responsibilities with other organizations working in the field, including the Palestine Energy Center (PEC), an existing independent agency focusing on research and public education.

SECTION B: PROJECT JUSTIFICATION

Although baseline activities are on-going in the PA to update existing building codes and improve end-use energy efficiency, these activities do not address barriers hindering the inclusion of energy codes in the available building codes or construction of energy efficient buildings. This project will add-on the existing activities and will provide the stakeholders with needed support to establish cost-effective energy codes in buildings. Governmental participation will be a requirement to transform codes and guidelines to standards, which in turn will require trained professionals in design and construction to apply the standards in their work. In addition, public awareness will be needed to activate market demand, as well as provide economic incentive scenarios in order to overcome increases in construction cost.

The proposed GEF project provides for incremental costs that are vital to the establishment, adoption and application of energy codes and guidelines for construction in the region. This in turn will contribute to a measurable reduction in energy consumption in the building sector and bring about global benefits by reducing CO₂ emissions and other greenhouse gases in the atmosphere. As such, and by removing barriers to the establishment and adoption of energy codes for buildings, the project falls under Operational Programme 5 of GEF and serves the objectives underlined in the UNFCCC. It also contributes to the integration of global environmental concerns within national developmental activities and benefits.

The regional aspect of the project will facilitate the exchange of knowledge and expertise between Lebanon, PA, and other countries in the region in this field. It would assist the Palestinians to benefit from the Lebanese experience in the establishment of energy codes and guidelines for buildings and the institutional, human and capacity development achieved in process. And, as all Mediterranean countries have similar climate and building design, this project has sound replicability potential.

Moreover, primary energy consumed in the PT is imported and purchased from outside sources making it an expensive commodity and an economic constraint, in addition to being an environmental burden. Thus, the reduction of energy consumption is a national priority.

This project is a timely intervention that presents an opportunity for the PT to address this issue in advance of the anticipated private sector investment \$ 15 billion in the construction sector over the period 2000-2020. It will also add-to and complement the PEA and MLG's on-going activities in this field.

B.1. Problem to be Addressed, Current Situation

After the signing of the Palestinian - Israeli Interim Agreement (Oslo II) in September 1995, the PA areas witnessed a construction boom of buildings and housing units. This wave of construction followed years of strict limitations by Israel on Palestinian construction in the PT. The number of new building licenses granted in the West Bank and Gaza Strip from the first quarter of 1996 to the second quarter of 1997 reached 19,786. Nevertheless, the anticipated need for housing units to cover the existing shortage in housing is estimated at 200,000.

Despite the relatively mild winters and summers that characterize the PT, heating remains essential in the winter season (November – March) and cooling is required in the hot summer (June - September). Electricity, butane (natural gas), kerosene, timber and coal are the common energy sources for heating in winter. Approximately 40% of the 872 KTOE of energy consumed in the PT is used for residential purposes. The consumption of energy by public and service buildings, although undocumented, is apparently substantial, especially for heating, cooling and lighting. Around 23.3% and 0.7% of the West Bank and Gaza Strip households, respectively, use kerosene for heating, while 52.1% and 38.3% use timber and coal. Most cooling systems in the PT areas operate on electricity. Electric lighting is the dominant type, except for 2% of the Palestinian population in rural areas whom are left with no connection to an electricity grid, and thus kerosene and oil lamps are still in use.

The application of innovative building codes to save energy consumption in buildings is therefore essential to reduce emissions of greenhouse gases and energy bills. The existing compulsory building codes in the PA areas are outdated and lack reference to energy-saving modalities. The following barriers have also hindered the voluntary adoption of energy-saving building modalities by Palestinians in the PT:

- Lack of energy codes for buildings;
- Lack of testing laboratory or quality control body for assurance of specifications;
- Inexperienced human and resource capacity in this field;
- Limited access to information and appropriate technologies in this field; and
- Economic constraints due to low per capita GNP of US\$1350.

Potential For Energy Savings In Buildings

As indicated in Annex 7 of the Project Document, the estimated total CO₂ savings from the proposed activities of this project will be 1.95 million tons. This calculation is based on a likely penetration rate of 50% from proposed changes to actual application of a standardized energy saving building code over a twenty-year period. The projected increase of a building growth rate of 2.5% is conservative and will most likely be exceeded, considering the natural population growth rate in the PT and a possible influx of refugees from neighboring countries.

The studies that have been conducted to estimate the potential energy savings by reduction of heat loss in winter and heat gain in summer indicated extremely low thermal resistance of walls, windows, doors, roofs and floors, high air infiltration and lack of proper shadowing in the currently constructed buildings. These results are indicative of the huge amount of energy that

may be saved by introducing proper energy codes in buildings. A preliminary study at the Department of Architecture at An-Najah National University* showed that adding 4 cm of mineral fiber (fiberglass or fiber rock) or polystyrene in walls and roofs of a typical Palestinian building would reduce its heating needs by 60%. Air conditioning requirements will be reduced to 30% if proper shading of direct solar radiation is provided to glass areas on the southern, eastern and western walls of the building. These savings add up to large amounts when replicated in the over 1 million existing housing units and the initially required additional 200,000 housing units to be built in the coming few years.

It is well known that most of the Palestinian modern buildings consist of walls constructed from stones, concrete, bricks and plaster with a total thickness not exceeding 25 cm. Flat roofs are constructed of concrete, hollow bricks and plaster. Technical papers by Palestinian researchers have shown that the typical values of thermal transmittance of walls range between 1.5 and 1.8 kcal/hr.m².° C compared to values range between 0.1 and 0.35 kcal/hr.m².° C for walls in buildings in the USA. Accordingly, energy loss in winter in local homes exceeds 6 times energy loss in buildings in the USA at similar weather conditions.

Selection of suitable energy efficient materials in buildings is sufficient to improve thermal resistance dramatically, hence minimizing energy losses. Modern and adopted techniques must be adopted for this purpose. Improving energy efficiency in buildings by development of energy codes must be accompanied by proper passive solar design. If it is succeeded to do so, then there will be an opportunity to design houses that work with the climate not against it. To make the best use of this opportunity, it must be understood the wide variety of energy conservation and passive solar heating and cooling applications, so as to appropriately select a suitable combination for a particular climate. In doing so, we will obtain the highest possible comfort at the lowest possible expenditure for materials and energy.

Solar energy applications in buildings are of great importance for energy efficiency and energy conservation. Passive and active solar design of buildings is beyond the scope of this project. However, certain parameters of solar designs must be considered in Building Codes and evaluation of energy efficiency of buildings. These parameters include direct sun shading in summer, solar radiation reflections from surfaces, and natural lighting. Research done by the PEA showed that annual energy savings from reducing the utilization of incandescent light by 60 minutes a day would be over US\$ 1.7 million and 11,600 tons of CO₂. This may be easily achieved by enhancing natural lighting in buildings.

* M.F.Baba, "Development of an Efficient Technique to Insulate Existing Palestinian Buildings Using Fiber Rock", Proceedings of the 1st Int. Conference on Implementing Local Materials In Industrial Applications, Amman – Jordan, September 1993.

The Barriers to Energy Efficient Buildings

The project aims at removing barriers that hinders the establishment and voluntary adoption of energy codes for buildings. Also, it should promote the acceleration of market penetration of the energy-efficient technologies by removing market distortion and institutional barriers that still hinder the economically efficient use of energy in construction.

Market barriers in the residential sector are largely due to the lack of information about energy use and related costs and about technologies available to reduce energy consumption. Furthermore, Palestinian individual consumers often do not have access to information on means of financing investments in general and energy-efficiency technologies in particular. Due to a lack of financial resources, decisions are made to meet day-to-day requirements, of which energy-related decisions present only a minor part. Direct expenditure and not energy efficiency is the important criteria for their decisions.

There are many examples of market imperfections in the PA. A building owner or developer may be interested in minimizing investment, and the tenant who will have to pay the energy bills is rarely in a position to influence any decision concerning the building and its construction. Furthermore, in public buildings or multifamily houses where individual heat requirements are not separately metered, the single customer may not be aware of the cost of providing heat and might regulate indoor air temperature by opening windows instead of controlling through the thermostat. The overall barriers are as follows:

1 - Institutional barriers

So far, municipalities in the West Bank and Gaza Strip are the main bodies responsible for applying building codes. The Engineers' Association also carries some responsibilities in developing and applying building codes. In this regard, we can characterize the institutional barriers by the following points:

- B.1. Absence of energy codes for buildings. The currently applied building codes in the West Bank and Gaza Strip are outdated and do not address the issues of energy savings and efficiency.
- B.2. Absence of quality assurance of building materials. Quality control division at PSI is still in the preliminary stages, and lacks equipment and experience.
- B.3. Lack of a coordination body in the PA to establish and promote energy codes for buildings.

2 - Human and resource capacity barriers

Most of the engineers working in the construction sector have graduated from Arab countries or third-world Universities. Most of these universities pay little attention to energy efficiency in general and energy efficiency in buildings in particular. In special cases where “environmental systems in buildings” is addressed in programs such as architecture, it is not taught to students who will deal directly with building construction in the future such as civil engineers. Architects have more awareness about energy efficiency in buildings and passive solar design but they have

little influence on the structural design and construction method. The lack of integrated building design method makes this problem worse.

The human and resource barriers can be characterized as follows:

- B.4. Lack of formal and informal training in local educational institutions in energy efficiency in buildings and building designs.
- B.5. Lack of expertise and knowledge of local civil engineers and contractors in designing and constructing energy efficient buildings.

3 - Information Barriers

- B.6. Limited access of professionals and consumers to appropriate technologies in the field of energy efficiency in buildings
- B.7. Unavailability of studies, guidelines, and software to local professionals and consumers for the designing and construction of energy efficient buildings.
- B.8. Lack of awareness of the short- and long-term economic and environmental benefits of energy-saving designs and construction.
- B.9. Unfamiliarity with methods and tools for measuring energy efficiency in buildings.

B.2. Expected project outputs, with underlying assumptions and context

To achieve its objective, the project should target the four main barriers to the voluntary adoption of energy codes in buildings that are stated in the previous section and lay the ground for future adoption of an act on energy codes for buildings.

Therefore, the main outputs anticipated of this project are:

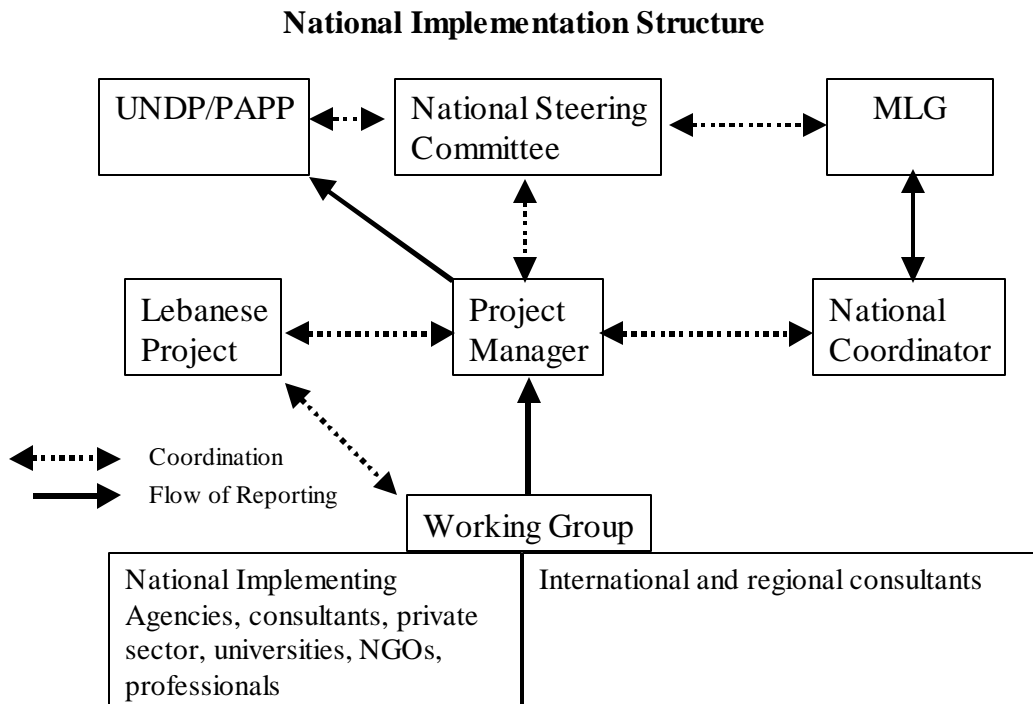
1. A model energy code for buildings specifying minimum energy efficient standards for new building construction.
2. Developed human and resource capacity in the Palestinian society to promote and develop energy codes for buildings.
3. Increased awareness of the long-term economic and global benefits of energy-efficient building material, methods and designs.
4. Dissemination mechanisms that ensure open and wide access to cost-effective energy-saving building materials, methods and designs.
5. Action plan for the facilitation of future adoption of the “Energy Code for Buildings Act”, ensuring the continued momentum of the project activities after the completion of the project.
6. Reduction in greenhouse gases emission and energy consumption.

B.3. Target Beneficiaries

- Ultimately, the entire Palestinian population and future generations will benefit from the improvement of energy-efficiency in buildings by adoption of building codes.
- Neighboring countries and other countries with similar climates and economic situations will also benefit from the outcomes of the project.
- National programs for both Lebanon and PA, through training of engineers and all staff working in the establishment of Building Codes and related techniques.
- The international community and global environment through improving energy efficiency and minimizing emissions of CO₂ and other greenhouse gases including CFC used for air conditioners.

B.4. Project Strategy and Implementation Arrangements

The United Nations Development Programme/Programme of Assistance to the Palestinian People (UNDP/PAPP) will be the executing agency of the Palestinian project, utilizing and applying UN rules and regulations in the implementation of projects using fully transparent and reliable financial mechanisms. The Ministry of Local Government (MLG) will be the lead national counterpart responsible for the implementation of the project activities, assigning a national coordinator for this project from their staff. MLG experts and engineers will be active elements in all working groups of this project. Several local Palestinian institutions, individuals, associations, and private sector will also contribute to the implementation of this project under the umbrella of the MLG.



The HCC may serve as the National Steering Committee (NSC) to the project, with other representatives from the stakeholders, mainly the PEA, UNDP, and representatives from the NGO and Universities. The NSC will meet every six months to monitor progress and advise on implementation, review workplans and carry out other advisory roles.

The UNDP/PAPP, in coordination with the MLG, will recruit a Project Manager who will plan and manage the day to day activities of the project, liaise with the MLG, coordinate with national institutions and local implementing institutions and coordinate with the Lebanese counterpart. The MLG will designate a senior official as the National Coordinator who will act as the counterpart to the Project Manager and ensure proper coordination with the various relevant departments in the MLG and facilitate the project implementation within the PA institutions.

A Working Group will be created to implement the project under the supervision of the Project Manager. The Working Group will be composed of national, regional and international consultants and other professionals from the counterpart institution and stakeholders (professionals from the PEA, Palestinian municipalities and village councils, local universities, NGOs, the private sector, and external consultants) who will carry out the activities of the project. Through the Project Manager, the Working Group will establish cooperation with the technical teams of the Lebanese project in order to ensure effective exchange of knowledge, expertise and information material. This cooperation will also lead to effective utilization of project funds.

MLG responsibilities will include:

1. Providing a fully functional office for the project in the MLG premises in the Ramallah, including a full-time secretary;
2. Provide qualified technical assistance to the project manager;
3. To, jointly with UNDP/PAPP, select and prepare ToRs and negotiate contracts for local implementing institutions and/or agencies and international and national consultants for the relevant activities in the project;
4. Prepare quarterly financial and operational reports as requested;
5. Chair the National Steering Committee for the project,
6. Supervise activities of sub-contracted institutions and local consultants.

UNDP/PAPP responsibilities will be the following:

1. To contract a project manager for the project according to the ToR (Annex II);
2. To contract the selected local implementing institutions, or appropriate short-term consultants for the relevant activities of the project;
3. To transfer the funds available to the implementing institutions into separate bank accounts to be opened by them for the purpose of their subcontract with UNDP/PAPP, upon submission of a written request and certified documents and according to an agreed schedule of payment;
4. To monitor the project implementation and progress;

5. To purchase equipment necessary for the implementation of the project and to make the necessary arrangements for its temporary or permanent use by the implementing institutions or individuals, in full consultation with MLG;
6. To provide appropriate backstopping and support, as necessary; and,
7. To report to GEF – New York.

B.5. Reasons For Assistance From UNDP/GEF

The PA, within the framework of regional projects, has been made eligible to GEF funding through article 9 (b) of the GEF instrument.

This project will work to build capacity for the establishment of energy efficient building codes. Adoption of these codes by concerned parties will create a positive impact on the local and the global environment. The main objectives of this project are in line with the objectives of the GEF and the articles of the UNFCCC. At the same time, the project is in line with the PA' s sustainable development objectives and the Letter of Sector Policy on Energy, which sets out the national policy for the development of the sector.

The project funds are devoted to removal of barriers to energy efficiency and as a cost effective mechanism for institutional strengthening and capacity building of the local and regional "Engineering Body" in general and the engineers at MLG in specific. It achieves the desired impact on the long-term growth of greenhouse gas emissions. Furthermore, this project will involve different Palestinian ministries, national and international experts, NGO' s and research institutions, hence supporting the energy sector on a broader basis.

Through the barrier removal mechanism, the project will also address the need for greater efficiency, self-sustainability and for introduction of new methods and techniques within the construction sector. Furthermore, capacity building, human resources development and barrier removal will facilitate the implementation of new ideas and pilot projects. Lastly, the project will also provide a policy and action framework for improving human life, human thermal comfort and climate change mitigation objectives within the existing system in a cost-effective way, mainly by utilizing regional and local expertise that have gained considerable experience through active participation in international conferences and workshops on the topic.

SECTION C: DEVELOPMENT OBJECTIVES

The development objective of this project is to build national capacity that would enable Palestine to:

1. Reduce greenhouse gas emissions
2. Establish thermal energy standards for buildings and prepare grounds for future adoption of the standard as an energy code for buildings.
3. Initiation of a transformation in the construction industry in Palestine.

The above objectives will be achieved through removal of barriers to the adoption and implementation of building thermal guidelines. This goal will be achieved through securing the expected results and outputs discussed in the following section. However, the overriding framework of the project is the developing of institutional bodies to promote and adopt energy codes in buildings and the establishment of a sustainable mechanism for verification and certification.

SECTION D : IMMEDIATE OBJECTIVES, OUTPUTS AND ACTIVITIES

To achieve its objective, the project should target the three main barriers to the voluntary adoption of energy codes in buildings that are stated in the section B.1. and lay the ground for future adoption of an act on energy codes for buildings.

D.1. Immediate Objectives, Outputs and Activities

Immediate Objective 1 : Establishing a Cost-effective Energy Codes for Buildings

Output 1.1: Cost-effective energy codes for buildings established

Activity 1.1.1: Review energy codes for buildings in the neighboring countries of the region, including Lebanon, and international codes. Some countries in the Middle East including Lebanon have developed their codes for energy-efficiency in the construction sector few years ago. These countries have gained great experience about the potential of energy savings for applying these codes in our specific climate. In such case, the project will benefit and build up on the codes established in these countries in order to design the most suitable codes for such climate.

Activity 1.1.2: Review traditionally used energy-saving construction materials and methods and building designs in the PT. Collect information and material on energy -efficient building material and designs used elsewhere. A technical database will be prepared for these materials including all technical specifications and thermal properties

Activity 1.1.3: Bring regional and international consultants to assist in the establishment of the energy codes for buildings. These experts will review all results of *activity 1.1.1 and activity 1.1.2* and work jointly with Palestinian experts to develop new codes for the specific climate and building techniques suitable for the PT.

Activity 1.1.4: Draft energy codes for buildings for the PA areas based on cost-effective energy-saving modalities. Technical reports and data sheets will be prepared for all energy efficient materials that can be used to insulate building shells and the proper techniques that can be applied to reduce heat loss on a cost effective basis.

Output 1.2: Preparation for the future adoption of regulatory Energy Codes for Buildings Act

Awareness programmes usually tend to work effectively when targeting actions that make good economic sense for the consumer. In some instances, such as adoption of building codes, where the economic benefits are not currently recognized, direct market intervention, in addition to awareness programmes, are needed. Regulatory instruments applied to energy demand policy

include the broad array of standards and control mechanism, such as restrictions on fuel use and building codes. Economic instruments may include taxes, pricing, charges, subsidies and other financial incentives. Special attention will be given to the Lebanese experience in these matters.

