

UNITED NATIONS DEVELOPMENT PROGRAMME  
**Project of the Government of Lebanon**

**PROJECT DOCUMENT**

PROJECT NUMBER	LEB/99/G31
TITLE	Lebanon - Cross Sectoral Energy Efficiency and Removal Barriers to ESCO Operation
DURATION	5 years
PROJECT SITE	Lebanon
ACC/UNDP SECTOR AND SUBSECTOR	8-051 Energy Conservation
EXECUTING AGENCY	Ministry of Hydro-Electric Resources (MoHER) /Electricite du Liban (EDL)
ESTIMATED STARTING DATE	August 2000
PROJECT BUDGET	USD 4.4 million

IN-CASH:			
GEF	USD	3.4 million	
To be mobilized <sup>1</sup>	USD	0.5 million	
MoHER (In cash)	USD	0.5 million	
IN-KIND			
MoHER	USD	0.5 million	
PARALLEL FINANCING	USD	0.5 million	
<b>TOTAL PROJECT COST</b>	<b>USD</b>	<b>5.4 million</b>	

UNDP AND COST-SHARING	
<b><u>UNDP:</u></b>	
GEF	\$3,400,000
To be mobilized <sup>1</sup>	\$ 500,000
MoHER	\$ 500,000
<b><u>OTHER:</u></b>	
Government	\$ 500,000
Other	\$ 500,000
<b><u>TOTAL:</u></b>	<b><u>\$5,400,000</u></b>

**2. BRIEF DESCRIPTION**

In 1992, after the end of 17 years of civil strife, the Government of Lebanon launched an emergency rehabilitation and reconstruction plan for the country. The most prominent component of this plan was the rehabilitation of the country's electricity sector, which to date has consumed 33% of the reconstruction budget. Investments increased power production capacity from 600 MW in 1992 to 1400 MW in 1998 and a target of 2000 MW for the year 2000. However, with an estimated yearly growth rate of 4-6% in energy demand, interest in end-use energy efficiency and conservation are being seen as a viable alternative to meet growth in demand.

Lebanon, however, has no former experience with such endeavours and lacks the mechanism and framework for the definition and undertaking of end-use energy conservation schemes. Consequently, a number of critical barriers exist at present, which could prevent any intentions at end-use energy conservation. For measurable and sustainable energy savings to be achieved a mechanism needs to be established and barriers need to be removed.

The goal of this project is, therefore, 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 sector industries as a set in becoming an independent, commercially viable private corporation. There will be a broad range of supporting activities including information dissemination, awareness programmes, and policy analysis and programme design.

On behalf of:	Signature	Date	Name/Title
The Government	: _____	12 July 2001	<u>Mahmoud Osman, President, CDR</u>
Ministry of Energy & Water:	_____	12 July 2001	<u>Mohamad A. H. Baydoun, Minister of Energy &amp; Water</u>
UNDP	: _____	12 July 2001	<u>Yves de San, Resident Representative</u>

<sup>1</sup> These resources are to be mobilized during project implementation; the UNDP country office is to secure these funds; several efforts are currently underway to approach donor agencies



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## LIST OF ACRONYMS / ABBREVIATIONS

ALIND	Association of Lebanese Industrialists
ALME	Association Libanaise pour la Maitrise de l'Energie
CDR	Council for Development and Reconstruction
EDL	Electricité du Liban
ESCO	Energy Service Company
EU-IPP	European Union Investment Planning Programme
GEF	Global Environment Facility
GHG	Greenhouse Gas
GoL	Government of Lebanon
II	Industrial Institute
IMF	International Monetary Fund
IRP	Integrated Resource Planning
LCECP	Lebanese Center for Energy Conservation and Planning
LIBNOR	Lebanese Norms Institute
MoE	Ministry of Environment
MoHER	Ministry of Hydro-Electric Resources
MoP	Ministry of Petroleum
NCSR	National Council for Scientific Research
PCC	Project Coordinating Committee
PM	project Manager
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention for Climate Change
TOR	Terms of Reference

## A- CONTEXT

### 1. Description of Subsector

Seventeen years of civil strife and military occupation left Lebanon (population 3.75 million) devastated. During this period (1974 –1990) per capita GDP dropped from US \$ 2,250 to 825. Moreover, damages to physical assets have been estimated at US \$ 25 billion. 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.

Great strides have been taken since 1990 towards improving the economy. According to Central Bank 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 1994 to 5% in 1997.

Improving the country's energy situation took clear priority to the Government of Lebanon for which 97% of its energy requirements of fossil fuel are imported. Expenditures under emergency reconstruction and rehabilitation plan have reached US\$ 4 billion to date. Infrastructure development, a main thrust of this plan, allocated a substantial portion to the electricity sector, which to date has received about 33% of the reconstruction budget. The emergency *Power Sector Master Plan* for the years 1992-2002 launched by CDR focused on the rehabilitation of the electric supply-side. Among its activities was, first the expansion of the power generating capacity which increased from 600 MW in 1992, to a 1400 MW in 1998, and second the rehabilitation of the transmission and distribution networks (Annex D). However, with an estimated yearly growth in demand of about 4-6%, demand for power is expected to exceed supply already in the year 2002, despite heavy investments in new generating facilities. The situation is expected to especially exasperated as no end-use energy conservation plans are put forth.

Given the emergency nature of the planning conditions however, the *Power Sector Master Plan* concentrated on the provision of reliable electricity through construction and rehabilitation efforts. There were no efforts planned to ensure the existence of long term national energy planing capabilities as well as any efforts to address the intricate issues of end-use energy demand management and conservation.

Although, end-use energy conservation is emerging as a widely accepted viable alternative to supply side expansion, Lebanon finds itself today without the proper framework to address end-use energy conservation issues and strategies in a meaningful and comprehensive manner. Added to this, the country also finds itself without any reliable data on energy demand patterns and distribution. However, energy intensity in 1996 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 efficiency and energy conservation gains in Lebanon.

## 2. Host Country Strategy

### ENERGY SECTOR

According to the Lebanon's UNFCCC inventory report, the energy sector was responsible for the emission of approximately 12 million tons of CO<sub>2</sub> in 1994. The three major fuel consuming sectors in the country were respectively the transport, the electricity, and the industry sectors. The transport sector accounted for 34% of CO<sub>2</sub> emissions, the electricity sector for 31%, and the industry sector for 24%. Table 1 provides information on electric energy consumption trends in Lebanon. Details of sectoral consumption listed by fuel type can be seen in tabular form in Annex E.

Year	1994	1997	2000	2010	2020
<b>Electric Energy Demand (1000 GWH)</b>	<b>6.8</b>	<b>8.81</b>	<b>10.19</b>	<b>15.09</b>	<b>22.23</b>

**Table 1:** Electric Energy Consumption Trends in Lebanon / Baseline scenario

Data for 1994 is from EDL bulletin, 1994. Projection for 1997-2020 is from UNFCCC mitigation team, calculated at demand growth rate of 4%.

On the demand side, increased Government awareness of demand issues prompted the initiation of a number of activities aiming at establishing an effective and reliable basis for the assessment of electricity demand. Foremost, a *National GIS mapping* project of the transmission and distribution network was initiated in 1995. The project was implemented in steps starting with central Beirut and ending with a complete national map expected in the year 2000. Furthermore, a project for the establishment of a *National Control Center* for network load management was also launched. This US\$ 26 million initiative is expected to be implemented as of mid 1999, and to be fully operational in early 2002.

### ENERGY POLICY

At the outset, the emergency nature of the reconstruction efforts in Lebanon left no room for broad perspective planning. With the emergency planning-phase almost complete and power cuts and electricity rationing still a reality, the Government is turning its attention to the need to address the demand aspect of the electricity sector and the need to rationalise electric demand towards quantified conservation targets.

Lebanon's main objectives for 2000-2020 are (a) to improve energy efficiency in the main sectors of the economy, and (b) to develop the use of renewable energy technologies.<sup>2</sup> It has been estimated by Lebanon's UNFCCC Enabling Activity project mitigation phase currently ongoing, that the adoption of energy efficiency and conservation in the electricity supply and end-use sectors could potentially lead to average annual savings in CO<sub>2</sub> emissions of between 0.97-1.2% during the period 2000-2020. Such savings could lead to a total reduction of

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<sup>2</sup> ref. Statement of Mr. Joseph El-Hawa, Director General of EDL, at the National Workshop on Energy Efficiency in Beirut, September 16 – 17, 1998

approximately 12 million tons of CO<sub>2</sub> emissions in the years 2000 - 2020. See also Annex F and Annex G for further details.

The mitigation team towards the end of March 1999 will identify end-use efficiency and conservation measures. In the meantime, several proposals -endorsed by the Government and for some of which funding has been secured- have been prepared or are under preparation and will lead to achieve such savings. These proposals include the promotion of the use of Solar Water Heaters, promotion of the use of Fluorescent Lamps and promotion of energy efficiency in buildings.

#### ENERGY PRICING

The Ministry of Petroleum is responsible for regulating prices of all petroleum derivatives in Lebanon; even those imported by the private sector. In 1997, subsidies on fuel prices were lifted. Moreover, since 1996, electricity tariffs were raised several times with no immediate effect on demand patterns. Bill collection has increased from 37% in 1996 to 50% in 1997, and is expected to reach 84% by 2001.

In this respect, Lebanon has taken a number of initiatives to ensure that some of the necessary financial incentives for energy efficiency and conservation are put in place. These initiatives are the following:

- Subsidies on fuel prices have been lifted in an effort to evolve toward world market prices. The local consumer prices set according to the Platt's market prices for different oil products, and were as follows in 1997:

Lebanese Consumption of Oil Products in 1997<sup>3</sup>

<b>Product</b>	<b>Imports (tons)</b>	<b>Price/ton (\$)</b>	<b>Energy Bill (million \$)</b>	<b>Percent (%)</b>
Gasoline	1,375,514	179	247	29.35
Diesel	1,320,000	213	281	33.40
Kerosene	108,454	190	21	2.45
Liquid gas	141,241	291	41	4.88
Fuel-oil	1,804,995	133	239	28.48
Asphalt	87,585	138	12	1.44
<i>Total</i>	<i>4,837,789</i>		<i>841</i>	<i>100.00</i>

Until 1988 the government retained a monopoly over the petroleum market, but a number of private companies have subsequently been authorised to import, store and distribute petroleum. As of September 1999, the Government has introduced a mobile fuel pricing system and the local fuel price is weekly adjusted according to international prices.

- Electricity tariff rates have recently been reviewed more than once. Tariff increases were introduced in October 1996 and later in March 1997, as rehabilitation fees. The current

<sup>2</sup> Banque du Liban Yearly Bulletin 1996



monthly electricity tariff rates are divided into several brackets depending on the level of electricity consumption<sup>4</sup>; the most commonly used bounds and their respective tariff rates are the following:

<b>Consumption</b>	<b>Tariff Rates</b>
300~400 kwh	LL 80 (US\$ 0.053)
400~500 kwh	LL 120 (US\$ 0.080)
over 500 kwh	LL 200 (US\$ 0.133)

The tariff rates for consumption less than 300 kwh are kept below the actual cost of electricity largely for social reasons. However, the tariff rates have been steadily increased and consequently subsidies are expected to be removed in a few years. 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 was launched in June 1998 and is expected to be complete in June 1999.

- Overall electricity bill collection increased from 37% in 1996 to 50% in 1997 due to the progress made in the GIS Mapping project, the installation of additional meters and the registration of end-use consumers in a database. To date, installation of meters is almost complete in the Greater Beirut area and will be further expanded to the rest of the country. The increase in bill collection is estimated to reach 84% by 2001 especially that privatization of bill collections is now under serious consideration after the experience gained from privatizing bill collection in 1996 in the Bekaa and Akkar<sup>5</sup>.

### **3. Prior and On-going Assistance**

As a consequence of rehabilitation needs and the resulting clear supply-side focus of Lebanon’s reconstruction focus, there has been little interest in the demand side aspects of energy consumption in Lebanon. With rehabilitation efforts drawing to a close, this approach is changing, however. More interest is shifting towards the softer side of demand issues, and currently there are a number of initiatives being financed although the amount allocated to the demand issue is small compared to that of the supply issues. The projects that include demand issues are:

1. The GIS mapping project (total US\$ 3 million). This project aims at improving the technical and administrative performance of EDL. The first phase of this project funded by MoHER was initiated in 1995 and covered the transmission and distribution network of Central Beirut. Expansion of this project to cover other Lebanese areas is currently under consideration.
2. The National Control Centre (total US\$ 26 million). This project funded through loans from the IBRD and EIB, will collect effective and reliable data on electricity transmission and distribution for the assessment of electricity-demand and network load management. It is expected to be implemented as of mid 1999, and to be fully operational by early 2002.

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<sup>4</sup> Information provided by EDL

<sup>5</sup> Banque du Liban Yearly Bulletin 1996

3. The Billing and Revenue Modernisation Study (total US\$ 340,000). This project, funded through a grant from the USTDA, will identify mechanisms for improved bill collection. The project has started in December 1998 and is expected to be completed in August 1999.
4. Some components of the EU-IPP module (total US\$ million) address demand side management through the collection of data on sectoral consumption of energy, type and efficiency of final energy consumption, and load curves and behavioural/cultural patterns of energy use for better energy management.

The Government has, however, been unable to address issues of efficiency and conservation per se (incl. Demand Side Management), which is resulting in a virtual standstill in improving energy efficiency of the Lebanese economy. This is mainly due to the existence of a number of barriers (described in Section B). If these barriers are not addressed, the resulting waste of energy will continue to slow economic growth, and lead to an increase in the already unnecessarily high level of per capita electricity consumption and resulting GHG emissions.

#### **4. Institutional Framework for Subsector**

As a result of twenty years of absence of energy policy and planning, sectoral responsibilities remain scattered. The Ministry of Hydro-Electric Resources (MoHER) is responsible for electricity and hydropower; the Ministry of Petroleum is responsible for fossil fuel based products and the Ministry of Agriculture is responsible for firewood and charcoal. Under MoHER, which develops electricity sector policy and regulation, the electric utility *Électricité du Liban* (EDL) covers 66% of total electricity demand through generation, transmission and distribution. Private stand-alone generators supply about 34% of the total electricity demand (industry 22%, and domestic 12%). EDL provides electricity to 800,000 consumers in the domestic (48%), industrial (23%) and public sectors (12%). Concessions and losses constitute 17 %.

A full-scale Ministry of Energy has been proposed to unify responsibilities. More recently, the new Government, formed in December 1998, has reconfirmed such a vision by issuing a decision (September 99) by the Council of Ministers that confirms the will to create a Ministry of Energy merging the Ministries of Hydraulic and Electric Resources with that of Fuel and Petroleum. In the interim, a National Energy Steering Committee has been created to act as an advisory and coordinating mechanism on energy issues. The Committee comprises members from the following Government and non-Government institutions: MoHER, Ministry of Environment (MoE), EDL, National Council for Scientific Research (NCSR), Ministry of Industry, Association Libanaise pour la Maitrise de L'Energie (ALME), Ministry of Petroleum, and Ministry of Agriculture.

## **B- PROJECT JUSTIFICATION**

### **1. Problems to be Addressed**

In Lebanon, the combined emissions of the power and industry sectors are equal to 55% of Lebanon's total emissions of CO<sub>2</sub>. This figure is expected to increase even further as electricity demand is expected to increase at a rate varying between 4-6% per year over the next 20 years.

As energy conservation and efficiency measures are not being undertaken or considered in Lebanon, it is estimated that the potential for energy savings and GHG emission reductions is high. As such, the long-term goal of this project is to reduce the growth rate of GHG emissions resulting from the combustion of carbon based fuels and the consumption of electric power, thereby contributing to the mitigation of climate change.

The current project will work to strengthen the capacity of the Government of Lebanon to implement and sustain long-term energy efficiency efforts that have a well-documented positive impact on the global as well as the local environment. The proposal is also in line with Lebanon's sustainable development objectives and is being seen as a corner-stone initiative that is vital for the effective re-organization and efficient operation of the energy sector.

Project funds are devoted to barrier removal activities as a cost-effective mechanism of institutional strengthening within MoHER and EDL. More specifically the project will remove barriers to the effective adoption of energy efficiency measures in the Lebanese energy sector, both public and private, as well as the introduction of conservation. The project thereby conforms to Operational Programme number 5 of the GEF Operational Strategy.

The proposed project also complements several ongoing national activities including efforts to assess and document energy-demand (GIS mapping and National Control Center) as well as efforts to insure that financial incentives for energy efficiency are in place (restructuring of tariff rates to include time of use tariffs). Furthermore, the proposed project is country driven (the initiative came from MoHER and EDL) and is in conformity with the views of EDL top management<sup>6</sup> for restructuring the electricity sector that emphasizes cost recovery and conservation.

Lebanon supports the need for the introduction of energy conservation measures to the various sectors, especially that the proposed project constitutes a time appropriate intervention with the emergency planning phase drawing to a close and preparations are made to embark on the next planning phase. The mitigation phase of the ongoing UNDP/GEF – Climate Change Enabling Activities project, estimated that the adoption of end-use energy conservation in the electricity sector could potentially lead to an average yearly CO<sub>2</sub> emission reduction of 0.97-1.2%. In the year 2000 –2020, such savings could lead to a total reduction of approximately 12 million tons of CO<sub>2</sub> emissions.