Activity 1.2.1: Identification of factors that may influence or hinder the voluntary adoption of energy-saving modalities in buildings or compulsory adoption of energy codes for buildings. A socio-economic survey and market survey maybe required to provide answers;

Activity 1.2.2: Formation of a Work Group that would advocate for the future adoption of energy codes for buildings; and

Activity 1.2.3: Establishment of an action plan and identification of future projects that would facilitate the adoption of the “Energy Codes for Buildings Act”. Participants from the broad array of stakeholder will participate in the preparation of this plan.

Immediate Objective 2: Building local human and resource capacity in energy-saving modalities in the PA

Output 2.1: Capacity and knowledge of local engineers and buildings-related professional and the public in energy codes for building enhanced.

Very few Palestinians could be identified as specialists in the area of energy-savings in buildings. It is of great importance for sustainability of the project objectives to build the human local capacity in this specific area. Local capacity can be achieved through

- local training conducted by international and regional experts
- sending local experts to attend conferences, seminars and workshops in related areas
- gathering technical materials such as international standards, specifications and modern techniques
- training local technical engineers on using equipment that can be used to test thermal properties of materials, and how to evaluate test results.

Activity 2.2.1: Transfer energy-saving knowledge and technologies through in-country training of local professionals from the private sector as well as project staff in the appropriate fields of energy-saving modalities. Lebanese and International experts working on the establishment of building codes will play a major role in this matter.

Activity 2.2.2: Facilitate the participation of local expertise in regional and international workshops and conferences in this field. This includes members of the Engineers' Association, local universities, private sector and NGOs.

Activity 2.2.3: Obtain specialized technical books, references and publications on energy-saving technologies in buildings, which will be made available to the project team and accessible by all concerned organizations and individuals.

Activity 2.2.4: Provide equipment that would facilitate the implementation of the activities of the project such as computers, software, energy-testing tools such as infra-red cameras to identify temperature distribution and others.

Immediate Objective 3: Wide public adoption of cost-effective energy-saving modalities in buildings

Output 3.1: Promotion of wide and voluntary adoption of cost-effective energy-saving modalities in buildings by the Palestinian public

Activity 3.1.1: Publish and distribute energy-saving explanatory pamphlets, newsletters, articles, consumer guides, and other publications in the field of buildings. These publications will explain in a simple matter and easy language the contents of the energy-savings building code. Some of the publications will aim at the general public to increase awareness of potentials of energy savings in buildings. Others, will target the technical community including engineers, contractors, students and technical workers, to enhance their knowledge and understanding of the codes and methods of application. As Lebanon has experience in this field, close cooperation with the their project team will be established for this activity.

Activity 3.1.2: Establish an open access information center on the Internet, through a specialized homepage on energy-saving modalities and models in building. A specialist or company will be selected to design this homepage in English and Arabic in an attractive and easy to navigate format. This homepage will be made available for the Palestinian community and the technical community.

Activity 3.1.3: Hold seminars and workshops that would convey the economic and environmental short, long-term and global benefits of energy-saving modalities in buildings. Participants would include professional members of the Palestinian Engineers Association, members of the Palestinian Contractors Association and the public;

Activity 3.1.4: Provide technical assistance in the implementation of a pilot project to enhance energy efficiency in existing building. A public facility, such as a school or clinic, will be selected for improving thermal insulation and switching to double-glazing for windows. This pilot project can be considered as a part of training for local engineers and technical workers, where they can see and feel all materials that can be used for improving thermal insulation of building shell and the techniques to apply them. Evaluation of the cost-effectiveness of this project can be done in a local seminar or workshop as specified in *activity 3.1.3*.

Immediate Objective 4: Increase Regional Cooperation

Output 4.1: Exchange of knowledge and expertise in the region strengthened

Activity 4.1.1: Hold an initial coordination meeting between the Palestinian and Lebanese teams working on the two Lebanese and Palestinian national projects. The Palestinian team should learn from the previous experience of his Lebanese counterpart in developing Building Codes

for this climate. They should learn from the positive and negative feedback after implementing these codes, and the customer reaction.

Activity 4.1.2: Exchange visits and transfer knowledge and experience between the countries of the region, particularly with Lebanon.

Activity 4.1.3: Exchange of publications and information tools on energy-saving modalities produced by the national activities of the project. Public awareness material could be commonly produced and common experts could be contracted.

SECTION E : INPUTS

E.1. Palestinian Authority Inputs

The PA represented by MLG will assign qualified staff members for the positions listed below. Also, MLG is responsible for providing suitable offices, including utilities, for the project coordinator and other senior participants whenever needed. Logistical assistance to the project team, especially for international and regional experts, is also a responsibility of the MLG.

<i>Positions</i>	<i>Work Months</i>	<i>Personal cost in US\$</i>
National Coordinator	24	12,000
Administrative Personnel	20	6,000
Other Technical Staff		28,000
Facility		8,000
Transportation		6,000
Misc. Expenses		4,000
Total in Kind		64,000

E.2. GEF Inputs

GEF will provide a total of US \$500,000 to this project. This input will be used for all non-in-kind support required for major activities of the project as outlined in Section J (Project Budget).

E.3. UNDP Inputs

UNDP/PAPP is providing direct funding (up to US \$ 100,000) for training. In addition to that, UNDP shall provide local support for the execution and monitoring of this project at all stages. UNDP/PAPP shall also be responsible for all hiring and other employment decisions for national, international experts and staff.

SECTION F: SUSTAINABILITY ANALYSIS AND RISK ASSESSMENT

Most of the Palestinian experts and decision-makers identify increased energy consumption as a precursor to economic development, irrespective of global environmental problems. Therefore, the PA expressed its willingness to address the issue of energy-efficiency especially in buildings. However, to overcome risks that may generate from social, economic or political instabilities, the regional project emphasizes the cost-effectiveness of devised energy codes for buildings and the building of local capacity and knowledge in this field. This will ensure the sensitization of the public, NGOs, and the private sector to carry out energy-efficient modalities in buildings regardless of the involvement of the Government/Authority.

It should be further stressed that in applying for GEF resources the PA agree to ensure strict compliance and enforcement with the emerging building and thermal codes. The authority also understands that this forms a UNDP prerequisite to project approval and implementation and that lack of enforcement may lead to UNDP suspension of activities.

Political Risks

The unstable political situation in the area is a main source of risk for this project. In case of failure of the peace negotiations, the PA institutions may find themselves in a situation of no-authority to develop social or structural changes for end-use energy consumption and conservation. Emphasizing cost-effective energy-saving modalities in buildings where incentives for change become economic-driven could avert this risk. The involvement of the NGO sector and universities in the implementation of the project could also buffer the impact of political instability and may ensure the continuity and sustainability of the project's long-term objectives.

The building of local Palestinian capacity and resources in the field of energy-saving building methods and designs will also create a building block that would lead and sustain the motives of the project.

Other Risks

The high costs of energy imports played a major role on the willingness of decision makers in the PA to adopt energy-efficiency measures in all sectors including the construction sector. If the PA succeeded to import oil or other energy products from Arab Countries at substantial low costs, it may change this willingness and attitude. Same reaction may be expected by individuals and groups. This risk can be overcome by increasing awareness among individuals and decision makers of other benefits of energy efficiency and its impacts on health, environment, economic security and future development.

SECTION G: PRIOR OBLIGATIONS AND PREREQUISITES

The Ministry of Local Government, the Higher Council of Construction and other relevant PA institutions are committed to consider, adopt and implement the outcomes of this project.

SECTION H: MONITORING AND EVALUATION PLAN

The UNDP/PAPP will be the executing agency of the project where project administration is carried out and project activities, finances, and the overall progress are monitored. The Palestinian Higher Council of Construction and the project's Work Group will provide the necessary guidelines and supervision of the project's technical work plan and activities in line with national and global interests. The UNDP/PAPP, the MLG and a third party such as the PEA or an international/national consultant would participate in the midterm and final review of the project.

SECTION I: LEGAL CONTEXT

A Memorandum of Understanding (MOU) will be signed between UNDP/PAPP and the Palestinian Ministry of Local Governments (MLG). The MOU will outline the expectations and responsibilities of each party carrying out the implementation of the project.

SECTION J: PROJECT BUDGET

B.L	Component	Total in USD	Year One	Year Two
11.00	Experts	55,800	34,800	21,000
11.01	International Experts	40,800	22800	18,000
11.02	International Experts for in-country training	15,000	12000	3,000
15.01	Official Travel	25,000	12500	12,500
16.00	Evaluation and Monitoring	15,000	0	15,000
16.01	Evaluation mission(s)	7,000	0	7,000
16.02	Mid-term Review	8,000	0	8,000
17.00	Personnel	159,200	94,000	65,200
17.01	Project Manager	67,200	33,600	33,600
17.02	Engineer	24,000	16,800	7,200
17.03	Energy Expert	24,000	16,800	7,200
17.04	Architect	24,000	16,800	7,200
17.05	Local Consultants	20,000	10,000	10,000
21.00	Subcontracts:	97,000	56,000	41,000
21.01	Revision of available Codes	3,000	3,000	0
21.02	Revision of Construction material	3,000	3,000	0
21.03	Public Awareness	66,000	40,000	26,000
21.04	Internet construction	10,000	10,000	0
21.05	Publishing	15,000	0	15,000
32.00	Training	53,000	24,000	29,000
32.01	In-country Training	5,000	2,500	2,500
32.02	Regional workshops	25,000	10,000	15,000
32.03	Seminars	8,000	4,000	4,000
32.04	Regional meetings	15,000	7,500	7,500
45.00	Equipment	49,000	49,000	0
45.01	Energy testing equipment	15,000	15,000	0
45.02	Books and Publications	4,000	4,000	0
45.03	equipment and software	30,000	30,000	0
53.01	Miscellaneous	8,963	4,000	4,963
93.01	UNDP/PAPP Administrative Cost (8%)	37,037	21,944	15,093
99.00	Project total	500,000	296,244	203,756

SECTION K : ANNEXES

LIST OF ANNEXES

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Annex 1.
Implementation plan

This project for the PA is a part of a regional project which includes Lebanon. Coordination activities between Lebanon and the PA and other countries in the region involved in similar projects will be held at the initiation of the project. Occasional meetings and exchange of visitors and experts will be held throughout the project. A final meeting between the project coordinators of both national components will be held at the end of the project to evaluate outcomes and exchange experience gained in process.

The duration of this project is two years (24 months). The National Project Coordinator (NPC) will draw the final project work plan in coordination and supervision of UNDP/PAPP. Certain activities, such as training programs conducted by international consultants, will be planned in coordination with the Lebanese counterpart.

DURATION OF PROJECT (IN MONTHS): 24								
ACTIVITIES	PROJECT-MONTHS							
	3	6	9	12	15	18	21	24
1. Surveys and data collection								
2. Establishment of Palestinian Standards of energy-saving construction materials								
3. Establishment of cost-effective energy codes for buildings.								
4. Building local human and resource capacity in energy-saving modalities in buildings			(O c c a s i o n a l)					
5. Promotion of wide and voluntary adoption of cost-effective energy-saving modalities in buildings								
6. Preparation for the future adoption of Energy Codes for Buildings								
7. Monitoring & evaluation								
8. Preparation of final Report								

Annex 2.
Schedule of Project Reviews, Reporting and Evaluation

Activity	Year 1				Year 2			
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th
Inception Report								
Monthly Progress Reports								
Quarterly Financing Reports								
Annual Progress Report								
Project Implementation Review								
Med-Term Review								
Final Report								

Annex 3. ***Training Courses***

Training Course 1 : Principles of heat loss/gain and ventilation in building

Trainer : National expert.
Period : 12 hours (6 meetings x 2 hours)
Starting time: 2 Months after project initiation

Target Groups : (a) Architects, Civil eng. Mech. eng., contractors from the private sector.
(b) Engineering staff of MLG and PSI.
(c) Engineering staff of Ministry of planning .
(d) Principles engineers of municipalities and village councils.
(e) Engineering staff of Ministry of Housing .

Objectives

The main objectives of this main course are to concentrate on providing the participants with the essential mathematical and physical background for estimating heat loss and gain in buildings.

- 1- Design criteria for human comfort in buildings.
- 2- Sources of heat loss and gain in buildings.
- 3- Methods for minimizing heat loss in winter and heat gain in summer.
- 4- Calculations of thermal resistance of walls, roofs, windows, doors, skylights, etc... .
- 5- Determination of energy requirements for heating and cooling.

Training Course (2) : Energy efficient materials for different types of concrete, steel and wood structure.

Trainer : International, regional and/or national
Periods : 12 hours (6 meetings x 2 hours) .

Target Groups:

- (1) Private Sector: construction engineers, contractors technical sales specialists.
- (2) Government: engineers and architects from MLG, MOP, PSI, etc... .
- (3) Municipality and village counsel engineers.

Objectives and Tasks:

The main objective of this training course is to provide participants with essential knowledge concerning all types of energy efficient materials that can be used for all types of constructions. This includes properties of materials, possible applications, and advantages and disadvantages. This course includes the following tasks:

- (1) Thermal properties of local construction materials and masonry units.
- (2) Insulating materials which include polystyrene, mineral fibers, wood, polyurethane, organic fibers. foams, etc... .

- (3) Single glassing and double glassing and insulation of doors.
- (4) Air infiltration sealing materials for windows and doors.
- (5) Vapor barriers.

Training Course (3): Building Codes: Definitions and Applications.

Trainer : International Consultant
 Period : 15 hours (3 Meetings x 5 hours)
 Starting time : After completion the building codes and training courses 1 & 2

Target Groups :

- (1) **Mandatory** for MLG engineering staff, PSI energy technical group, Association of Engineers representatives, municipality principals engineers.
- (2) **Others**: engineers, contractors, consultants, etc. from private sector.

Objectives and Tasks:

The main objective of this course is to familiarize all concerned parties with the developed codes for energy efficient buildings, as well as to apply the codes to new private and public buildings.

- (1) Code elements and principles.
- (2) Techniques for applying the codes.
- (3) Preparation of a "Planing and Specification Form for Energy Conservation Construction".
- (4) Suggestions for adoption of mandatory codes and voluntary codes.
- (5) Suggestions for incentives for adoption energy efficient codes in buildings.
- (6) Economic analysis and feasibility of applying energy efficiency codes in the construction sector.

Training Course (4): Testing Procedures for Thermal Properties of Building Materials and Existing Buildings

Trainer : International consultant .
 period: 15 hours (3 meeting x 5 hours)
 Starting date: 1st quarter of the 2nd year of project

Target Groups:

- (1) PSI - energy staff.
- (2) MLG - standard staff.
- (3) Engineers of accredited private testing laboratories.

Objectives and Tasks:

The main objective of this course is building capacity for quality control engineers regarding testing procedures on energy efficiency of building materials and existing buildings.

- (1) Introduction to equipment needed for testing in the lab and the field.
- (2) International standards of the procedures for testing thermal properties of building materials.
- (3) Evaluation of testing results.

Annex 4.

Terms of Reference

1- National Project Coordinator

National Project Coordinator (NPC) is the key person of the project who is responsible for the overall implementation of the project. He/he shall coordinate all activities with UNDP/PAPP, the MLG and the Lebanese counterpart, for ensuring the consistency of all activities with project documents and objectives. He/she or she will carry the following responsibilities:

1. Assist UNDP/PAPP and MLG on recruitment of project staff and establish their terms of reference;
2. Assist in issuing subcontracts for all project activities under the supervision of UNDP/PAPP;
3. Nominate qualified international/regional/and national consultants and trainers to UNDP/PAPP and MLG;
4. Arrange for international expert visits and training activities;
5. Establish coordination channels with MLG, and other primary participants;
6. Work jointly with implementing institutions and parties on preparing their work plans and assigning their duties in the project;
7. Provide the secretariat for National Steering Committee and draft the agenda for its meetings and take minutes;
8. Establish channels of coordination and communication with the Lebanese counterpart of this bilateral;
9. Prepare progress reports and other required reporting;
10. Prepare the annual working plan in coordination with UNDP/PAPP and MLG; and
11. Other relevant tasks.

QUALIFICATIONS

- A graduate degree (M.Sc. or Ph.D.) in engineering, architecture, civil engineering, construction management, energy or mechanical engineering;
- Minimum of 5 years of experience in energy efficiency and strong knowledge of building technology and construction;
- Fluency in English and Arabic and strong reporting and computer skills; and
- Ability to communicate, lead meetings, and work effectively with national, regional and international consultants and NGO's.

2- National Coordinator (MLG Staff)

MLG will nominate one of its senior staff to assist in the implementation of the project activities and liaise between the project and the various related departments and coordinate logistical issues at the MLG. He or she will assist the Project Manager in the administrative and technical parts of the project.

3- National Steering Committee

The National Steering Committee (NSC) will be composed of the following members:

- Ministry of Local Government, Minister or his representative
- UNDP/PAPP Representative
- Senior representative of the Ministry of Environmental Affairs
- Senior representative of the PEA
- Representative of the Engineers' Association
- Senior Representative of the Ministry of Housing
- Representative from the Local Implementing Institutions

The responsibilities of NSC are as follows:

- Provide guidance and advice to the project in respect to the Authority's national policies;
- Review and approve annual workplans;
- Review progress reports and financial reports;
- Present the Energy Codes of Building to the PA for approval and endorsement; and
- Assist in the implementation of the objectives of the projects in their lined institutions.

The NSC will meet every six months or according to the need upon the request of the MLG.

Annex 5.
Incremental Cost Assessment

This project will build on ongoing local initiatives to revise and upgrade the currently applied town planning laws and building codes in both the Lebanese Republic and the PA, to include energy codes for buildings in their scope.

Incremental Cost Matrix

	Baseline	Alternative	Increment
Business as usual	<ul style="list-style-type: none"> • Established building codes will not include energy codes and guidelines • Low energy efficiency in buildings 	<ul style="list-style-type: none"> • A set of energy codes and guidelines for buildings • Awareness and training programs to promote and facilitate the employment of building codes in new buildings • Improved energy efficiency and reduction in greenhouse gases 	<ul style="list-style-type: none"> • Remove barriers to the establishment and adoption of energy codes and guidelines in buildings
Domestic and regional benefits	<ul style="list-style-type: none"> • Limited or no saving in energy and national expenditure • Lack of public knowledge and professional expertise in energy-efficiency in buildings • PA will not be able to achieve energy end-use efficiency saving targets • No regional cooperation and collaboration reduction energy bills in buildings 	<ul style="list-style-type: none"> • Employment of cost-effective energy-saving modalities in buildings • Reduction of national expenditure on energy imports • Development of local capacity and industries in the field of energy savings in buildings • Arab regional demonstration and cooperation in the field of energy savings modalities in buildings • Health benefits from avoidance of kerosene or charcoal/wood fires 	<ul style="list-style-type: none"> • Inform the public of the economic and environmental benefits of energy codes in buildings • Train professional on the design, and construction of energy-efficient buildings • Establish incentive finance mechanisms for the employment of energy-saving modalities in buildings • Facilitate regional cooperation and meetings to address energy

	Baseline	Alternative	Increment
			savings and energy codes in buildings
Global Benefits	<ul style="list-style-type: none"> Limited reduction of CO₂ gas emissions PA Baseline reduction negligible High usage of Air Conditioners, most of which uses CFC's responsible for Ozone Depletion 	<ul style="list-style-type: none"> Annual reduction in CO₂ emissions estimated at 0.1 million tons of CO₂ for PA (Annex 7?) Sensitization of regional initiative for reducing CO₂ emission from buildings Reduction in CFC emissions 	<ul style="list-style-type: none"> Annual reduction in CO₂ emissions estimated at: 0.13 million tons of CO₂ for Lebanon and 0.1 million tons of CO₂ for PA (Annex 6) Sensitization of regional initiative for reducing CO₂ emission from buildings
Costs	<ul style="list-style-type: none"> PA US\$ 330,000 establishment of building codes <p>Total baseline activities: US\$ 1. 400 million</p>	<p>Total Alternative: US\$ 2. 649 million</p>	<ul style="list-style-type: none"> GEF: US\$ 500,000 PA in-kind contribution to the project US\$ 64,000 <p>Total: US\$ 564,000</p>