By limiting the growth in energy demand from the various sectors, the proposed project will ensure measurable and sustainable global benefits in terms of long-term GHG emission reductions, which in-turn will contribute to the mitigation of climate change. GEF Funding for the barrier removal process is critical to secure the said global benefits. Moreover, the proposed project builds on replicable project and investment options in energy efficiency and is based on mechanisms and interventions already documented and proven to work in other countries. The current proposal will add to the experiences gained, and will thus contribute to enhancing lessons learned with processes and applications of energy efficiency and conservation in developing country settings.

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<sup>6</sup> Stated by Mr. Joseph El-Hawa, Director General of EDL, at a press conference held on 15 September 1998

## BARRIERS

The energy sector in Lebanon experiences a number of critical barriers that hinder the formulation, adoption and implementation of end-use energy efficiency and energy conservation initiatives. The proposed project aims at removing these barriers while initiating and setting the stage for follow-on investments. This will be achieved around the establishment of the overall institutional point responsibility for energy conservation and planning issue in Lebanon – a framework that, to-date, has never existed. The barriers that the project addresses are presently the following:

### ***Information Barriers***

- a) Shortage of data on patterns of end-use energy consumption in all the sectors of the economy. In the electric power sector for example, customer load research to identify impact on different end uses on system load profile can not be determined and as such targeted for efficiency and load management programs.
- b) Lack of documentation regarding the economic, environmental and social implications of end-use energy conservation on a national as well as on a sectoral level.

### ***Awareness Barriers***

- a) Decision maker skepticism about the social, environmental and economic benefits, resulting from the introduction of energy conservation measures and policies.
- b) As a result of lack of institutional point responsibility as well as relatively low energy pricing, a low level of general and specific awareness and motivation exists on the part of both consumers and industrial and commercial managers towards energy efficiency.
- c) No general public awareness of issues pertaining to energy efficiency and conservation.

### ***Economic and Financial Barriers***

- a) Unavailability of financing. There are no dedicated financing schemes or special incentives provided for energy efficiency initiatives. This barrier is especially important due to the high capital investment costs needed of some interventions that require the installation of specialized equipment.
- b) With insufficient financial incentives to invest in energy efficiency equipment, no local market has developed for energy efficient measures and equipment.
- c) No market currently exists for energy efficiency services.

### ***Institutional Barriers***

- a) Absence of institutional focus: there is no entity with the mandate or responsibility to monitor the nation's efficiency and to design policies and programs to improve it.
- b) No explicit national policy currently exists to promote more efficient use of energy.

### ***Capacity Barriers***

- a) Throughout the country, and specifically within MoHER, there are very few people who are knowledgeable about energy efficiency. This covers all aspects of efficiency to manufacturing and labeling of efficient products to identifying and implementing potential measures.
- b) Insufficient capacity among relevant Government and private entities to audit, monitor and plan energy efficiency options and interventions.

## **2. Expected End of Project Situation**

The expected end of project situation can be summarized as follows:

- Following barrier removal, an adequate policy and market environment, as well the needed capability to capture existing and emerging opportunities for cross sectoral energy savings will exist in Lebanon. Capturing such opportunities could potentially lead to an average yearly CO<sub>2</sub> emission reduction of 0.97-1.2%. In the years 2000 - 2020, such savings could lead to a reduction of approximately 12 million tons of CO<sub>2</sub> emissions.
- Following barrier removal, sustainable public and private institutional point responsibility will have been established and operationalised in Lebanon to define and implement end-use energy conservation planning and programmes.
- Market forces activated to bring about options for cost effective energy savings to all sectors.
- Skills with regards to energy efficiency and energy planning will have been developed.

The major specific outputs of the project activities will be:

- 300-400 energy audits of industrial plants and buildings. This will include recommendations for specific interventions to achieve verifiable energy savings and recommendations for financing options;
- Specific financing mechanisms to create incentives for investments in energy efficiency interventions and technology;
- An assessment of the Demand Side Management potential by end-use technology, by sector and by energy source. This will include recommendations and strategies (mix of technical, policy and financial) for targeting specific end-use technologies and sectors;
- Policy recommendations (with high level support) for legislative and other action;
- Targeted information materials and programmes regarding energy efficiency based on documentation of cost-effectiveness of energy conservation options for various sectors and technologies;
- Energy efficiency codes and norms for equipment;
- Human capacity to identify and capture energy savings opportunities with technical, financial and policy measures;

- Increased market share of efficient equipment;
- Consumer and policy maker understanding and support for energy conservation;
- National energy conservation plan, under the auspices of national energy planning.

### 3. Target Beneficiaries

The main beneficiaries of this project are:

- Industrial, commercial, and residential energy users who will take advantage of energy efficiency information and technical assistance offered through energy audits, the Energy Center, and promotional activities.
- Local and international private sector and local NGOs involved in the business of energy services consultation, design, installation, financing, and management.
- Buyers of new energy efficient equipment available in the market.
- The MoHER and EDL, which will benefit from lower investment and expenditures for meeting the reduced energy needs. They will benefit from major institutional strengthening through the development of a comprehensive energy planning policy as well as the establishment of a sustainable mechanism to manage the implementation of end use efficiency and conservation measures in various sectors in Lebanon.
- The Lebanese population at large will be the end result beneficiary of this major intervention in view of its impact on the energy bill, the provision of energy efficiency and conservation services and the increased public awareness that will result.
- The global community, which will benefit from the reduced emission of greenhouse gases.

### 4. Project Strategy and Implementation Arrangements

The overall strategy will be to create the institutional focus and capability to improve the efficiency of energy use, within the power sector and the entire economy. The strategy is to develop a range of mutually reinforcing capabilities on an institutional level such as providing engineering services, load assessments, policy analysis, information dissemination and so on. Thus, the proposed activities focus on removal of barriers that hinder formulation, adoption and implementation of end-use energy efficiency policies.

As a central element in removing cross-sectoral barriers to energy efficiency and energy conservation in Lebanon, the current project will establish the **Lebanese Center for Energy Conservation and Planning** at MoHER. The Center will constitute the institutional point responsibility for energy conservation and energy planning issues until a market demand is established for the former and the latter is embedded sustainably in national planning cycles. From the outset, the Center will be established as an autonomous public corporation that is

financially and administratively independent, offering energy efficiency services on a revenue-generating basis. Providing such services to both the private and the public sectors, the Center will work to become a commercially viable entity, with the aim of privatization (see Annex I for the institutional development process of the Center). In this context it is noteworthy that the proposed autonomous public set-up has been successfully implemented in the past in other sectors, such as the Lebanese Norms Institute (LIBNOR), the Industrial Institute (II), and the National Center for Scientific Research (NCSR), to name but a few.

As it is shown in Annex H, the Center will be organized initially into five units: Engineering services, Finance, Marketing, Analysis and Planning. The latter will be institutionalized as a department in the current structure of the Ministry of Hydraulic and Electric Resources after the end of the project.

The Lebanese government, as part of its in-kind contribution, will host the LCECP within the premises of the Ministry of Hydraulic and Electric Resources and will provide the necessary furniture and equipment. Part of the Lebanese government's in-kind contribution to this project is the salaries and services of six government employees (US \$ 350,000). These persons would be appointed to sustain the functions of the LCECP. The project, however, will support the recruitment of qualified experts in the field of energy conservation to initiate the project activities and to ensure the project sustainability at the level of the national institutions.

The Center will anchor the two main thrusts of the project: (i) engineering and services function, and (ii) the planning, policy and promotion function.

#### ENGINEERING AND SERVICES FUNCTION

This module will constitute the main revenue generating function of the Center. As such, it would comprise the main activities that will be apt for privatization. More specifically:

- a) Energy Audits: This will comprise the development and implementation of an auditing programme with identified and targeted end-users and end-use technologies and applications in various energy-end use sectors such as industry and residential. The strategy will be to address common energy efficiency opportunities in a standardized, repeating fashion so that economies of scale and high levels of participation are achieved. This approach of targeting "horizontal technologies" will be implemented on boilers, steam systems, electric motors, power factor correction, lighting and air-conditioning, and other applications. As experience is gained further into the programme, other more sophisticated technologies (with higher capital costs) will be pursued and a more vertical approach to audits will be used. The approach has been successfully implemented in other large-scale programmes in developing countries and is capable of realizing large energy savings (5-15%) at low costs. Another general strategy will be to pursue low/no cost opportunities through what is termed as "housekeeping" measures. Many of these measures should usually be undertaken as part of any good plant maintenance but are overlooked due to inattention or lack of training. This approach has little or no capital cost, and is not influenced by the current energy pricing subsidies. When the social subsidies for the lower income bracket are removed by 2005, and

as capacity increases in the Center, more detailed energy auditing services focusing on the full plant can be provided.

- b) Feasibility Studies: Portfolio preparation involving the cost-benefit analysis of *targeted measures*, and *overall strategies* to be adopted. Targeted measures include key heavy consumers or widespread high consumption items and applications, and overall strategies include policy changes and development of norms and codes for voluntary (through market transformation) or mandatory adoptions (through legislative modes).
- c) Technical Advice and Project Design: Technical advice and recommendation as well as project design services provided to public and private sector interventions for energy conservation. Furthermore, preparation of technical specifications for labeling processes once related standards are developed. Both GEF and non-GEF resources will fund this activity.
- d) Dedicated Energy Efficiency Financing: Facilitating and supplying creative and dedicated energy efficiency and conservation financing to private and public sectors. This will be undertaken through the direct design of accepted and tried financing modalities, certification of projects for financing or, at a more advanced stage, direct finance by the Center with payback through “performance contracting” and other advanced modalities. Vendor finance mechanisms will also be explored and demonstrated.
- e) Marketing, Promotion and Visibility: Assessments of market issues pertaining to the availability, adequacy and pricing of energy efficient technology will be undertaken, as well as the design of programmes to improve market penetration and market transformation to such technologies. Furthermore, working with information and awareness campaigns there will be focus on promotion of the activities undertaken by the engineering and services function, dissemination of the outcome of such activities, seeking out new revenue generating clients. Both GEF and non-GEF resources will fund this activity.
- f) Demand Assessments: Comprehensive surveys and measurements covering various sectors assessing energy demand by sector, industry, technology and energy/fuel type. Load and consumer research accompanied by database development will also be a mainstay of this activity. Lastly demand conservation resource assessments will be derived from the above. Non-GEF resources will fund this activity.

#### PLANNING, POLICY AND PROMOTION FUNCTION

The module will constitute some of the main planning themes that the Government of Lebanon is considering under its own sustainable development objectives. It also constitutes some main policy; promotion and information schemes that are part of the overall barrier removal process, and that also could potentially be revenue generating. More specifically:

- a) Information and Awareness Campaigns: In order to achieve maximum impact, all information activities are to be carried out in tandem and support of the energy service activities described under point (1) above. Thus both types of interventions will be mutually reinforcing. Focus will initially be placed on critical areas for improving efficiency such as



the residential sector (48% of electric energy demand). More generally, however, the activity will focus on design and implementation of information programmes on energy efficiency to inform consumers in all sectors of waste patterns and help them develop energy efficient practices. Emphasis will be placed on the economic and environmental benefits of such measures. Furthermore, the activity will also design and implement extensive awareness raising programmes focused on gaining necessary public support for the adoption of energy conservation measures, norms and standards. Both GEF and non-GEF resources will fund this activity. For cost efficiency and greater impact, relevant outreach materials, already produced under the GEF funded energy efficiency projects in neighboring Egypt, the Palestinian Authority and Syria will be used and adapted to the Lebanese setting.

- b) Policy Analysis: Initially an assessment of policies, legislation and regulations will be undertaken to identify policy barriers to energy efficiency in generally including those to market development and penetration of efficient technologies. The assessment will consider pricing, import tariffs and restrictions, taxation and incentives or disincentives, public sector procurement guidelines as well as equipment standards and codes. In view of the past two decades of civil strife and the accompanying isolation of Lebanon, there is presently no information or awareness at the policy level of policy options and modalities. This component will foster an ongoing effort to provide long-term policy advice to government on energy efficiency and conservation issues. Based on the above, a set of targeted policies will be evaluated with resulting recommendations of a set of options to the Government for adoption. Both GEF and non-GEF resources will fund this activity. The GEF resources will focus on bringing international experience and lessons learnt to Lebanon for further adaptation in the Lebanese setting. As the other GEF projects in this field provide experiences and lessons, these will be transferred to the Lebanese setting. Of particular relevance are experiences in the codes and standards areas, as well as with economic policy instruments. Lessons from neighboring Egypt, Syria and the Palestinian Authority will be of particular interest.
- c) Strategic Planning: A comprehensive Integrated Resource Planning exercise will be undertaken to ascertain the optimum resource mix that would ensure a high quality of energy supply to all users in Lebanon. This will be an ongoing exercise where results of scenarios are presented to policy and decision-makers in Lebanon. Furthermore, energy sector conservation plans with achievable energy savings targets will be developed with associated programmes to achieve these. This activity will be funded by non-GEF resources.
- d) Legal and Institutional Reform: Comprehensive studies and proposals of regulatory measures to facilitate and promote end-use energy conservation in all sectors of the economy. This activity will be funded by non-GEF resources.

In summary, as Lebanon is embarking in a rapid institutional change phase (administrative reform process), the proposed set up is of a “soft” and flexible institution that will allow for easy adjustment should a full-scale ministry of energy be set-up. Initially only a portion of the costs of the Center will be recovered, however, over time and as a market is established, full recovery of both operational and administrative costs is envisaged. At such a point where the engineering and financing services provided have become commercially viable, the revenue generating

functions of the Center will be privatized as a financially viable Energy Service Company (ESCO). After privatization and establishment of the ESCO, the non-revenue generating functions of the Center will remain under MoHER as a Department for Energy Planning and Management. During the period of project support, these planning, information and analysis functions of the Center (non-revenue producing) will be largely funded through baseline contributions of the Government, bilateral co-financing from the EU IPP program as well as through other associated financing related to this project.

### **Implementation Arrangements**

The day-to-day project management will be carried out by a National Project Manager (PM) who will be housed within the premises of MoHER thereby ensuring access to the ministry's facilities. The PM will be hired on project funds, based on a competitive recruitment process managed by UNDP and the executing agency cooperatively. S/He will prepare a detailed workplan during project initiation, and will carry out and coordinate the management, administrative and financial functions related to project implementation – this includes coordination among participating agencies, hiring of personnel, work scheduling, information collection/dissemination, and provision of technical assistance as well as technical/financial reporting. Finally, the PM will work closely with a Project Co-ordination Committee that will be representative of the National Energy Steering Committee currently working to ensure co-ordination between all stakeholders on matters related to energy.

## **5. Reasons for Assistance from UNDP/GEF**

The project is designed to remove the barriers that hinder the sustainable and successful formulation, adoption and implementation of end-use energy conservation policies and measures. In doing so, the project will initiate a mechanism that will contribute to transforming the energy-demand market into one that is much more energy-efficiency oriented and one where the cost of adopting a more energy efficient approach is economically feasible. As such, the project is in line with GEF Operational Programme No. 5 "*Removal of Barriers to Energy Efficiency and Energy Conservation*" of the GEF Operational Strategy, and incorporates all pertinent considerations stemming from this programme.

The global environmental objective pursued in this project is to reduce the growth rate of GHG emissions resulting from the combustion of carbon based fuels through reduction of the consumption of electric power in various sectors such as power, industry, residential, etc. For this, the project aims at the removal of major barriers hindering the adoption of energy efficiency and conservation measures. In doing so, the project will initiate a mechanism that will contribute to transforming the energy-demand market into one that is much more energy-efficiency oriented and one where the cost of adopting a more energy efficient approach is economically feasible.

As the existing national initiatives do not endeavor the reinforcement of all sustainable aspects of the energy sector on a long-term basis, the GEF and UNDP funding will enable the Government of Lebanon to remove the existing barriers at the level of information, awareness, economic and institutional capacity presented in the project brief. Moreover, the proposed project will strengthen capacity of the Government of Lebanon for the sound energy planning through the establishment of a specialized institution within MOHER.

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

There are significant global benefits to be achieved as a result of the implementation of this project. Once the project has removed the said barriers, the adoption of end-use energy efficiency and conservation measures in the energy sector could potentially lead to average annual savings in CO<sub>2</sub> emissions of 0.97-1.2 %. In the years 2000 - 2020, such savings could lead to a total reduction of approximately 12 million tons of CO<sub>2</sub> emissions.

Domestic benefits are measured as the resulting increased levels of awareness and capacity as well as well the development of a local market for energy efficiency and conservation services in various sectors. Identification of energy consumption reduction potentials in various sectors plus verification and dissemination of cost-effective technologies in the Lebanese context will result in increased level of investments in energy efficiency interventions. The adoption of regulatory measures for end-energy efficiency will further facilitate such investments.

GEF funding for barrier removal is critical for the achievement of the project's objectives. Without this incremental funding, it will not be possible for Lebanon to formulate, adopt and implement end-use energy conservation plans, at a level resulting in reductions of GHG emissions, despite the economic advantage in terms of energy savings, and the environmental advantage in terms of reduced GHG emissions.

The implementation of a comprehensive energy conservation and efficiency programme will allow the GoL to continue to meet energy demand in the year 2002. Moreover, the significant fuel savings that will be made will result in major economic, environmental and social benefits. As such, significant improvements in the quality of the local environment and its positive implications on the health of the population will be attained.

## **6. Special Considerations**

The achievements of the project in terms of curbing both the increase in energy demand and the associated increase in GHG emissions will be sustained as a result of successful barrier removal. This barrier removal will result in the establishment of the necessary public awareness, capacity building, economic incentives, regulatory reform as well as the much-needed institutional focal point responsibility. This will therefore lead to public and private support for end-use energy conservation plans, thus ensuring sustainability.

Furthermore, the establishment of the Lebanese Center of Energy Conservation and Planning implies long-term commitment on behalf of the Government to energy conservation issues. It should be stressed that the Government has committed itself to supporting the Center financially after the completion of the project, until such a time when certain parts of the Center can be considered commercially viable and apt for privatization. Moreover, after privatization a number of the Center's policy, analysis and public information functions (not revenue generating) will be

transformed into a Department for Energy Planning and Management within MoHER. See the functional organization chart in Annex H.

Lastly, the project will ensure sustainability through ensuring a market driven approach to the provision of energy efficiency services through the incubation and establishment of the country's first ESCO. This approach will be backed by targeted policy interventions designed to eliminate perverse incentives and foster market based incentives for energy efficiency and conservation.

## **7. Coordination Arrangements**

The Project Coordination Committee will be representative of the *National Energy Steering Committee* currently working to ensure co-ordination between all stakeholders on matters related to energy. It will include a number of representatives from different stakeholder groups and will have the following responsibilities: (i) ensuring co-ordination between relevant proponents and stakeholders on project activities; (ii) providing advise on policy issues; (iii) providing recommendation and advise pertaining to project implementation; (iv) reviewing and addressing policy recommendations of the project.

Coordination should also be established with the planned six module EU funded Investment Planning Programme (IPP) that will be launched in 1999. The project aims at supporting the implementation of public infrastructure investments in Lebanon. The three and a half year energy module of this programme budgeted at US\$ 3 million aims to address energy issues in the whole energy cycle including supply-side, demand-side, renewable energy, etc. The Lebanese Government is committed to ensure close co-ordination between any external technical assistance in demand-side management and this UNDP/GEF proposal through *operational co-ordination* referring to successful examples of collaboration with EU and UNDP in the field of energy in Peru and Chile.

In light of the available TORs of the EU-IPP, and following extensive discussions held between the Government, EU and UNDP, it is agreed that at least 20 % of the total cost of the EU IPP Programme (equivalent to not less than \$ 500,000) will cover demand side management and will thus be considered as parallel financing to the current initiatives.

EU funds will be allocated to support mainly baseline activities such as those that are of an explicit institutional and policy nature and other that constitute part of the sustainable development baseline course of action of the Government of Lebanon. EU funds will also be used to prime investments scale projects in energy efficiency by supporting project design and providing technical advice to concerned private or public entities.

The Government has agreed to the following coordination mechanisms to avoid any duplication between the EU IPP and the proposed GEF/UNDP project:

1. The Energy Steering Committee created by both MoHER and Ministry of Environment in 1997 acts as the steering body for both the EU IPP and the proposed UNDP/GEF supported projects until a new institutional set up is formed as a co-ordinating body.

2. Joint Task Forces and Joint Programming will be developed in the areas where both programmes will be operational and include the following :
  - a) Energy information systems and data banks (Task Force)
  - b) Energy planning, strategy and policy preparation (Task Force)
  - c) Training and awareness campaigns (Joint Programmes)

## **8. Counterpart Capacity**

The Ministry of Hydraulic and Electric Resources is the major government institution in charge of energy conservation and planning in Lebanon and it is divided in two directorates: The Directorate for hydrological and electrical equipment and the Directorate of investment.

Based on the Ministry's organigramme, the structure of the two directorates and their roles and responsibilities, The execution of this project and its sustainability will lie within the Planning Department under the first directorate. Its main responsibility is to design, plan and follow up the implementation of the hydrological and electric projects as well as the establishment of necessary databases and statistics. This department, in its turn, is divided into four units:

- The Hydrological Planning Unit
- The Electrical Planning Unit
- The Projects and their follow-up Unit
- The Statistics Unit

This Department is currently poorly staffed, 7 civil servants (Head of Department, three water engineers, one surveyor, one drawer, one engineer head of the projects and follow up department). The Ministry gives a lot of importance to strengthen this department and has added to its function, the responsibility of identifying renewable energy resources as well as the planning for energy conservation projects that will support the existing electric resources. For this, the Ministry will be requesting to provide the necessary staffing requirements for this department.

The Ministry of Hydraulic and Electric Resources has expressed its full commitment to sponsor the objectives and outputs of this GEF project and to continue with their full implementation beyond the project completion date. MoHER has expressed its willingness to execute the project, and to do so in collaboration with other local organizations, including EDL, LIBNOR, the private sector and local NGOs.

## **C- Development Objective**

The overall objective of the current GEF proposal is to assist Lebanon in curbing GHG emissions resulting from inefficient end-use energy consumption in all sectors of the economy. This will be achieved through removal of barriers to the wide scale introduction of energy efficiency and energy conservation measures in all sectors of Lebanese society. More

specifically, 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 establishment of a sustainable institutional focus, with responsibility and capacity to identify barriers to energy efficiency and sound energy planning and remove these. At the same time, this institutional point responsibility will also work to provide energy efficiency and conservation services to all sectors of the economy. Consequently, when the above barriers are removed the capability will exist to capture the arising opportunities for efficiency and energy savings.

## **D- Immediate Objectives, Outputs, Indicators, and Activities**

### **Immediate Objective 1: To establish the Lebanese Center for Energy Conservation and Planning.**

#### Success Criteria

- By 2003, the GoL will have a specialized institutional setup for energy conservation and planning
- The annual CO2 emissions savings will be 0.97-1.2 %
- Economic tools for promoting energy efficiency will be formulated and enforced
- Yearly energy consumption bulletins will be produced

### **Output 1.1: Fully operational Center hosted at the MoHER.**

Responsible parties: UNDP, MoHER, and EDL, Project Manager

#### Activities for Output 1.1

- 1.1.1 Recruitment of PM and necessary national support staff for the initiation of the project activities.
- 1.1.2 Follow up the appointment of national focal points for the various functional service units of the Centre.
- 1.1.3 Organization of initiation training for national focal points to acquaint and involve them in the different functions of the centre.
- 1.1.4 Establishment and the convening of the Project Co-ordinating Committee
- 1.1.5 Identification and contracting of technical backstopping agency that will assist in the initiation and follow up the progress of the technical aspects of the project (TORs in Annex B)

**Output 1.2: A long-term “Business Plan” for the Lebanese Center for Energy Conservation and Planning Developed and Initiated.**

Responsible parties: Project Manager, MoHER, local ESCOs and technical backstopping agency

Activities for Output 1.2

- 1.2.1 Conduct a training course in energy service companies and the energy efficiency service business targeting the MoHER, EDL staff, local energy companies as well as the appointed national focal points. The course will review the ESCO business in other countries, present various models of successful ESCOs and describe the types of services and products being offered by ESCOs around the world. The international expert conducting the course will assist the Center’s staff prepare the business plan and strategy described below as part of the training exercise.
- 1.2.2 Develop a general business plan and strategy for the duration of the project with the goal of transforming a portion of the Center into a commercially viable center at the end of the project. The plan should identify products and services to be offered management support systems needed marketing strategies, and areas of responsibility.
- 1.2.3 Develop a specific business plan for 2000 detailing the staff activities for that year, the expenses and revenue projections.
- 1.2.4 Develop monthly financial and progress reports comparing actual costs and revenues relative to plan. These financial statements should accompany progress reports on Center activities.
- 1.2.5 Develop annual financial statement and progress report summarizing the finances of the Center for the year and accomplishments to date.
- 1.2.6 Develop business plan for 2001. This plan should be able to be more precise than the first plan, given one year’s operational experience. A computerized business-planning model should be used to come up with a detailed annual plan and budget.
- 1.2.7 Develop business plan for 2002 and beyond. This plan should include not only year 2002 activities, but also describe the steps necessary to establish those services that are commercially viable as a separate, independent company. This plan would then lay the framework for the government to take the actions necessary to establish the Center as a separate public or private business.

**Immediate Objective 2: To provide necessary engineering and energy marketing services pertaining to energy conservation.**

Success criteria

- Application of audits to address common energy efficiency opportunities
- Market forces activated for cost effective energy savings and market demand established
- Availability and use of energy efficient equipment increased
- Codes and standards for energy efficient equipment developed and promoted
- Appropriate financing mechanisms and marketing modalities designed and made available

**Output 2.1: 300-400 energy audits with identified and targeted end-users and end-use technologies and applications in various energy end-use sectors such as industry and residential performed.**

Responsible parties: PM, MoHER, local audit firms, audit training firm

Activities for Output 2.1

- 2.1.1 Develop an audit program for EDL's direct service customers by:
- identifying potential audit recipients
  - defining the scope of audits (in terms of types of equipment and facilities and potential energy efficiency measures)
  - developing a schedule for performing audits
  - describing audit reports
- 2.1.2 Develop and execute a plan to develop auditing capabilities at MoHER and EDL, through:
- identification of staffing needs (e.g., number and type of staff required)
  - assessment of contracting needs
  - specification of overhead requirements
- 2.1.3 Prepare and deliver an auditor training program through the development and delivery of training courses as well as their follow up. Training will focus upon the selected number of electrical and thermal energy-use measures specified for this program.
- 2.1.4 Deliver 300- 400 comprehensive facility audits. Electrical audits shall be performed directly by EDL staff; thermal audit shall be contracted to existing auditing firms specializing in thermal energy audits. This will include the preparation of reports describing energy savings potential, assessing costs and benefits of energy efficiency measures, recommending an implementation plan for energy efficiency measures, and providing guidance on how to implement recommended measures.
- 2.1.5 Follow-up with audited customers through the assessment of implemented recommendations, reasons for non-implementation and provision of necessary guidance.



- 2.1.6 Based on the above activities, assess periodically the program experience to identify ways that future audits might be improved and provide information needed for follow-up, auditor training.
- 2.1.7 Develop an incentive program for customers served by MoHER and EDL. The provision of audits will help MoHER and EDL improve customer relations and will improve the management of customer demands, thereby reducing peak time energy charges. The incentive program will require:
- program eligibility guidelines (size, industry, and credit condition of customers)
  - level of cost sharing among MoHER, EDL, and customers
  - requirements for EDL implemented audits
  - program monitoring procedures
  - schedule for program implementation and expiration
  - other legal provisions (termination, liability, force majeure, assignment).

The specified audit incentive program will focus on a selected number of thermal and electrical end-use efficiencies for which there is a reasonable likelihood of significant energy savings.

**Output 2.2: Energy Efficiency standards and labels designed and their adoption initiated.**

Parties responsible: PM, LIBNOR, local legal expert, International and national standards specialists

Activities for Output 2.2

- 2.2.1 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. It is also purchased by middle and upper income families who are less price sensitive and thus may be more accepting of the elimination of the least expensive and most inefficient models.
- 2.2.2 Coordinate with LIBNOR to set a minimum efficiency standard as well as develop a label, which conveys energy efficiency and cost of use information to the buying public. An international expert in energy efficiency standards will assist LIBNOR in the appliance selected.
- 2.2.3 Conduct a survey of the range of efficiencies of the appliance found in the Lebanese market. The survey should determine the range of efficiencies in each size class of the appliance and present the information so that estimations can be made of the number of sales of each size that would be affected by minimum efficiency standards, as well as the energy and power savings that would result.
- 2.2.4 Work with LIBNOR to set a minimum efficiency standard for each size class of appliance. Once the standard is set, it should be codified in government regulations.

- 2.2.5 Develop a draft label for the appliance that is easy to understand and clearly conveys information regarding efficiency and cost of use information. The label should display information, which shows how the particular appliance ranks relative to others of its class in terms of efficiency and cost.
- 2.2.6 Conduct focus groups to test the label design. Modify the design based on focus group inputs.
- 2.2.7 Assess the enforcement requirements for the label and standard program. Make recommendations for increased staffing or other resources to bring enforcement capability up to the required level. Also, assess the need for a consumer information program to educate consumers both of the new standards as well as how to read and use the new label.
- 2.2.8 Implement the new standard and the label. A grace period, such as one year, might be considered to allow manufacturers time to work off existing inventory, which is below the standard, and adjust their manufacturing and marketing to the higher efficiency models. Enforcement and consumer information programs should be implemented in conjunction with the implementation of the standards and labeling program.

**Output 2.3: Technical advice and recommendation as well as project design services provided to public and private sector interventions for energy conservation.**

Responsible parties: PM, MoHER, EDL, training ESCO

Activities for Output 2.3

- 2.3.1. Organize a one day "business transformation" seminar for the energy services industry that will provide guidance to Lebanese businesses on how to provide more comprehensive energy efficiency services using practices and possibly to begin the process of becoming energy service companies (ESCOs). This seminar shall be held in the first year of the project and shall be open to all segments of the energy service industry.
- 2.3.2. Prepare and deliver a two-day seminar on energy service business practices that will provide more business advice on advanced energy services business issues. Seminar will provide expert training and guidance from global ESCOs and equipment manufacturers from Europe, the U.S. and other countries with strong energy service markets on:
  - business development
  - marketing
  - customer relations
  - contracting
  - staffing
  - business strategy

- international joint ventures
- other business and financial issues

2.3.3. Facilitate networking between national and international ESCOs.

2.3.4. Prepare proceedings and publish reports on each of the above-mentioned seminars and meetings to record the relevant principles and conclusions presented.

2.3.5. Establish permanent sources of information within MoHER on ESCO business issues that can be provided to the energy services industry on an ongoing basis.

**Output 2.4: Creative and dedicated energy efficiency and conservation financing facilitated/supplied to private and public sectors.**

Parties responsible: PM, finance expert

Activities for Output 2.4

2.4.1. 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

2.4.2. Design accepted and tried financing modalities, certification of projects for financing, pilot vendor finance mechanisms and identify replicable modalities.

2.4.3. 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.

2.4.4. Provide direct finance by the Center with payback through “performance contracting” and other advanced modalities.

2.4.5. Provide guidance in the implementation of these modalities.

**Output 2.5: Assessments of market issues pertaining to the availability, adequacy and pricing of energy efficient technology completed, as well as the design of programs to improve market penetration and market transformation to such technologies.**

Parties responsible: PM, local energy technology firm, socio-economist

### Activities for Output 2.5:

- 2.5.1. Conduct a market survey with maximum geographic outreach to assess the availability, adequacy, and pricing of energy efficient technologies as well as local manufacturers and their main challenges in this domain
- 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...
- 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 the different regions, the promotion of small and medium enterprises, local customs measures for imported products, possible financing modalities, etc.
- 2.5.4. Estimate 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.
- 2.5.5. Investigate 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 of complying equipment.
- 2.5.6. Based on the above assessment, organize a training for local manufacturers on identified most used energy efficient technologies to promote their local manufacturing, maintenance and market penetration.
- 2.5.7. Assess the benefits and costs of changing customs duty classification from equipment that are likely to have the largest impact on energy efficiency in Lebanon. The assessment recommendations should be proposed and followed up for adoption by the government.

**Output 2.6: Comprehensive surveys and measurements covering various sectors assessing energy demand by sector, industry, and technology and energy/fuel type completed.**

Parties responsible: local energy firms, International expert

### Activities for Output 2.6

- 2.6.1. Design the DSM assessment with the assistance of an international expert in the use of DSM models in conducting such assessments. The assessment should cover energy demand by sector, industry, technology and energy/fuel type. The assessment should make as much use as possible of data that will become available as a result of the various energy service programs being offered by the Center. Equipment needed to conduct the

assessment, such as metering equipment, should be identified as part of the design process and procured.

- 2.6.2. Conduct the DSM assessment.
- 2.6.3. Publication of the results in a detailed report and development of a database that will be regularly updated.
- 2.6.4. The results of the DSM assessment will be used as the basis for integrated energy planning exercises within the government. The results should also be incorporated into the energy plans developed by the Ministry of Planning.
- 2.6.5. Conduct training for staff of MoHER and EDL on Demand Side Management and load research. The training should cover the general concepts of DSM, data needs, staffing and equipment needs to build a load research capability, DSM models and their operation and use, and the rudiments of integrated resources planning.
- 2.6.6. Procure and install a DSM model such as EPRI's DSManager. Training of staff on the use of the model should be done in conjunction with the design of the DSM assessment.

**Immediate Objective 3: To assist the GOL in strengthening its policy aspects and increasing public awareness pertaining to energy planning and conservation issues.**

Success criteria

- Adequate energy policies embedded in national planning cycles
- Adoption of updated and new policy options
- Increased public awareness at the consumer and decision making levels
- Strengthening institutional and human capacities for introducing technical, financial and policy measures.
- Energy Conservation Center institutionalized by law

**Output 3.1: Increased awareness and understanding pertaining to energy efficiency at the demand side level targeting the consumer and the policy makers.**

Responsible parties: PM, local NGOs, Information specialist

Activities for Output 3.1

- 3.1.1. Development of an information dissemination plan based on analysis of energy consumption in the residential sector, attitudes and behavior of residents, and the identification of significant opportunities for improving efficiency which can be implemented at no or low cost. Detailed information needs will be issued from the assessments that will be undertaken by the project.