Annex 6.
Logical Framework

Interventions Strategy	Project Planning Matrix		Assumptions
	Objectively Verifiable Indicators	Means of Verification	
<p>Development Objective</p> <ul style="list-style-type: none"> • Establishment and Adoption of energy codes for buildings • Reduction of CO2 emissions into the environment 	<ul style="list-style-type: none"> • A set of energy codes and guidelines for buildings will be established in the PA and endorsed by the PA/MLG by the year 2001 • Annual energy saving of 0.025 MTOE for PA. 	<ul style="list-style-type: none"> • Published building codes and guidelines • Monitoring of residential energy bills 	<ul style="list-style-type: none"> • Standards are cost-effective and satisfactory to the PA and the Lebanese Government • Public support for energy codes and guidelines in buildings is sufficient.
<p>Immediate Objectives</p> <ul style="list-style-type: none"> • Building local capacity in the field of energy-saving modalities in buildings • Wide public adoption of cost-effective energy-saving modalities in buildings • Transformation of construction industry 	<ul style="list-style-type: none"> • Increased number of energy-efficient buildings • Increased demand on energy-efficient building material and designs • Improved energy performance in residential buildings • Increased public awareness of energy-saving modalities • Increased knowledge and expertise in energy-efficient modalities by civil engineers and contractors 	<ul style="list-style-type: none"> • Survey of new houses and building permits • Market survey • Monitoring of energy bills for residential buildings • Public attendance of workshops and demand on user guidelines and information sheets • Civil engineers attendance of workshops • Examination of new buildings designs and construction 	<ul style="list-style-type: none"> • Consumers support of energy-saving modalities • Energy codes and guidelines and cost-effective • Energy-efficient building material is available in the market • Design and construction of Energy-efficient building comply with town planning and building codes.
<p>Activities</p> <ul style="list-style-type: none"> • Coordination between Lebanon and the PA • Build professional knowledge and expertise • Public awareness and 	<ul style="list-style-type: none"> • Series of meetings, workshops, joint training programs and exchange of documents • Ability of local engineers to 	<ul style="list-style-type: none"> • Holding of seminars., meetings, training workshops and exchange of documents • Increased number of energy-efficient buildings 	<ul style="list-style-type: none"> • Lebanon and the PA will work synchronously and perform parallel • The public will accept energy saving modalities in buildings

dissemination of information	design and implement energy-efficient buildings	<ul style="list-style-type: none"> Public demand of published material and attendance of seminars 	<ul style="list-style-type: none"> Good advertising and outreach methods are utilized
<ul style="list-style-type: none"> Preparation for future adoption of energy codes for building act Facilitative the introduction of energy efficiency programs in local universities 	<ul style="list-style-type: none"> Published material and holding of public seminars on energy saving modalities in buildings Availability of studies and planned activities that would facilitate the future adoption of energy codes for building act “Energy-Efficiency in Buildings” programs established in local universities 	<ul style="list-style-type: none"> Compiled energy-saving modalities in buildings supported by analysis of adoption barriers Availability of capacity to teach courses and students and professionals enrolment in these training courses 	<p>The PA is willing to address the issue of energy efficiency in buildings</p> <p>Universities are willing to develop new programs within their departments</p>

Annex 7.
Calculations Of Greenhouse Gas Emissions
In the Palestinian Territories

The calculation of the Palestinian reduction in Greenhouse gas emissions as a result of the implementation of this project is based on several assumptions, as the baseline data to generate such information is incomplete. The PT did not yet undertake the exercise of preparing their country report on climate change and thus valuable data are missing. Therefore the calculations of the reduction on Greenhouse emissions is based on the following:

1. The number of new building licenses granted in the West Bank and Gaza Strip from the first quarter of 1996 to the second quarter of 1997 reached 19,786, according to the records of the Palestinian Central Bureau of Statistics. The estimated need for housing units to cover the current shortage in housing is estimated at 200,000, not to include the future demand as a result of population growth.
2. Approximately 42% of the 872 KTOE of energy consumed in the PT is used for residential purposes.
3. Electricity, butane (natural gas), kerosene, timber and coal are the common energy sources for heating. Approximately 23.3% and 0.7% of the West Bank and Gaza Strip households, respectively, use kerosene for heating, while 52.1% and 38.3% respectively use timber and coal. Most cooling systems in the PT areas operate on electricity.
4. The consumption of energy between the various sectors is estimated as follows:

Table 1: By-sector breakdown of energy consumption

Sector	Energy Utilization	Energy Source
Transportation (40%)	370 KTOE	Petrol
Residential and small businesses (42%)	389 KTOE	Petrol and electricity
Large business and other (18%)	167 KTOE	Petrol and electricity

Energy Consumption

The assumptions used in the following calculations are estimations based on research and processed data close to the current conditions. These assumptions are:

- 1- Heating utilizes 18.75% (73 KTOE) of residential energy consumption. Of this, 15.3% (11.18 KTOE) are from petrol sources, 47.5% (34.7 KTOE) are from coal and wood, and 37.2% (27.2 KTOE) are from butane/electricity sources.

- 2- Cooling utilizes 6.25% (24.3 KTOE) of residential energy consumption with 100% from electric source.

Table 2: Energy consumed for heating and cooling by the residential sector in 1998.

Residential and small businesses	1998 KTOE	1998 Kilo ton CO2
Electricity	51.50	0.51*
Petrol	11.18	0.04
Wood	34.70	0.11
TOTAL	97.38	0.66

* Emission due to electricity is calculated at 780g of CO2 emitted for every 1 KWh produced.

The total number of population in the West Bank and Gaza Strip is around 2.9 million (Palestinian Central Bureau of Statistics) with an average household size of 6.2 individuals. Therefore the residential energy consumption is divided among 467,740 residential units.

Table 3: Projected building growth.

	1998 million units	2000 million units	2010 million units	2020 million units
Building growth rate (2.5%)	0.470	0.494	0.632	0.809
Building retirement rate (-1.3%)*		0.458	0.402	0.353
Resulting no. of new household units		0.036	0.230	0.456

* Building life span has been assumed to be 75 years which gives a yearly building retirement rate of 1.3%.

Table 4: Projected yearly growth in energy demand for heating and cooling (@ 3%).

	2000 KTOE	2010 KTOE	2020 KTOE
Electricity	54.63	73.43	98.69
Petrol	11.86	15.94	21.42
Wood	36.81	49.47	66.49
Total	103.30	138.84	186.60

The relative proportion of energy type used has been maintained the same throughout the projection period.

Table 5: Total energy demand and CO₂ emissions between 2000 and 2020.

Heating and cooling 2000 - 2020	Energy demand KTOE	CO₂ emissions Kilo tons
Total Electricity	1567	15.37
Total Petrol	340	1.07
Total Wood	1056	3.32
TOTAL	2963	19.76
Average/year	141	0.94

Considering that the GEF intervention through energy codes for buildings will lead to a maximum of 30% reduction in residential energy consumption; and assuming an adoption rate of 50% of energy efficient codes for buildings, then savings will reach 11 KTOE per year as shown in table 6.

Table 6: Total Potential Energy Savings Attributable to Project (Summary table)

Project Time frame	2000 – 2002
Forecast Time frame	2000 – 2020
Projected Total size of sector in 2020	0.809 Million building units
Projected size of new building units from 2000	0.420 Million building units
% of new building units from Total	52 %
Likely penetration rate of “energy code” application	50 % of new building units
Potential per household energy savings	30 %
Estimated Total energy savings due to proposed project (2000/2020)	231 KTOE or 0.231 MTOE
Estimated annual energy savings due to proposed project	11 KTOE or 0.011 MTOE
Estimated Total CO ₂ savings due to proposed project (2000/2020)	1.95 Million tons
Estimated annual CO ₂ savings due to proposed project	0.1 Million tons

Annex 8.

The Energy Efficiency and Energy Codes for Building Projects

The Palestinian Authority has been granted funds by GEF to implement "Energy Efficiency Improvement and Greenhouse Gas Reduction project" (PAL/97/G31). Presently, the Palestinian Authority is requesting GEF's support to implement a new project in the field of Energy Efficiency related to "Capacity Building for the Adoption and Application of Energy Codes for Buildings". The two projects focus on energy efficiency and when combined will ensure that the Palestinian Authority will more comprehensively address the issue of energy efficiency within its multidisciplinary components. Below is a summary explanation of the differences and complementary aspects of the two projects.

1- Targeted Energy sub-sector

The Energy Efficiency (EE) project focuses on both supply and demand sides of Energy utilization. It is designed to improve energy utilization by introducing energy-efficient appliances (mainly Compact Florescent Light bulbs and refrigerators), reducing energy losses (through energy audits of factories, reduction of power factor, improvement of capacitors and distribution lines).

The Energy Codes for Building (EB) project addresses the energy efficiency from the end-user side only through the improvement of buildings' construction and design (insulation, construction material, building orientation and others). It does not touch on the quality of appliances that will be installed in the building whether it is air-condition, lights, kitchen appliances, machines ...etc.

The link between the EE Project EB project in this respect is strong in terms of the impact of the two projects on the energy sector and reduction of Greenhouse Gases. Although the targeted energy sub-sectors in both projects are different, however the two projects are required to go in parallel in order to ensure efficient and comprehensive approach towards energy savings on the supply and demand sides. While it is anticipated, for example, that the introduction of energy efficient lighting, heating, and air conditioning systems will reduce energy consumption, bad landscaping (direction of the house relevant to the sunlight and wind) and improper installation of walls will hinder the attainment of substantial energy savings from these systems.

2- Capacity Building

Both projects consider capacity building of local Authority institutions and personnel in energy efficiency is a key factor that will ensure the sustainability of the project objectives and outputs. While the EE targets the electric engineers, mechanical engineers, policy-makers in the Palestinian Energy Authority, the EB targets architects, structural and construction engineers, policy makers in the Palestinian Ministry of Local Government who are responsible for setting and enforcing building codes in the Palestinian Territories.

3- Standards, Rules and Regulations

Both projects include regulatory component that sets standards and regulations for the Palestinian Authority to adopt in order to promote efficiency in Energy distribution and consumption. The EE project calls of labeling systems of appliances for the main dealers and distributors, setting trade regulations and standards for appliances and machinery to be imported into the Territories and other similar aspects. It request that Palestinian Authority Institutions only purchase energy-efficient machinery and equipment The EB considers setting building standards and codes for energy-efficient construction such as wall and window glass thickness, elevation of the ceiling, quality of insulation material and others.

4- Awareness and Incentives to the Public

Both projects include an awareness component to encourage end-users to adopt and utilize the standards, regulations and material (or machinery) set by both projects. The EE addresses mainly the issue of Energy Tips to end-users and information on energy utilization and savings expected from using energy-efficient appliances or machinery. The incentives to the public ranges from a Leasing programme for the CFL bulb, and free energy audits and advisory to factories and large businesses. The EB focuses on widespread information and manuals on energy -efficient material and designs in buildings and construction. This component is strong in the EB as the EB is set to provide voluntary rather than compulsory Energy law or legislation. Therefore, the provision of advice and manuals on house design and construction material has been considered as a main activity in the EB project.

5- Project Management

The project Steering Committee of both the EE and EB contain both the Palestinian Energy Authority and the Palestinian Ministry of Local Government so as to ensure proper coordination and exchange of information between the two projects. Other members of the Steering Committee are mostly different in the two projects as to reflect the nature and specialization of each project. The EE for example has members of the Ministry of Industry, Ministry of Trade while the EB Committee includes the Ministry of Housing, the Palestinian Higher Council for Construction, the Engineer Palestinian Association and other.

As a summary, the table below shows the main objectives and outputs of the two projects for quick reference and comparison:

Energy Efficiency (EE)	Energy Codes for Building (EB)
Objectives	
<ul style="list-style-type: none"> • Improve industrial, commercial, and residential sector energy efficiency by reducing awareness, information, financial, business, technology, and other barriers to energy efficiency. • Improve residential sector energy efficiency by reducing information, financial, equipment, and other barriers to energy efficiency. • Facilitate Reduction in electricity distribution line losses. • Promote increased customer awareness and strategic actions by public and private sector energy market participants through an energy efficiency center. 	<ul style="list-style-type: none"> • To develop and remove barriers for the adoption of energy codes and thermal guidelines for buildings which will enhance energy efficiency and end-use performance • Building local capacity in the field of energy-saving modalities in buildings
Outputs	
<p><i>1. Industrial/Commercial/Government Sector Energy Efficiency Improvements</i></p> <ul style="list-style-type: none"> • Energy efficiency market information to assist potential providers of energy efficiency equipment and services. • Audits and energy savings advice to approximately commercial, industrial, and government sector. • Public forums that instruct industrial, commercial, and government sector on low/no cost energy savings measures. • Advice on energy efficiency business to potential energy services providers. • Encourage adoption of procurement policies that considers energy costs associated with the purchase of all energy-using equipment. • Training program in energy efficient equipment maintenance • Development of a list of energy efficient projects in need of finance and financial advisory assistance to energy efficient project sponsors • Capacitor regulations and power factor penalty rates. 	<ol style="list-style-type: none"> <i>1. A set of completed energy codes and guidelines for buildings.</i> <i>2. Developed human and resource capacity to develop energy codes for building and design and execute energy efficient buildings.</i> <i>3. Information dissemination tools and increased public and policy-makers' awareness of cost-effective energy-efficient building material, methods and designs, as well as benefits of energy efficient measures in buildings.</i> <i>4. Developed institutional bodies to promote and adopt energy codes in buildings and increased support at the formal and informal level.</i> <i>5. Action plan for the facilitation of future adoption of Energy Code for Buildings Act</i>

Energy Efficiency (EE)	Energy Codes for Building (EB)
<p>2. Residential Sector Energy Efficiency Improvements</p> <ul style="list-style-type: none"> • Trade actions to make available energy efficient refrigerators and lighting equipment. • Information campaign on the benefits of energy efficient models of refrigerators and lighting. • Enforced information or labeling system to identify the energy use of individual refrigerator. • A hire-to- financing mechanism to enable consumers to buy energy efficient equipment. • Leasing program to manage the initial cost of installing compact fluorescent lights or fluorescent tube fixtures. <p>3. Electricity Distribution Line Project Identification</p> <ul style="list-style-type: none"> • Identification and evaluation of high priority distribution system enhancement projects. • Development of a code of practice and standards to be used by distribution companies in the PA. <p>4. Energy Efficiency Center</p> <ul style="list-style-type: none"> • For providing essential information to potential energy service providers. • Overcome barriers of customer awareness by providing information for <i>consumers</i> (end-users) on the benefits of energy efficiency. • Evaluations of the performance and efficiency gains of the project activities • A country-wide energy efficiency information network to facilitate providing energy information to the energy service industry and to end-use consumers. • Strategic resource planning and analysis capabilities • Increase energy efficiency electric appliances and equipment, reduce growth in electrical demand, and share implementation responsibilities among government, energy service providers, and electric consumers. 	

**UNITED NATIONS DEVELOPMENT PROGRAM
GLOBAL ENVIRONMENT FACILITY**

PROJECT DOCUMENT

Number and Title: LEB/99/G35/A/1G/99
Capacity Building for the Adoption and Application of Energy Standards for Buildings

Duration: 24 months

Project Site: Lebanon

ACC/UNDP Classification: 0350: Energy

Project Type: Climate Change

Government Implementing Agency: The Lebanese Directorate General of Urban Planning under the Ministry of Public Works

Executing Agency: Government of Lebanon

Estimated Start-up Date: April 2000

GEF Inputs: 494,000 US\$

(In Kind) Inputs: 21,000 US\$ Lebanese Government
70,000 US\$ Lebanese Order of Engineers & Architects

Brief Description: The project will remove barriers for the formulation, adoption, dissemination and application of thermal buildings standards through the assessment of environmental and social impacts, national benefits as well as economic benefits to consumers. The removal of the barriers will pave the way for the transformation of the thermal buildings standard to a thermal building code adopted by the government. The project will allow developing economic incentives, scenarios and mechanisms to help private developers in overcoming the incremental construction cost. It will also remove barriers for the transfer of relevant knowledge and experience among the participating country and other countries in the region. With the projected investment in the construction sector over the period 2000-2020 calculated at \$ 40 billion for Lebanon, the project is seen as a foundation for the creation of a national momentum targeting the reduction of CO₂ emissions in buildings.

On behalf of:	Signature	Date	Name/Title
The Government:	_____	_____	_____
Executing Agent:	_____	_____	_____
UNDP:	_____	_____	_____

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ACRONYMS AND ABBREVIATIONS

ALIND	ASSOCIATION OF LEBANESE INDUSTRIALISTS
ALME	ASSOCIATION LIBANAISE POUR LA MAITRISE D' ENERGIE
CDR	COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION
EDL	ELECTRICITE DE LIBAN
FFEM	FONDS FRANCAIS POUR L' ENVIRONNEMENT MONDIAL
GEF	GLOBAL ENVIRONMENT FACILITY
GHG	GREENHOUSE GASES
LIBNOR	LIBANESE NORM INSTITUTE
LEBDUP	LEBANESE DIRECTORATE GENERAL OF URBAN PLANNING
MOE	MINISTRY OF ENVIRONMENT
MoHER	MINISTRY OF HYDRAULIC AND ELECTRIC RESOURCES
MPW	MINISTRY OF PUBLIC WORKS
NCSR	NATIONAL COUNCIL FOR SCIENTIFIC RESEARCH
OENGAR	ORDER OF ENGINEERS AND ARCHITECTS OF LEBANON
PM	PROJECT MANAGER
PSC	PROJECT STEERING COMMITTEE
UNFCCC	UNITED NATIONS FRAMEWORK CONVENTION FOR CLIMATE CHANGE
UNDP	UNITED NATIONS DEVELOPMENT PROGRAM
UNEP	UNITED NATIONS ENVIRONMENT PROGRAM
TOR	TERMS OF REFERENCE

SECTION A. CONTEXT

A.1 Description of Subsector:

1. The Lebanese Republic is situated along the Mediterranean coast of west Asia and covers a land area of 10,450 square kilometers. Lebanon has an estimated population of 3.75 Million and an annual growth rate of 1.5%.
2. The country has been devastated by a long period of civil strife and military occupation from 1974 through 1990. During this period (1974-1990), the per capita GDP dropped from US \$2250 to 825. Apart from the tremendous loss in human resources, about 200,000 professional and skilled Lebanese have sought employment in other countries. In addition to that, the total damage to physical assets during the war period was estimated at US \$ 25 billion. Damages have been both a direct result of the war as well as the accumulated effects of a near and total disruption in capital investments and maintenance. Besides trying to cope with the social consequences of the war, Lebanon was faced with the tremendous task of planning, financing and executing a comprehensive reconstruction of the country's physical infrastructure. To adjust, the Lebanese Council for Development and Reconstruction (CDR) was established as the body responsible for a 10-year emergency reconstruction and rehabilitation plan launched in 1992.
3. Great efforts have taken place since 1991 towards improving the economy. According to the Central Bank of Lebanon reports based on IMF estimations, GDP increased from 9.1 billion US\$ in 1994 to 13.7 billion US\$ in 1997, and inflation dropped from 10% in 1995 to 5 % in 1997.
4. Lebanon, in absence of rich natural resources of energy, imports 97% of its energy needs in the form of crude oil. According to the UNFCCC inventory report, this imported energy resulted in 12 million tons of CO₂ emissions in 1994. The Lebanese imported oil bill exceeded 400 million US\$ in 1996¹. Improving the countries' energy situation is a priority to the government of Lebanon. Expenditure under emergency reconstruction and rehabilitation plan have reached 4 billion US\$ to date. About 33% of the infrastructure development was allocated to the electricity sector. The emergency Power Sector Master Plan for the years 1992-2002 launched by CDR focused on the rehabilitation of the electric supply-side. Despite heavy investments in new generating facilities, the demand for electricity is expected to exceed supply in year 2002. The situation is expected to exasperate as no energy conservation plans are put forth and no meaningful effort is made to consider energy conservation issues and implement meaningful strategies to reduce the growth in the energy demand side. Current energy intensity in Lebanon is estimated to be 0.35 Toe/1000 US\$. This relatively high figure compared to other developed countries of similar conditions indicates that there is significant potential for energy conservation gains in Lebanon.
5. With increase in population, buildings still remain the largest consumer of energy and will be singled out for the present study as a target for energy conservation. For the country to meet the demands, a set of conservation standards for building designs is to be

implemented backed with incentives for building owners and contractors to comply with the new standards. The economic growth and recovery and construction efforts are essentially placing more demands on energy use in the country, which has witnessed a boom in the building sector. The construction permits for 1995 reached 33,059 declined in 1996/97 but are picking up in 1998. With 800,000 people displaced during the war, Lebanon's medium term projected housing needs are in the order of 500,000 units. The anticipated private sector investment in the construction sector in Lebanon over the period 2000-2020 is 40 billion US\$. Building more power plants and buying more foreign oil to run them is not an economically feasible solution for the long term development, particularly when most of the consumption is taking place in the residential sector. So energy conservation and regulation on all levels will become the most important factor for meeting the future demand.

A.2 Host Country strategy

A.2.1. Building Sector

According to the UNFCCC inventory report, the building sector in Lebanon (residential, commercial and institutional) consumed in 1994 for space heating and cooling purposes 0.30 MTOE resulting in the emission of 1.93 million tons of CO₂. The energy used for space heating and cooling was derived from three sources whose 1994 breakdown is as follows: electricity (0.13 MTOE representing 27% of total national electricity supply), LPG/diesel oil (0.12 MTOE representing 15% of total national LPG/diesel imports) and wood (0.05 MTOE). The projected average yearly energy consumption for space heating and cooling between 2000 and 2020 is calculated to be 0.49 MTOE based on a conservative 3% energy growth rate (see Annex D).

Construction and design of buildings in Lebanon have changed considerably over the last century. Flat roofed and thin walled buildings of relatively low thermal insulation have replaced the stone walled houses, which were characterized by good thermal mass and passive design. Typical low-income buildings have the following envelope characteristics¹:

- **Wall Construction:** 10 cm hollow concrete blocks with 1.5 cm mortar cement on both sides
- **Floor construction:** 20 cm thick concrete slab with 1.5 cm mortar cement, 3 cm sand aggregate and 2 cm thick terrazzo tiles
- **Roof Construction:** 20 cm thick concrete slab with 1.5 cm mortar cement on the inside.
- **Windows and Glass:** Float clear single pane glass with 6 mm thickness and average conductance.

¹ N.Ghaddar and A.Bsat, "Energy Conservation of Residential Buildings in Beirut", *International Journal of Energy Research*, Vol. 32, No.2, pp.523-546 (1998).

Insulation is rarely used. New buildings are, however, characterized by more efficient use of construction material¹. Despite the relatively mild winters and summers that characterize Lebanon, heating remains essential in the winter (November/March) and cooling in the summer (June/September). The enhancement of the existing insulating and ventilation capabilities of new buildings is essential to alleviate high energy bills for heating and cooling.

The building sector in Lebanon, therefore, represents a heavy environmental and economic burden. The energy consumed for the provision of thermal comfort, cooling, ventilation and lighting in buildings constitutes a substantial proportion of the energy bill. Several barriers are hindering the achievement of effective better energy performance in buildings. These barriers (described in Section B) are mainly attributed to the lack of energy codes and thermal building standards, institutional structure, information and public awareness, and professional expertise in this field. Lebanon has already proceeded in the establishment of thermal guidelines for buildings. Several projects and initiatives have and are being implemented in this field including a call for a revision of the Lebanese Building Law the Ministry of Public Works (see section A.3).

A.2.2 Energy Policy and the Lebanese Building Law

1. With the emergency planning-phase almost complete and power cuts and electricity rationing still a reality, the Lebanese Government is turning attention to the need to address the demand aspect of the electricity sector and the need to rationalize electric demand towards quantified conservation targets.
2. The Lebanon's UNFCCC Enabling Activity Project through the Lebanese Ministry of Environment, which communicated the First National Communication of Lebanon in September of 1999, has constructed and identified a national strategy for mitigation of greenhouse gases in a way that is consistent with national development and reconstruction objectives and priorities. Special emphasis was put on identifying cost-effective mitigation opportunities that exist in Lebanon (technical or policy specific). The building sector cost-effective mitigation options took up the issue of the thermal performance of building envelopes, and the reduction in energy consumption of space heating and cooling once thermal buildings guidelines (technical specific) are adopted (policy specific).
3. A study on summer and winter thermal comfort in buildings was commissioned in 1995 by an initiative from the Lebanese Council for Development and Reconstruction (CDR). This study entitled “Guide de l' isolation thermique et du confort d' ete des batiments au Liban” was carried out by the French “Centre Scientifique et Technique du Batiment” (CSTB) under the supervision of the Lebanese Norms Institute LIBNOR and in collaboration with volunteer Lebanese specialists. The study Version (2.0) is intended to serve as a guideline. With this initiative, there are no planned activities to secure public participation, professional training or to promote awareness among professionals or policy makers.

4. Another study was supported by National Council for Scientific Research (NCSR) during 1994-1996, on energy conservation in residential building in Beirut and the thermal code of practice in which ranking is done of energy conservation measures for building envelopes based on economical indices. An economic model for optimization and sensitivity cost analysis is also done with emphasis on the national economy as well as the consumer and a set of economical indices are used along with the payback period of any investment on measures. A set of recommendations has been arrived at concerning minimum energy conservation measures for use in Beirut. Many of the measures suggested have a negative payback period of less than one year. To give flexibility to building designers and insure proper enforcement, the work recommended an upper ceiling on the peak cooling load, PCL, and the peak electrical consumption, PEL, per unit area of living space. The work was conducted at the American University of Beirut and remained only at the academic level.
5. The Lebanese Building Law has so far lacked any reference to the thermal performance of buildings, and as a result, has lacked any consideration for the buildings' energy consumption. Currently, the Ministry of Public Works has called for a revision of the Lebanese Building Law and the thermal performance element may be missed.

A.2.3. Energy Pricing

1. The Ministry of Oil & Gas, which was merged with MoHER, is responsible for regulating prices of all petroleum derivatives in Lebanon, even those imported by the private sector. Energy tariffs used to be subsidized, however, recently, the subsidies on fuel prices were lifted and electricity tariffs structure has been changed. Electricity tariffs were raised with no real effect on demand patterns so far, due to existing illegal connections and the problems with billing. Incomplete bill collection (37% in 1996) also remains a major problem. As a clear disincentive for conservation, it is preventing investments in Demand Side Management efforts. Until 1988 the government retained a monopoly over the petroleum market, but a number of private companies has subsequently been authorized to import, store and distribute petroleum. The government introduced a new pricing system, which ensures the local fuel price level at above the international market price level. In 1998, the government set a local fuel price at the same level as the international fuel price level at that time. The price will be adjusted only when the international fuel price exceeds the set local price.
2. Electricity tariff rates have recently been reviewed more than once. Tariff increases were introduced in October 1996 and latest in March 1997 as rehabilitation fees. The current electricity tariff rates for residential areas are divided into 5 bounds depending on the level of electricity consumption. The tariff rates for consumption less than 300 kWh are kept below the actual cost of electricity, which is estimated to be 0.08 US\$, mainly for social reasons. However, the subsidies are expected to be removed by the year 2000. Currently the tariff rates are being restructured to include Time of Use tariffs. A study on "Time of Use Tariffs" financed by the French Technical Assistance Aid was launched in June 1998 and completed in 1999. This study is currently being studied for approval by the Board of EDL.

3. As long as technical and non-technical losses are high, both local decision makers and international organizations can hardly be convinced that energy efficiency measures and adoption of building thermal guidelines are a priority. With improved management, installation of meters, and internal and external follow up by EDL (Electricite de Liban), the increase in bill collection is estimated to reach 84% by year 2001.

A.3 Prior and on-going Assistance:

Relevant activities undertaken by the Lebanese Government with bilateral and multilateral support that can be drawn upon in the present project are:

1. The Lebanese Council for Development and Reconstruction (CDR) initiative study of thermal comfort in buildings was carried out in 1995 by CSTB under the supervision of LIBNOR and in collaboration with volunteer Lebanese specialists. The study recommended measures that are estimated to bring about 25% energy reduction in space heating and cooling per household. Version (2.0) of the building thermal guidelines was published by LIBNOR for voluntary review and feedback in early 1999. With this initiative, there are no planned activities to secure public participation or to promote awareness. To be noted also is that the contract with CSTB ends with the issuing of the preliminary version.
2. The “Association Libanaise pour la Maitrise de L’Energie” (ALME) has initiated an economic feasibility study on Energy Efficient Building (EEB) measures endorsed by the FFEM. An economic feasibility study will be performed on Energy Efficient Building (EEB) measures endorsed by the FFEM who are contributing around one million US\$ in incremental cost. Several operational demonstration projects will be promoted, the first of which is a housing project in Zouk Mousbeh and another identified demonstration project is promoted by “Elissar Contracting and Engineering” which is constructing 64 social apartments totaling 3900 m² including offices and shops. The demonstration operation includes a follow-up mechanism to evaluate the impact of the introduced improvements on energy use and energy bill. The dissemination of results of the energy savings in the pilot projects on the national level will be done in collaboration with the Lebanese Order of Engineers. Workshops will be used to promote the use of more efficient household equipment, integrated use of solar thermal energy and best construction practices for effective buildings’ envelopes. The EEB project comprises three main activities within a four-year time frame:
 - (i) A pilot demonstration project, Byblos residential park, with around 50% of the total project budget for purchasing energy efficient equipment.
 - (ii) A monitoring activity, with around 30% of the total project budget for purchasing measurement equipment for project monitoring.
 - (iii) A formulation of guiding brochures for several EEB measures including low-consumption lamps and solar water heaters; and a focused capacity building activity targeting the training of around 50 national specialists. This takes up the remaining 20% of the project’ s budget.

3. GEF council has recently approved a national major project LEB/99/G31 entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”. The GEF Council has recently approved the project brief. The project is expected to begin in July 2000 and will be executed by the Ministry of Hydro-Electric Resources MoHER. The goal of this project is to reduce GHG emissions in Lebanon by improving demand-side energy efficiency through the creation of a multi-purpose Lebanese Center for Energy Conservation and Planning. The Center, which is expected to be a “soft” and flexible institutional set-up, will simultaneously undertake barrier removal activities and provide energy efficiency services to the public and private sectors, with the aim of becoming an independent, commercially viable private corporation. The project will undertake a broad range of supporting activities including information dissemination, awareness programs, and policy analysis and program design. It will play a crucial role in activating market demand for energy efficiency and will therefore greatly benefit the current proposal. Specifically, it will be working jointly with this proposal on activities including assessment of environmental and social impacts and national benefits of adopting a thermal building standard; economic benefits to consumers and pay back time; and, developing economic incentives, scenarios and mechanisms to help private developers overcome the incremental construction cost.

The “Thermal Comfort Guidelines” (which has already taken a 2 year effort) is not yet structured as a complete and agreed upon document that can be incorporated into an energy building code. The capacity building activity of the FFEM/Byblos project is limited and does not target a national and governmental scope of professionals, and does not aim at initiating policy changes; but rather aims at informing a limited number of specialists about the findings of the Byblos project. Due to the existence of a number of barriers (described in Section B), the Government has been unable to address the issue of enforcing strict thermal guidelines for buildings, despite the serious implications of increased electricity consumption for heating and cooling and the resulting increase in GHG emissions. Moreover, the Ministry of Public Work has called for a revision of the Lebanese Building Law, and unless a buildings' energy code is incorporated, the Lebanese Building Law will be deficient.

A.4 Institutional Framework:

The Lebanese Directorate General of Urban Planning (under the Ministry of Public Works) is the body responsible for the advancement of building laws. Municipalities at the decentralized level (under the Ministry of Municipal & Town Affairs) are another body that can play a role in the compliance process to the building law. The participation of Ministry of Hydraulic and Electric Resources may be needed to achieve better bill collection and tariffs incentives, which indirectly contribute to the successful implementation of the thermal buildings standard (the thermal standard will reflect a lower energy bill for heating and cooling purposes). Furthermore, the following parties have a key role to play in the advancement of thermal building codes:

1. Lebanese Norms Institute (LIBNOR) founded in 1962, responsible for setting national norms and standards. These standards are voluntary in principle unless endorsed by the government.
2. Council for Development and Reconstruction (CDR) constituted in 1991 after the end of the war. It is a governmental organization for planning and resource mobilization.
3. The Order of Engineers and Architects founded in 1952 currently comprising around 20,000 professional members from the various fields of Engineering, and the field of architecture. Membership in the Order is a prerequisite for professional practice in the country.
4. Municipalities that have been activated through the electoral process held in 1998 and have independent budget and may play a very significant role in the verification process during construction of new buildings or through implementation of new rules for old existing buildings. The Beirut Municipality, in particular, has a larger role to play, since it issues building permits independently within Beirut for limited residential type buildings and has a large professional staff. Other Municipalities are represented through the Ministry of Municipal and Town Affairs.
5. The Syndicate of Contractors in Lebanon which is not involved in policy settings.
6. Association Libanaise pour la Maitrise de l' Energie (ALME), is a national scientific NGO founded in 1992. It comprises around 50 professionals specialized in the various fields of engineering, architecture and economics. Its aim is the promotion of sustainable development through the encouragement of energy saving measures and the use of cleaner renewable energy sources.
7. Local Universities may play an important role in the training of graduating professionals and emphasizing the energy code of practice for efficient buildings. American University of Beirut (AUB), Lebanese University (LU) and the Ecole Supérieure des Ingenieurs a Beyrouth (ESIB) are all involved in studies and research on energy conservation, energy efficiency and energy management in buildings.

SECTION B. PROJECT JUSTIFICATION

B.1 Problem to be Addressed and the Present Barriers

B.1.1 Problem to be Addressed:

The characteristics of building envelopes play a key role in influencing the amount of energy used for heating or cooling. In 1994, the building sector consumed 13.77×10^6 GJ for space heating or cooling, which resulted in the emissions of 1016 Gg of CO₂ according to the UNFCCC inventory report. This figure is expected to increase at a rate varying between 3-6% over the next 20 years. The preliminary Building Thermal Guidelines Version (2.0), published by LIBNOR for voluntary review in 1999, is not complete and it is intended for voluntary application. There are no governmental plans to transform these guidelines into building standards, nor activate market demand in order to increase the voluntary applications of these guidelines. The Building Thermal Guidelines are intended, as a first step, to bring to the attention of the Lebanese building sector the possibilities of building envelope energy conservation measures. But the proposed guidelines are not based on a thorough economic

assessment that takes into account the cost and availability of construction materials in the local or regional market.

So as energy conservation measures in buildings are not being applied in Lebanon, then the potential for energy savings and GHG emissions reduction is estimated to be high. As such, the long-term goal of the project is to reduce the growth rate of GHG emissions resulting from the combustion of carbon based fuels and the consumption of electric power for heating and cooling of buildings, thereby contributing to the mitigation of climate change.

Although baseline activities to update existing building codes are on-going in the Lebanese Republic, these activities do not address barriers hindering the inclusion of energy codes in the available building codes or construction of energy efficient buildings. The project will add on the existing activities and will provide the stakeholders with needed support to establish cost-effective energy codes in buildings. Governmental participation will be a requirement to transform the guidelines and voluntary standards to a code, which in turn trained professionals in design and construction must be familiar with in order to apply them in their work. The adoption of the thermal building standard by the government will pave the way for future transformation of the standard to a code enforced by law. In addition, public awareness will be needed to activate market demand, as well as provide economic incentive scenarios in order to overcome increases in construction cost.

This timely intervention presents an opportunity for Lebanon to address this issue given that the anticipated private sector investment in the construction sector in Lebanon over the period 2000-2020 is \$ 40 billion.

Moreover, primary energy consumed in Lebanon is imported and purchased from outside sources making it an expensive commodity and an economic constraint, in addition to being an environmental burden. Thus, the reduction of energy consumption is a national priority and is important to the balance of payments.

Considerable intangible benefits are also expected where improvement in health and safety measures would result by reducing the need for heating using open kerosene heaters, open charcoal and wood fires. Through efficient buildings, living standards and productivity in offices would improve.

The regional aspect of the project will facilitate the exchange of knowledge and expertise between Lebanon and the Palestinian Authority and other countries in the region in this field. It would assist the Palestinians to benefit from the Lebanese experience in the establishment of energy codes and guidelines for buildings and the institutional, human and capacity development achieved in the process. And, as all Mediterranean Arab countries have more or less the same weather, therefore having to take similar actions, this project has sound replicability potential.

Several barriers in Lebanon are hindering the achievement of effective better energy performance in buildings. These barriers (described in the next section B.2) are mainly attributed to the lack of thermal building standards, institutional structure, information and public awareness, and professional expertise in this field.

Thus, the proposed GEF project provides for incremental costs that are vital to the establishment, adoption and application of energy codes and guidelines for construction in the region. It also contributes to the integration of global environmental concerns within national developmental activities and benefits.

B.1.2. Barriers:

In the Lebanese component, the proposed capacity building project aims at removing the barriers that hinder the Lebanese Government from the adoption of a thermal standard, and the consequent transformation in the construction industry. The barriers in Lebanon include:

Institutional barriers

- L.1. Uncompleted thermal guidelines, hindering their transformation into standards.
- L.2. Lack of a coordinating mechanism between the body which develops the codes, the body which adopts the codes, and body which applies the codes, which would hinder adopting standards and putting them into effect.
- L.3. Absence of adequate verification, supervision and certification mechanism, so that developers may not evade compliance.

Economic barriers

- L.5. Absence of economic feasibility studies, which would substantiate the investment in energy efficient building measures by establishing payback time.
- L.6. Absence of economic incentives, which would instigate developers (who are not necessarily the end-users of the building unit and payers of the energy bill) to incorporate energy efficient measures despite an increase in construction cost.

Information and capacity barriers

- L.7. Policy makers' unfamiliarity with environmental, economic and social benefits.
- L.8. Architects, engineers, and contractors unfamiliarity with methods of design and execution of energy efficient buildings.
- L.9. Consumer unawareness of favorable environmental, comfort and life-cycle economic benefits.

B.2 Expected End of Project Situation

Upon completion of the project, the Government of Lebanon will have greatly increased public awareness of cost-effective energy-efficient building materials, methods and designs, as well as benefits of energy efficient measures in buildings. Overall, it will possess improved institutional, human and resource capacities in the field of energy efficiency and standards in

buildings and transformation of the construction industry. The expected end of project situation can be summarized as follows:

1. Following barrier removal, an adequate policy and market environment will emerge, as well as the needed capacity to formulate and adopt energy codes for buildings.
2. Information dissemination tools and increased public awareness will have been developed about cost-effective energy- efficient building materials, methods and designs, as well as benefits of energy efficient measures in buildings.
3. Skilled human and resource capacity will have been built in the field of energy efficiency and standards in buildings and transformation of the construction industry.
4. Sustainable public and private point responsibility will have been established to promote and adopt energy standard in buildings and support energy conservation practices at the formal and informal level.
5. An institutional mechanism will be recommended on verification and certification of building thermal standard compliance by developers.
6. Market forces will be activated to increase demand on energy-efficient building materials and passive designs and initiate a change in the construction industry.
7. Regional cooperation and coordination in the field of energy efficiency in buildings will have been established.

The major specific outputs of the project activities are:

1. A complete “thermal building guideline” through participation, consolidation and consensus among stakeholders. Achievement of this output removes barriers L.1 and L.2.
2. Policy makers knowledge of economic, environmental and social impacts that would result from the adoption of Thermal standards. Achievement of this output removes barrier L.6.
3. Developers' willingness to incorporate energy efficiency building measures as a result of the introduction of economic incentive through specific financing mechanisms. Achievement of this output removes barriers L.4 and L.5.
4. A competent verification and certification mechanism and issuing of building certificates that links the building specifications with its thermal performance through use of acceptable scientific means (certified computer simulations). Achievement of this output removes barrier L.3.

B.3 Target Beneficiaries

The main beneficiaries of this project are:

- The MoHER and EDL, which will benefit from lower investment and expenditures for meeting the reduced energy needs.

- Directorate of Urban Planning at the Ministry of Public Work will benefit from the training of their engineers and officers on thermal building standards adoption and compliance procedures.
- Engineers and architects, as members of Order of Engineers and Architects, who will benefit through the training workshops on the design and application of thermal standard for buildings.
- Governmental and non-governmental institutions which will benefit from the training workshops on certification and verification.
- Engineering and architecture students at local universities, who will benefit from the assessment seminars and from the capacity building of national expertise on the issue of energy conservation in buildings.
- Occupants of Commercial and residential energy-efficient buildings, who will have a reduced energy bill and substantial savings in capital investment due to reduced heating and air-conditioning equipment capacity.
- Local and international private sector involved in the marketing of buildings' energy conservation materials and designs.
- The Lebanese population at large will be the end result beneficiary in view of indirect impact on health and safety by reducing the need for heating using open kerosene heaters, open charcoal and wood fires. Measures that improve buildings thermal performance also improve noise level indoor conditions, bringing in more comfort and productivity during daytime for office workers.
- The global community, which will benefit from the reduced emissions of green house gases.

B.4 Project Strategy and Implementation Arrangements

B.4.1 Project Strategy:

The central strategy of this project is to create the institutional focus and capability to the establishment, adoption and application thermal guidelines and thermal standards for building construction in Lebanon.

This building project will complement the ongoing energy conservation initiatives in Lebanon and allow the Lebanese Government to adopt the formulated Lebanese “Thermal comfort building guidelines” and feasibility studies. The necessary external support will be provided through hiring international consultants to assist in reviewing the guidelines. The project will focus on removal of barriers that hinder the formulation, adoption, dissemination, and application of thermal standards for buildings and insure presence of a competent verification and certification mechanism for compliance. The project will eventually initiate a transformation in the Lebanese construction industry. It will also remove barriers for the transfer of relevant knowledge and experience among other countries in the region.