- 3.1.2. Development of information materials (media, pamphlets, brochures, and documentaries) that will be used to inform consumers in all sectors of waste patterns, as well as the means of dissemination.
- 3.1.3. 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, norms and standards targeting decision-makers, private sector, government departments and consumers.
- 3.1.4. Promotion of the engineering and services function of the center through the dissemination of the outcomes of these activities in addition to the publication and dissemination of yearly energy consumption bulletin.
- 3.1.5. Evaluation of the impact of the residential information program. Contract with a local consumer research firm to conduct an analysis of the effectiveness of the information provided to consumers (KAP study). The goal of the study would be to determine the knowledge, attitudes and practice of the consumers towards energy efficiency and conservation.
- 3.1.6. Preparation of promotional material to support customs duty reduction based on the findings of Activity 2.5.7

**Output 3.2: Energy policy assessed, policy options for adoption by the GOL submitted.**

Responsible parties: Project Manager, International Legal expert, and local legal expert

Activities for Output 3.2

- 3.2.1. Assessment of the existing national policies, legislation and regulations to identify policy barriers to energy efficiency including those to market development and penetration of efficient equipment.
- 3.2.2. Based on this assessment, develop a list of priority policy issues to sustain the Energy Center viability including:
  - Center revenues – Pricing should be made for the services provided to industrial and commercial customers to cover the cost of local consultants and contract services.
  - Create an energy conservation fund, which can be used by the Center to create incentives for program participants. The incentives could be rebates on high efficiency equipment, etc.
  - Energy Pricing Policies - Various pricing issues could be studied including removal of price subsidies, time-of-use pricing, marginal cost pricing, pricing of rural electricity and its impact on the market for off-grid distributed generation.
  - Energy Efficiency Standards in Government Procurement - Incorporating minimum efficiency standards into government procurement practices not only helps save the government money, but it acts as a market stimulus for more efficient products.

- Lifecycle Costing in Government Procurement - The use of lifecycle costing in government procurement, particularly major installations, again not only saves the government money but also creates a stronger market for energy efficiency.
- Incentives for Energy Efficiency within Public Sector Industries - Pay structures and management systems often do not provide sufficient incentives in public industries to promote efficient management and operation. This area would be studied to identify areas ways in which to incentivize both management and staff to use energy more efficiently.
- Mandatory Energy Audits - Mandatory energy audits for plants and buildings over a certain size may be justifiable if it is found that there is a low participation rate of these facilities in the Center's programs. The mandate could also be extended to management, e.g., requiring the designation of an energy manager and reporting energy consumption and planned energy efficiency measures, as well as implementation, e.g., requiring that certain measures be implemented or that certain targets be met, such as international benchmarks for energy consumption per unit output.
- Legal Foundation for Energy Efficiency - It is likely that few, if any, of the laws and decrees governing Lebanon address the efficient use of energy as an objective or concern of public agencies or corporations. This study would review all relevant laws to determine whether they address energy efficiency and propose amendments to those laws where efficiency can meaningfully and usefully be incorporated.

3.2.3. Follow up the official adoption by the Government of Lebanon of the proposed policies.

**Output 3.3: A comprehensive Integrated Resource Planning exercise undertaken to ascertain the optimum resource mix that would ensure a high quality of energy supply to all users in Lebanon.**

Responsible parties: Project Manager, IRP International expert, MoHER

#### Activities for Output 3.3

- 3.3.1. Based on the Demand Side management assessment (output 2.6), undertake an Integrated Resource Planning exercise in close coordination with all concerned parties (government and non-government)
- 3.3.2. The results of the extensive national consultation process of the IRP will be used as a basis for the development of energy sector conservation plans with achievable energy savings targets along with associated programs to achieve them to be proposed and adopted by the Government.
- 3.3.3. Propose several scenarios of these plans for the adoption by the government decision-makers.

**Output 3.4: Legal and institutional reform studied, and proposals of regulatory measures to facilitate and promote end-use energy conservation in all sectors of the economy developed.**

Responsible parties: Project Manager, local legal expert, MoHER

Activities for Output 3.4

- 3.4.1 Review the current organizational structure of the MoHER and EDL and propose several options to incorporate the long-term viability of the Energy analysis and planning function of the Energy Conservation Center.
- 3.4.2 Propose, along with the reform strategy of the Office of the Minister of State for Administrative Reform, the institutional structure including all the administrative and legal measures required.
- 3.4.3 Identify and provide the required capacity building input required for the functioning of the analysis and planning department of the Center.
- 3.4.4 Ensure the full absorption of the other functions of the center (engineering, finance and marketing) by the private sector.

**Output 3.5: Capacity-building activities for general audiences throughout the country implemented.**

Parties responsible: international expert in conjunction with the relevant staff in the MoHER and EDL.

Activities for Output 3.5

- 3.5.1 Assess the training needs for various targets in the industrial and commercial sectors. The target audiences should include top management, plant managers, plant and building engineers, equipment operators, maintenance and repair personnel, as well as relevant technical and management personnel within the various ministries, such as the Ministry of Industry, Ministry of Planning and the Ministry of Economy.
- 3.5.2 Based on the assessment, develop a priority list of training courses and an approximate schedule for the courses. An illustrative list of courses might be the following:
  - Energy Management for Companies (plant managers, engineers and technicians)
  - Energy Management for Executives
  - Energy Accounting
  - Boiler Efficiency Improvement
  - Steam System Efficiency Improvement
  - Electric System Efficiency Improvement
  - Lighting Efficiency Improvement
  - Power Factor Improvement



- Boiler Water Treatment
  - Waste Heat Recovery
  - Energy Efficiency Financing
  - Energy Measurement and Instrumentation
  - Air Conditioning and Refrigeration
- 3.5.3 Conduct the technical training courses. A one-year schedule of technical training courses should be prepared and published well in advance of the first course. This will allow people to schedule attendance in their area.
- 3.5.4 Prepare a training evaluation program to reflect on the course effectiveness. Course completion certificates should also be given to each participant. The evaluation should take place at the workplace.
- 3.5.5 Identify study tours at the regional and international levels targeting the concerned government and non-government institutions including the private sector.

## **E- INPUTS**

To complement the on-going baseline activities of the current project, the Government has expressed commitment to fund activities that contribute to its own sustainable development objectives. As such, generalized energy planning activities and accompanying exercises (such as IRP) would receive co-financing from Government and parallel financing from the EU as Baseline action. More specifically, these activities include load and consumer research, demand assessments, technology surveys and database development. Furthermore, policy research will also be conducted as part of such baseline efforts as well as the implementation of information programmes. Lastly, funds needed to support the establishment of the needed institutional point responsibility for energy planning and conservation will also be provided through baseline parallel and co-financing.

The baseline activities presented above are US \$ 1 million in total. Of this figure, US\$ 0.5 million will be contributed to the project by the Government of Lebanon (MoHER). The remaining US\$ 0.5 million will be contributed to MoHER to support the above activities through the EU IPP program. Over and above the in-cash contribution, the Government of Lebanon has committed US \$ 0.5 million in kind as well.

### **UNDP /GEF/ MoHER in-cash input**

The in-cash input of UNDP, GEF and MoHER amount to USD 4,4 million and are detailed in the project budget but can be summarized along the following:

#### **Personnel**

This will cover the expenses of the international and the national human resources that will be made available by the projects to undertake the required activities.

Total national : USD 1,178,000 including all necessary local expertise

Total international : USD 292,500

**Contracts**

The subcontracts to be done through the project will entail the required assessment activities, the surveys, studies, seminars, auditing, technical backstopping

The overall subcontract value amounts to : USD 2,065,000

The technical backstopping agency contract : USD 100,000

## **Training**

As detailed in the project activities and as listed in the project budget, the training component in this project will cover group training, study tours and consultative meetings as well as consultative meetings. The total budget of this component accounts for USD 240,000

### 1. The Group training component include:

- Initiation workshop
- Business transformation seminar
- Energy Services and business practices
- Audit training
- DSM training
- Load research training
- Local manufacturers training
- Standards and Labels training
- Customs training
- ESCOs training
- Public training on :
  - Energy Management for Companies (plant managers, engineers and technicians)
  - Energy Management for Executives
  - Energy Accounting
  - Boiler Efficiency Improvement
  - Steam System Efficiency Improvement
  - Electric System Efficiency Improvement
  - Lighting Efficiency Improvement
  - Power Factor Improvement
  - Boiler Water Treatment
  - Waste Heat Recovery
  - Energy Efficiency Financing
  - Energy Measurement and Instrumentation
  - Air Conditioning and Refrigeration

## **Equipment**

The equipment that will be procured by the project amounts to USD 299,000

The remaining costs of the project cover the awareness material, the reporting costs, contingencies and the UNDP Country Office support cost.

## **Government in-kind input**

The Government in-kind input of USD 500,000 is detailed in the budget section as follows:

Personnel	:	USD 350,000
Equipment	:	USD 130,000
Sundries	:	USD 20,000

## **F- RISKS AND PRIOR OBLIGATIONS**

Successful implementation of the proposed project is essential for the formulation and achievement of energy conservation and energy efficiency targets required curbing the expected rise in energy demand. Some risks do, at present, exist which could jeopardize the realization of the overall objectives of the project. These can be summarized as follows:

### ***1. Narrow market for energy efficiency and conservation activities after life span of project***

This is unlikely as Lebanon is fairly industrialized by Middle East standards with industrial production constituting the largest single element of total exports, valued at \$716 million. Furthermore, according to the Ministry of Industry, there were more than 23,000 factories in 1995 and Lebanon is undergoing major growth in all its consuming sectors. As an example, in 1997 some 517 new industrial establishments with capital totaling about \$720 million were established, up from 459 in 1996.

### ***2. Reluctance to accept energy efficiency policies***

The policy analysis function and capability of the Center has been designed to mitigate this by quantifying benefits to the country resulting from such policy measures and obtaining support for their implementation at the highest levels. Moreover, the intensive public awareness campaigns will secure vital public support for the efficiency programmes and services thereby reducing potential political resistance to adoption of energy efficiency policies.

### ***3. Activities may not be sufficient to make the Center self-supporting***

This is unlikely since currently energy conservation is not a familiar concept in Lebanon, and the scope of needed action is considerable in all sectors of the economy. It is expected that due to the scope of services to be provided to both private and public sectors, the Center will eventually be able to generate sufficient revenue to be self-financing and viable for privatization. Furthermore, MoHER has agreed to continue support of the Center beyond GEF support until such a time when commercial viability is a reality.

### ***4. 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 efficiency will not emerge with and following the implementation of project activities.

## **G- PROJECT REVIEW, REPORTING AND EVALUATION**

The project will be monitored in accordance with established UNDP monitoring procedures. The UNDP office in Lebanon will provide ongoing performance monitoring with backstopping from UNDP technical staff in headquarters. Moreover, yearly Tripartite Reviews will also be held with the participation of the project's counterparts. During the Tripartite Reviews, the project performance will be measured against established work plans; expenditures will be reviewed and overall technical performance will be assessed. (Further procedures for overall project review will be detailed at project document formulation stage.)

There will be a mid-term evaluation at the end of the second year of the project.

Dissemination will be co-ordinate between the Center's marketing, promotion and information functions and the *Co-ordination Board* of the project. Focus will be as broad as possible to encompass a multitude of organizations and institutions both public and private to ensure engagement of public and private stakeholders is achieved. Second, the marketing section in particular with its promotional and awareness campaigns and conferences, will ensure that visibility and dissemination of project's activities and results is secured particularly among the general public.

The Government will provide the Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the procedures set out in Section 30503 of the UNDP Policies and Procedures Manual (PPM) and Section 10404 of the UNDP Finance Manual. The Audit will be conducted by the legally recognized auditor of the Government, or by a commercial auditor engaged by the Government.

## **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 Programme.

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 revisions, which rephrase the delivery of agreed, project inputs, reflect increased expert and/or other costs due to inflation or take into account agency expenditure flexibility.

## I- BUDGETS

### Government in-kind Contribution

BL	Description	Total (US\$)	Total P/m	Year1	Year2	Year3	Year4
<b>10.00</b>	<b>Personnel</b>						
13.00	<u>Administrative support personnel</u>						
13.01	Secretary	36,000	48	9000	9000	9000	9000
17.00	<u>National Experts</u>						
17.01	National Coordinator	96,000	48	24000	24000	24000	24000
17.02	Mechanical Engineer (2)	144,000	48	36000	36000	36000	36000
17.03	Administration staff	32,000	32	12000	10000	10000	
17.04	Legal advisor	42,000	24		21000	21000	
<b>19.99</b>	<b>Subtotal personnel</b>	<b>350,000</b>	<b>200</b>	<b>81,000</b>	<b>100,000</b>	<b>100,000</b>	<b>69,000</b>
<b>40.00</b>	<b>Equipment</b>						
42.00	<u>Expandable equipment</u>						
42.01	Offices/premises	80,000		20,000	20,000	20,000	20,000
42.02	Meeting room for PCC	20,000		5,000	5,000	5,000	5,000
42.03	Utilities, stationary, Tel, fax	30,000		7,500	7,500	7,500	7,500
<b>49.00</b>	<b>Subtotal equipment</b>	<b>130,000</b>		<b>32,500</b>	<b>32,500</b>	<b>32,500</b>	<b>32,500</b>
<b>50.00</b>	<b>Miscellaneous</b>						
51.00	Sundries	20,000		5,000	5,000	5,000	5,000
<b>59.00</b>	<b>Subtotal miscellaneous</b>	<b>20,000</b>		<b>5,000</b>	<b>5,000</b>	<b>5,000</b>	<b>5,000</b>
	<b>Total</b>	<b>500,000</b>	<b>216</b>	<b>118,500</b>	<b>137,500</b>	<b>137,500</b>	<b>106,500</b>

**LEB/99/G31 Project- GEF + MOHER**

SBLN	Description	Imp. Agenc	Total	2000	2001	2002	2003	2004	2005
<b>10</b>	<b>PROJECT PERSONNEL</b>								
<b>11</b>	<b>International Consultants</b>								
11.01	ESCO expert	NEX	20,000	20,000					
11.02	DSM expert	NEX	10,000		10,000				
11.03	IRP Expert	NEX	20,000		20,000				
11.04	equipment standard experts	NEX	34,000		17,000	17,000			
11.05	Legal Expert	NEX	35,000		15,000		20,000		
11.06	Finance Expert	NEX	33,500	6,000	16,750	10,750			
11.07	Audit Expert	NEX	15,000	15,000					
<b>11.99</b>	<b>Subtotal</b>		<b>167,500</b>	<b>41,000</b>	<b>78,750</b>	<b>27,750</b>	<b>20,000</b>		<b>0</b>
<b>13</b>	<b>Admin Support</b>								
13.01	Administrative Assistant	NEX	60,000	4,000	12,000	12,000	12,000	12,000	8,000
<b>13.99</b>	<b>Subtotal</b>		<b>60,000</b>	<b>4,000</b>	<b>12,000</b>	<b>12,000</b>	<b>12,000</b>	<b>12,000</b>	<b>8,000</b>
<b>15</b>	<b>Monitoring and Evaluation</b>								
15.01	Mid-term evaluation	NEX	15,000			15,000			
<b>15.99</b>	<b>Subtotal</b>		<b>15,000</b>			<b>15,000</b>			
<b>16</b>	<b>Mission Costs</b>								
16.01	Local Travel	NEX	8,000	1,000	2,000	2,000	2,000	1,000	
16.02	International Travel	NEX	25,000	2,000	5,000	5,000	5,000	5,000	3,000
<b>16.99</b>	<b>Subtotal</b>		<b>33,000</b>	<b>3,000</b>	<b>7,000</b>	<b>7,000</b>	<b>7,000</b>	<b>6,000</b>	<b>3,000</b>
<b>17</b>	<b>National Consultants</b>								
17.01	Project Manager	NEX	186,000	12,400	37,200	37,200	37,200	37,200	24,800
17.02	Engineering Services Coordinator	NEX	75,000	5,000	15,000	15,000	15,000	15,000	10,000
17.03	Finance Operations Coordinator	NEX	150,000	10,000	30,000	30,000	30,000	30,000	20,000
17.04	Marketing Services Coordinator	NEX	150,000	10,000	30,000	30,000	30,000	30,000	20,000
17.05	Legal Expert	NEX	5,000		1,250	1,250	1,250	1,250	
17.06	Training Coordinator	NEX	72,000		24,000	24,000	24,000		
17.07	Standards expert	NEX	30,000		15,000	15,000			
17.08	Electrical Engineer	NEX	95,000	3,000	19,000	19,000	19,000	19,000	16,000
17.09	Socio-economic	NEX	96,000	4,000	24,000	24,000	24,000	20,000	