The project will focus on providing capacity building and training on the technical know-how to design and execute energy efficient buildings of local selected national professionals (engineers and architects), and counterparts in Directorate General of Urban Planning in the Ministry of Public Works, Order of Engineers and other institutions.

The project will promote regional coordination in the field of energy efficiency in buildings.

B.4.2 Institutional Structure and Implementation Arrangement

Institutional Structure

The Lebanese General Directorate of Urban Planning (under the Ministry of Public Works) is the body responsible for the advancement of building laws and will be the executing agency for this project. This arrangement will also allow the project to access the governmental network and involve reconstruction and planning entities.

The Project Steering Committees (PSC) will be formed of representatives of the various stakeholders of the project in the country. The PSC will meet on a monthly basis under the chairmanship of the Executing Agency. The PSC is composed of the following:

- Project Manager (PM).
- Representative from the Directorate General of Urban Planning LEBDUP.
- Two representatives from the Lebanese Order of Engineers and Architects who should include one Architect and one mechanical engineer.
- Representative from Council for Development and Reconstruction
- Representative from Lebanese Norms Institute (LIBNOR)
- Representative from the Municipal and Town affairs under the Ministry of Municipal & Town Affairs
- Representative from UNDP
- Representative from the Ministry of Environment
- *Ex-officio* member from the Ministry of Hydro-Electric Resources (MoHER)
- *Ex-officio* member from the Electricite du Liban (EDL)

Detailed Terms-of-Reference for the PSC is shown in Annex B.

In addition, the following institutions may participate with high-level members, although their absence will not delay PSC meetings when a full quorum is in attendance:

- Ministry of Housing
- Ministry of Industry
- Association of Lebanese Industrialist (Construction Industry Section)
- North Lebanon Order of Engineers and Architects
- Association Libanaise pour la Maitrise d' Energie (ALME-NGO).
- American University of Beirut (AUB)
- Ecole Supérieure des Ingenieurs a Beyrouth (ESIB)

- Lebanese University (LU)
- Lebanese American University (LAU)
- Syndicate of Contractors
- Other relevant parties

Regional Component

The project will promote regional coordination among the participating parties in the field of energy efficiency in buildings through the following activities:

- 1- Hold an initial coordination meeting between the Palestinian and Lebanese teams working on this regional project.
- 2- Exchange of visits and transfer of knowledge and experience between the countries of the region and specifically with Lebanon.
- 3- Exchange of publications and information tools on energy-saving modalities produced by the national activities of the project.

Implementation Arrangement

The project will be implemented, under the overall supervision and responsibility of Directorate General of Urban Planning at the Ministry of Public Works and under the coordination of the Project Steering Committee (PSC). The project will be implemented by a Project Manager and qualified national experts assisted by Government counterpart teams from the relevant ministries and institutes.

The PM will coordinate closely with a National Coordinator appointed by the LEBDUP who will ensure the sustainability of the project.

The Directorate General of Urban Planning will host the PM and the project staff and provide the necessary office space and administrative support. Specifically, the design unit and the planning unit in the General Studies Division will be the host of the project planning and meeting activities. They will provide necessary guidance for identification of targeted government professionals for training on compliance procedures to the thermal building standards in design and construction stages and on construction of information database.

The Order of Engineers and Architects (OENGAR) will participate through hosting seminars and training workshops for the professional body. The OENGAR will support publications of material relevant to the application of the thermal standard.

LIBNOR will overview the transfer of the thermal building guideline into a thermal building standard.

ALME, which is the body conducting and monitoring the Byblos project, will contribute through supporting information and indicators of the success of implementation of the thermal standard.

The Ministry of Environment will participate in the environmental assessment and promoting publication material and brochures that link the sustainability of the Lebanese environment to the current project.

B.5 Reasons for Assistance from GEF/UNDP

The project is designed to remove the barriers that hinder the sustainable and successful formulation, adoption and implementation of energy code and thermal building guidelines. As such, and by removing barriers to the establishment and adoption of energy codes for buildings, the project contributes to the reduction of the risk for climate change, and falls under Operational Program No. 5 "Removal of Barriers to Energy Efficiency and Energy Conservation" of the GEF Operational Strategy, and incorporates all pertinent considerations stemming from this program.

The global environmental objective pursued in this project is to reduce the growth rate of GHG emissions resulting from the combustion in carbon based fuels through reduction of the consumption of electric power used for heating or cooling of buildings. The project will create the institutional focus and capability to the establishment, adoption and application of thermal guidelines and standards for building construction in Lebanon. In doing so it will initiate a mechanism that will contribute to transforming of the construction materials and design market into one that is more conscious about energy use in buildings and one where the cost of adopting energy measures in buildings is economically feasible.

The existing national initiatives do not endeavor to reinforce all sustainable aspects of thermal building guidelines adoption and implementation on a long-term basis. The GEF and UNDP funding will enable the Government of Lebanon to remove existing barriers at the level of information, technical, awareness, economic and institutional presented in the project brief. Moreover, the Ministry of Public Work has called for a revision of the Lebanese Building Law, and in this regards, the proposed project will provide a time appropriate intervention for the incorporation of energy standards for buildings envelopes.

The GEF and UNDP funding will therefore complement most of the proposed activities of the project, but will be concentrated mainly at the level of activities related to technical consultations and services, and will support to a lesser extent policy and promotion activities.

GEF funding for barrier removal is critical to the achievement of the project's objectives. Without this incremental funding, it will not be possible for Lebanon to formulate, adopt and implement thermal building guidelines at a level resulting in significant reductions in GHG emissions.

B.6 Special Considerations

- There will be an emphasis on the capacity building of national technical staff including those recruited by the project and those identified by the Government as counterparts. This is essential for the development of sustainable strategies and tools for the implementation of the thermal building guidelines.
- Specific attention will be paid to the dissemination of and public access to the available information to ensure wide involvement and recognition by developers, engineers, architects and contractors of the environmental and economic impact of the energy code for buildings.

B.7 Co-ordination Arrangements

The Project Steering Committee who has representatives from main stakeholder groups and will have the following responsibilities:

- (a) ensuring coordination between all stakeholders on project activities. The stakeholder groups include:
 1. Those involved in development of “Thermal guidelines”: CDR, LIBNOR, and various Lebanese stakeholders including ALME.
 2. Those involved in adoption of codes: Ministry of Public Work and Directorate General of Urban Planning, and Municipalities under the Ministry of Municipal & Town Affairs.
 3. Those involved in application and compliance: Order of Engineers and Architects, Syndicate of Contractors and Municipalities.
 4. Those involved in the verification of the application: Directorate General of Urban Planning, Municipalities, and private verification offices such as Veritas, Socotech, Apave, SGS, etc.
 5. The private sector, which will be investing approximately \$ 40 billion in buildings over the next 20 years (see Annex F).
- (b) ensuring coordination between this project and other ongoing activities and initiatives in the region. Experience will be drawn from other ongoing enabling activities projects;
- (c) monitoring the project activities and assess timely progress; and
- (d) providing overall guidance for the project.

In order to ensure full cooperation and minimize the risk of duplication of efforts with the existing DSM project², its executing agency, the Ministry of Hydro-Electric Resources, as well as the Electricite du Liban have *ex-officio* seats on the current project’s Steering Committee. Specifically, the DSM project² will be working jointly with this project on

² DSM GEF supported project (2000-2004), titled "Lebanon-Cross Sectoral Energy Efficiency and Removal of Barriers to Energy Services Company Operation"

activities including assessment of environmental and social impacts and national benefits of adopting a thermal building standard as well as economic benefits to consumers and pay back time; and on developing economic incentives, scenarios and mechanisms to help private developers in overcoming the incremental construction cost.

B.8 Counterpart Support Capacity

To achieve the goal set for this project, the Government of Lebanon will be involved in the establishment of a Project Steering Committee (PSC) to assist in, and ensure the successful implementation of project activities.

The Directorate General of Urban Planning in the Ministry of Public Works has expressed its full commitment to host this GEF project in the Planning or Design Units, and to continue with their full implementation in collaboration with Beirut Municipality and other local institutions and organizations, including CDR, LIBNOR, Order of Engineers, the private sector and local NGOs.

The Directorate General of Urban Planning in Beirut is divided into two departments and three units directly under the Directorate General Manager Office as follows:

- General Studies Department
- Municipal Projects Department
- Al-Diwan Unit
- Information and Database Unit
- Higher Council Treasury Unit

Besides the above divisions, there are 20 other regional technical units that are located at various geographic areas of Lebanon.

Based on the Directorate General of Urban Planning internal structure, and the roles and responsibilities of various divisions, the execution of this project and its sustainability will lie within the General Studies Department which has five units. The Planning Unit will be the target host for the project because of its major involvement in new building construction permits. There will also be some coordination with the Design Unit, in the same General Studies Department, which generally receives the requests for building permits. The Planning Unit has currently 40 civil servants (Head of Unit, seven engineers, thirteen surveyors, six foremen, ten draftsmen, one clerk and two office boys). The Design Unit has a unit head and 10 engineers beside some other 28 civil servants. The general structure of LEBDUP is given in Annex G that also provides some information on the role of the Planning Department that will host the current project.

Order of Engineers and Architects in Beirut will host some of the proposed events of the project. The Order of Engineers and Architects will provide its premises for conduction of the workshops, participate in general and specialized publications for awareness about target issues, and host the expected Data Bank on Buildings that comply with the thermal standard.

The order of Engineers in Beirut will cooperate with the Order of Engineers Branch in Tripoli for coordination on seminars. Currently the Order of Engineers and Architects is a non profit organization and has an electoral board, several technical committees and around 27,000 registered professional members of engineers and architects in Beirut and about 3000 members in the Tripoli Order. Usually, the Order of Engineers receives plans of proposed buildings projects, does an area check and technical checks of the specifications of the building with regard to civil, electrical and mechanical services and issues an approval which is required by the LEBDUP and Municipalities. The OENGAR has engineers and employers as permanent staff to do the registration for permits tasks, to check compliance and areas and to estimate the required fees based on areas and function that will be paid to the Order.

SECTION C. DEVELOPMENT OBJECTIVE

The development objective of this project is to build national capacity that would enable Lebanon to:

1. Reduce greenhouse gas emissions
2. Establish thermal energy standards for buildings and prepare grounds for future adoption of the standard as an energy code for buildings.
3. Initiation of a transformation in the construction industry in Lebanon.

The above objectives will be achieved through removal of barriers to the adoption and implementation of building thermal guidelines. This goal will be achieved through securing the expected results and outputs discussed in the following section. However, the overriding frame work of the project is the developing of institutional bodies to promote and adopt energy codes in buildings and the establishment of a sustainable mechanism for verification and certification.

SECTION D. IMMEDIATE OBJECTIVES, OUTPUTS, INDICATORS AND ACTIVITIES

D.1 IMMEDIATE OBJECTIVE 1: REVIEW THE “THERMAL BUILDING GUIDELINES” PREPARED BY LIBNOR AND CONDUCT AN ENVIRONMENTAL, ECONOMIC AND SOCIAL ASSESMENT OF THESE GUIDELINES.

Success Criteria:

- Project Steering Committee is formed and hosted at the Directorate General of Urban Planning of the Ministry of Public Work.
- Environmental, economic and social impact assessments are performed and do show the national and consumer benefits of the Thermal Building Guidelines adoption.
- Thermal Building Guidelines” are technically sound.

Output 1.1: Setup of a coordination mechanism between the institutional bodies that will formulate, promote and adopt a building thermal standard.

Responsible Parties: UNDP, LEBDUP, LIBNOR, CDR, Order of Engineers & Architects (OENGAR), Municipalities, MoHER & EDL.

Activities for Output 1.1

- 1.1.1 Recruitment of the Project Manager PM and necessary support staff for initiation of the project.
- 1.1.2 Follow up the appointment of national focal points at LEBDUP, LIBNOR, OENGAR, Beirut Municipality, Municipalities under the Ministry of Municipal & Town Affairs and CDR.
- 1.1.3 Establishment of the convening Project Steering Committee PSC and ensuring its meeting on regular basis.
- 1.1.4 Identification of international and regional consultants in the area of thermal response and energy conservation of buildings, who have been active in developing and evaluation of buildings energy standards in other countries in the region and who are experts in environmental and economical impact assessment of adopting thermal building guideline. (This activity is done in common with the DSM Project and inline with activity 3.5.5).
- 1.1.5 Identification of national specialists and experts in the area of energy conservation in buildings, who are capable of guiding and performing environmental, economical and social assessment on the impact of adopting of thermal building guidelines. One of the specialists should have expertise in socio-economics (This activity is done in common with the DSM Project and inline with activity 3.5.5).

Output 1.2: Review of the “Thermal Building Guidelines” proposed by LIBNOR.

Responsible Parties: PM, LEBDUP, LIBNOR, OENGAR, ALME, Municipalities and International Consultant.

Activities for Output 1.2

- 1.2.1 Recruitment of an international or regional consultant who has expertise in development and evaluation of thermal response and guidelines of building. Regional experience in similar projects will be highly preferable.
- 1.2.2 Review of the preliminary “thermal building guidelines” version (2) issued by LIBNOR under the CSTB contract. The initial phase of the review should identify any key issues and means to strengthen weak links. The general questions to be answered for this part of the review include:

- * Are the suggested guidelines compatible with the various climatic zones of Lebanon?
- * Do the guidelines require sophisticated technical skills and building practices?
- * How much flexibility does the energy code offer in terms of material selection?
- * Is the building function compatible with the suggested guidelines?
- * How does the energy code for buildings or the thermal guidelines compare with other countries of similar climate and economic conditions?

The current “thermal building guideline” version (2) does not incorporate any economical indices and at this point it is understood that it must be some how flexible to leave room for economic assessment. The building thermal load that originates from the envelope is just one component of many others that contribute to the heating or cooling load of the building. Commercial, Institutional, residential, schools and hospitals may reflect different percentage reductions of thermal load, for the same-implemented guidelines.

1.2.3 The international or regional consultant will then prepare an Assessment Plan on what is needed for conduction of the economic, environmental and social impact of adoption of thermal building standard. The Assessment Plan will identify the activities that will be conducted by the national experts and may include the following:

- *. Survey and identify current construction materials on the market and their cost. This includes all components that relate to buildings envelopes.
- *. Identify available energy conservation measures available in the market and their costs.
- *. Propose a set of commercial or public domain software that can be used for the economic assessment of the thermal guidelines based on local climate and regional experiences on the use of such software.
- *. Propose means of evaluating energy reductions due to application of thermal guideline and the corresponding reductions in GHG emissions.

1.2.4 Prepare and deliver the review to the PM and the PSC with the Assessment Plan that need to be conducted before communicating the final version that transforms the building thermal guidelines into a standard.

Output 1.3: Conduction of and environmental, economic and social impact assessment of the adoption of thermal building standard *(This output will be conducted in coordination with output 2.5 of the DSM project document funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”)*

Responsible Parties: PM, LEBDUP, MoE, project international consultant, national specialists including socio-economy expert.

Activities for Output 1.3

- 1.3.1 Recruitment of at least four national specialists identified in activity 1.1.5.
- 1.3.2 The international or regional consultant in the presence of the PM will meet with national specialists to discuss the Assessment Plan and distribute responsibilities according to specialty for conduction of the feasibility study. She/he will guide the national specialists on the use of available local, commercial or public domain computer software for the thermo-economic and environmental assessment. Local universities and engineering consultant offices use some of the software.
- 1.3.3 As part of the assessment plan, national experts will conduct a survey of current construction materials standards for buildings and prices. The current thermal specification and practices in buildings have been already identified through the UNFCCC GHG inventory and mitigation report. The costs of these practices need to be compared with the suggested standard thermal guidelines and the incremental cost has to be determined. The help of PM and PSC can be obtained at this point to solicit information already available with governmental institutions and with private sector. Undertake a national survey to identify the mostly used energy efficient building technologies, the needed technologies, target consumers, urban vs. rural situations. Cooperation with the EEB pilot project conducted by ALME and financed by FFEM can be solicited to use their results on energy efficient technologies.
- 1.3.4 As part of the assessment plan, national experts will conduct a market survey with maximum geographic outreach to assess the availability, adequacy, and pricing of energy efficient building technologies as well as local manufacturers and their main challenges in this domain.
- 1.3.5 As part of the assessment plan, national experts will survey of incremental cost on use of special or new construction materials that are not currently in the market and also the involved skilled labor cost and any additional costs that could be attributed to the adoption of thermal building guidelines which may also include increases in construction time and or reduction of interior building space due to use of thicker walls etc. This is why the buildings thermal standards need to be flexible and linked directly to the required power rating needed by the building for heating or cooling purposes.
- 1.3.6 As part of the assessment plan, socio-economic national experts will define consumer and national economic indices and perform the economic analysis of the impact of the incremental initial investment cost expected to result due to the adoption of the thermal guidelines on new buildings and retrofitted buildings. The economic indices will include the net present value of the capital investment and the pay back period for implementing specific conservation measures. The economic indices should include also national benefits due to reduction of total power plant generation capacity leading to reduction of GHG emissions associated with implementation of the energy code. Some of these indices are already available through the economic feasibility study on Energy Efficient Building (EEB) measures initiated by ALME and endorsed by the FFEM, and the LNCSR study conducted by AUB.

- 1.3.7 Conduct a socio-economic impact assessment of social and health changes or benefits that may result from the adoption of thermal building guidelines. The effect of changes in energy bill on the different social categories and the affordability of the incremental capital investment cost in construction need to be assessed. Recommendations should be given on economic incentives, scenarios and mechanisms that can help private developers in overcoming the incremental construction cost. A national expert in environmental studies and socio-economy will conduct this assessment.

Output 1.4: Development and design of programs that can improve market penetration and market transformation to buildings' energy-efficient technologies. (This output is actually output 2.5 of the DSM project document funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency” (2000-2004)

Parties responsible: PM, international expert and economist from the DSM Project.

Activities for Output 1.4

- 1.4.1 Based on the findings of activities 1 through 5 of output 2.5 of the DSM Project **funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”** and other examples from the regional and international community, recommend programs to facilitate the market penetration of energy efficient building technologies covering the different regions, the promotion of small and medium enterprises, local customs measures for imported products, possible financing modalities, etc.

Note that this activity is funded by the other GEF DSM project, which includes the following:

- *Estimation of the likely costs for new product design, new technology licenses from foreign partners, production line re-tooling costs, and associated lead times needed to comply with the standards under discussion.*
- *Investigation of possible support strategies that could help local manufacturers with the transition effort to adopt energy efficient technology and develop a recommended plan to realistically facilitate local manufacture in complying with construction materials requirements.*

Output 1.5: Development of creative and dedicated buildings thermal energy efficiency and conservation financing that can be facilitated/supplied to private and public sectors. (This output will be conducted through output 2.4 of the DSM project funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”)

Responsible: PM, finance expert of DSM project

Activities for Output 1.5

- 1.5.1 Based on the findings of activities 1 through 5 of output 2.4 of the DSM Project **funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”** recommend accepted and tried financing modalities, certification of projects for financing, pilot vendor finance mechanisms and identify replicable modalities.
- 1.5.2 Prepare publications and information on possible financing modalities obtained through the DSM Project.

Note that this activity is funded by the other GEF DSM project, which includes the following:

- *Conduct an assessment of the existing possible financing mechanism such as banks and identify possible and most convenient ways for cooperation between the private and public sectors*
- *Design accepted and tried financing modalities, certification of projects for financing, pilot vendor finance mechanisms and identify replicable modalities.*
- *Design, package and market a leasing program for identified energy efficiency technologies. The program would include the eligibility requirements, the installation procedures, payment provisions and possible financing mechanisms. The program should specify the economic savings, the customer benefits and the GHG emissions reduction.*
- *Provide direct finance by the Center with payback through “performance contracting” and other advanced modalities.*
- *Provide guidance in the implementation of these modalities.*

The current project will only benefit from these findings and use them for the purpose of promoting market changes for energy-efficient buildings' envelopes.

D.2 IMMEDIATE OBJECTIVE 2: PRODUCE THE COMPLETED AND AGREED-UPON THERMAL BUILDING STANDARD DOCUMENT.

Responsible Parties: PM, LEBDUP, LIBNOR, OENGAR, ALME, Municipalities (Ministry of Interior), MoE, Project International Consultant and NGOs.

Success Criterion

- The relevant stakeholders accept “Thermal Building Guidelines”: LIBNOR, LEBDUP, OENGAR and CDR.
- Thermal Building Standard for voluntary use is available in Arabic, English and French

Output D.2.1: Final Review of the Thermal Buildings Guidelines in the Light of the Impact Assessment Results

Responsible Parties: PM, LEBDUP, LIBNOR, OENGAR, ALME, Municipalities (Ministry of Interior), MoE, Project International Consultant and NGOs.

Activities for Output 2.1:

- 2.1.1 A detailed report will be submitted to the PM, MoE, LEBDUP and the project International Consultant on the results of the environmental socio-economic assessment of implementation of the thermal buildings guidelines.
- 2.1.2 The international consultant will meet with the national specialists and finalise the review of the thermal building guidelines in the light of the environmental, economic and social impact assessment results and check if any further modifications need to be added to the guidelines.
- 2.1.3 The international consultant will meet with the PSC and the focal points in LEBDUP, LIBNOR, OENGAR, ALME and Municipalities to discuss the minimum acceptable standards for building thermal structure design and use the assessment results as a verification element for any point.

Output D.2.2: Production of the Completed and Agreed-upon Thermal Buildings Standard Document.

Responsible Parties: PM, LEBDUP, LIBNOR, OENGAR, ALME, Municipalities (Ministry of Interior), MoE, Project International Consultant and NGOs.

Activities for Output 2.2

- 2.2.1 Translation of the Thermal Building Guideline Reviewed Document into Arabic and English from its current language of French. The PM can hire a technical translator and cooperate with staff in LIBNOR, LEBDUP and OENGAR to insure that the Thermal Building Guideline Reviewed Document is available in those three languages.
- 2.2.2 The Thermal Building Guidelines Document will be circulated, by the PM, to all PSC members and representatives to allow for any final technical comments.
- 2.2.3 The OENGAR will form a sub-committee from its own professional board members who will meet with the PM and national specialists to secure final approval of the document through endorsement by the OENGAR. This effort can also be coordinated by the Northern Order of Engineers.

- 2.2.4 The PM will conduct a general PSC meeting that includes all members and representatives (stated in section B.4.2.) to approve the adoption of the Thermal Building Guidelines as a Standard.

D.3 IMMEDIATE OBJECTIVE 3: DISSEMINATION AND SENSITIZATION OF POLICY MAKERS, PROFESSIONALS AND GENERAL PUBLIC ON THE THERMAL BUILDING STANDARDS ENVIRONMENTAL, ECONOMIC AND SOCIAL ASSESSMENTS THROUGH WORKSHOPS AND PUBLICATIONS.

Success Criteria:

- Policy makers and professionals will be knowledgeable about economic, environmental and social impact, which would result from the adoption of building thermal guidelines.
- Increased general public awareness of energy efficient building technologies and their environmental, economical, and social impacts.
- Increased general public and developers awareness of economic incentives for financing and adopting thermal building guidelines
- Market forces will be activated to increase demand on energy-efficient building materials and passive designs and initiate a change in the construction industry.
- Developers' are more willing to incorporate energy efficient building measures as a result of the introduction of economic incentive through specific financing mechanisms.

Output D.3.1: Dissemination of environmental, economic and social assessments information and possible financing modalities through workshops and publications to stakeholders.

Responsible Parties: PM, LEBDUP, LIBNOR, OENGAR, CDR, ALME, Municipalities (under the Ministry of Municipal & Town Affairs), MoE, MoHER, EDL, project international consultant, and national experts.

Activities for Output 3.1

- 3.1.1 Publication of the report on the results of the environmental socio-economic assessment of implementation of the new thermal building standard.
- 3.1.2 The PM will prepare a general plan for dissemination of the results of the building thermal guidelines assessment study and the sensitization of professionals to energy efficient buildings.
- 3.1.3 The PM will conduct a general PSC meeting that includes all members and representatives (stated in section B.4.2.) to discuss the plan for dissemination of the results of the building thermal guidelines assessment study and the sensitization of professionals to energy efficient buildings design and execution.

- 3.1.4 Identify the targeted public and private participants from stakeholders who are directly involved in the building sector as professionals, policy makers and building market drivers in the building industry. **Policy makers** will be mainly identified from the public sector from various ministries. **Professionals** will be identified from building industry, engineering & architects design offices, engineering and architecture university students, and members of OENGAR and Syndicate of Contractors. **Market drivers** will be identified from building industry sector, industrialist, building contractors and economists and private sector investors in reconstruction and construction such as SOLIDARE and ALISAR. This activity will be conducted by the PM with coordination of the PSC.
- 3.1.5 Prepare information materials in form of pamphlets, brochures, and documentaries from the results of impact assessment. The material will be used in the dissemination workshops.
- 3.1.6 The PSC with coordination of OENGAR and national specialists will group participants and announce a stakeholder first series of one-day workshops to cover Building Thermal Guidelines and their impact assessment results. The objective of the first series of workshops is to disseminate to the identified participants in the previous activity 3.1.4, the significance of adopting these guidelines, the national benefits, the long-term consumer benefits and the resulting improvement in the quality of the environment of Lebanon in terms of reduction of GHG emissions. The workshop series shall be held during the last quarter of the first year of the project. The PM will decide on the number of workshops that need to be conducted to insure the wide coverage of the targeted audience in all regions of Lebanon. The OENGAR will host some these workshops, while the Northern Order of Engineers may host one in the northern area of Lebanon.
- 3.1.7 The PSC with coordination with DSM Project Manager (DSM Project is **funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”**), will organize a second set of one-day workshops in coordination with the OENGAR. The second series of one-day workshops will address market drivers identified in activity 3.1.4 and possible market penetration programs and financing modalities as recommended in outputs 1.4 and 1.5. The second series will stress on economic incentives, scenarios and mechanisms that will help private developers in overcoming the incremental construction cost. Integrate information obtained in activity 1.5.1 into the designated workshops for sensitization of stakeholders on the existing possible financing mechanism such as banks and the possible and most convenient ways for cooperation between the private and public sectors.
- 3.1.8 Prepare proceedings and publish reports on the above-mentioned workshops and record the relevant principles and conclusions presented for further dissemination to concerned parties.

Output 3.2: Sensitization of the general public through awareness campaigns on environmental, economic and social assessments of the adoption of thermal building guidelines.

Responsible Parties: PM, PSC, OENGAR, ALME, Municipalities (under the Ministry of Municipal & Town Affairs), MoE, and information specialist.

Activities for Output 3.2

- 3.2.1 Development of an information dissemination plan to general public that includes documentaries, brochures, articles and publications that can be used in television, magazines and newspapers campaigns, in addition to community group campaigns.
- 3.2.2 Implementation of the planned activities in the form of intensive awareness campaigns stressing on gaining necessary public support for the adoption of energy conservation measures in buildings to reduce heating and cooling load, and targeting decision-makers, private sector, government departments and consumers.

D.4 IMMEDIATE OBJECTIVE 4: CAPACITY BUILDING OF RESOURCES (INFORMATION DISSEMINATION TOOLS) AND SKILLED MANPOWER IN THERMAL BUILDING STANDARD ADOPTION METHODS AND DESIGNS AND IN CERTIFICATION AND VERIFICATION PROCESS FOR COMPLIANCE.

Success Criteria:

- Information dissemination tools will have been developed about cost-effective energy-efficient building material, methods and designs, as well as benefits of energy efficient measures in buildings.
- Skilled human and resource capacity will have been built in the field of thermal standards in buildings in preparation for initiating a transformation of construction industry
- An institutional mechanism is built for verification and certification of building standard compliance by developers on voluntary basis.
- Regional cooperation and coordination in the field of energy efficiency in buildings is built.

Output 4.1: Capacity building of professionals to energy efficient building design and execution.

Responsible Parties: PM, LEBDUP, LIBNOR, CDR, OENGAR, ALME, Municipalities, MoE, international consultant, national specialists and NGOs.

Activities for Output 4.1

- 4.1.1 Prepare publications on the results of market survey in which identification is done of the mostly used energy efficient building technologies, the needed

technologies, the target consumers, urban vs. rural situations and assessment is done on the availability, adequacy, and pricing of energy efficient building technologies (see activities 1.2.4, 1.3.5, 1.3.6 and 1.3.7). These publications will provide reference information for the continuity and sustainability of the capacity building activities. This activity will be carried by the PM in coordination with PSC and OENGAR.

- 4.1.2 Identify the targeted public and private sector professionals for training on energy efficient design and execution. The professionals are selected from building industry, engineering & architects design offices, engineering and architecture university students, members of OENGAR and members of the Syndicate of Contractors. (architects, engineers and contractors).
- 4.1.3 Conduct training workshops on the technical know how to design and execute energy efficient buildings. This will provide the skill needed for the application of the thermal standards and the transformation of the building industry. In addition the workshops should explain economic incentives, scenarios and mechanisms that will help private developers in overcoming the incremental construction cost. It will be carried out through the international and national specialists to give a series of seminars and workshops.
- 4.1.4 Prepare general and specialized publications as reference and reminder of target issues.

Output 4.2: Capacity building, legal and institutional reform studied, and proposals of regulatory measures to facilitate and promote reinforcement of verification and certification mechanism for building thermal standards through training of personnel who verify building permits and personnel who certify compliance to permits during various construction phases. (Check output 3.4 of the DSM Project)

Responsible Parties: PM, LEBDUP, OENGAR, Beirut Municipality, Municipalities (under the Ministry of Municipal & Town Affairs), MoE, MoHER, EDL, and local legal expert and national expert.

Activities for Output 4.2

- 4.2.1 Assessment of existing national policies, legislation and regulations with regard to barriers for adoption of thermal building guidelines.
- 4.2.2 Identification of the current building construction review process from initiation of a permit document to final construction. In this activity it is essential to identify the personnel and parties (both public and private verification offices) who are in charge of the review process and those who are in charge of tracking conformity of executed project to the building permit document.

- 4.2.3 Identify the additional building components that will be need to be added to the permit request form for verification to compliance of thermal building guidelines. This may include providing additional information on specification of building envelope materials, envelope thermal properties (building heat conductance indicator and or expected peak heating or cooling loads etc.), and the sizing of electric power rating as well as any other parameters that may appear in the agreed-upon thermal building standard.
- 4.2.4 Identify any added complications to the current verification steps if the thermal guidelines are adopted. The PM, legal and national expert, LEBDUP and Municipalities should recognize weaknesses in the current system.
- 4.2.5 Prepare a strategy and action plan with the help of LEBDUP, and legal expert, which is competent, simple and consumer driven for the verification and certification processes for future adoption of the building code. Recommend possibilities and options for utilization of private verification offices and the role of OENGAR in the process. The mechanism should take into consideration that compliance must be also fortified with tax incentives through linking the thermal guidelines of the building to the type of permit fees imposed on the customer. The action plan should include new forms required to be filled by developers, and engineers requesting the building permit with information pertaining to the application of the building thermal code. Adopted forms in other regional countries, which already implemented a building thermal code, can be solicited.
- 4.2.6 Propose the recommended action plan to the Office of the Minister of State for Administrative Reform.
- 4.2.7 Provide capacity building to officers of LEBCPD, OENGAR, private verification offices, Beirut Municipality and Municipalities on the submitted verification and certification mechanism through training of personnel. The training can be conducted by PM, national expert on verification and the focal points in OENGAR, LEBDUP, and EDL.

Output D.4.3: Establishment of a database bank.

Responsible Parties: PM, LEBDUP, OENGAR, Beirut Municipality and other Municipalities under the Ministry of Municipal & Town Affairs.

Activities for Output 4.3

- 4.3.1 The PM with coordination of LEBCPD will initiate a mechanism by which information bank which the responsible parties would hold data about new buildings that applied the Thermal standards and older building that are being retrofitted to meet the thermal specifications of the standards. This database will form the foundation for future verification of the effectiveness of the thermal standards in reducing energy consumption, in addition to forming the basis for future updating of the Thermal standards.

4.3.2 The database will be exchanged and hosted by the OENGAR.

Output 4.4: Regional cooperation and coordination in the field of energy efficiency in buildings and thermal building guidelines adoption will be built.

Responsible parties: PM and PSC

Activities of output 4.4

- 4.4.1 Hold an initial coordination meeting between the Palestinian and Lebanese teams working on this regional project. Coordination activities between Lebanon and the Palestinian Authority and other countries in the region involved in similar projects will be held at the initiation of the project. A final meeting between the project coordinators of both national components will be held at the end of the project to evaluate outcomes and exchange experience gained in process.
- 4.4.2 Exchange information about international or regional consultants in the field of energy conservation in buildings.
- 4.4.3 Exchange of visits and transfer of knowledge and experience between the countries of the region and specifically with Lebanon.
- 4.4.4 Exchange of publications and information tools on energy-saving modalities produced by the national activities of the project.
- 4.4.5 A final meeting between the project coordinators of both Lebanese and Palestinian national components will be held at the end of the project to evaluate outcomes and exchange experience gained in process.

SECTION E : INPUTS

E.1 Government Inputs in Kind

To complement the on-going baseline activity of the Byblos pilot project endorsed by the FFEM which is contributing around 1 million US\$ in incremental cost, the Government has expressed commitment to fund activities of the current project that contribute to its own sustainable development objectives in-kind contributions. The Government of Lebanon & Order of Engineers will contribute \$ US 91,000 which are detailed in the project budget and are summarized here as follows:

	Activity	Contribution	Source
1	Completion of the Thermal building guidelines	11,000 US\$ in-kind	LIBNOR
2	Environmental, economic and social assessments	10,000 US\$ National. consultant	CDR
3	Sensitization of policy makers	10,000 US\$ in-kind	Order of Engineers & Architects
4	Sensitization of professionals	US\$ 10,000 in-kind	Order of Engineers and Architects
5	Reinforcement of verification and certification offices through training of personnel	10,000 US\$ in-kind	Ministry of Public Works
6	Establishment of database	10,000 US\$ Equipment	LIBNOR
7	Project personnel and facilities	30,000 US\$	LIBNOR, LEBDUP and OENGAR

E.2 UNDP/GEF Inputs

The UNDP/GEF will contribute \$ US 494,000, for this project as follows:

Personnel	: 140,000 US\$
Subcontracts	: 179,000 US\$
Training	: 90,000 US\$
Equipment	: 15,000 US\$
Travel	: 10,000 US\$
Evaluation mission(s)	: 20,000 US\$
Miscellaneous	: 40,000 US\$
Project Total	: 494,000 US\$

SECTION F: PRIOR OBLIGATIONS AND RISKS

Close cooperation between the different ministries and departments at the institutional and personal level will be the crucial element of achieving the objectives of this project.

The project will respond to this issue, by ensuring an effective cooperation through the Project Steering Committee and by ensuring that other presuppositions for close collaboration between the project personnel and between them and other staff and partners.

F.1 Prior Obligations:

The Lebanese Government expressed willingness to address the issue of energy-efficiency in buildings. However, to overcome risks that may generate from social, economic or political instabilities, the project emphasizes the cost-effectiveness of adopting energy codes for buildings and the building of local capacity and knowledge in this field. This will ensure the sensitization of the public, NGOs, and the private sector to carry out energy-efficient modalities in building regardless of the involvement of the Lebanese Government. Note that an ongoing baseline activity, launched by ALME on economic feasibility of Energy Efficient Building (EEB, Byblos Project) measures, is endorsed by the FFEM who are contributing around one million US\$ in incremental cost as given in section A.3 of this document.

It should be further stressed that in applying for GEF resources, the Lebanese Government agrees to ensure strict future compliance and enforcement with the emerging building and thermal codes. The Government also understands that this is a UNDP prerequisite to project approval and implementation and that lack of enforcement may lead to UNDP suspension of activities.

The major contributors to the sustainability of the project are:

1. The designers' ability to apply the "Thermal building guideline". This could be followed through by the Order of Engineers and Architects (who is endorsing the project), and also through universities to insure that graduating professionals are properly informed.
2. The contractors' ability to execute the specifications. The ability of contractors to execute the specifications is enhanced with the training provided through this project on the new codes. The ability is also shaped by pressure from developers, mandatory engineering supervision, and the level of technical difficulty introduced by the thermal guidelines. Since the issue here is building envelopes, the technical difficulty is not of a high level as is the case for systems and equipment efficiencies and electrical installation. The thermal guidelines are flexible and usually indicate measures that can be applied with ease either with regard to the use of insulation, multi-layer walls, different building materials or double pane glass. The syndicate of contractors could follow these guidelines. Thermal standard adoption has been successful in neighboring regional countries and problems that arise from lack of training of contractors have not been raised.

3. The ability to verify compliance to standards, which can be followed through by the Directorate General of Urban Planning and Municipalities, or possibly private verification offices. Part of the project objectives was to build the capacity for compliance verification and prepare grounds for future adoption of the thermal building standards as a code. The verification forms and process will all be prepared as part of the project.
4. Proper economic incentives including taxes, pricing, charges, advertising and subsidies, and creative financing mechanisms that would encourage the engagement of private developers in the transformation of the building industry. This could be followed through by CDR and the recently approved GEF LEB/99/G31 project entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”.

F.2 Project Risks

1. Uncertainty associated with new building techniques and narrow market for buildings energy efficient practices.

The investment in the construction of new buildings is expected to reach 40 Billion USD in the next 20 years. This ensures the presence of a wide market for new energy efficient building technologies. The training of professionals and the initiation of market change based on public awareness will reduce the risk significantly.

2. Reluctance to accept thermal building guidelines.

The capacity building of human resources to understand and adopt the guidelines and the quantifying of benefits to the country and consumers will remove the reluctance. The dissemination of environmental, economic and social assessment results to professionals, private developers and public will reduce resistance to the implementation of the standard. There are several elements that may contribute to the reluctance to accept the guideline: the first element is the ignorance of consumers about the benefits of using implementing these guidelines. But when consumers become aware of the economic benefits on the long term and with the increase of the electricity cost, they will be more willing. The second element is actually professionals including architects and engineers who design and supervise building construction and they are the first to deal with customer concern and suggest alternatives. When professional capacity building is done they will be able to overcome this reluctance in the customer and in themselves, now that they understand the consequences of the implementation. The third element will be by having successful models of buildings that have implemented the measures and became a good example to show people. The fourth element is the certification and verification procedure that can be very effective in overcoming this obstacle. The fifth element is the availability of resources and information about how to and why to build energy efficient buildings. These resources will be enhanced by the publications, brochures and data base availability at the end of the project. All these elements will help minimize the risk.

3. Inability to track and enforce the thermal standards.

The enforcement and tracking of compliance to thermal guidelines will be consumer driven, given the professional and public awareness that resulted from the capacity building of the project activities. The recommended verification involves all relevant public and private parties and the help of MoHER and EDL for maintaining proper tariff for electricity and control of power rating permitted to buildings.

4. Decline in energy prices.

This is unlikely to occur, since Lebanon imports all its energy needs and the electricity bill, with improved collection by EDL, is becoming an important burden on the consumer income.

5. Lack of attractive financing

This is unlikely for a number of reasons. Before the civil war Lebanon was the Middle East's premier financial center and it seems likely that Lebanon will regain that status. Further, commercial banks have also been encouraged through incentives to finance reconstruction and are issuing their shares in the stock market to raise capital. Commercial banks are also expanding their capital base through consolidation while competition with foreign banks that have begun to return to Lebanon is emerging. As such, with such history of successful commercial banking, and with the specific activities targeting availability of dedicated financing options through this project, it is very unlikely that adequate financing for energy efficient buildings will not emerge.

SECTION G: PROJECT REVIEW, REPORTING AND EVALUATION

G.1 Monitoring and evaluation plan

The project will be monitored in accordance with established UNDP monitoring procedures. The UNDP office in Lebanon will provide on-going performance monitoring with backstopping from UNDP technical staff in headquarters. In addition to the yearly tripartite review meetings organized the progress of the project with the participation of the project's counterparts, a mid-term external evaluation at the end of the first year will also be held. During the Tripartite Review, the project performance will be measured against established work plans; expenditures will be reviewed and overall technical performance will be assessed.

The project will also submit on a yearly basis a Project Implementation review to the GEF.

A project terminal report will be prepared for consideration at the terminal review meeting. It shall be prepared in draft sufficiently in advance to allow review the PCC and UNDP at least four months prior to terminal review.

G.2 Application of Lessons Learned

In order to achieve maximum impact, development of the proposed GEF Project will draw upon lessons learned in development and implementation of similar projects in the region and elsewhere. Experience will be drawn upon from the ongoing GEF-supported Energy Efficiency project in Egypt, which includes a component on energy codes. In addition, project

design will benefit from the nearly finalized drafting of the project document for the Tunisia Building Codes project.

SECTION H: LEGAL CONTEXT

This project document shall be the instrument referred to as such in Article 1 of the Standard Basic Agreement between the Government of Lebanon and the United Nations Development Program.