SBLN	Description	Imp. Agenc	Total	2000	2001	2002	2003	2004	2005
17.10	Information Specialist	NEX	28,000		7,000	7,000	7,000	7,000	
17.11	Procurement Officer	NEX	36,000	8,000	24,000	4,000			
17.12	Ad-hoc short term consultant	NEX	4,000			2,000	2,000		
<b>17.99</b>	<b>Subtotal</b>		<b>927,000</b>	<b>54,400</b>	<b>228,451</b>	<b>210,452</b>	<b>191,453</b>	<b>161,454</b>	<b>92,805</b>
<b>19</b>	<b>Component Total</b>		<b>1,202,500</b>	<b>102,400</b>	<b>326,201</b>	<b>272,202</b>	<b>230,453</b>	<b>179,454</b>	<b>103,805</b>
<b>20</b>	<b>CONTRACTS</b>								
21.01	Technical backstopping agency	NEX	100,000	20,000	20,000	20,000	20,000	20,000	
21.02	Energy audits	NEX	1,000,000	200,000	800,000				
21.03	Socio-economic Survey	NEX	5,000		5,000				
21.04	Market & Appliances Survey	NEX	40,000		40,000				
21.05	Energy demand Survey/Sector	NEX	15,000	3,000	7,500	4,500			
21.06	Feasibility Study	NEX	39,000		27,000	12,000			
21.07	Pre& Post-testing of material	NEX	10,000			5,000		5,000	
21.08	Awareness Campaign+ KAP	NEX	30,000				10,000	20,000	
21.09	Financing mechanisms assessment	NEX	10,000	5,000	5,000				
21.10	Dedicated financing	NEX	700,000	20,000	200,000	200,000	280,000		
21.11	ESCO database	NEX	1,000			1,000			
21.12	Customs Analysis	NEX	15,000		15,000				
<b>29</b>	<b>Component Total</b>		<b>1,965,000</b>	<b>248,000</b>	<b>1,119,500</b>	<b>242,500</b>	<b>310,000</b>	<b>45,000</b>	
<b>30</b>	<b>TRAINING</b>								
<b>32</b>	<b>Other Training</b>								
32.01	Study Tours	NEX	50,000	2,000	10,000	10,000	10,000	10,000	8,000
32.02	Initiation workshop	NEX	5,000	5,000					
32.03	Business Transformation seminar	NEX	10,000	5,000	5,000				
32.04	Energy Service business practices	NEX	10,000		10,000				
32.05	Public Training	NEX	39,000		5,000	10,000	15,000	9,000	
32.06	Local Manufacturers Training	NEX	40,000		20,000	20,000			
32.07	Standards & Labels Training	NEX	10,000		5,000	5,000			
32.08	Customs Training	NEX	5,000		5,000				
32.09	ESCO Training	NEX	20,000	5,000	10,000	5,000			
32.10	Audit Training	NEX	20,000	5,000	10,000	5,000			
32.11	DSM Training	NEX	2,000	2,000					
32.12	Local research Training	NEX	5,000		5,000				



SBLN	Description	Imp. Agenc	Total	2000	2001	2002	2003	2004	2005
32.13	Project Coord. Committee Meeting	NEX	5,000	1,000	1,000	1,000	1,000	1,000	
32.14	Promotional seminars	NEX	6,000	1,000	1,000	2,000	1,000	1,000	
32.15	Consultation Meetings	NEX	5,000	1,000	1,000	1,000	1,000	1,000	
<b>32.99</b>	<b>Line Total</b>		<b>232,000</b>	<b>29,000</b>	<b>90,001</b>	<b>61,002</b>	<b>30,003</b>	<b>24,004</b>	
<b>39</b>	<b>Component Total</b>		<b>232,000</b>	<b>29,000</b>	<b>90,001</b>	<b>61,002</b>	<b>30,003</b>	<b>24,004</b>	
<b>40</b>	<b>EQUIPMENT</b>								
<b>45</b>	<b>Equipment</b>								
45.01	Computer (8)	NEX	18,000	18,000					
45.02	Printer (5)	NEX	5,000	5,000					
45.03	E-mail & Internet	NEX	5,000	5,000					
45.04	Webpage	NEX	5,000		5,000				
45.05	Photocopiers	NEX	5,000		5,000				
45.06	Auditing equipment	NEX	180,000	180,000					
45.07	DSM software	NEX	8,000	8,000					
45.08	Technical documents	NEX	7,000	1,000	2,000	1,500	1,500	1,000	
45.09	Overhead projector	NEX	1,000	1,000					
45.10	Screen	NEX	1,000		1,000				
45.11	Stationary	NEX	8,000	2,000	2,000	2,000	1,000	1,000	
45.12	Vehicle (2)	NEX	45,000	45,000					
45.13	Demonstration Equipment	NEX	10,000	10,000					
45.14	Slides Machine	NEX	1,000		1,000				
45.15	Operational & Maintenance of Equipment	NEX	10,000	1,000	2,000	2,000	3,000	2,000	
<b>45.99</b>	<b>Line Total</b>		<b>309,000</b>	<b>276,000</b>	<b>18,000</b>	<b>5,500</b>	<b>5,500</b>	<b>4,000</b>	
<b>49</b>	<b>Component Total</b>		<b>309,000</b>	<b>276,000</b>	<b>18,000</b>	<b>5,500</b>	<b>5,500</b>	<b>4,000</b>	
<b>50</b>	<b>MISCELLANEOUS</b>								
<b>51</b>	<b>Sundries</b>								
51.01	Contingencies	NEX	24,500	2,000	5,000	5,000	5,000	5,000	2,500
<b>51.99</b>	<b>Line Total</b>		<b>24,500</b>	<b>2,000</b>	<b>5,000</b>	<b>5,000</b>	<b>5,000</b>	<b>5,000</b>	<b>2,500</b>
<b>52</b>	<b>Reporting Costs</b>								
52.01	Reporting Costs	NEX	20,437	2,000	6,000	5,000	1,437	3,000	3,000
52.02	Awareness Material	NEX	30,000			20,000	10,000		
<b>52.99</b>	<b>Line Total</b>		<b>50,437</b>	<b>2,000</b>	<b>6,000</b>	<b>25,000</b>	<b>11,437</b>	<b>3,000</b>	<b>3,000</b>

SBLN	Description	Imp. Agenc	Total	2000	2001	2002	2003	2004	2005
<b>54</b>	<b>Direct Costs</b>								
54.01	Project Support Services	NEX	116,563	22,032	46,745	18,560	18,128	7,864	<b>3234</b>
<b>54.99</b>	<b>Line Total</b>		<b>116,563</b>	<b>22,032</b>	<b>46,745</b>	<b>18,560</b>	<b>18,128</b>	<b>7,864</b>	<b>3,234</b>
<b>59</b>	<b>Component Total</b>		<b>191,500</b>	<b>26,032</b>	<b>57,745</b>	<b>48,560</b>	<b>34,565</b>	<b>15,864</b>	<b>8,734</b>
<b>99</b>	<b>Project Total</b>		<b>3,900,000</b>	<b>681,432</b>	<b>1,611,447</b>	<b>629,764</b>	<b>610,521</b>	<b>268,322</b>	<b>112,539</b>
<b>100</b>	<b>COST SHARING</b>								
<b>103</b>	<b>Government Cost-Sharing</b>		485,437	217,000	268,437				
<b>109</b>	<b>Component Total</b>		485,437	217,000	268,437				
	CO Administration %		3%	3%	3%				
	CO Administration		14,563	6,510	8,053				
	<b>Total Gov. Cost-Sharing</b>		<b>500,000</b>	<b>223,510</b>	<b>276,490</b>				
<b>999</b>	<b>Net GEF Contribution</b>		<b>3,400,000</b>	<b>457,922</b>	<b>1,334,957</b>	<b>629,764</b>	<b>610,521</b>	<b>268,322</b>	<b>112,539</b>

**UNITED NATIONS DEVELOPMENT PROGRAMME ( Funds to be mobilized)**

SBLN	Description	Total	2000	2001	2002	2003	2004	2005
11	<b>International Experts &amp; Consultants</b>							
11.02	DSM Expert	30,000		20,000	1,000			
11.03	IRP Expert	100,000		20,000	20,000	20,000	40,000	
11.05	Legal Expert	25,000		15,000		10,000		
<b>11.99</b>	<b>Line Total</b>	<b>155,000</b>	<b>-</b>	<b>55,000</b>	<b>21,000</b>	<b>30,000</b>	<b>40,000</b>	
17	<b>National Professionals</b>							
17.02	Engineering Services Coordinator	75,000	5,000	15,000	15,000	15,000	15,000	10,000
17.05	Legal Expert	55,000		13,750	13,750	13,750	13,750	
17.08	Electrical Engineer	25,000	5,000	5,000	5,000	5,000	5,000	
17.1	Information Specialist	20,000		5,000	5,000	5,000	5,000	
<b>17.99</b>	<b>Line Total</b>	<b>175,000</b>	<b>10,000</b>	<b>38,750</b>	<b>38,750</b>	<b>38,750</b>	<b>38,750</b>	<b>10,000</b>
21	<b>Subcontract A</b>							
21.03	Socio-economist Survey	25,000		25,000				
21.05	Energy demand Survey	25,000		12,500	12,500			
21.06	Feasibility Study	11,000	5,000	3,000	3,000			
21.08	Awareness Campaign + KAP	30,000		5,000	5,000	10,000	10,000	
21.11	ESCO database	9,000			9,000			
<b>21.99</b>	<b>Line Total</b>	<b>100,000</b>	<b>5,000</b>	<b>45,500</b>	<b>29,500</b>	<b>10,000</b>	<b>10,000</b>	
30	<b>Training</b>							
32.1	DSM Training	8,000		8,000				
<b>30.99</b>	<b>Line Total</b>	<b>8,000</b>	<b>-</b>	<b>8,000</b>				
50	<b>Reporting Costs</b>							
52.01	Reporting Costs	12,000				5,000	7,000	
52.02	Awareness material	50,000		10,000	20,000	10,000	10,000	
<b>50.99</b>	<b>Line Total</b>	<b>62,000</b>		<b>10,000</b>	<b>20,000</b>	<b>15,000</b>	<b>17,000</b>	
99	<b>Budget Total</b>	500,000	15,000	157,250	118,250	93,750	105,750	10,000

## **J- LIST OF ANNEXES**

<b>ANNEX A</b>	<b>WORKPLAN</b>
<b>ANNEX B</b>	<b>PROJECT STAFF TERMS OF REFERENCE</b>
<b>ANNEX C</b>	<b>INCREMENTAL COST ASSESSMENT</b>
<b>ANNEX D</b>	<b>LOGICAL FRAMEWORK</b>
<b>ANNEX E</b>	<b>CURRENT SET-UP OF THE LEBANESE ELECTRICITY SECTOR</b>
<b>ANNEX F</b>	<b>CO<sub>2</sub> EMISSIONS BY FUEL TYPE</b>
<b>ANNEX G</b>	<b>CALCULATION OF GREENHOUSE GAS EMISSION SAVINGS</b>
<b>ANNEX H</b>	<b>LCECP FUNCTIONAL ORGANIZATION CHART</b>
<b>ANNEX I</b>	<b>INSTITUTIONAL DEVELOPMENT PROCESS OF LCECP</b>

**Annex A**  
**PROJECT WORKPLAN**

Project Intervention	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>1. IMMEDIATE OBJECTIVE:</b> to establish the Lebanese Center for Energy Conservation and Planning																				
<b>1.1 Output:</b> Fully operational Center hosted at the MoHER																				
1.1.1 Activity: recruitment of PM and necessary national support staff for the initiation of the project activities	■																			
1.1.2 Activity: follow up the appointment of national focal points for the various functional service units of the Center																				
1.1.3 Activity: organization of initiation training for national focal points to acquaint and involve them in the different functions of the Center																				
1.1.4 Activity: establishment and the convening of the Project Co-ordination Committee																				
1.1.5 Activity: identification and contracting of technical backstopping agency that will assist in the initiation and follow up the progress of the technical aspects of the project	■																			
<b>1.2 Output:</b> A long-term "Business Plan" for the Lebanese Center for Energy Conservation and Planning developed and initiated																				
1.2.1 Activity: conduct a training course in energy service companies and the energy efficiency service business		■																		
1.2.2 Activity: develop a general business plan and strategy for the duration of the project																				
1.2.3 Activity: develop a specific business plan for 2000 detailing staff activities for that year, expenses and revenue projections		■																		
1.2.4 Activity: develop monthly financial and progress reports comparing actual costs and revenues relative to plan		■	■	■																
1.2.5 Activity: develop annual financial statement and progress report summarizing the finances of the Center for the year and accomplishments to date				■				■			■			■						■
1.2.6 Activity: develop business plan for 2001				■																
1.2.7 Activity: develop business plan for 2002 and beyond								■												
<b>2. IMMEDIATE OBJECTIVE:</b> provide necessary engineering and energy marketing services pertaining to energy conservation																				
<b>2.1 Output:</b> 300-400 energy audits with identified and targeted end-users and end-use technologies and applications in various energy end-use sectors such as industry and residential performed																				
2.1.1 Activity: develop an audit program for EDL's direct service customers		■																		
2.1.2 Activity: develop and execute a plan to develop auditing capabilities at MoHER and EDL		■																		
2.1.3 Activity: prepare and deliver an auditor training program through the development and delivery of training courses as well as their follow up			■																	
2.1.4 Activity: deliver 300-400 comprehensive facility audits				■	■															
2.1.5 Activity: follow-up with audited customers through the assessment of implemented recommendations, reasons for non-implementation and provision of necessary guidance							■													

2.1.6 Activity: periodical assessment of the program experience to identify ways that future audits might be improved and provide information for follow-up, auditor training																							
2.1.7 Activity: develop an incentive program for customers served by MoHER and EDL																							
<b>2.2 Output:</b> Energy Efficiency standards and labels designed and their adoption initiated																							
2.2.1 Activity: identification of the first appliance for which minimum efficiency standards and labeling requirements will be developed																							
2.2.2 Activity: coordinate with LIBNOR to set minimum efficiency standard as well as develop a label.																							
2.2.3 Activity: conduct a survey of the range of efficiencies of the appliance found in the Lebanese market																							
2.2.4 Activity: work with LIBNOR to set a minimum efficiency standard for each size class of appliance																							
2.2.5 Activity : develop a draft label for the appliance																							
2.2.6 Activity: conduct focus groups to test the label design and modify the design based on focus group inputs																							
2.2.7 Activity: assess the enforcement requirements for the label and standard program																							
2.2.8 Activity: implement the new standard and the label																							
<b>2.3 Output:</b> technical advice and recommendation as well as project design services provided to public and private sector interventions for energy conservation																							
2.3.1 Activity: organization of one-day "business transformation" seminar for energy services industry																							
2.3.2 Activity: prepare and deliver a two-day seminar on energy service business practices																							
2.3.3 Activity: facilitate networking between national and international ESCOs																							
2.3.4 Activity: prepare proceedings and publish reports on each of the above mentioned seminars and meetings to record the relevant principles and conclusions presented																							
2.3.5 Activity: establish permanent sources of information within MoHER on ESCO business issues																							
<b>2.4 Output:</b> creative and dedicated energy efficiency and conservation financing facilitated/supplied to private and public sectors																							
2.4.1 Activity: assessment of existing possible financing mechanism																							
2.4.2 Activity: design accepted and tried financing modalities, certification of projects for financing, pilot vendor finance mechanisms and identify replicable modalities																							
2.4.3 Activity: design, package and market leasing program for identified energy efficiency technologies																							
2.4.4 Activity: provision of direct finance by the Center with payback through "performance contracting" and other advanced modalities																							
2.4.5 Activity: provision of guidance in the implementation of these modalities																							
<b>2.5 Output:</b> assessments of market issues pertaining to the availability, adequacy and pricing of energy efficient technology completed, as well as design of programs to improve market penetration and market transformation to such technologies																							
2.5.1 Activity: market survey to assess the availability, adequacy, and pricing of energy efficient technologies, as well as manufacturers and their main challenges in this domain																							
2.5.2 Activity: national socio-economic survey to identify mostly used energy efficient technologies, needed technologies, target customers ...																							
2.5.3 Activity: design of programs to facilitate the market penetration of energy efficient technologies																							

<u>2.5.4 Activity:</u> estimation of 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																			
<u>2.5.5 Activity:</u> investigation of possible support strategies																			
<u>2.5.6 Activity:</u> organization of a training for local manufacturers on identifies most used energy efficient technologies																			
<u>2.5.7 Activity:</u> assessment of the benefits and costs of changing customs duty classification for equipment that are likely to have largest impact on energy efficiency in Lebanon																			
<b>2.6 Output:</b> comprehensive surveys and measurements covering various sectors assessing energy demand by sector, industry, and technology and energy/fuel type completed																			
<u>2.6.1 Activity:</u> design DSM assessment with assistance of international expert																			
<u>2.6.2 Activity:</u> conduct DSM assessment																			
<u>2.6.3 Activity:</u> detailed report of results and development of a database																			
<u>2.6.4 Activity:</u> integrated planning exercises within the government, based on the results of the DSM assessment																			
<u>2.6.5 Activity:</u> training for staff of MoHER and EDL on DSM and load research																			
<u>2.6.6 Activity:</u> procurement and installation of a DSM model as well as training of staff on use of the model																			
<b>3. IMMEDIATE OBJECTIVE:</b> to assist the GOL in strengthening its policy aspects and increasing public awareness pertaining to energy planning and conservation issues																			
<b>3.1 Output:</b> increased awareness and understanding pertaining to energy efficiency at the demand side level targeting the consumer and the policy makers																			
<u>3.1.1 Activity:</u> development of information dissemination plan																			
<u>3.1.2 Activity:</u> development of information materials																			
<u>3.1.3 Activity:</u> implementation of planed activities																			
<u>3.1.4 Activity:</u> promotion of engineering and services function of the center																			
<u>3.1.5 Activity:</u> evaluation of the impact of the residential information program																			
<u>3.1.6 Activity:</u> preparation of promotional material to support customs duty reduction																			
<b>3.2 Output:</b> energy policy assessed, policy options for adoption by the GOL submitted																			
<u>3.2.1 Activity:</u> assessment of existing national policies, legislation and regulations																			
<u>3.2.2 Activity:</u> development of a list of priority issues to sustain the Energy Center																			
<u>3.2.3 Activity:</u> follow-up of the official adoption by the Government of Lebanon of the proposed policies																			
<b>3.3 Output:</b> a comprehensive Integrated Resources Planning exercise undertaken to ascertain the optimum resources mix that would ensure a high quality of energy supply to all users in Lebanon																			
<u>3.3.1 Activity:</u> undertaking of an Integrated Resource Planning exercise in close coordination with all concerned parties																			
<u>3.3.2 Activity:</u> development of energy sector conservation plans using results of the extensive national consultation process of the IRP																			
<u>3.3.3 Activity:</u> proposition of several scenarios of these plans for the adoption by the government decision-makers																			

<b>3.4 Output:</b> legal and institutional reform studied, and proposals of regulatory measures to facilitate and promote end-use energy conservation in all sectors of the economy developed																			
<u>3.4.1 Activity:</u> reviewing of current organizational structure of the MoHER and EDL and proposition of several options to incorporate the long-term viability of the Energy analysis and planning function of the Center			█																
<u>3.4.2 Activity:</u> proposition of institutional structure including the administrative and legal measures required																		█	
<u>3.4.3 Activity:</u> identification and provision of required capacity building input required for the functioning of the analysis and planning department of the Center																			█
<u>3.4.4 Activity:</u> ensuring he full absorption of the other functions of the center by the private sector																			
<b>3.5 Output:</b> capacity-building activities for general audiences throughout the country implemented																			
<u>3.5.1 Activity:</u> assessment of training needs for various targets in the industrial and commercial sectors												█							
<u>3.5.2 Activity:</u> development of a priority list of training courses and an approximate schedule for the courses																			
<u>3.5.3 Activity:</u> conducting the technical training courses																			
<u>3.5.4 Activity:</u> preparation of training evaluation program																			
<u>3.5.5 Activity:</u> identification of study tours at the regional and international levels targeting the concerned government and non-government institutions																			



**ANNEX B  
TERMS OF REFERENCE**

**PROJECT MANAGER**

**Overall responsibilities**

The Project Manager is the executive director of the project and bears primary responsibility for the successful execution of all project activities. This person is expected to serve full time and will be fully committed to the day-to-day management of this project. He/she 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.

**Technical responsibilities**

- Provide overall technical leadership for project activities.
- In collaboration with the Ministry of Hydraulic and Electric Resources, 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 Annual Project Work Plans and budget;
- Keeping financial and monitoring records for required project reporting;
- Preparing Annual Performance Reviews, Project Implementation Reviews, and other necessary reports for submission to the UNDP Country Office and to 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.
- Liaise with organisations participating in the project and ongoing programmes relevant to the project;
- Calling for the Project Co-ordinating 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 executing new energy strategies and mobilizing collaborative efforts that involve energy end users and professionals who can influence energy use.

- Minimum of 10 years experience in energy utilization, 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 electricity or thermal energy industries, with knowledge of sector planning and operations activities.
- Proven abilities to bridge communities of electric and oil/gas utilities, academics from technical fields, senior government officials, industry, finance, and international donors.
- Demonstrated effectiveness in working on or managing international grant projects of one-half million dollars or more.

### **National Project Coordinating Committee**

The Project Co-ordination Committee will include a number of representatives from different concerned stakeholder groups namely:

- The Council for development and Reconstruction
- The Ministry of hydraulic and Electric Resources
- Electricite du Liban
- Ministry of Environment
- Industry Institute
- ALIND
- ALME
- Relevant Academic Institutions
- Relevant Project Representatives (FFEM / EU)

The main responsibilities of this committee will entail the following:

- ensuring co-ordination between relevant proponents and stakeholders on project activities;
- providing advise on policy issues;
- Review and comment on each year's proposed work plan and budget and providing recommendation and advise pertaining to project implementation;
- 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 PTD should address or resolve.
- Provide strategic advice and leadership on actions that must be taken by the Ministry of Hydraulic and Electric Resources to ensure success of the project and implementation of all initiatives.

## Administrative/executive Assistant

### **Job Description**

The administrative/executive 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 and communications 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.

## **ENGINEERING SERVICES COORDINATOR**

### **Job Description**

Under the supervision of the project manager, the engineering services coordinator will follow up the auditing, technical and engineering services of the center and shall be responsible for the execution of all audits and the provision of technical information under this Project. He/she shall carry out the following activities.

### Technical Responsibilities:

- Coordinate technical matters of importance to the provision of business advisory services. Contract thermal and electrical audits including the setting up of specifications and follow up the implementation process.
- Oversee and attend an initial one-month auditor training class and annual follow-up classes; evaluate learning and performance of other members of the ATS Work Group.
- Supervise the delivery of electrical audits and the performance of thermal audits by outside contractors
- Compile the quantitative and statistical analysis of audit data and oversee and use this analysis for the development of energy saving recommendations for audit recipient's facilities
- Coordinate and provide data to information specialist
- Direct preparation of brief, executive-level audit reports summarizing findings, conclusions, and recommendations; oversees preparation of supporting documentation
- Follow-up with audited customers to evaluate the success of the audit program and to urge customers to install additional measures

### Qualifications

- Advanced degree in electrical engineering or equivalent technical specialty
- Ten years of experience, especially in working with electrical grid networks and/or energy-use technologies. Prior experience in auditing or closely related activities required. Knowledge of key energy efficiency issues in Lebanon
- Excellent oral/written communications skills in English and Arabic
- Good organizational and managerial skills are required.

## **MARKETING SERVICES COORDINATOR**

### **Job description**

Under the supervision of the project manager, the marketing services co-ordinator will be responsible for the analysis of the energy efficient technologies found in the Lebanese market and design programs to facilitate the penetration of energy efficient technologies into the market. He/she shall carry out the following activities.

### **Technical Responsibilities**

- Develop Terms of Reference for a subcontract to undertake a survey of the range of efficiencies of the electrical appliances found in the Lebanese market to determine the range of efficiencies in each size class of the appliance, and present the information in a report.
- Based on the analysis of the survey results, 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...
- Collaborate with the relevant staff of the project for the elaboration of information campaigns, focused training, elaboration of standards and labels, design and dissemination of leasing arrangements...
- Is responsible for the regular reporting on market issues related to the services provided by the center
- Design programs to facilitate the market penetration of energy efficient technologies covering the different regions, the promotion of small and medium enterprises, local customs measures for imported products, possible financing modalities, etc.

### **Qualifications**

- Advanced degree in marketing
- Minimum of 10 years experience in market analysis, especially in the field of energy efficient technologies
- Excellent skills in communication in both English and Arabic

## **FINANCE OPERATIONS COORDINATOR**

### **Job description**

Under the supervision of the Project Manager, and in close co-ordination with the market services co-ordinator, the finance operations co-ordinator will carry out the following activities.

### **Technical responsibilities**

- Develop monthly financial report and progress reports comparing actual costs and revenues relative to the Center business plan.
- Develop annual financial statement and progress report summarizing the finances of the Center for the year and accomplishments to date.
- Collaborate with the Market services coordinator to assess the existing possible financing mechanism 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 and package a leasing arrangement for identified energy efficiency technologies.
- Follow up the implementation of the dedicated financing by the Center with payback through “performance contracting” and other advanced modalities.
- Monitoring the performance of the financing programs made under this Project.

### **Qualifications**

- Advanced degree in finance, economics, or its equivalent required; university training or work experience in electrical engineering or equivalent technical specialty desirable.
- 5– 10 years of business, finance, or related experience, preferably in the Lebanese electric utility industry
- Excellent oral/written communicative skills in English and Arabic
- Knowledge of key energy efficiency issues in Lebanon desirable

## **TRAINING COORDINATOR**

### **Job description**

Under the supervision of the Project Manager and in close collaboration with the information specialist and the engineering services co-ordinator, the training co-ordinator will be responsible for the organisation of all training sessions throughout the duration of the Project, and the co-ordination of seminars and training programs. He/she shall be responsible for the following activities:

### **Technical Responsibilities:**

- Collaborate with all the departments of the energy Conservation Center to organize all the identified trainings that will be conducted as part of the project.
- Follow up with all contracted parties for the timely and satisfactory submission of training reports and outcomes.
- Assess the training needs for various targets in the industrial and commercial sectors, government and public
- Based on this assessment, develop a training plan – as part of the project yearly workplan- to be discussed by all concerned and ensure its implementation
- Prepare regular training reports that will become part of the progress report submitted by the Project Manager to the different concerned parties.
- Identify and ensure the procurement of necessary training equipment and material that will use for the different trainings

### **Qualifications**

- Advanced degree in professional or technical education and communication
- Prior experience in organizing training courses
- Knowledge of key energy efficiency issues in Lebanon
- Excellent oral and written communication skills in English and Arabic



## **STANDARDS EXPERT**

### **Job description**

Under the supervision of the Project Manager, the standards expert will co-ordinate with LIBNOR the parties involved to set the efficiency standards and design appropriate labels. He/she will be technically co-ordinating with an international standards expert and shall carry out the following activities.

### **Technical Responsibilities:**

- Coordinate with LIBNOR and the international equipment standards consultant to identify the first appliances for which the minimum efficiency standards and labeling requirements will be develop, and then set such standards.
- Work with LIBNOR to set a minimum efficiency standard for each size class of appliance.
- Develop labels for the appliances conveying all relevant information
- Work with the market services consultant to develop a consumer information program according to the need to educate consumers both of the new standards and well as how to read and use the new label.

### **Qualifications:**

- Advanced degree in electrical engineering,
- Specialization or a minimum of 10 years experience in standards requirements.
- Excellent oral and written communication skills in English and Arabic

## **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 energy efficiency including those to market development and penetration of efficient equipment.
- Review all relevant laws and decrees to determine whether they properly address energy efficiency and propose amendments to those laws where efficiency can be incorporated.
- In close collaboration with the project manager and the Technical backstopping agency, identify an international legal expert to assist with the review of the proposed laws, policies and amendments and promulgation along the international trends.
- In collaboration with the Standards experts, assess the enforcement requirements for the label and standards program for the appliances found in the Lebanese market.
- Assist in the customs policy formulation and enforcement.
- Assist in the national consultations meetings especially for the review of organizational structure of the MoHER and EDL and discuss the feasibility of the proposed options for the operation of the Energy analysis and planning function of the Energy Conservation Center.
- Propose, along with the reform strategy of the Office of Minister of State for Administrative reform, the legal requirements concerning the institutional structure of the Center.

### **Qualifications:**

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

## **SOCIO-ECONOMIST**

### **Job description**

Under the supervision of the Project Manager, 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.
- Draft the terms of reference for the socioeconomic survey and follow-up all the implementation steps
- Coordinate with the information specialist for the dissemination of public information taking into consideration the different target groups.
- Work with the market services coordinator to perform the economic analysis that will help select equipment that is likely to have the greatest impact on energy efficiency in Lebanon.
- Assess the economic challenges pertaining to the availability, adequacy and pricing of energy efficient technologies found in the market.

### **Qualifications:**

- Advanced degree in social and economic sciences
- At least five years experience in performing quantitative and statistical analysis
- Strong quantitative and economic skills
- Fluency in written and spoken English and Arabic

## **ELECTRICAL ENGINEER**

### **Job description**

Under the direct supervision of the Engineering Services Co-ordinator, the electrical engineers carry out the following activities:

### **Technical Responsibilities:**

- Assist the Engineering services coordinator in the development of an audit program for MoHER and EDL's direct service customers.
- Follow-up the implementation of the audit plan
- Identify the local ESCOs and auditing firms in Lebanon that should benefit from the audit training program as well as the implementation of the audit plan
- Follow-up with audited customers to identify recommended measures installed and not installed, assess customer's reasons for installing and not installing measures, and encourage customers to install additional measures.
- Undertake site visits to assess the program experience to identify ways that future audits might be improved and provide information needed for follow-up and auditor training.
- Assist in the development of an ESCO database at the ministry of Hydraulic and Electric Resources.
- Coordinate with the information specialist for the dissemination of appropriate information to the ESCOs and energy firms target groups
- Identify the specifications of the auditing equipment that will be procured by the project.

### **Qualifications:**

- University degree in electrical engineering
- Five years experience of Lebanese electric utility industry, especially in working with electrical grid networks and/or energy-use technologies
- Good oral and written communication skills in English and Arabic
- Knowledge of key energy and electrical utility issues in Lebanon.

## INFORMATION SPECIALIST

### **Job Description**

Under the supervision of the project manager, the information specialist will organize, synthesize, and present energy efficiency information for external dissemination to equipment manufacturing and, government representatives, and public at large to secure understanding of and support for energy efficient equipment and buildings.

### Responsibilities

- Collaborate with all project technical members to prepare briefing packages and background materials on the energy center work.
- Advise on effective communication channels and mechanisms for information dissemination that can reach target audiences among manufacturers, industries, relevant professionals, and consumer groups.
- Advise on and assist in development of educational materials on energy efficiency to be used in training or other education and promotion activities.
- Develop and distribute information and promotional materials needed to promote understanding and adoption of codes and standards.
- Prepare the terms of reference for subcontractors to undertake the public awareness pertaining to energy conservation, design and implement a national awareness campaign, undertake a KAP (knowledge, attitude, performance) study following the campaign.
- Identify and assess optimal communication channels and information distribution mechanisms and develop an energy efficiency information strategy
- Support the information and educational activities of national and international consultants in the conduct of their work, including compilation of local materials and packaging of materials prepared or provided by consultants.

### **Qualifications**

- Advanced degree in professional or technical education and communication
- Five years of professional experience in professional or technical education
- Proven ability to design and administer successful professional education activities
- Excellent communication skills
- Strong written and spoken language skills in Arabic and English
- Demonstrated, effective organizational skills
- Knowledge of energy efficiency issues desirable

## **INTERNATIONAL CONSULTANTS**

### **INTERNATIONAL INTEGRATED RESOURCE PLANNING EXPERT**

#### **Level of Effort: 6 Months**

The International Integrated Resource Planning Expert shall have the following responsibilities:

- Assisting the Project Manager to prepare an initial long-term resource plan in which energy efficiency resources provide a contribution towards meeting Lebanon's long-term energy needs
- Assisting the project manger in the preparation a special resource planning study (e.g. the effects of reducing subsidies on the level of energy efficiency in Lebanon, or the role of energy efficiency in reducing Lebanon's long-term GHG emissions) to can influence Lebanon's policy
- Advising the Project Manager on the key issues to consider in performing further integrated resource planning studies that consider properly the role of energy efficiency
- Advising the Project Manger on data sets and information needed to properly consider the benefits of energy efficient resources relative to supply side resources

#### **Desired Qualifications**

- Advanced degree in engineering or technical discipline, and/or in business and finance
- Ten years of experience in the international energy efficiency industry with significant experience performing electricity integrated resource planning
- Strong oral and written communication skills required
- Proven record of international consulting excellence

## **INTERNATIONAL ESCO EXPERT**

### **Level of Effort: 2 Months**

These international ESCO Consultants shall have the following responsibilities:

- Participate in one or both of the first two seminars, by delivering presentations on specific energy efficiency business issues, including market analysis, marketing and sales, performance contracting, business strategy, and staffing. The content of these presentations need to show how new energy service companies can successfully launch new business and expand these businesses over time by offering new services and creating value for customers.
- Assist the engineering services coordinator by providing guidance to help specific Lebanese companies solve specific problems.
- Provide other information on the experience of international ESCOs to on an as needed basis 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 industry, either as an ESCO or as a consultant to the ESCO industry
- Strong oral and written communication skills required; prior experience addressing large groups in international settings highly desirable
- Knowledge of key energy efficiency issues in Lebanon desirable

## **INTERNATIONAL EQUIPMENT STANDARDS CONSULTANT**

### **Job Description**

The primary responsibility of the consultant will be to provide technical and implementation knowledge about energy efficiency technologies, equipment standards, and standards implementation strategies in use by other countries.