The following revisions may be made to this project document with the signature of the UNDP Resident Representative only, provided he/she is assured that the other signatories are in agreement with the proposed changes:

- Revisions in, or addition of, any of the annexes of the project document
- Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project but are caused by the rearrangement of inputs already agreed to or by cost increases due to inflation;
- Mandatory annual revision, which re-phase the delivery of agreed, project inputs, reflect increased expert and/or other costs due to inflation or take into account agency expenditure flexibility.

SECTION J- BUDGETS

Project Budget						
B.L	Description	w/m	Total	2000 (4m)	2001	2002 (8m)
11	International Consultants					
11.01	Thermal building standards	3	30,000	15,000	15,000	
11.02	trainer for professional	4	20,000		10,000	10,000
11.99	subtotal		50,000	15,000	25,000	10000
13	Administrative support					
13.01	Administrative Assistant	24	24,000	4,000	12,000	8,000
13.99	subtotal		24,000	4,000	12,000	8,000
15	Monitoring & Evaluation		13,700		10,000	3,700
16	Mission Cost		10,000	2,000	5,000	3,000
17	National consultants					
17.01	Project Manager	24	60,000	10,000	30,000	20,000
17.02	EC & assessment	6	15,000	10,000	5,000	
17.03	socio-economist	2	5,000	2,500	2,500	
17.04	legal expert	5	5,000		5,000	
17.05	EC trainer	8	20,000		15,000	5,000
17.06	Verification & certification trainer	6	15,000		10,000	5,000
17.98	Ad-hoc short-term consultants		10,000		5,000	5,000
17.99	subtotal		130,000	22,500	72,500	35,000
19	Component total		227,700	43,500	124,500	59,700
20	Subcontracts					
21.01	subcontract A- awareness		97,000	7,000	50,000	
21.02	subcontract B-Translation of guidelines		12,000		6,000	40,000
21.03	subcontract C-financial incentives		5,000		5,000	6,000
29	Component total		114,000	7,000	61,000	46000
33	Training					
32.01	stakeholders & policy makers (5)		10,000		2,000	8,000
32.02	workshops/professionals (15)		35,000		20,000	15,000
32.03	Verification & certification (10)		25,000		18,000	7,000
32.04	regional meeting (2)		10,000		5,000	5,000
32.99	subtotal		80,000		45,000	35,000
39	Component total		80,000		45,000	35,000
45	Equipment					

45.01	Computers (4)		15,000	2,000	13,000	
45.02	Printers (3)		5,000	2,000	3,000	
45.99	subtotal		20,000	4,000	16,000	
49	Component total		20,000	4,000	16,000	0
50	Miscellaneous					
51.01	sundries		12,600	3,000	6,000	3,600
52.01	Reporting costs		15,000	2,000	8,000	5,000
54.01	support to executing agency		24,700	3,200	13,025	8,475
59	component total		52,300	8,200	27,025	17,075
99	PROJECT TOTAL		494,000	62,700	273,525	157,775

K - LIST OF ANNEXES

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ANNEX A

SCHEDULE OF PROJECT REVIEWS, REPORTING & EVALUATION

Activity	Year 1				Year 2			
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th
Inception Report								
Monthly Brief Progress Report								
Quarterly Financing Reports								
Annual Progress Report								
Project Implementation Review								
Mid-term Review								
Final Report								

ANNEX B

TERMS OF REFERENCE FOR THE PROJECT

PROJECT MANAGER

Overall responsibilities

Under the supervision of UNDP and the National Executing Agency, the Project Manager will act as the executive director of the project and bears primary responsibility for the successful execution of all project activities. She/he is expected to serve full time and will be fully committed to the day-to-day management of this project. She/he will manage closely all project work activities and shall be responsible for ensuring that all work remains consistent with project objectives and the project document. The PM will be hosted within the Directorate General of Urban Planning at the Ministry of Public Works. The PM will be hired based on competitive recruitment process managed by UNDP and the executing agency, cooperatively. The PM will select his/her own staff to run the Project Office from Directorate General of Urban Planning LEBDUP.

Technical responsibilities

- Provide overall technical leadership for project activities.
- In collaboration with the Order of Engineers and Architects and the Directorate General of Urban Planning at the Ministry of Public Work, identify national consultants to be used on the project.
- Collaborate with the international backstopping agency in preparing short lists of all international consultants for the project.

Managerial responsibilities

- Drawing up the detailed Bi-Annual Project Work Plans and budget;
- Keeping financial and monitoring records for required project reporting in line with the UNDP guidelines for project management.
- Preparing Annual Performance Reviews, Project Implementation Reviews, and other necessary reports for submission to the UNDP Country Office, the National Executing Agency and the GEF.
- Overall planning and management of the implementation of project activities of the project;
- Review and approve all staff assignments and consulting agreements (both national and international), and to execute work agreements and contracts for all national project professional and administrative personnel.
- Liase with organisations participating in the project and ongoing programmes relevant to the project;
- Calling for the Project Steering Committee and preparing the agenda and other required documentation; and
- Follow up with Ministries and legislative bodies regarding the consideration of policies proposed by the project for introduction.

Qualifications

- Masters or Ph.D. degree in engineering, economics, public policy, or management.
- Broad technical and management experience in thermal building standard applications for energy efficiency and mobilizing collaborative efforts that involve developers, end users and professionals who can influence the use of energy efficient technologies in building construction.
- Minimum of 10 years experience in energy utilization in buildings, public policy, public communications, promotion of new technologies, and/or national level planning. He/she have a minimum of three years experience in a line management position where he or she has demonstrated the ability to lead teams of professionals from diverse backgrounds in non-routine activities.
- Excellent oral and written communication skills in both Arabic and English.
- Experience in building construction sector, with knowledge of sector operations activities.
- Demonstrated effectiveness in working on or managing international grant projects one-quarter million dollars or more.

Project Steering Committee

The Project Steering Committee, under the chairmanship of the National Executing Agency, will include a number of senior representatives from different concerned stakeholder groups namely:

- Project Manager (PM)
- Representative from the Directorate General of Urban Planning LEBDUP.
- Two representatives from the Lebanese Order of Engineers and Architects who should include one Architect or civil engineer and one mechanical engineer.
- Representative from Council for Development and Reconstruction
- Representative from Lebanese Norms Institute (LIBNOR)
- Representative from the Municipal and Town affairs under the Ministry of Municipal & Town Affairs
- Representative from the Ministry of Environment
- Representative from UNDP
- *Ex-officio* member from the Ministry of Hydro-Electric Resources (MoHER)
- *Ex-officio* member from the Electricite du Liban (EDL)

In addition the following institutions may participate with high-level members, although their absence will not delay PSC meetings when a full quorum is in attendance:

- Ministry of Housing
- Ministry of Industry
- Association of Lebanese Industrialist (Construction Industry Section)
- North Lebanon Order of Engineers and Architects
- Association Libanaise pour la Maitrise d' Energie (ALME-NGO).
- American University of Beirut (AUB)
- Ecole Superieure des Ingenieurs a Beyrouth (ESIB)
- Lebanese University (LU)
- Lebanese American University (LAU)
- Syndicate of Contractors
- Other relevant parties

The main responsibilities of this committee will entail the following:

- ensuring co-ordination between relevant proponents and stakeholders on project activities;
- providing advice on policy issues;
- oversee and advice project execution
- Reviewing and addressing policy recommendations of the project.
- Review work progress at meetings that shall be held no less often than quarterly; and identify problems and issues that the PSC should address or resolve.
- Provide strategic advice and leadership on actions that must be taken by the Order of Engineers and Architects and the Directorate General of Urban Planning at the Ministry of Public Works to ensure success of the project and implementation of all initiatives.
- Work as an additional information link between the project management and the regional community.

Administrative Assistant

Job Description

The administrative assistant will provide administrative, financial, and contractual support to the Project Manager, and will ensure the smooth administration of this project. Under the supervision of the Project Manager, the administrative assistant will carry out the following tasks:

- Coordinate logistics and schedule for meetings.
- Draft project progress communications and press releases.
- Prepare monthly financial report on project expenditures and finances.
- Coordinate inter-agency meetings associated with the project.
- Prepare contractual documents (consulting contracts, staff employment agreements, sub-contracts, and procurement) in adherence with UNDP requirements.
- Monitor and report monthly on activities and expenditures.
- Oversee all work activities of administrative support aspect.
- Follow- up financial matters with the UNDP country office

Qualifications

- University degree in business, management, or communications.
- Proven experience in supporting management, finance, and communications of donor-funded projects.
- Skill in budgeting and accounting.
- Excellent oral and written communications in Arabic and English. .
- Proven ability to use software applications for budgeting, word processing, and presentations.

LEGAL EXPERT

Job description

Under the supervision of the Project Manager and in close collaboration with the project staff dealing with legal issues, the national legal expert will be responsible for the following activities:

Technical Responsibilities:

- Assess the existing national policies, legislation and regulations to identify policy barriers to adoption of thermal buildings guidelines including those to market development and penetration of efficient buildings technology.
- Review all relevant laws and decrees to determine whether they properly address thermal building guidelines and propose amendments to those laws where buildings guidelines can be incorporated.
- In collaboration with the Thermal Buildings Guidelines experts, verification and certification government officers, and Order of Engineers and Architects, assess the enforcement requirements for the guidelines.
- Assist in the national consultations meetings especially for the review of the certification and verification procedure of the LEBDUP, MoHER, EDL and OENGAR and discuss the feasibility of the proposed options for the implementation of the guidelines.
- Propose, along with the reform strategy of the Office of Minister of State for Administrative reform, the legal requirements concerning verification procedure.

Qualifications:

- 1 The legal expert will be a lawyer with at least five years experience in the field of environment
- 2 Knowledge of key energy efficiency issues in Lebanon
- 3 Excellent oral and written English and Arabic languages. French is an asset.

NATIONAL EXPERTS

1- EXPERT IN ENERGY CONSERVATION IN BUILDINGS AND IMPACT ASSESSMENT.

Environmental and Economical Impact Assessment Expert shall have the following responsibilities:

- Participate in the economic, environmental and social impact assessment of adoption of thermal building standard according to the plan prepared by the international consultant.
- Investigate with the international consultant the use of available local, commercial or public domain computer software for the thermo-economic and environmental assessment.
- Assist the project manger and the international consultant in the preparation of the energy code assessment report that integrates all the study data and information on the established benefits that can influence Lebanon' s policy with regard to the building law.
- Participate in the workshops and seminars series for sensitization of professionals and policy makers as planned by the PM.

Desired Qualifications

- Advanced degree in engineering or technical discipline, and/or in business and finance
- Five years of experience in the international energy conservation environmental and economical assessment means.
- Strong oral and written communication skills required
- Proven record of national consulting excellence.

2- EXPERT IN ENERGY EFFICIENCY PRACTICES AND TECHNOLOGIES IN BUILDING DESIGN AND CONSTRUCTION.

Energy Efficiency Practices and Technologies in Building Design and Construction Expert shall have the following responsibilities in coordination with PM and the international consultant on impact assessment:

- Conduct a survey of current construction materials standards for buildings and prices.
- Undertake a national survey to identify the mostly used energy efficient building technologies, the needed technologies, the target consumers, and the urban vs. rural situations.
- Conduct a market survey with maximum geographic outreach to assess the availability, adequacy, and pricing of energy efficient building technologies as well as local manufacturers and their main challenges in this domain
- Survey of incremental cost on use of special or new construction materials that are not currently in the market and also the involved skilled labor cost and any additional costs that could be attributed to the adoption of thermal building guidelines.
- Assist the project manger and the international consultant in the preparation of the energy code assessment report that integrates all the study data and information on the established benefits that can influence Lebanon' s policy with regard to the building law.
- Participate in the workshops and seminars series for sensitization of professionals and policy makers as planned by the PM.

Desired Qualifications

- Advanced degree in engineering, architecture or technical discipline, and/or in business and finance
- Ten years of experience in energy conservation practices in building design and construction. At least five years experience in supervising building projects with international conservation standards.
- Familiarity with the building construction market and industries in Lebanon.
- Strong oral and written communication skills required
- Proven record of national consulting excellence.

3- THERMAL BUILDING GUIDELINES EXPERT AND VERIFICATION AND CERTIFICATION TRAINER.

The Thermal Building Guideline expert and trainer in means of verification and certification shall have the following responsibilities, under the supervision of the PM and in coordination with the legal and financial experts:

- Identify the additional building components that will be need to be added to the permit request form for verification to compliance of thermal building guidelines (see output D.4.4).
- Assess any added complications to the current verification steps if the thermal guidelines are adopted.
- Prepare a strategy and plan with the help of LEBDUP, and legal expert for the verification and certification processes for future adoption of the building code. Recommend possibilities and options for utilization of private verification offices and the role of OENGAR in the process.
- Participate in meetings of the certification and verification procedure of the LEBDUP, MoHER, EDL and OENGAR and outline the proposed options for the implementation of the guidelines.
- Prepare the new proposed forms, required to be filled in by developers and engineers requesting the building permit, with information pertaining to the application of the building thermal code. Adopted forms in other regional countries, which already implemented a building thermal code, can be solicited.
- Prepare material for the training seminars and workshops of public and private verification parties and officers.
- Participate in the training seminars on verification and certification procedures for building guidelines to public and private verification parties and officers.

Desired Qualifications

- Advanced degree in engineering, or technical discipline, and/or in business and finance.
- Ten years of experience in energy conservation practices in building sector certification mechanisms. At least five years experience in supervising and involvement in the building verification and certification procedures in Lebanon.
- Knowledge of key energy efficiency issues in Lebanon.
- Excellent oral and written English and Arabic languages. French is an asset.

4. SOCIO-ECONOMIST NATIONAL EXPERT

Job description

Under the supervision of the Project Manager and in coordination with the International Environmental and Economical Impact Assessment Expert, the socio-economist's primary responsibility shall be to provide analytic support for all needs assessment, surveys and feasibility studies undertaken in the project. He/she shall be responsible for the following activities:

Technical Responsibilities:

- Assist the project manager and the different staff in the formulation of the terms of reference of the subcontracts to ensure that they cover the socioeconomic aspect.
- Based on all assessments and surveys, advise and recommend the most appropriate scenarios and actions that will ensure maximum benefit at the level of communities.
- Coordinate with the training coordinator for the dissemination of public information taking into consideration the different target groups.
- Work with the national experts on efficient building technologies to perform the economic analysis that will help select proper options that are likely to have the greatest impact on energy reduction through building envelopes in Lebanon.
- Assess the economic challenges pertaining to the availability, adequacy and pricing of building energy efficient technologies present in the current construction industry and in the market.

Qualifications:

1. Advanced degree in social and economic sciences
2. At least five years experience in performing quantitative and statistical analysis
3. Strong quantitative and economic skills
4. Fluency in written and spoken English and Arabic

INTERNATIONAL OR REGIONAL CONSULTANTS

1. REGIONAL/INTERNATIONAL THERMAL BUILDING STANDARDS CONSULTANT

Job Description

The primary responsibility of the consultant will be to review the preliminary "Thermal Building Guideline version 2.0", which was issued by LIBNOR under the CSTB contract. The consultant will identify any key issues and means to strengthen weak links in the guidelines as specified in output D.2.1. He will co-ordinate with LIBNOR on the minimum acceptable standards for building thermal structure design and disseminate to the focal points in LEBDUP, LIBNOR, OENGAR, ALME and Municipalities on the means for approaching the final Standard.

Technical Responsibilities

- Advise on the typical buildings' thermal guidelines adopted by other regional countries for effectiveness and cost.
- Review the preliminary "Thermal Building Guideline version 2.0", which was issued by LIBNOR under the CSTB contract. The consultant will identify any key issues and means to strengthen weak links in the guidelines as specified in output D.2.1, where local conditions and construction market capabilities need to be considered.
- Prepare an assessment plan on the economic, environmental and social impact of adoption of thermal building standard that may include tasks specified in output D.1.3.
- Guide the national specialists on how to conduct the Assessment Plan and distribute responsibilities according to specialty for conduction of the feasibility study.
- Supervise the survey of incremental cost on use of special or new construction materials that are not currently in the market and also the involved skilled labor cost and any additional costs that could be attributed to the adoption of thermal building guidelines which may also include increases in construction time and or reduction of interior building space due to use of thicker walls etc.
- Assist the project manager and national experts in the preparation of the thermal guideline assessment report that integrates all the study data and information on the established benefits that can influence Lebanon' s policy with regard to the building law.
- Prepare and deliver the review to the PM and the PSC on the modifications done that transforms the building thermal guidelines to a standard.
- Collaborate with LEBDUP, LIBNOR, OENGAR, ALME and Municipalities on the means for approaching the final Standard, to identify most promising opportunities for guidelines' implementation.

- Provide information, advice, and data regarding implementation and enforcement techniques used in various countries for building construction standards.
- Participate in one or both of the first two seminars targeting professionals and policy makers, by delivering presentations on specific key issues with respect to adoption of thermal building guidelines and other countries experiences.

Qualifications

- High university degree in mechanical engineering or architecture and energy policy or equivalent technical specialty;
- Minimum of ten years of experience with thermal buildings loads and performance, and energy codes of buildings, preferably in regional countries.
- Demonstrated knowledge of international construction industry and building technology implementation issues
- Proven professional reputation via published papers or consulting assignments on subject of energy codes of buildings.

2. INTERNATIONAL OR REGIONAL EXPERT ON THERMAL BUILDING GUIDELINES PROFESSIONAL TRAINING

This international/regional consultant shall have the following responsibilities:

- Guide the national trainers on setting the training plan based on needs assessment, develop workshop contents.
- Participate in training seminars of professionals on the application of thermal building guidelines and their benefits, by delivering presentations on energy conservation in buildings issues, including market analysis and environmental impact of adoption of the guidelines.
- Assist in the development of the national awareness campaign for the dissemination of the results of environmental, economical and environmental impact assessment for the adoption of guidelines in Lebanon.
- Provide other information and case studies on the international experience of Energy Efficient Buildings and discuss options as needed during the above-mentioned meetings and seminars.

Desired Qualifications

- Advanced degree in engineering or technical discipline, and/or in business and finance
- 10 years of experience in the energy efficiency building technologies.
- Strong oral and written communication skills required; prior experience addressing large groups in international settings highly desirable
- Knowledge of key thermal guideline issues and barriers in Lebanon will be desirable.

ANNEX C: INCREMENTAL COST ANALYSIS MATRIX

	Baseline	Alternative	Increment
Business as usual	<ul style="list-style-type: none"> Established building codes will not include energy codes and guidelines Low energy efficiency in buildings 	<ul style="list-style-type: none"> An energy standard for buildings is established Awareness and training programs to promote and facilitate the employment of building codes in new buildings Improved energy efficiency and reduction in greenhouse gases 	<ul style="list-style-type: none"> Remove barriers to the establishment and adoption of energy codes and guidelines in buildings
Domestic and regional benefits	<ul style="list-style-type: none"> Limited or no saving in energy and national expenditure Lack of public knowledge and professional expertise in energy-efficiency in buildings The Lebanese Government will not be able to achieve energy end-use efficiency saving targets No regional cooperation and collaboration reduction energy bills in buildings 	<ul style="list-style-type: none"> Employment of cost-effective energy-saving modalities in buildings Reduction of national expenditure on energy imports Development of local capacity and industries in the field of energy savings in buildings Arab regional demonstration and cooperation in the field of energy savings modalities in buildings Health benefits from avoidance of kerosene or charcoal/wood fires 	<ul style="list-style-type: none"> Inform the public of the economic and environmental benefits of energy codes in buildings Train professional on the design, and construction of energy-efficient buildings Establish incentive finance mechanisms for the employment of energy-saving modalities in buildings Facilitate regional cooperation and meetings to address energy savings and energy codes in buildings
Global Benefits	<ul style="list-style-type: none"> Limited reduction of CO₂ gas emissions Lebanon Baseline reduction of 0.08 million tons of CO₂ 	<ul style="list-style-type: none"> Annual reduction in CO₂ emissions estimated at: 0.13 million tons of CO₂ for Lebanon (Annex D) Sensitization of regional initiative for reducing CO₂ emission from buildings 	<ul style="list-style-type: none"> Annual reduction in CO₂ emissions estimated at: 0.13 million tons of CO₂ for Lebanon (Annex D) Sensitization of regional initiative for reducing CO₂ emission from buildings
Costs	<ul style="list-style-type: none"> Lebanon: US\$70,000 Thermal guidelines for buildings(CDR/LIBNOR) Lebanon: US\$ 1 million, energy-efficient building pilot project (ALME/FFEM) <p>Total baseline activities: US\$ 1.070 million</p>	<p>Total Alternative: US\$ 1.655 million</p>	<ul style="list-style-type: none"> GEF: US\$494,000 Lebanon in-kind contribution to the project US\$ 91,000 <p>Total: US\$ 0.585 million</p>

ANNEX D: LOGICAL FRAMEWORK

Logical Framework

Interventions Strategy	Project Planning Matrix		Assumptions
	Objectively Verifiable Indicators	Means of Verification	
Development Objective			
<ul style="list-style-type: none"> • Establishment and Adoption of energy codes for buildings • Reduction of CO2 emissions into the environment 	<ul style="list-style-type: none"> • An energy standard for buildings will be established in Lebanon and endorsed by the Lebanese Government by the year 2001 • Annual energy saving of 0.02 MTOE for Lebanon (2001-2020). 	<ul style="list-style-type: none"> • Agreed-upon thermal building standard is in published form. • Letter of endorsement of energy codes and guidelines by the Lebanese Government and The Order of Engineers and Architects • Monitoring of residential energy bills 	<ul style="list-style-type: none"> • Standards are cost-effective and satisfactory to the Lebanese Government • Public support for energy codes and guidelines in buildings is sufficient.
Immediate Objectives			
<ul style="list-style-type: none"> • Building local capacity in the field of energy-saving modalities in buildings • Wide public adoption of cost-effective energy-saving modalities in buildings • Transformation of construction industry • Regional cooperation is established. 	<ul style="list-style-type: none"> • Increased number of energy-efficient buildings during voluntary application of the standard (2002-2010). • Increased demand on energy-efficient building material and designs • Improved energy performance in residential buildings • Increased public awareness of energy-saving modalities • Increased knowledge and expertise in energy-efficient modalities by civil engineers, architects and contractors 	<ul style="list-style-type: none"> • Survey of new houses and building permits • Market survey • monitoring of energy bills for residential buildings • Public attendance of workshops and demand on user guidelines and information sheets • Civil engineers and architects attendance of workshops • Examination of new buildings designs and construction 	<ul style="list-style-type: none"> • Consumers support of energy-saving modalities • Energy codes and guidelines and cost-effective • Energy-efficient building material is available in the market • Design and construction of Energy-efficient building comply with town planning and building codes.
Activities			
<ul style="list-style-type: none"> • Coordination between Lebanon and the region. • Build professional knowledge and expertise • Public awareness and dissemination of information 	<ul style="list-style-type: none"> • Series of meetings, workshops, joint training programs and exchange of documents • Ability of local engineers to design and implement energy-efficient buildings • Published material and holding of public seminars on energy saving modalities in buildings 	<ul style="list-style-type: none"> • Holding of seminars., meetings, training workshops and exchange of documents • Increased number of energy-efficient buildings • Public demand of published material and attendance of seminars 	<ul style="list-style-type: none"> • The public will accept energy saving modalities in buildings • Good advertising and outreach methods are utilized

- Approval of thermal guidelines
- Training for verification and certification
- Establish a database

- A set of complete thermal guideline, approved by the government and supported with impact assessment and feasibility studies
- Training program for verification and certification methods
- A complete system of information database

- Published and distributed guidelines; letter of guidelines approval from the government; positive impact assessment and feasibility studies
- In country capacity to certify compliance to thermal guidelines; and a verification and certification system is in place
- Information availability to the public and professionals

Government is willing to address the issue of energy efficiency in building; Government staff capable of carrying out assessment and feasibility studies
 Government assign a team for verification and certification
 Collection of data on energy-saving modalities in buildings is completed

ANNEX E: ENERGY EFFICIENCY DSM PROJECT AND BUILDING ENERGY EFFICIENCY PROJECT COMMON OUTPUTS AND ACTIVITIES

<p align="center">LEB/99/G31 Lebanon Cross-Sectoral Energy Efficiency & Removal of Barriers to ESCO Operation</p>	<p align="center">EEB - Capacity Building for the Adoption and Application of Energy Standards for Buildings</p>
<p>Output 2.2 Energy Efficient standards & labels design & their adoption initiated</p> <p><i>Activities</i> 2.2.3. Conduct a survey of the range of efficiencies of the appliances found in the Lebanese market (\$20,000)</p>	<p><u>Output 1.3:</u> Conduction of and environmental, economic and social impact assessment of the adoption of thermal building standard (<i>This output will be conducted in coordination with output 2.5 of the DSM project document funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”</i>);</p> <p><u>Activities</u> 1.3.3 As part of the assessment plan, national experts will conduct a market survey with maximum geographic outreach to assess the availability, adequacy, and pricing of energy efficient building technologies as well as local manufacturers and their main challenges in this domain.</p> <p>1.3.4 As part of the assessment plan, national experts will conduct a market survey with maximum geographic outreach to assess the availability, adequacy, and pricing of energy efficient building technologies as well as local manufacturers and their main challenges in this domain.</p>
<p>Output 2.4 Creative & dedicated energy efficient & conservation financing facilitated/supplied to private and public sectors</p> <p><i>Activity 2.4.1. Conduct an assessment of the existing possible financing mechanism such as banks & identify possible & most convenient ways for the cooperation between the private & public sectors (\$20,000)</i></p>	<p><u>Output 1.5:</u> Development of creative and dedicated buildings thermal energy efficiency and conservation financing that can be facilitated/supplied to private and public sectors. (This output will be conducted through output 2.4 of the DSM project funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency”)</p> <p><u>Activities for Output 1.5</u></p> <p>1.5.3 Based on the findings of activities 1 through 5 of output 2.4 of the DSM Project funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency” recommend accepted and tried financing modalities, certification of projects for financing, pilot vendor finance mechanisms and identify replicable modalities.</p> <p>1.5.4 Prepare publications and information on possible financing modalities obtained through the DSM Project.</p> <p><i>Note that this activity is funded by the other GEF DSM project, which includes</i></p>

<p>Output 2.5: Assessments of market issues pertaining to the availability, adequacy & pricing of energy efficient technology completed, as well as the design of programs to improve market penetration & market transformation to such technologies</p> <p><i>Activities</i></p> <p>2.5.1. Conduct a market survey with maximum geographic outreach to assess the availability, adequacy, & pricing of energy efficient technologies as well as local manufacturers and their main challenges in this domain (\$20,000)</p> <p>2.5.2. Undertake a national socio-economic survey to identify the mostly used energy efficient technologies, the needed technologies, the target consumers, the urban vs. rural situations, the impact of the energy bill on the different social categories, etc. (\$25,000)</p> <p>2.5.3. Based on the above findings and other examples from the regional and international community, design programs to facilitate the market penetration of energy efficient technologies covering different regions, the promotion of small and medium enterprises, local customs measures for imported products, possible financing modalities, etc.</p>	<p><u>Output 1.4:</u> Development and design of programs that can improve market penetration and market transformation to buildings' energy-efficient technologies. (This output is actually output 2.5 of the DSM project document funded by GEF and entitled "Barrier Removal for Cross-Sectoral Energy Efficiency" (2000-2004)</p> <p><u>Activities for Output 1.4</u></p> <p>1.4.2 Based on the findings of activities 1 through 5 of output 2.5 of the DSM Project funded by GEF and entitled "Barrier Removal for Cross-Sectoral Energy Efficiency" and other examples from the regional and international community, recommend programs to facilitate the market penetration of energy efficient building technologies covering the different regions, the promotion of small and medium enterprises, local customs measures for imported products, possible financing modalities, etc.</p> <p>Note that this activity is funded by the other GEF DSM project</p>
<p>Output 2.6 Comprehensive surveys and measurements covering various sectors assessing energy demand by sector, industry, and technology and various energy/fuel type completed</p> <p><i>Activities</i></p> <p>2.6.1. Design the DSM assessment with the assistance of an international expert in the use of DSM models in conduction such assessments</p> <p>2.6.2. Conduct the DSM assessment both activities at (\$50,000)</p>	<p><u>Output 1.3:</u> Conduction of and environmental, economic and social impact assessment of the adoption of thermal building standard</p> <p>1.3.5 As part of the assessment plan, socio-economic national experts will define consumer and national economic indices and perform the economic analysis of the impact of the incremental initial investment cost expected to result due to the adoption of the thermal guidelines on new buildings and retrofitted buildings. The economic indices will include the net present value of the capital investment and the pay back period for implementing specific conservation measures. The economic indices should include also national benefits due to reduction of total power plant generation capacity leading to reduction of GHG emissions associated with implementation of the energy code. Some of these indices are already available through the economic feasibility study on Energy Efficient Building (EEB) measures initiated by ALME and endorsed by the FFEM, and the LNCSR study conducted by AUB.</p>
<p><i>Links:</i></p> <p><i>As shown in the table, all the assessment activities that will be undertaken by the LEB/99/G31 project will provide baseline information for the EEB project activity 2 aiming at policy changes and market transformation pertaining to the adoption and application of the Energy codes for building. The incremental cost provided by the GEF in the EEB project will actually focus on the analysis of this information in terms of environmental, social impacts and economic benefits to consumers as mentioned in this activity.</i></p>	

ANNEX F: CALCULATION OF GREENHOUSE GAS EMISSIONS OF BUILDINGS ENVELOPE

CALCULATIONS OF GREENHOUSE GAS EMISSIONS IN LEBANON

INTRODUCTION

The proposed project centers around lifting existing barriers to the promotion and advancement of the adoption and application of the recently developed “Thermal building guideline”. The proposed efficiency measures in the said “guideline” can achieve an estimated 25% reduction on heating and cooling energy demand per building unit.

Without the proposed project, the analysis estimates that the penetration rate of “guideline” application between 2000-2020 will not exceed 20% of new building units; with the proposed capacity building project, and for the same projected time frame, the analysis expects to achieve a 50% penetration rate of “guideline” application for new building units.

Building stock

From the 1996 building survey conducted by the Lebanese “Administration Centrale de la Statistique”, one can see that the 1994 building stock consisted of some 0.48 million buildings comprising some 1.34 million building units. In terms of pattern of use, 75% of these building units were occupied by residential use, and the remaining 25% by commercial and institutional use.

For the purpose of this analysis, the building life span has been assumed to be 75 years for residential and commercial use alike. This gives a yearly building retirement rate of 1.3%. Moreover, and based on historical trends, the yearly building growth rate has been taken as 2.5% for the study period.

Table 1 reveals that the new building units entering the market between 1994 and 2000 is in the order of 1.60 million building units, and between 2000 and 2020, in the order of 1.28 million building units.

Table 1: Projected building growth.

	1994 million units	2000 million units	2010 million units	2020 million units
No. of building units resulting from growth (+ 2.5%)	1.34	1.56	1.99	2.55
No. of building units remaining from old stock (-1.3%)	1.34	1.24	1.09	0.95
Resulting no. of new building units		0.32	0.90	1.60

Environment and energy

The energy consumed by the residential, commercial and institutional sector for space heating and cooling amounted to 13.77×10^6 GJ (0.30 Mtoe) in 1994. This energy was derived from three sources: electricity, gas/diesel oil and wood, whereby the amount of electricity used

corresponded to 27% of total country electricity supply, and the amount of gas/diesel oil used corresponded to 15% of total country imports of gas/diesel oil (table 2).

Table 2. Energy consumption for the provision of thermal comfort

<i>Residential, commercial and Institutional</i>	1994 Mtoe	1994 Million tons of CO ₂
Electricity	0.13	1.28
Gas/diesel oil	0.12	0.39
Wood	0.05	0.26
TOTAL	0.30	1.93

Energy sources: the first national inventory of greenhouse gases conducted in 1998, and a study performed in 1992 by “Electricite de France” (EDF) for “Electricite du Liban” (EDL)

For the purpose of this analysis, the energy growth rate for space heating and cooling purposes has been considered as 3% for the study period. Moreover, the market share of energy type used for the provision of thermal comfort has been assumed to slightly change as shown in table 3.

Table 3: Assumption as to the market share of energy type used for space H/C

	1994	2000 – 2020
% market share of electricity	44%	50%
% market share of gas/diesel	39%	40%
% market share of wood	17%	10%

Table 4 presents the projected energy demand by the building sector for the provision of thermal comfort, and table 5 presents the total energy consumed for space heating and cooling between 2000 and 2020, and the resulting CO₂ emissions.

Table 4: Energy demand for space heating and cooling under energy growth rate of 3%.

<i>Residential, commercial and institutional</i>	1994 Mtoe	2000 Mtoe	2010 Mtoe	2020 Mtoe
Electricity	0.13	0.18	0.24	0.32
Gas/diesel oil	0.12	0.14	0.20	0.26
Wood	0.05	0.04	0.05	0.07
Total	0.30	0.36	0.49	0.65

Table 5: Total energy demand and CO₂ emissions from space H&C

Space heating & cooling 2000 - 2020	Energy demand Mtoe	Million tons CO₂ Emissions
Total Electricity	5.19	50.7**
Total Gas/Diesel oil	4.14	13.87
Total wood	1.04	5.05
TOTAL	10.37	69.62
Average/year	0.49	3.32

**The carbon emissions due to electricity are derived from the 2000-2020 baseline electricity-supply analysis presented under the UNFCCC mitigation study -- for every 1 KWh produced, 780g of CO₂ are emitted.

Potential Energy Savings of “Guideline” Application:

Table 6 shows the implications of the application of the “thermal building guideline” on energy demand. Both the baseline assumptions of 20% penetration rate of “guideline” application and the 50% penetration rate as a result of the proposed project are assessed. The calculation results show that the proposed project can achieve an additional 3.8% energy reduction in addition to the baseline energy reduction.

Table 6: Effect of application “ guideline”

2000 – 2020	Baseline “ guideline” application	Project “ guideline” application
% of new building units from total	50 %	50 %
Application rate of “ guideline”	20 %	50 %
<i>% energy reduction per building unit</i>	25 %	25 %
Total energy saved	0.26 Mtoe	0.65 Mtoe
% energy reduction	2.5 %	6.3 %
Total CO ₂ emissions	1.74 Million tons	4.35 Million tons
Average annual CO ₂ saved	0.08 Million tons	0.21 Million tons

CONCLUSION

At a building life span of 75 years, and a building growth rate of 2.5%, 1.28 million new building units would enter the market between 2000 and 2020.

At an energy growth rate of 3%, a total of 10.37 Mtoe would have been consumed for space heating and cooling between 2000 and 2020.

The proposed capacity building project can activate “ guideline” application in order to achieve a 50% penetration rate instead of the 20% baseline penetration rate, achieving thus additional savings of 0.39 Mtoe between 2000 and 2020. This in turn would result in an additional reduction of 2.55 million tons of CO₂ between 2000 and 2020.

Table 7: Total Potential Energy Savings Attributable to Project (Summary Table)

Project Time frame	2000 – 2002
Forecast Time frame	2000 – 2020
Projected Total size of sector in 2020	2.55 Million building units
Projected size of new building units from 2000	1.28 Million building units
% of new building units from Total	50 %
Likely penetration rate of “ guideline” application	50 % of new building units
Potential per household energy savings	25 %
Estimated Total energy savings due to proposed project	0.39 Mtoe
Estimated annual energy savings due to proposed project	0.02 Mtoe
Estimated Total CO ₂ savings due to proposed project	2.61 Million tons
Estimated annual CO ₂ savings due to proposed project	0.13 Million tons

ANNEX G

TECHNICAL TRAINING WORKSHOPS

There are two series of one-day workshops for dissemination of the results of the environmental, economic and societal assessment of the thermal building guideline adoption. The third set of technical training workshops to professionals will discuss techniques on how to implement the guidelines in the construction procedure. The fourth set of workshops involves certification and verification training. The first three sets of workshops will be coordinated with the Order of Engineers and Architects. The fourth will be coordinated mainly with the Urban Planning Directorate, Municipalities and private verification offices. The following is a summary of proposed workshops.

1- First Series One-day Workshops to Cover Building Thermal Guidelines and their impact assessment results:

The objective of the first series of workshops is to: (1) Explain what are energy conservation measures, what is meant by building thermal indices or guidelines, and explain the type of changes introduced to buildings construction materials and methodology to reduce energy loss through envelopes and reduce energy use. (2) Disseminate to the identified stakeholders, the significance of adopting these guidelines, the national benefits, the long-term consumer benefits and the resulting improvement in the quality of the environment of Lebanon in terms of reduction of GHG emissions. This workshop is targeted to policy makers, building industry professionals and market developers.

2- Second series One-day workshops to address market drivers identified in activity 3.1.4 and possible market penetration programs and financing modalities as recommended in outputs 1.4 and 1.5:

The second series will stress on economic incentives, scenarios and mechanisms that will help private developers in overcoming the incremental construction cost. Integrate information obtained in activity 1.5.1 into the designated workshops for sensitization of stakeholders on the existing possible financing mechanism such as banks and the possible and most convenient ways for cooperation between the private and public sectors.

3- Technical Training Workshops:

Conduct training workshops on the technical know how to design and execute energy efficient buildings. This will provide the skill needed for the application of the thermal standards and the transformation of the building industry. In addition the workshops should explain economic incentives, scenarios and mechanisms that will help private developers in overcoming the incremental construction cost. There could be several titled workshops on:

- 1) Energy Efficient Materials for Building Envelopes Construction including glazing, material properties, availability and incremental cost.

- 2) Techniques for Applying Energy Guidelines for Buildings. Long term effects of energy conservation in buildings
- 3) What are Minimum Energy Specifications Required for an Energy Efficient Building in Lebanon Climate.

Above titles may be adjusted, based on advice from the international consultant and national specialists.

4- Verification and Certification Workshops:

To train personnel on verification and certification mechanism so that the different indices and forms introduced are fully understood and on the proper procedures for effective verification.

DECEMBER 1999 WORK PROGRAM: COMMENTS FROM COUNCIL MEMBERS
(REFERENCE TO GEF/C.14/6 – NOVEMBER 5, 1999)

Regional (Lebanon, Palestinian Authority): Capacity-building for the Adoption and Application of Energy Codes for Buildings, MSP (UNDP) GEF: \$0.99 m; Total: \$1.25 m

Comments from France:

Energy-efficiency in buildings is a major factor in reducing CO₂ emissions, particularly in Mediterranean countries. FFEM is already implementing a project in this area in Lebanon, and consultations should be held to ascertain what synergies might exist with the proposed project. The primary constraint is not the code itself, but rather, the arrangements adopted to gradually improve building practices as the various sector actors are brought on board.

Comments from Switzerland:

This project is logically built and reflects in its approach the experience of energy saving obtained through Building Codes and Regulations in the last two decades in Northern Europe.

The steps proposed in the proposal are sound and logical.

It seems that the proposal of a Building Code (based on the "Guide [l'isolation thermique et du confort des batiments au Liban]") does not include the installations such as boilers and cooling systems. It would be worth considering the development of a standard which includes building envelope and technical installations as well. It would then be possible to achieve more saving than mentioned in the proposal (25%).

This project should be supported. The issues mentioned above (including HVAC systems) could help, if considered, to increase the saving by application of more global standards.

ANNEX I RESPONSE TO COMMENTS FROM COUNCIL MEMBERS

Regional (Lebanon, Palestinian Authority): Capacity-building for the Adoption and Application of Energy Codes for Buildings, MSP (UNDP) GEF: \$0.99 m; Total: \$1.25 m

Response to the Comments from France:

The current project activities take into account the FFEM on-going project in the area of energy efficiency in Lebanon. The Project Steering Committee includes members from ALME and will include national specialist who have worked or are working in the EEB-FFEM project. The sensitization workshops and material preparation for these workshops will benefit from the results of the other project. The current project has structured activities in a way that integrates efforts and provides training for the various stakeholders of the building sector including market drivers. Conducting the environmental, economic and social assessment and dissemination of the assessment results before final adoption of the thermal building standard will ensure that there are no weak points in the standard and pave the way for adoption.

Response to the Comments from Switzerland:

The current project does not include the installations such as boilers and cooling systems, as the project is mainly directed toward building envelopes. However, these installations will be part of the DSM project that is funded by GEF and entitled “Barrier Removal for Cross-Sectoral Energy Efficiency” during the period 2000-2004.

Output 2.2 of the DSM Project states that:

“Energy Efficiency standards and labels designed and their adoption initiated”, and its first activity 2.2.1 states the following: “Identify the first appliance for which minimum efficiency standards and labeling requirements will be developed. It is suggested that air conditioners be the first appliance as this currently has a low saturation rate but is rapidly growing and is a primary contributor to summer peak.” Other energy efficiency standards and labels will target boiler as well as other home appliances. The intended dissemination and technical workshops will include the effect of equipment efficiency on the demanded energy consumption. This will be part of the economic assessment of the current project that should translate the adoption of the thermal standard into reduction in the energy bill of the consumer and reduction in CO₂ emissions.

The activities of this project do observe coordination with the DSM project on issues related to financing modalities and market surveys. (See outputs 1.4 and 1.5 of the current project)