### **Technical Responsibilities**

- Advise on the typical energy performance of common and high-efficiency energy-consuming equipment or appliances manufactured and used outside Lebanon
- Collaborate with national energy efficiency equipment specialist to compare equipment in Lebanese market with high efficiency international models to identify most promising opportunities for improving energy efficiency.
- Advise the Project Manager and the engineering services coordinator on the analysis of data on equipment and appliances in Lebanon, to assess magnitude of energy efficiency potential if new models were more energy efficient.
- Offer guidance to the national standards expert in the selection of an initial “short list” of the most promising opportunities for applying energy standards to improve equipment efficiency.
- Provide information and data on international experience with manufacturer costs incurred for technology R&D or licenses for energy efficient technology, production re-tooling, and manufacture of efficient models. Provide international experience and data regarding manufacturer response and any price increases for compliance with energy efficiency equipment standards.
- Provide information, advice, and data regarding implementation and enforcement techniques used in various countries for equipment and appliance energy standards.
- Supply information on international experience with testing protocols and facilities to verify compliance with energy standards.

### **Qualifications**

- High university degree in electrical or mechanical engineering or equivalent technical specialty;
- Minimum of ten years of experience with equipment design, performance, and energy utilization, preferably in more than one country
- Demonstrated knowledge of international equipment manufacturing industry and technology design issues

Proven professional reputation via published papers or consulting assignments on subject of energy efficiency and design in equipment or appliances



## **INTERNATIONAL LEGAL EXPERT**

### **Terms of Reference**

Under the supervision of the project manager and in close collaboration with the national legal expert, the International Legal Expert will be responsible for the following tasks:

- Review the compiled information on existing laws and regulations and their state of enforcement
- Support the national legal expert in the formulation of the energy conservation policies and laws
- Provide the necessary technical international expertise for the formulation of the Lebanese relevant laws.

### **Qualifications**

The international Legal Expert will be a lawyer with at least ten years experience in the utility industry, with previous assignments conducted in at least two different developing nations, and have prepared and negotiated policies and laws pertaining to energy efficiency.

## **DSM INTERNATIONAL EXPERT**

### **Job Description**

Under the supervision of the Project Manager, the Demand Side International Expert will collaborate with the local Market Services Coordinator and the Engineering Services Coordinator to undertake the following activities:

### **Technical Responsibilities:**

- Assist in the design the DSM assessment covering energy demand by sector, industry, technology and energy/fuel type along the international scales
- Develop, together with concerned staff, the terms of reference of the contracted party that will perform the DSM assessment as well as the market assessment survey.
- Review the results of the DSM and provide operational recommendations for the interventions by the energy Center and MoHER
- Assist in the design and analysis of the comprehensive surveys and measurements covering various sectors to assess the energy demand
- Assist in the preparations for the DSM as well as its implementation.
- Advise on the procurement of a DSM model such as EPRI's DSManager, and assist the training coordinator in designing a training course on the use of the model for the staff of the Center.

### **Qualifications:**

- Advanced degree in engineering or technical discipline
- At least 10 years experience in the Energy Efficiency industry
- Expertise and knowledge of key energy efficiency issues in the region/ preferably Lebanon
- Training experience is required
- Strong oral and written communication skills are required

## Annex C

### INCREMENTAL COST

#### 1. Broad Development Goals

After the end of 17 years of civil war, the Government of Lebanon launched the Power Sector Master Plan for the years 1992-2002 to rehabilitate the electricity generation, transmission, and distribution to meet the increasing electricity demand with the recovering economy. The power generating capacity has increased from 600 MW in 1992, to a current 1400 MW in 1998. However, given the emergency nature of this plan, the intricate issues of end-use energy demand management and conservation were not addressed. If the current trend of rapid growth rate in energy demand continues (4-6% annually), demand for power is expected to exceed supply already in the year 2002, despite heavy investments in new generating facilities.

The proposed project reflects the action needed to develop a comprehensive energy planning policy and to establish a sustainable mechanism to manage implementation of end use efficiency and conservation measures in various sectors in Lebanon, by removing the existing barriers in this field.

#### 2. Baseline

Recently, the UNFCCC Enabling Activity Project in Lebanon has finalised its mitigation work to present Lebanon's first national communication to the UNFCCC in March 1999. According to the inventory report of this project, the electricity sector accounts for 31% of the fuel consumption in the country. For a country which imports 97% of its energy requirements of fossil fuel and with the rapid growth rate in energy demand (4-6% annually), end-use energy conservation is emerging as a widely accepted viable alternative to supply-side expansion.

Increased Government awareness of demand issues prompted the initiation of a number of activities aiming at establishing an effective and reliable basis for the assessment of electricity demand. Foremost, is a *National GIS mapping* project of the transmission and distribution network initiated in 1995. The first phase of this project (total \$3million) covered the central Beirut area; the project is expected to end with a complete national map by the year 2000. Furthermore, a project for the establishment of a *National Control Centre* which will collect effective and reliable data on electricity transmission and distribution for the assessment electricity-demand and for network load management was also launched. This US\$ 26 million initiative is expected to be implemented as of mid 1999, and to be fully operational in early 2002. Moreover, the *Billing and Revenue Modernisation Study* (total US\$ 340,000) will assist the GoL to identify mechanisms for improved bill collection. This project has started in December 1998 and is expected to be completed in August 1999.

Although end-use energy conservation is emerging as a widely accepted viable alternative to supply side expansion, Lebanon finds itself today without the proper framework to address end-use energy efficiency and conservation issues in a strategic and comprehensive manner, which this proposal aims to support.

As an indication of its efforts to ensure the existence of long-term national energy planning capabilities as well as to address the intricate issues of end-use energy demand management and conservation, the GoL is committing US\$ 1.0 to cover baseline costs of the proposed project.

Moreover, the three and a half year energy module of the EU-IPP programme budgeted at US\$ 3 million which aims to address energy issues in the whole energy cycle includes a component for demand-side. It has been agreed that at least 20% of the total cost the EU IPP programme (equivalent to not less than \$500,000) will cover demand-side management and will thus be considered as co-financing to the current initiative.

### 3. Global Environment Objective

The global environmental objective pursued in this project is to reduce the growth rate of GHG emissions resulting from the combustion of carbon based fuels through reduction of the consumption of electric power in various sectors such as power, industry, residential, etc.

For this, the project aims at the removal of major barriers hindering the adoption of energy efficiency and conservation measures. In doing so, the project will initiate a mechanism that will contribute to transforming the energy-demand market into one that is much more energy-efficiency oriented and one where the cost of adopting a more energy efficient approach is economically feasible. As such the project is in line with GEF Operational Programme No. 5 “Removal of Barriers to Energy Efficiency and Energy Conservation” of the GEF Operational Strategy, and incorporates all pertinent considerations stemming from this programme.

### 4. GEF Alternative

As described in the project brief, the proposed activities focus on removal of barriers that hinder formulation, adoption and implementation of end-use energy efficiency policies.

As the existing national initiatives do not endeavor the reinforcement of all sustainable aspects of the energy sector on a long-term basis, the GEF and UNDP funding will enable the Government of Lebanon to remove the existing barriers at the level of information, awareness, economic and institutional capacity presented in the project brief. Moreover, the proposed project will strengthen capacity of the Government of Lebanon for the sound energy planning through the establishment of a specialized institution within MOHER.

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

There are significant global benefits to be achieved as a result of the implementation of this project. Once the project has removed the said barriers, the adoption of end-use energy efficiency and conservation measures in the energy sector could potentially lead to average annual savings in CO<sub>2</sub> emissions of 0.97-1.2 %. In the years 2000 - 2020, such savings could lead to a total reduction of approximately 12 million tons of CO<sub>2</sub> emissions.

## **5. Domestic Benefits**

Domestic benefits are measured as the resulting increased levels of awareness and capacity as well as the development of a local market for energy efficiency and conservation services in various sectors. Identification of energy consumption reduction potentials in various sectors plus verification and dissemination of cost-effective technologies in the Lebanese context will result in increased level of investments in energy efficiency interventions. The adoption of regulatory measures for end-energy efficiency will further facilitate such investments.

The implementation of a comprehensive energy conservation and efficiency programme will allow the GoL to continue to meet energy demand in the year 2002. Moreover, the significant fuel savings which will be made will result in major economic, environmental and social benefits. As such, significant improvements in the quality of the local environment and its positive implications on the health of the population will be attained.

## **6. Incremental Cost Matrix**

The Incremental Cost Matrix for the proposed project is shown in the following pages:

## **7. Agreement**

Agreement regarding the items to be included in the final project document shall be done through a local project appraisal committee meeting. The PAC meeting will be undertaken to consult all relevant proponents as regards the final framework for items to be financed and project implementation arrangements.

## Incremental Cost Matrix

<b>Baseline</b>	<b>Alternative</b>	<b>Increment</b>
<p><i>Business as Usual</i></p> <ol style="list-style-type: none"> <li>1. On-going initiatives in demand side will not allow development of institutional focus and capability for end-use energy efficiency and conservation.</li> <li>2. Barriers that hinder the formulation, adoption, and implementation of end-use energy efficiency will not be removed.</li> <li>3. Minimum achievements in end-use energy efficiency and conservation.</li> </ol>	<p><i>Proposed Situation</i></p> <ol style="list-style-type: none"> <li>1. A multi-purpose Lebanese Centre for Energy Conservation and Planning as a sustainable public and private institutional focus will be established.</li> <li>2. Engineering services such as energy audits and technical advice will be provided to both public and private sectors.</li> <li>3. Cost-effectiveness of energy conservation options and technologies for various sectors demonstrated.</li> <li>4. An innovative financing system for energy services.</li> <li>5. An extensive awareness and promotion campaign</li> <li>6. A comprehensive capacity building programme to ensure sustainability of Centre</li> </ol>	<p><i>New Features</i></p> <p>The project will remove main barriers presently existing to the adoption and implementation of end-use energy efficiency conservation measures at maximum levels.</p>
<p><i>Domestic Benefits</i></p> <ol style="list-style-type: none"> <li>1. MoHER with the support of EU and other on-going initiatives will achieve limited improvements related to end use energy efficiency.</li> <li>2. Very limited energy demand reduction and fuel savings will result;</li> <li>3. GoL will not be able to meet increasing demand for power in the 2002.</li> <li>4. Local environmental, economic, social benefits will be very limited;</li> </ol>	<p><i>Domestic Benefits</i></p> <ol style="list-style-type: none"> <li>1. An independent and flexible institutional set up for energy conservation in place.</li> <li>2. Energy efficiency policy options and regulations in place.</li> <li>3. Adoption of maximum regulatory measures for end-use energy efficiency.</li> <li>4. Local market for energy efficiency and conservation services is developed.</li> <li>5. Local capacity is created and awareness raised on issues pertaining to energy efficiency and conservation.</li> <li>6. GoL will be able to meet increasing demand for power in the 2002.</li> <li>7. Significant fuel savings will result in significant local environmental, economic, and social benefits.</li> </ol>	<p><i>Domestic Benefits</i></p> <p>Investment and adoption of economically feasible end-use energy efficiency measures and conservation and availability of technologies and services.</p>

<p style="text-align: center;"><i>Global Benefits</i></p> <p>1. Negligible global benefits (in terms of GHG emission reduction) corresponding to energy savings achieved through limited Lebanese energy conservation efforts</p>	<p style="text-align: center;"><i>Global Benefits</i></p> <p>1. Annual reduction of 0.97-1.2 % in CO2 emissions resulting in approximately 12 million tons of CO2 emissions savings between 2000-2020.</p> <p>2. The current proposal will enhance lessons learned with processes and applications of energy efficiency and conservation in developing country settings.</p> <p>3. Networking and exchange of experience at the level of similar GEF initiatives in the subregion will be possible.</p>	<p style="text-align: center;"><i>Global Benefits</i></p> <p>1. Significant GHG emission reductions in Lebanon</p> <p>2. Replication of Lebanese experience in other developing countries.</p>
<p style="text-align: center;"><i>Baseline Cost</i></p> <p>1. MoHER: US \$ 1.0 million  2. EU IPP : US \$ 0.5 million  Total : US \$ 1.5million</p>	<p style="text-align: center;"><b>Alternative Cost</b></p> <p style="text-align: center;">US \$ 5.4 million</p>	<p style="text-align: center;"><i>Incremental Cost</i></p> <p>1.GEF : US \$ 3.4 million  2.UNDP: US \$ 0.5 million  Total: US \$ 3.9 million</p>

**ANNEX D**  
**LOGICAL FRAMEWORK**

<b>Intervention Strategy</b>	<b>Objectively verifiable Indicators</b>	<b>Means of Verification</b>	<b>Assumption</b>
<p><i>Development Objective</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Reinforcing the national institutional capacity for the identification and removal of barriers pertaining to energy efficiency and sound energy planning.</li> <li><input type="checkbox"/> Curbing GHG emissions resulting from inefficient end-use energy consumption in all sectors of the economy.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> By 2003, The GoL will have a specialized institutional set up for Energy Conservation &amp; Planning.</li> <li><input type="checkbox"/> The Annual CO2 emissions savings will be 0.97-1.2 %</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Existence &amp; operation of the institutional set-up</li> <li><input type="checkbox"/> Economic tools for promoting energy efficiency formulated and enforced</li> <li><input type="checkbox"/> Yearly energy consumption bulletins</li> <li><input type="checkbox"/> Customer load research</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Necessary institutional &amp; policy reforms are in line with national priorities</li> <li><input type="checkbox"/> Attraction of additional financing to sustain energy efficiency programs</li> <li><input type="checkbox"/> Improvements in bill collection materialising</li> </ul>
<p><i>Immediate Objectives</i></p> <p>The project will assist the GoL in establishing a Lebanese Center for Energy Conservation and Planning whose main functions would be:</p> <ul style="list-style-type: none"> <li>- Providing engineering &amp; energy marketing services</li> <li>- Strengthening policy aspects and increase public awareness pertaining to energy conservation issues</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Adequate energy policies embedded in national planning cycles</li> <li><input type="checkbox"/> Market forces activated for cost effective energy savings and market demand established</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> MoHER support for centre until its privatisation</li> <li><input type="checkbox"/> Energy conservation plans adopted by private &amp; public institutions</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Government will endorse the centre as a public autonomous set up,</li> <li><input type="checkbox"/> Active private sector in Lebanon will produce &amp; market energy efficient technologies,</li> <li><input type="checkbox"/> Active participation of the utility (EDL) in energy conservation</li> </ul>



<p><i>Outputs</i></p> <ol style="list-style-type: none"> <li>1. 300-400 energy audits of industrial plants and buildings</li> <li>2. Specific financing mechanisms to incentivise investments in energy efficiency interventions &amp; technologies</li> <li>3. Assessment of the Demand Side Management potential and development of strategies (technical, policy and financial) targeting specific end-use sectors and technologies</li> <li>4. Policy recommendations for legislative &amp; other actions</li> <li>5. Public awareness regarding energy efficiency</li> <li>6. Energy efficiency codes &amp; norms for equipment</li> <li>7. Human capacities to identify energy savings opportunities</li> <li>8. Increased market share of efficient equipment</li> <li>9. Consumer &amp; policy maker understanding and support for energy conservation</li> <li>10. National energy conservation plan institutionalised</li> </ol>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Application of audits to address common energy efficiency opportunities</li> <li><input type="checkbox"/> Adoption of updated &amp; new policy options</li> <li><input type="checkbox"/> Increased public awareness at the consumer &amp; decision making levels</li> <li><input type="checkbox"/> Availability and use of energy efficient equipment</li> <li><input type="checkbox"/> Codes &amp; standards for energy efficient equipment developed and promoted</li> <li><input type="checkbox"/> Strengthening institutional &amp; human capacities for introducing technical, financial and policy measures</li> <li><input type="checkbox"/> Appropriate financing and marketing modalities designed and made available</li> <li><input type="checkbox"/> Centre institutionalised by law</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Records for auditing system obtained and repeated in specified sectors</li> <li><input type="checkbox"/> Assessment and adoption of legislation, regulations and economic tools in place</li> <li><input type="checkbox"/> Knowledge, Attitude &amp; Practice (KAP) studies on end use energy efficiency</li> <li><input type="checkbox"/> Market surveys to assess 1. Availability, prices &amp; percentage of use of energy efficient equipment 2. Trends in consumer load</li> <li><input type="checkbox"/> Budget allocation to centre</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> High level of participation to secure a "horizontal technologies" approach <ul style="list-style-type: none"> <li><input type="checkbox"/> Involvement of the private sector (commercial banks, ESCO...) to provide financing modalities</li> <li><input type="checkbox"/> Privatisation of electricity sector implemented</li> <li><input type="checkbox"/> Government policy for energy efficiency fine-tuned &amp; subsidies on energy gradually removed</li> <li><input type="checkbox"/> Regulations related to energy conservation and efficiency approved</li> </ul> </li> </ul>
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<i>Activities</i>	<u><i>Inputs</i></u>		<i>Preconditions</i>
<ol style="list-style-type: none"> <li>1. The development &amp; implementation of an energy auditing program</li> <li>2. Prepare action of feasibility studies on the cost benefit analysis of targeted measures and overall strategies to be adopted by key heavy consumers</li> <li>3. Provision of technical advice and project design services to public &amp; private interventions for energy conservation.</li> <li>4. Design and supply of dedicated energy efficiency and conservation financing modalities</li> <li>5. Market assessment and design of programs to improve market penetration and transformation to energy efficiency technologies</li> <li>6. Conducting surveys and measurements to asses energy demand, consumer load nature and demand conservation resource</li> <li>7. Launching of awareness campaigns and information programs on energy</li> <li>8. Assessment of the existing policies, legislation and regulations to identify policy options and recommend their adoption by the Government</li> <li>9. Integrated Resource Planning will be undertaken and used as a basis for the development of energy sector conservation plans to be proposed &amp; adopted by the Government</li> </ol>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Funds and expertise for engineering and services function of the centre</li> <li><input type="checkbox"/> Funds and expertise for policy changes, development of norms, financial instruments and technical specifications for labelling processes</li> <li><input type="checkbox"/> Funds and expertise for information and awareness campaign</li> <li><input type="checkbox"/> Funds and expertise for Integrated Resource Planning</li> <li><input type="checkbox"/> Pioneering and co-operative end-users for demonstrating success stories at the outset of the program</li> </ul>		<ul style="list-style-type: none"> <li><input type="checkbox"/> Subsidies in the electricity sector to be removed and collection improved</li> <li><input type="checkbox"/> Financial instruments are put in place to support policy changes in the energy sector</li> <li><input type="checkbox"/> Codes, norms and specifications for labelling put in place</li> </ul>

**ANNEX E**  
**CURRENT SET-UP OF THE LEBANESE ELECTRICITY SECTOR**

<i>Policy and Regulations:</i>	<b>Ministry of Hydro-Electric Resources (MoHER)</b>
<i>Transmission and distribution:</i>	<b>Electricite du Liban (EDL)</b>
<i>Power generation benefiting from EDL's transmission and distribution network:</i>	
<b>A - Public Authorities</b>	<ul style="list-style-type: none"> <li>1 - Electricite du Liban (EDL) <ul style="list-style-type: none"> <li>- Zouk &amp; Jieh: fuel-oil, 1169 MW</li> <li>- Baalbeck &amp; Tyr: diesel, 150 MW</li> <li>- Zahrani &amp; Beddawi: combined-cycle, 870 MW</li> <li>- Safa: hydro, 12 MW</li> </ul> </li> <li>2 - Office National du Litani (ONL) <ul style="list-style-type: none"> <li>- Litani: hydro, 191 MW</li> </ul> </li> </ul> <p>-----</p>
<b>B - Concessions</b>	<ul style="list-style-type: none"> <li>1 - Nahr Ibrahim: hydro, 32 MW</li> <li>2 - Bared: hydro, 17 MW</li> <li>3 - Kadisha: fuel-oil and hydro, 75 MW</li> </ul> <p>-----</p>
<b>C - Temporary</b>	<ul style="list-style-type: none"> <li>1 - Syrian supply, 50-100 MW</li> </ul>
<i>Standalone Power generation:</i>	
<b>Industries and others:</b>	(300 - 400 MW)

**ANNEX F**  
**CO2 EMISSIONS BY SECTOR AND BY FUEL TYPE**

Energy sector fuel uses and associated CO2 emissions in 1994:

<b>ENERGY SECTOR</b>	<b>FUEL TYPE</b>	<b>QUANTITY (Tons)</b>	<b>CO<sub>2</sub> EMISSIONS (Tons)</b>	<b>EMISSIONS</b>
Energy Industry (EDL)	Gas/diesel oil	48 650	154 571	3 615 049
	Fuel oil	1 124 070	3 460 190	
	Lubricants	197	288	
Manufacturing Industry & construction	Gas/diesel oil	425 424	1 351 660	2 769 327
	Fuel oil	286 944	883 291	
	LPG	21 060	62 208	
	Coking coal	180 000	467 248	
	Lubricants	102	150	
	Municipal solid waste	1 500	4 770	
Transport	Gasoline (road)	1 242 803	3 819 872	3 957 122
	Diesel oil (road)	40 906	129 967	
	Gasoline (navigation)	379	1 163	
	Diesel oil (navigation)	29	100	
	Jet kerosene	1 910	6 020	
Commercial / Institutional	Gas/diesel oil	57 677	183 252	226 319
	LPG	14 580	43 067	
Residential	Gas/diesel oil	65 449	207 945	539 614
	LPG	110 360	325 986	
	Charcoal	1 560	5 363	
	Kerosene	100	320	
Agriculture / Forestry	Gas/diesel oil	179 987	571 857	571 857
<b>TOTAL</b>				<b>11 679 288</b>

**Source: Lebanon's UNFCCC inventory report, 1997**

## Annex G

### CALCULATIONS OF GREENHOUSE GAS EMISSION SAVINGS

#### PRELIMINARY NUMBERS BASED ON INDICATIVE ASSESSMENT OF SAVINGS IN PRIORITY SECTORS

**Table 1. Potential Energy Savings in Lebanon, Base Year**

Targeted Interventions	Base-Year Consumption of End-Use in subsector (kWh /hh/year)	Potential Improved Level of Consumption (kWh/hh)	Projected Savings Per Household (kWh/hh) (Column 1-2)	Size of Sector Base-Year, GWh (LEAP input activity data)	Total Potential Energy Savings Base-Year, GWh	Total Potential CO <sub>2</sub> Savings Base Year *000t
Solar H2O in Household	2555	639	1916	1316	987	691
Lighting in Households	432	86.4	345.6	508	406	284
Lighting in Commerce				218	87	61
Industry Lighting				421	168	118
Industry-electric motors				2947	589	412

**Table 2. Total Potential Energy Savings Attributable to Project**

Targeted Interventions (same as above)	Potential Per Unit Savings, from above Table (kWh/hh/year)	Likely Penetration or Saturation, End of Project (%)	Estimated Size of Sector, End or Project, GWh	Estimated Annual Energy and CO <sub>2</sub> Savings attributable to project		Likely Penetration or Saturation, in 2020 (%)	Estimated Annual Energy & CO <sub>2</sub> Savings (end of project to 2020)		Total Energy & CO <sub>2</sub> Savings Attributable to Project (project period + subsequent period in both kWh & CO <sub>2</sub> )	
				GWh	000 t		GWh	000 t	GWh	000 t
Solar H2O in Household	1916	10	1540	66	46	34	361	253	6111	4278
Lighting in Households	345.6	10	595	27	19	34	149	104	2519	1763
Lighting in Commerce		15	255	8.8	6.2	47	49	34	824	577
Industry Lighting		15	493	16.8	12	47	94	66	1588	1112
Industry-electric motors		15	3451	63	44	47	329	230	5580	3906

Therefore, the emissions savings in 20 years is 11.6 million tons.

Footnotes apply to both tables.

1. The contribution of electric heaters to total residential demand is 22%
2. Potential savings of moving from electric water heaters to solar ones are 75%
3. The contribution of lighting to total residential demand is 8.5%
4. Potential savings of moving to efficient fluorescent ones are 80%
5. The contribution of commercial lighting to total residential demand is 3.65%
6. Potential savings of moving from ordinary fl. Lamps to more efficient ones are 40%
7. The contribution of lighting to total industrial demand is 10%
8. Potential savings of moving from ordinary fl. Lamps to more efficient ones are 40%
9. The contribution of electric motors to total industrial demand is 70%
10. Potential savings of moving to more efficient motors are 20%

## CALCULATION OF CO<sub>2</sub> EMISSIONS

### 1. INTRODUCTION

The calculation of CO<sub>2</sub> emissions from the electricity supply sector in Lebanon for the years 2000-2020 begins with an estimate of the demand, and from this foundation builds possible future scenarios using different combinations of technologies for energy demand and supply. It is essential; therefore, to start the analysis by defining a baseline scenario based on official government plans and projections. The mitigation scenarios will explore the merits of options not considered by the government to arrive at an optimal planning strategy that will lead to a generation expansion plan at minimum cost and minimum GHG emissions.

### 2. THE COMPUTER MODEL

In this analysis, the LEAP model has been used. This is essentially an energy simulation model used as a tool to determine the effects of changes in electricity supply and demand on the Lebanese electric power system in order to aid in planning for the future. Data on electricity generating units in the system, fuel prices, and the magnitude and nature of the load are entered interactively. The program determines, then, which units should be loaded at different levels of demand. For a given scenario, LEAP provides information on the degree that each of the plants is used, the amount of energy deficit (energy shortage) and information on environmental emissions as compared to the base case.

LEAP needs the following data to operate:

1. **Demand:** peak demand, load curve
2. **Power plants:** capacity, fuel type, heat rate. For hydro power, LEAP requires the yearly generation of energy.
3. **Economic data:** fuel price, operation and maintenance costs, capital costs of new plants, and the discount and inflation rates.

LEAP uses a load-duration curve to model the demand. The load curve that is used in this work is derived from 1974 EDL data. It is assumed that the load duration curve has not changed since that time because of the unchanged nature of demand.

### 3. THE BASELINE SCENARIO

The baseline scenario will provide all the necessary information on the most likely developments that are awaited in the years 2000-2020. All projections for future electricity generation, demand increase and possible government actions have been made after consultation with officials from the Lebanese electric utility (EDL) and in conformity with EDL published plan for the years 1996-2002.

The supply system projections are closely linked to already announced government policy and priorities. In particular, the already announced policy of the government on the following matters:

- commitment to full restoration of the generation, transmission and distribution networks.
- commitment to continuously increase the capacity in the future to meet the expected increase in demand.
- selection of natural gas as the future fuel for electricity generation if funding is available.

### 4. ELECTRICITY GENERATION

The Lebanese power plants can be grouped into 2 categories: Hydraulic plants and Thermal plants. Two types of fuels are currently used: fuel oil and gas oil. By 2005, an extensive move towards natural gas is anticipated. In this analysis, the generation scenarios assume that all shortages will be removed in the future. This requires an appropriate system expansion around the year 2002. The generating units to be added have been decided upon after consultation with EDL officials and in light of the fact that natural gas will not be available before 2005, and may not be sufficient to meet all demands after 2005.

## **5. ELECTRIC ENERGY DEMAND**

Lebanon's demand is divided into 2 parts:

1. Residential and commercial (including concessions, schools, hospitals and governmental buildings).
2. Industrial.

Electric energy in Lebanon is shared among the consumers as follows: 62% are consumed by the residential sector, 23% by the industrial sector and 15% for losses.

Although it is a normal practice to relate the increase in electricity demand with the economic growth of a nation, in Lebanon, such a procedure would not lead to an accurate forecast because the Lebanese economy does not rely on productive sectors like industry, but rather on attracting investment from abroad, tourism and provision of services. These sectors depend mainly on the political stability in Lebanon and the region. In this analysis, the forecast of electricity demand growth for the years 2000-2020 has been fixed at 4% per year.

Details concerning generation units as well as electric energy demand supplied to LEAP are shown in Appendices A and B.

## **6. SELECTED MITIGATION SCENARIOS**

Despite the huge rehabilitation program of the electric power sector, Lebanon has made little (if any) investments in the following areas:

- energy conservation and load management
- renewable energy
- system optimization and loss reduction

Therefore it is natural to create reasonable mitigation scenarios that address these issues. Namely,

1. demand-side management to reduce future demand by 10% and possibly by 20%.
2. energy supply mix to ensure a solar energy contribution equivalent to 5% of total capacity.
3. loss reduction from 15% (currently) to 10%.
4. extensive strategy aiming at using options 1, 2 and 3 described above.

## **7. ENVIRONMENTAL ANALYSIS**

The total and the yearly CO<sub>2</sub> emissions resulting from the baseline scenario for the years 2000-2020 are given in Table 1 below.



**Table 1** Baseline scenario total and yearly CO<sub>2</sub> emissions for 2000-2020,

Demand growth rate	4%
Total CO <sub>2</sub> emission, Gg	286400
Average CO <sub>2</sub> emission, Gg/year	14300

The average yearly CO<sub>2</sub> emission reductions for 2000-2020, resulting from each of the mitigation scenarios under the 4% demand growth rates are given in Table 2.

**Table 2** Selected mitigation scenarios average yearly CO<sub>2</sub> emission reduction for 2000-2020 as compared with the baseline scenario, (Gg)

Scenario ↓	Growth rate ⇒	4%
#1. 5% capacity from solar		1096
#2. Loss reduction from 15% to 10%		852
#3. Load decrease by 10%		790
#4. Load decrease by 20%		1420

Table 3 shows the percentages of average yearly CO<sub>2</sub> emission reduction for the years 2000-2020 for the various mitigation scenarios as compared with the baseline scenario, (%)

**Table 3** Mitigation scenarios percentage yearly CO<sub>2</sub> emission reduction for the years 2000-2020 as compared with the baseline scenario, (%)

Years ⇒		2000-2020
Scenario ↓	Growth rate ⇒	4%
#1. 5% capacity from solar		0.4
#2. Loss reduction from 15% to 12%.		0.3
#3. Load decrease by 10%		0.27
#4. Load decrease by 20%		0.5
#5. Scenarios 1,2 and 3.		0.97
#6. Scenarios 1,2 and 4.		1.2

## 8. CONCLUSION

Although the mitigation scenarios presented above are very conservative, it can be concluded that the application of a demand-side management program supported by an energy loss reduction policy and reasonable solar (renewable) energy penetration can lead to **CO<sub>2</sub> emission reductions as follows:**

**0.97% to 1.2%** per year under the assumed energy demand growth rate of 4%.

**Appendix A. Generation characteristics for the baseline scenario. 2000-2020**

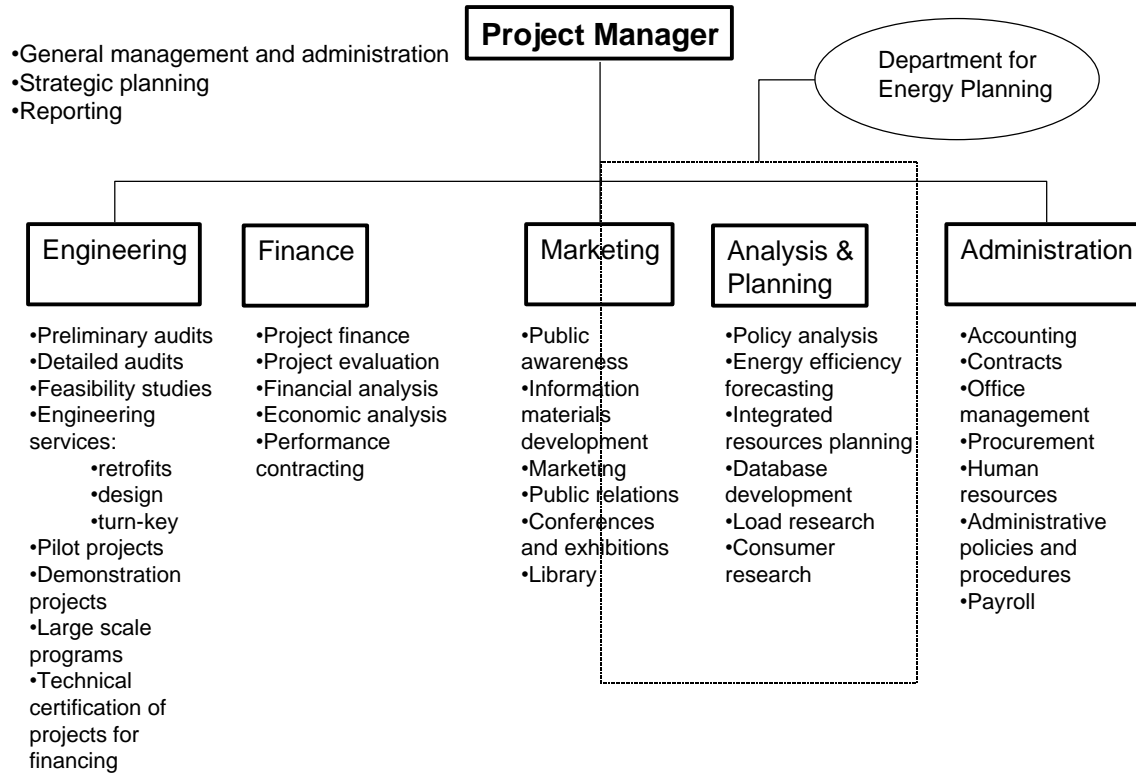
Years	Capacity after rehabilitation	Units to be added	Units to be withdrawn	Import from Syria
2000	Thermal:950 MW Hydro: 120 MW	- Gas turbine:150MW - Combined cycle units: only 300 MW out of 830MW operate on fuel oil due to transmission problems		1020 GWh
2002		- Combined cycle units: all the 830MW operate now on diesel oil - 400 MW, fuel oil	Jieh: 120 MW Zouk: 156 MW	2050 GWh
2005		Now the Combined cycle units operate on natural gas at full capacity: 830 MW		2050 GWh
2005-2020		Every five year add combined cycle operating on fuel oil		2050 GWh
2010			Jieh: 3x 65 MW	2050 GWh
2015			Zouk: 605 MW Hreiche: 70 MW	2050 GWh

**APPENDIX B BASE CASE DEMAND (IN THOUSAND GWH)**

Years ⇒	2000	2001	2002	2003	2004
TOTAL DEMAND	10.19	10.6	11.02	11.47	11.92
<b>4% Growth Demand (in Thousand GWH)</b>					
Years ⇒	2005	2010	2015	2020	
TOTAL DEMAND	12.4	15.09	18.36	22.33	

## ANNEX H

### Lebanese Center for Energy Conservation and Planning (LCECP) Functional Organization Chart



# ANNEX I

## Institutional Development Process of Lebanese Center for Energy Conservation and Planning (LCECP)

